A MANAGEMENT PLAN FOR MARRI RESERVE (28683) AND ARMSTRONG RESERVE (25229 and 40445) - DUNSBOROUGH

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Prepared by

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For the Shire of Busselton

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Common Acronyms and Abbreviations

AgWA	Agriculture Western Australia
CALM	Department of Conservation and Land Management
DCALC	Dunsborough Coast and Land Care Group
DEWCAP	Department of Environment Water and Catchment Protection
DRF	Declared Rare Flora
DEP	Department of Environmental Protection
DOLA	Department of Land Administration
EA	Environment Australia
FESA	Fire and Emergency Services Authority
GeoCatch	GeoCatch Network Centre (Geographe Catchment Council)
MRFG	Marri Reserve Friends Group
TIC Group	Toby Inlet Catchment Group

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Summary and Recommendations

Marri Reserve and the adjacent Armstrong Reserve are completely vegetated bushland reserves familiar to many as the bushland that straddles Naturaliste Terrace about 500 m northwest of the Dunsborough town centre, separating the townsite from the Old Dunsborough residential area. Marri and Armstrong Reserves are valued by the Shire of Busselton and the Dunsborough community for their environmental and landscape significance.

The Reserves have high regional conservation values. The dense *Melaleuca preissiana, M. raphiophylla* Woodland and the *Corymbia calophylla, Eucalyptus rudis, Melaleuca preissiana* Low Woodland found within Marri Reserve are the only remnants of these vegetation types, which have distributions restricted to the Dunsborough and Eagle Bay area, remaining on reserved lands (Keating and Trudgeon, 1986). In addition, they are the least disturbed and largest remaining remnants of this vegetation type, and they have high habitat value for native fauna due to the presence of water. The vegetation of the Reserves also includes Abba Ad and Abba AB vegetation communities (identified by Mattiske and Havel, 1998). Both of these vegetation communities are considered to be poorly represented (see White, 2002:8) as they have less than 30% of their original cover remaining. In the Geographe Bay catchment, less than 12% of the original cover of Abba AB vegetation remains, with 0% of this in conservation reserves, while less than 24% of the original cover of Abba Ad vegetation remains, with less than 1% of this in conservation reserves (Connell *et al.*, 2000:6). For this reason, the vegetation of both Reserves has high regional conservation value. Marri Reserve and Armstrong Reserve are home to the Western Ringtail Possum which is listed under the WA Wildlife Conservation Act (1950) Specially Protected Fauna Notice as 'Fauna that is rare or likely to become extinct', rated as 'Vulnerable'. The Quenda, which is listed as a 'Priority Species' by CALM (P4 - conservation dependent) is also present in Marri Reserve and possibly Armstrong Reserve. The presence of these species further increases the conservation value of the Reserves.

The aims of this management plan are to:

- To conserve, protect and enhance the biodiversity, ecology, and conservation values of the Marri and Armstrong Reserves for present and future Dunsborough residents and visitors to enjoy.
- To encourage community involvement in management of the Reserves.
- To raise community awareness of nature conservation and the protection of native flora and fauna.
- To encourage sustainable use of the Reserves, consistent with Reserves' regional conservation significance.

Marri Reserve (28683), which encompasses an area of 9.3 ha, is a 'C' class bushland reserve vested with the Shire of Busselton for the purpose of 'Community and Cultural Centre and Recreation' with the power to lease for 21 years. A small part of the southwestern corner of the Reserve has been developed for emergency services including a Fire Station and St. Johns Ambulance services.

Armstrong Reserve (25229), which encompasses and area of 3.51 ha, is a 'C' class bushland reserve vested with the Shire of Busselton for the purpose of 'Recreation' (figure 2). Armstrong Reserve is bisected by a narrow, linear reserve (40445) vested with the Shire of Busselton for the purpose of 'Drainage'. Three smaller community

purpose reserves are located in the southwestern corner of Armstrong Reserve: a Shire works depot site (Reserve 36468), the Country Women's Association Hall and rest room (Reserve 24962), and an old Bush Fire Brigade depot (now the SES depot – Reserve 34732).

Four main vegetation communities have been identified in the Reserves, containing a vascular native flora of at least 81 taxa from 28 families together with 106 introduced weed species. There has been no thorough, systematic survey of the vegetation and flora of either Reserve, so current information is fragmentary and incomplete. The vegetation of Marri Reserve is in very good condition, while Armstrong Reserve is in good to very good condition.

There has been no formal survey of the fauna of either Reserve to date. Western Ringtail Possums are occasionally sighted and Quenda diggings can be found in Marri Reserve. Rabbits and foxes are feral animals requiring control within the Reserves.

Marri and Armstrong Reserves are traversed by a natural watercourse and include several natural, seasonally inundated wetlands, and a number of channelised stormwater drains and stormwater detention basins. Marri and Armstrong Reserves play vital roles in the protection of areas downstream from flooding.

Marri and Armstrong Reserve do not attract many visitors looking for a nature-based experience because of the close proximity of the Meelup Park and the Leeuwin-Naturaliste National Park. Marri and Armstrong Reserve are used primarily by local residents to walk to the town centre and foreshore reserves.

Present and future management issues affecting Marri and Armstrong Reserve were identified through consultation with relevant agencies, interested groups and the Dunsborough community. Important issues facing the Reserves are:

- The degree of protection afforded to the Reserves by their current 'C' classification.
- Protection of native flora, and vegetation.
- Uncertainty about the status and extent of dieback disease within the Reserves.
- Potential impacts from the invasion of weeds.
- A lack of knowledge about the Reserves' fauna.
- Potential impacts from feral animals and domestic pets on the native flora and fauna.
- The need to use parts of the Reserves to protect areas downstream from flooding.
- Appropriate management of fire within the Reserves to protect life and property from the threat of wildfire whilst also maintaining and enhancing biodiversity.
- Uncontrolled and unmanaged access to the Reserves.

Because of their high regional conservation values, aesthetic appeal, and close proximity to the Dunsborough town centre, the Reserves are a valuable resource to the local community. The provision of interpretive signage and educative material aimed at raising community awareness and understanding of the Reserves' natural values to encourage sustainable use of the Reserves is an integral part of the management plan's conservation program.

In this management plan, specific management objectives and recommendations have been formulated to address the issues facing the Reserves, and to guide

implementation of the management plan. Many of the recommendations are very general to allow flexibility and choice in the way that they are implemented. Specific ideas and information for implementing the recommendations are detailed within the relevant sections of the management plan. Each recommendation has been assigned to at least one responsible authority. Any responsibility allocated to the Dunsborough Coast and Land Care Group (DCALC) or the Marri Reserve Friends Group (MRFG) is not a statutory obligation, rather it is intended to be a guide to the activities that the community can undertake together as a group. Priority is given to indicate the relative importance of each recommendation. Numerous recommendations require ongoing attention and should be continued for the life of the plan or until a review deems them unnecessary.

Recommendation	Responsibility	Priority
4.1a Investigate reclassifying the status of the Reserves to 'A' class to provide the Reserves with greater protection.	Shire of Busselton	High
4.1b Investigate changing the purpose of Marri Reserve from 'Community and Cultural Centre and Recreation' to 'Landscape Protection and Drainage' to ensure that the conservation significance of the Reserve is highlighted, while allowing necessary drainage and flood protection functions to continue.	Shire of Busselton	High
4.1c Investigate changing the purpose of Armstrong Reserve from 'Recreation' to 'Landscape Protection and Drainage' to ensure that the conservation significance of the Reserve is highlighted, while allowing necessary drainage and flood protection functions to continue.	Shire of Busselton	High
4.1d A formal request should be made to DOLA to alter the cadastral boundaries of the Busselton Shire works depot site (Reserve 36468) and the CWA Hall and rest room (Reserve 24962) to reflect the areas currently being used by these organisations.	Shire of Busselton	High
4.1e A formal request should be made to DOLA to amalgamate the area of Naturaliste Terrace Road Reserve no longer required for road widening into Marri Reserve (Reserve 28685).	Shire of Busselton	High
4.1f Formal names should be adopted for both Reserves. Community input should be sought as part of the formal naming process.	Shire of Busselton	High
4.2a A systematic survey of both Reserves' vegetation and flora should be undertaken as soon as possible and should accurately map the variation in vegetation types present in both Reserves.	Shire of Busselton and DCALC	High
4.2b Following a systematic vegetation survey, the recommendations of this plan should be reviewed to ensure that all management actions are prioritised to protect the areas with the highest conservation values.	Shire of Busselton	High
4.2c All due care should be taken to minimise disturbance to both the soil and native vegetation during any management activities within the Reserves.	All agencies involved in the management of the Reserve	High

Recommendation	Responsibility	Priority
4.2d A suitably accredited *Phytopthora cinnamomi* interpreter should be contracted to formally assess the pattern and extent of dieback disease caused by the fungus within the Reserves.	DCALC and the Shire of Busselton	High
4.2e Following a formal *Phytopthora cinnamomi* assessment, the recommendations of this management plan should be reviewed to ensure that all management actions prevent or limit the further spread of dieback disease within the Reserves.	Shire of Busselton	High
4.2f All management activities that involve soil disturbance should be planned to occur during the low rainfall months (November to March) when the soils are dry.	DCALC and the Shire of Busselton	High
4.2g All materials (including soils, brushing, mulch and plants) and machinery brought into the Reserve for any management activity must be free of the *Phytopthora cinnamomi* fungus.	MRFG and the Shire of Busselton	High
4.2h Appropriate dieback management procedures (see section 4.2.3) should be followed when planning or undertaking any management activities within the Reserves.	DCALC, MRFG and the Shire of Busselton	High
4.2i CALM should undertake surveys for the critically endangered Dunsborough Spider Orchid *Caladenia viridescens* and the endangered orchid *Caladenia exelsa* within the Reserves during the flowering season in 2003.	CALM	High
4.2j If any DRF or are identified within the Reserves, both the Shire of Busselton and the DCALC should be notified immediately.	CALM	High
4.2k If any DRF are located within the Reserves, any management activities that may impact on the DRF will need to be referred to both CALM and EA during the planning phase for the activity.	Shire of Busselton and the DCALC	High
4.2l Volunteer assistance to survey the Reserves for populations of DRF should be provided to CALM wherever possible.	DCALC and the MRFG	Medium
4.2m In Marri Reserve, areas around the detention basins and drains should be assisted to regenerate naturally.	MRFG	Low
4.2n In Armstrong Reserve, areas behind the CWA Hall and SES shed, and around the stormwater detention basin should be assisted to regenerate naturally.	MRFG	Low
4.2o The area of cleared ground around the Shire works depot in Armstrong Reserve will need to be rehabilitated using a combination of direct seeding and seedlings (tubestock). (see recommendations 4.2p and 4.2q).	MRFG	High
4.2p Only local provenance seed stock should be used for any revegetation or rehabilitation activities within the Reserves to maintain the genetic integrity and diversity of the Reserves' flora.	MRFG and the Shire of Busselton	High

Recommendation	Responsibility	Priority
4.2q All plants used for any revegetation or rehabilitation activities should be grown at a nursery accredited for *Phytopthora cinnamomi* (dieback disease) control.	MRFG and the Shire of Busselton	High
4.2r Prior to the collection of any native seed or any plant specimens, a license should be obtained from CALM.	MRFG and the Shire of Busselton	High
4.2s The Cape Naturaliste Regional Herbarium could be used to identify the flora of the Reserves.	MRFG	Low
4.2t A vouchered herbarium of the flora of the Reserves should be created as part of the Cape Naturaliste Regional Herbarium (see recommendation 4.2r).	MRFG	Low
4.2u Small, unobtrusive signs to identify common local plants species should be placed along the main walk tracks.	MRFG	Low
4.3a Priority for weed control should be given to any isolated patches of weeds and areas where weeds are surrounded by native vegetation – alongside the levee, drains and stormwater detention basins in Marri Reserve, and alongside the drains and stormwater detention basins in Armstrong Reserve.	DCALC, MRFG and the Shire of Busselton	High
4.3b Priority weeds for removal are: Dolichos pea *Dipogon lignosis,* Tagasate *Chamaecystis palmensis,* Sydney wattle *Acacia longifolia,* Black Wattle *Acacia melanoxylan,* Periwinkle Blue *Vinca major,* Black nightshade *Solanum nigrum,* Tangier pea *Lathyrus tingitamus,* Blue lupin *Lupinus consentini,* Arum lily *Zantedeschia aethiopica,* Freesia *Freesia* spp., Nasturtium *Tropaelum majus,* Wavy gladioli *Gladiolus undulatus,* Watsonia *Watsonia* spp., Pelargonium *Pelargonium* spp., Bridal creeper *Asparagus asparagoides,* and Veldt Grass *Ehrharta longiflora.*	DCALC, MRFG and the Shire of Busselton	High
4.3c Suitable measures to control weed within the Reserves include mechanical methods (mowing or slashing), hand removal, spot spraying, and herbicide wipe.	MRFG and the Shire of Busselton	High
4.3d For insurance purposes, the use of herbicides other than Roundup Biactive (Glyphosate) should only be undertaken by Shire of Busselton staff or suitably qualified and licensed contractors.	DCALC, MRFG and the Shire of Busselton	High
4.3e Broadscale weed spraying and burning should not be used to control weed species within the Reserves.	DCALC, MRFG and the Shire of Busselton	High
4.3f Weed control programs should be undertaken several times per year, and should occur before the weeds set seed.	DCALC, MRFG and the Shire of Busselton	High

Recommendation	Responsibility	Priority
4.3g An ongoing monitoring program focussing on disturbed areas, access tracks, drains and stormwater detention basins should be established to locate areas where weeds are invading and need attention, to identify new weeds, and to prioritise annual weed control efforts within the Reserves.	DCALC and the Shire of Busselton	High
4.3h Any weed control activity with the potential to impact on any DRF should be referred to CALM and EA for approval as necessary (see recommendations 4.2i, 4.2j and 4.2k).	DCALC and the Shire of Busselton	High
4.3i Community awareness of weed prevention and control, and the effects of fertiliser drift and dumping of garden waste within the Reserves should be raised through the provision of educative material.	DCALC	High
4.4a A suitably qualified fauna consultant should be contracted to assist the community to undertake a community based survey of the Reserves' native fauna.	DCALC and MRFG	High
4.4b Ongoing monitoring of the Reserves' fauna and birdlife should be undertaken using simple, non-intrusive survey methods.	MRFG	Low
4.4c Any new information gathered on the native fauna of the Reserves should be made available to the Shire of Busselton, CALM, and the general public at the Busselton Dunsborough Environment Centre.	DCALC and MRFG	High
4.4d Following a detailed fauna survey, the recommendations of this management plan should be reviewed to ensure that all management actions serve to protect or conserve the known populations of native fauna.	Shire of Busselton	High
4.4e Care should be taken to ensure that dead and decaying trees and hollow logs are not removed from the Reserves or impacted on by any management activities.	All agencies involved in management of the Reserves	High
4.4f Information on the importance of fauna habitat within the Reserves should be provided to the surrounding landholders.	DCALC and MRFG	Low
4.6a Any active rabbit warrens or fox dens identified within the Reserves should be fumigated using aluminium phosphide tablets (Phos-toxin). NB: As Phos-toxin is listed as an S7 poison, any person undertaking fumigation in the Reserves will need to have completed a Chem-Cert course in chemical handling.	DCALC, MRFG and the Shire of Busselton	High
4.6b Surrounding residents should be encouraged to contain their pets through the provision of information on the impacts of domestic pets on native flora and fauna in the Reserves.	DCALC and MRFG	Medium
4.6c Dog walking should be permitted on the main firebreak in Marri Reserve and along the main access tracks in Armstrong Reserve only, and dogs must remain on a leash.	Shire of Busselton	High

Recommendation	Responsibility	Priority
4.6a As part of the planning process, the Shire of Busselton should ensure that all new development guide plans include provisions for stormwater detention basins to detain all runoff onsite.	Shire of Busselton	High
4.6b If there is an unavoidable need to upgrade the stormwater detention capacity within the Reserves, the existing detention basin in Armstrong Reserve should be increased in size by digging out the area of degraded vegetation behind the Shire depot.	Shire of Busselton	High
4.6c The vegetation within Marri Reserve should not be disturbed to provide flood protection for areas downstream.	Shire of Busselton	High
4.6d The Shire of Busselton should closely monitor rehabilitation works along the degraded creek line upstream of Marri Reserve to ensure that satisfactory progress is being made towards achieving the recommendations made by the AgWA Land Conservation Officer.	Shire of Busselton	High
4.6e All stormwater detention basins within the Reserves should be planted with native riparian vegetation.	Shire of Busselton and DCALC	High
4.6f Eroding and incising drains within the Reserves should be stabilised by installing logs and rocks and planting native sedges along the toe of the bank without impeding flow within the drains.	Shire of Busselton and DCALC	High
4.6g Introduced weeds which are establishing in the channel of the drains should be removed and replaced with native riparian plants.	Shire of Busselton and DCALC	High
4.6h Headcutting at the confluence of the natural creek line and the drain along Naturaliste Terrace should be arrested by installing several small rock riffles in the base of the drain which should be designed to reduce the water slope without impeding the flow.	Shire of Busselton and DCALC	High
4.6i Where it enters Marri Reserve, the natural creek line should be realigned so that it flows alongside the firebreak rather than down the middle as it currently does.	Shire of Busselton and DCALC	High
4.6j The realigned creek line should be replanted with sedges to be salvaged from clearing works planned for Lot 74 (St Georges Aged Care Village on Alanta Elbow), and locally occurring tree and shrub species.	Shire of Busselton and DCALC	High
4.7a To protect Dunsborough town site residents from the threat of wildfire, controlled burns should be undertaken in both Reserves as soon as possible.	Shire of Busselton and Dunsborough Fire and Rescue Service	High
4.7b Existing firebreaks within the Reserves should be maintained to 3 m wide (to 5 m high) using equipment and techniques that minimise soil disturbance and do not widen or deepen the existing track.	Shire of Busselton	High

Recommendation	Responsibility	Priority
4.7c One new 3 m wide firebreak should be installed within Marri Reserve, running between Cape Naturaliste Road and Naturaliste Terrace. The firebreak should be installed as a formal, meandering, dual-use walking path, following the drier ridge line and avoiding seasonally wet areas (see recommendations 4.8c and figures 5 and 6).	Shire of Busselton	High
4.7d When planning the exact route of the new dual-use firebreak and path in Marri Reserve (prior to its installation), dieback disease surveys will be required (see recommendation 4.2d) and CALM will need to survey for DRF. Appropriate dieback disease hygiene procedures should be followed during the installation of the firebreak (see section 4.2.3)	Shire of Busselton	High
4.7e No further firebreaks should be installed within the Reserves.	Shire of Busselton and Dunsborough Fire and Rescue	High
4.7f To identify areas requiring controlled burns, fuel levels within the Reserves should be monitored annually.	Shire of Busselton	High
4.7g To maintain and enhance the Reserves' biodiversity, the controlled burn regime should vary the season and intensity of the burn (by using both spring and autumn burns) to achieve a mosaic of varying burn ages within the Reserves' vegetation. The period between controlled burns (fire frequency) should be as long as is possible (determined by regular monitoring of fuel levels within the Reserves – recommendation 4.7d).	Shire of Busselton and Dunsborough Fire and Rescue Service	High
4.7h Any prescribed burn plans for the Reserves must be referred to CALM for approval during the planning phase.	Shire of Busselton	High
4.7i In the event of any wildfire, CALM should be immediately notified.	Dunsborough Fire and Rescue Service	High
4.7j Local residents should be provided with FESA's 'Bushfire Survival Manual' to assist them to protect themselves from the threat of wildfires.	Shire of Busselton and DCALC	High
4.7k A community fire awareness course could be organised to assist the local residents to protect themselves from the threat of wildfires.	Shire of Busselton and DCALC	Medium
4.8a All vehicles except Shire, management and emergency vehicles should be prohibited within the Reserves.	Shire of Busselton	High
4.8b To effectively control access to the Reserves, non-locked, treated pine pole gates should be erected at all vehicle access points into the Reserves.	Shire of Busselton	Medium
4.8c The main access tracks through the Reserves should be formalised by hardening with raised, crushed limestone paths (see recommendation 4.2c).	Shire of Busselton and DCALC	Medium

Recommendation	Responsibility	Priority
4.8d To enhance the Reserves' aesthetic appeal, the Reserves' road boundaries should remain unfenced until a review of public use deems them necessary.	DCALC and the Shire of Busselton	High
4.8e The damaged ringlock and star picket fence along Gifford Road should be removed.	DCALC and the Shire of Busselton	Medium
4.8f The boundary between Armstrong Reserve and the residences on Cygnet Cove should be resurveyed (if necessary) and visibly marked. Landowners should then be encouraged to erect fencing along this boundary.	DCALC and the Shire of Busselton	High
4.9a Dog-walking should be allowed to continue along the main access tracks in Armstrong Reserve and the main firebreak in Marri Reserve only.	Shire of Busselton	High
4.9b Dogs must remain on a leash and droppings should be removed from the Reserves using the 'poo pouches' provided.	Dog owners	High
4.9c Camping should be prohibited within the Reserves.	Shire of Busselton	High
4.9d Amenities such as picnic tables, barbecues or toilets should not be provided within the Reserves.	DCALC and the Shire of Busselton	High
4.9e No new tracks or amenities (excepting the new dual-use path in Marri Reserve – recommendation 4.7c) should be provided within the Reserves until a review of visitor use deems them necessary.	DCALC and the Shire of Busselton	High
4.9f When planning the installation of any new tracks or amenities in the Reserves, dieback disease control will be need to be considered (see section 4.2.3 and recommendations 4.2f, 4.2g and 4.2h), and surveys for DRF will be needed.	Shire of Busselton and DCALC	High
4.9g The Shire of Busselton should investigate the possibility of installing play equipment for children in either Melaleuca Park or Redgum Place	The Shire of Busselton	Medium
4.9h A program should be established to monitor visitor use of the Reserves, particularly patterns of use and environmental impacts.	DCALC and the Shire of Busselton	Low
4.9i Several clean-up days should be organised to remove old litter and garden waste from the Reserves.	DCALC and MRFG	Medium
4.9j The Shire should provide rubbish bins and fortnightly rubbish collection at the start of the main walk tracks.	Shire of Busselton	High
4.9k Dog 'poo pouches' should be regularly supplied to a suitable post next to the rubbish bins.	MRFG and the Shire of Busselton	High
4.9l Regular, community 'clean up' days should be organised to remove litter from the road verges and alongside the main walk tracks.	MRFG	High
4.9m Interpretive signage should be used to inform visitors of the Reserves' regulations and conservation strategies.	DCALC and the Shire of Busselton	Medium

Recommendation	Responsibility	Priority
4.9n To avoid the proliferation of signs, all of the information that visitors require at each location should be posted on one eye-catching but simple, positively worded sign.	DCALC and the Shire of Busselton	High
4.9o Interpretive signage should be located at major access points to the Reserves, including the northwestern corner of Marri Reserve, at either end of the main walk track through Armstrong Reserve, and at other entry points as appropriate.	DCALC and the Shire of Busselton	Medium
4.9p Signage encouraging visitors to remove litter from the Reserves should be placed at each rubbish collection point.	DCALC and the Shire of Busselton	Medium
4.9q Signage prohibiting all vehicles except Shire and emergency vehicles should be placed at each management gate.	DCALC and the Shire of Busselton	Medium
4.10a The local community should be informed and educated about various impacts and threats to the Reserves, and what they can do to mitigate these threats, via the provision of educative leaflets and newsletters.	DCALC and MRFG	Medium
4.10b The local community should be informed about any potential threats to themselves or their pets from living in close proximity to the Reserve (including bushfire threats and weed and feral animal control programs), and what they can do to protect themselves.	DCALC and the Shire of Busselton	High
4.10c Interested local community members should be informed about the activities, achievements and success of the MRFG, and encouraged to participate in busy bees, social days and information days via the regular DCALC newsletter.	DCALC	High
4.10d The DCALC should actively encourage community participation in DCALC meetings and MRFG activities by placing notices in the local press.	DCALC	High
4.10e Schools, TAFE and universities should be encouraged to use the Reserves for projects that may improve awareness or understanding of the Reserves' natural features and conservation values, or research or monitoring projects that may assist to improve future management of the Reserves.	DCALC and the Shire of Busselton	Low
5.1a The DCALC should assist the Shire of Busselton to manage Marri and Armstrong Reserves by coordinating the activities of the MRFG within the Reserves consistent with this management plan.	DCALC	High
5.1b The MRFG should be formed as a subgroup of DCALC to undertake on-ground works within the Reserves.	DCALC	High
5.1c The DCALC should allow time at their regular meetings to plan the MRFG's activities and work towards achieving the objectives outlined in this plan by addressing the listed recommendations according to priority.	DCALC	High

Recommendation	Responsibility	Priority
5.1d A MRFG coordinator who is able to attend all DCALC meetings should be appointed to organise volunteers to undertake the work plans as coordinated by DCALC (see recommendation 5.1l).	DCALC	High
5.1e Minutes from the DCALC meetings detailing the MRFG's plans and activities should be made available to the Shire of Busselton, GeoCatch and CALM.	DCALC	High
5.1f One member of the DCALC should be designated to be responsible for informing the Shire, GeoCatch and CALM of the MRFG's activities, and be the point of contact within the group for these agencies.	DCALC	High
5.1g The Shire's Environmental Officer should be the first point of contact within the Shire for the DCALC, and should provide assistance and advice to the group as necessary.	Shire of Busselton	High
5.1h GeoCatch and CALM should nominate representatives who will be available to provide advice and assistance to the DCALC and MRFG as necessary.	GeoCatch and CALM	High
5.1i The DCALC should prepare a brief annual report listing the group's activities and successes or otherwise over the past twelve months to measure progress against the recommendations of this management plan.	DCALC	High
5.1j For insurance purposes, the DCALC will need to annually confirm in writing that the DCALC and MRFG accept the conditions of the Shire of Busselton's 'Friends of Reserves Strategy'.	DCALC	High
5.1k The MRFG should establish an accurate 'Volunteer Register' which must record the names and contact details of all volunteers attending work days or undertaking landcare activities within the Reserves.	MRFG	High
5.1l The Shire will need to be notified in writing of a list of volunteers (the MRFG membership) one of whom will always be onsite to direct activities as the MRFG Coordinator.	MRFG	High
5.2a The Busselton Shire should be notified well in advance of future projects and requests for funding and assistance so that the Shire can plan its budget accordingly. Ideally, DCALC should forward their work plans and future funding requirements to coincide with the Busselton Shire's annual budgets and 4 year plans.	DCALC	High
5.3a External funding opportunities should be actively sought to implement the recommendations of this management plan.	DCALC and the Shire of Busselton	High
5.4a The recommendations of this management plan should be reviewed as new information about dieback disease, native fauna populations, and rare and priority flora becomes available. If necessary, the recommendations should be amended to ensure that the Reserves' conservation values are protected.	Shire of Busselton	High
5.4b This management plan should be comprehensively reviewed within five years of its adoption by the Busselton Shire Council.	Shire of Busselton	High

1 Introduction

1.1 *Background*

Marri Reserve and the adjacent Armstrong Reserve are completely vegetated bushland reserves familiar to many as the bushland that straddles Naturaliste Terrace about 500 m northwest of the Dunsborough town centre, separating the townsite from the Old Dunsborough residential area. Marri and Armstrong Reserves are valued by the Shire of Busselton and the Dunsborough community for their environmental and landscape significance.

In November 1999, the Busselton Shire Council initially examined the potential conservation significance of the Marri Reserve and discussed a change of vesting and purpose to provide greater protection for the Reserve. The Council decided to defer its decision until it was determined that the Reserve contains flora of high conservation value capable of supporting a variety of fauna communities. As a result, in October 2002, the Shire of Busselton commissioned the preparation of this management plan for the Reserve, together with Armstrong Reserve. Specifically, the Shire requested that the management plan should highlight the conservation values of the Reserves, identify and examine present and future management considerations for the Reserves, and make prioritised recommendations for the future management of the Reserves.

As part of the planning process for this management plan, interested community members were invited to highlight issues affecting the Reserves and to provide opinions on the future management of the Reserves at a community consultation meeting held at the Dunsborough CWA Hall in March 2003. Interest in the meeting was sought through the local newspapers (GeoCatch Network News, the Busselton Margaret Times and the Busselton Dunsborough Mail) and through a number of the local community groups (including the Dunsborough Coast and Land Care Group - DCALC, the Toby Inlet Catchment Group – TIC Group, and the Meelup Park Management Committee). A focus of the meeting was also to spark community interest in the formation of a Marri Reserve Friends Group (MRFG) to assist in the future management of the Reserves

1.2 *Conservation Significance of the Reserves*

The dense *Melaleuca preissiana, M. raphiophylla* Woodland and the *Corymbia calophylla, Eucalyptus rudis, Melaleuca preissiana* Low Woodland found within Marri Reserve were identified by Keating and Trudgeon (1986) to be of high regional conservation value. They are the only remnants of these vegetation types, which have distributions restricted to the Dunsborough and Eagle Bay area, remaining on reserved lands (Keating and Trudgeon, 1986). In addition, they are the least disturbed and largest remaining remnants of this vegetation type, and they have high habitat value for native fauna due to the presence of water. For these reasons, Keating and Trudgeon (1986) recommended that the conservation value of Marri Reserve should be secured by upgrading the status of the reserve from ‘C’ class to ‘A’ Class, and changing the vesting purpose to ‘Conservation of Flora and Fauna’.

The vegetation of the Reserves also includes Abba Ad and Abba AB vegetation communities (identified by Mattiske and Havel, 1998). Both of these vegetation communities are considered to be poorly represented (see White, 2002:8) as they have less than 30% of their original cover remaining. In the Geographe Bay catchment, less than 12% of the original cover of Abba AB vegetation remains, with

0% of this in conservation reserves, while less than 24% of the original cover of Abba Ad vegetation remains, with less than 1% of this in conservation reserves (Connell *et al.*, 2000:6). For this reason, the vegetation of both Reserves has high regional conservation value.

Marri Reserve and Armstrong Reserve are home to the Western Ringtail Possum which is listed under the WA Wildlife Conservation Act (1950) Specially Protected Fauna Notice as 'Fauna that is rare or likely to become extinct', rated as 'Vulnerable'. The Quenda, which is listed as a 'Priority Species' by CALM (P4 - conservation dependent) is also present in Marri Reserve and possibly Armstrong Reserve. Both species are protected by the WA Wildlife Conservation Act (1950) and the Conservation and Land Management Act (1984) while the Western Ringtail Possum is also protected by the Commonwealth Environmental Protection and Biodiversity Conservation Act (1999). The presence of these species further increases the conservation value of the Reserves.

1.3 *Management Plan Aims*

The aims of this management plan are to:

- To conserve, protect and enhance the biodiversity, ecology, and conservation values of the Marri and Armstrong Reserves for present and future Dunsborough residents and visitors to enjoy.
- To encourage community involvement in management of the Reserves.
- To raise community awareness of nature conservation and the protection of native flora and fauna.
- To encourage sustainable use of the Reserves, consistent with Reserves' regional conservation significance.

1.4 *Focus and Scope of this Plan*

The Shire of Busselton funded this management plan to guide and assist the community, as the Marri Reserve Friends Group (MRFG) and the Dunsborough Coast and Land Care Group (DCALC), together with the Shire of Busselton to co-operatively manage Marri and Armstrong Reserves. Ultimate responsibility for management of the Reserves remains with the vesting body, the Shire of Busselton. However, this management plan seeks to encourage the community to assist the Shire to manage the Reserves by undertaking activities consistent with the recommendations of this management plan.

The focus of this management plan is to assist the MRFG and DCALC to co-ordinate community activities within the Reserves, and to provide a clear guide for the future management of the Reserves to both the Shire of Busselton and the community.

2 General Information

2.1 *Location of the Reserves*

Marri and Armstrong Reserves are located either side of Naturaliste Terrace, approximately 500 m northwest of the centre of the Dunsborough townsite (figure 1). Marri Reserve (28683) is bounded by Naturaliste Terrace to the northeast, Marri Drive to the south, Cape Naturaliste Road to the southwest and private property to the northwest. Marri Reserve encompasses an area of 9.3 hectares. Armstrong Reserve (25229) is bounded by Naturaliste Terrace to the southwest, Armstrong Street to the south, Gifford Road to the northeast and private property to the

northwest. Armstrong Reserve encompasses an area of 3.51 hectares which is bisected by drainage reserve 40445 (also included in this management plan).

2.2 *Vesting and Purpose*

Marri Reserve (28683) is a 'C' class bushland reserve vested with the Shire of Busselton for the purpose of 'Community and Cultural Centre and Recreation' with the power to lease for 21 years (figure 2). The reserve was originally vested for the purpose of recreation however the purpose was changed in 1984 to allow the potential development of the site for a community centre. A small part of the southwestern corner of the Reserve has been developed for emergency services including a Fire Station and St. Johns Ambulance services.

Armstrong Reserve (25229) is a 'C' class bushland reserve vested with the Shire of Busselton for the purpose of 'Recreation' (figure 2). Armstrong Reserve is bisected by a narrow, linear reserve (40445) vested with the Shire of Busselton for the purpose of 'Drainage' (figure 2). Three smaller community purpose reserves are located in the southwestern corner of Armstrong Reserve: a Shire works depot site (Reserve 36468), the Country Women's Association Hall and rest room (Reserve 24962), and an old Bush Fire Brigade depot (now the SES depot – Reserve 34732) (figure 2).

Neither reserve has been formally named. Both 'Marri Reserve' and 'Armstrong Reserve' are informal names used by the Busselton Shire and local residents to refer the reserves, and as such are the names used for the reserves in this plan. Several of Dunsborough's older residents know Marri Reserve as the 'Railway Reserve', although it is also not a formal name for the reserve.

2.3 *Catchment and Surrounding Land Uses*

The unnamed creek and drainage lines flowing through Marri and Armstrong Reserves discharge directly into the western end of Dunn Bay, southern Geographe Bay. Dunn Bay is a very shallow embayment which is bordered to the north by a dense, continuous seagrass meadow which, due to its fundamental ecological role in the productivity of this important fish nursery area, has been nominated for listing on the Register of the National Estate (SWASS, 1996).

Historically, the area surrounding the Reserves and the old Dunsborough townsite was mainly used for dairy farming. However, in the last two decades, the Dunsborough townsite has expanded very rapidly and the Reserves are now bordered on three sides by medium to high density residential developments. The creek and drainage lines through both Reserves now carry urban stormwater into Dunn Bay. To the west of Marri Reserve, the land remains undeveloped, although it is proposed for future residential development. Currently, the rural land upstream (west) of Marri Reserve is used for stock (mostly sheep) grazing and there is a small parcel of land that remains vegetated.

3 Description of the Reserves

3.1 *Landform, Soils and Topography*

Marri and Armstrong Reserves are located on the south-westernmost corner of the Swan Coastal Plain, which extends eastward from Dunsborough, along the coast of Geographe Bay northwards to Moore River, near Geraldton. The Swan Coastal Plain is a flat and gently undulating plain formed on Quarternary marine, alluvial (water borne) and aeolian (wind borne) sediments. The southern Swan Coastal Plain is

narrow, and in the Geographe Bay catchment, it extends around 10 - 15 km inland. To the west of the southern Swan Coastal Plain lies the Margaret River Plateau, more commonly known as the Leeuwin-Naturaliste Ridge or the Leeuwin Block. The Leeuwin Block is a raised horst which is separated from the Swan Coastal Plain by the Dunsborough Fault. The Leeuwin Block is composed of intensely deformed plutonic rocks, mainly granite and gneiss. The Reserves are located near the border between these two major landforms, very close to the Dunsborough Fault line.

The Reserves lie on the westernmost end of the Abba Plain land system, which is the major land system of the southern Swan Coastal Plain, lying inland of the narrower Quindalup Coast and Ludlow Plain land systems (Tille and Lantzke, 1990). A land system is defined as an area or groups of areas where the landform, geology, soils and vegetation types show similar, recurring patterns. The Abba Plain lies about 10-40 m above sea level, is about 10 km wide, and extends from about 5 to 15 km inland in the Geographe Bay catchment (figure 3). Two Abba Plain land units (of 11) are represented in the Reserves (Tille and Lantzke, 1990). They are:

- Abba Flats (A):
  Flats and low rises with sandy grey brown duplex (Abba) and gradational (Busselton) soils (present in both Marri and Armstrong Reserves).
- Abba Deep Sandy Dunes (Ad2):
  Gently sloping low dunes and rises (0-5% gradients) with deep bleached sands (present in Marri Reserve only).

The topography of the Reserves and the surrounding landscape is flat to gently undulating, with low rises and dunes interspersed with shallow, wetter depressions along the watercourses. Within the Reserves, *Melaleuca* woodlands occur in the shallow depressions and along the watercourses, while Banksia woodlands and Marri woodlands occur on the higher rises which surround the depressions.

3.2 *Vegetation and Flora*

The vegetation and flora of Marri Reserve has been informally examined by members of the TIC Group, the curators of the Naturaliste Herbarium, the Department of Conservation and Land Management (CALM) and a consulting botanist (Arthur Weston). Marri Reserve was also included in a formal survey of the vegetation of the coastal strip from Forrest Beach to Cape Naturaliste and Woodlands (near Cowaramup Bay) by Keating and Trudgeon (1986). There has been no survey of the native flora or vegetation undertaken in Armstrong Reserve. As a result, information about the Reserves' vegetation and flora is currently fragmentary and incomplete.

3.2.1 VEGETATION COMMUNITIES

Keating and Trudgeon (1986) recorded the presence of two vegetation communities within Marri Reserve. They are:

- *Melaleuca preissiana. M. raphiophylla* (Swamp Paperbark) Open Forest (S1 or MrMp1)

  This vegetation type is restricted to seasonal swamps and low lying areas of high soil moisture on cream-coloured to light-grey sandy soils. The paperbarks range in height from 6-12 m and are concentrated in the areas of highest soil moisture. Swamp Banksia (*Banksia littoralis*), Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata,* on the slightly higher ground) form a second tree stratum.

The understory is mid-dense and the occurrence of the four sided sword sedge *Lepidosperma tetraquetrum*, the tall sedge *Cyathochaeta clandestina* and the fern *Asplenum aff. flabellifolium* again indicate the high soil moisture of the area. Other prominent indicators of moisture include the shrubs *Boronia mollyae, Astartea fascicularis, Pteridium esculentum, Hibbertia perfoliata* and *Pimelia rosea* with the matted ground-covers *Aotus cordifolia* and *Empodisma gracillimum*.

This vegetation type occurs in swampy areas in the vicinity of the Dunsborough townsite and some of the moist depressions in the Eagle Bay area. Where it is not disturbed, this vegetation unit is encircled by *C. calophylla, E. rudis, M. preissiana* Low Woodland (S3 or MErMp1). The least disturbed occurrences of this vegetation type are in Marri Reserve and on privately owned land between Gifford and Naturaliste Road (possibly referring to Oceanbrook Estate and Armstrong Reserve). The occurrences in the Eagle Bay area are on cleared land where only the watercourse and its immediate vegetation have been retained. As much of this vegetation type has been reclaimed for residential development in the Dunsborough townsite, the regional conservation value of the Marri Reserve is very high. The habitat value and hence conservation value of this restricted vegetation type is further increased by the presence of water, an important resource for native fauna. (Keating and Trudgeon, 1986:133-135)

- *C. calophylla, E. rudis, M. priessiana* Low Woodland (S3 or MerMp1)

  This vegetation type occurs in low lying areas of Perth Basin (Swan Coastal Plain) sediments on very pale-brown to white-grey sandy soils. The mixed upper stratum (in which the white paperbark and clustered foliage of the *Melaleuca* is prominent) has a height range of 10 – 14 m. There is a lower tree stratum of *Banksia littoralis, B. grandis* and *Agonis flexuosa* with a height range of 3.5 – 9. Under these tree strata there is a dense and layered understory. Shrub species in the upper layer (1.8 – 3.5 m) of the understory include *Agonis linearifolia, Kunzea recurva, Astartea fascicularis, Homatospermum firmum, Oxylobium lanceolatum, Xanthorrhoea preissii* and juvenile *Melaleuca raphiophylla, M. preissiana,* and *M. thymoides.* The lower shrubs include *Eutaxia virgata, Macrozamia reidlei, Boronia dichotoma* and *Dampiera hederacea,* with sedges of *Lepidosperma angustatum* and herbs including *Anigozanthos rufus, A. manglesii, Thysanotus multiflorus* and *Johnstonia* (Hooded Lily) over the fern *Asplenium aff. flabellifolium*.

  This vegetation type only occurs in the Dunsborough townsite area, including Marri Reserve and private land between Gifford and Caves Roads. The main occurrence was continuous but has been dissected by Cape Naturaliste Road and residential developments. A significant portion of the remnants of this vegetation type lies within Marri Reserve, and as a result, this remnant is of high regional conservation value. (Keating and Trudgeon, 1986:135-136)

A consulting Botanist (Arthur Weston) who briefly examined Marri Reserve's vegetation in 1999 suggested that the vegetation was more complex and diverse than had been recorded by Keating and Trudgeon (1986), noting that they appeared to have not identified the *Banksia attenuata* component of the bushland which occurs in Marri Reserve (A. Weston, pers. comm. to Ron Glencross, dated August 31, 1999).

Both Reserves were also included in the area of broad scale vegetation mapping undertaken by Mattiske and Havel (1998) for the Regional Forests Agreement

process for CALM. The mapping, which identified vegetation types using a combination of aerial photo analysis and land system mapping, indicates that the Reserves contain two types of vegetation:

- Abba Ad
  Woodland of *Corymbia calophylla, Agonis flexuosa, Allocasuarina fraseriana, Nuytsia floribunda* on mild slopes in the humid zone. (Present in the western portion of Marri Reserve only).

- Abba AB
  Woodland and open forest of *Corymbia calophylla* on flats and low rises in the humid zone. (Present in Marri and Armstrong Reserves).

Both of these vegetation communities are considered to be poorly represented (see White, 2002:8) as they have less than 30% of their original cover remaining. The Environmental Protection Authority have suggested that 'the threshold level below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at a level of 30% of the pre-clearing extent of the vegetation type' (EPA, 2000:6). In the Geographe Bay catchment, less than 12% of the original cover of Abba AB vegetation remains, with 0% of this in conservation reserves, while less than 24% of the original cover of Abba Ad vegetation remains, with less than 1% of this in conservation reserves (Connell *et al.*, 2000:6).

While it is evident that the vegetation of both Reserves is more diverse than has been described by both Mattiske and Havel (1998) and Keating and Trudgeon (1986), the Abba AB and Abba Ad vegetation types both appear to be present in the Reserves. In addition, the vegetation types described by Keating and Trudgeon (1986) also appear to occur in Marri Reserve, and possibly Armstrong Reserve as well. There is also at least one further vegetation type represented in Marri Reserve (the *Banksia attenuata* Woodland referred to by A. Weston).

According to Tille and Lantzke (1990), both Reserves encompass the westernmost portion of the Abba Plain land system, and as a result, the vegetation of both Reserves can be considered to be representative of the Abba vegetation complex. Connell *et al.* (2000:7) indicate that only 7% of the original cover of all Abba Complex [Abba Plain] vegetation types currently remains within the Geographe Bay catchment, mostly on private lands. They indicated that less than 1% (0.03% or 33 ha) was (at the time of the report) set aside in conservation reserves (Connell *et al.*, 2000:7). Approximately 31 ha of Abba Complex vegetation types are currently conserved in Carbunup Reserve, and another 40 – 50 ha are set aside in Ambergate Reserve (both are vested with the Shire of Busselton for 'Conservation of Flora and Fauna'). Therefore, the total area of Abba Complex vegetation types currently conserved is more likely to be about 0.08% of the original extent of the vegetation types (pre-clearing).

Although current knowledge of the vegetation communities in both Reserves is not complete, it is likely that both Reserves have high regional conservation value, particularly Marri Reserve which, at 9.5 ha in area, would increase the area of Abba Complex vegetation types conserved within the Geographe Bay catchment by about 12.5%.

3.2.2 FLORA

The flora of Marri Reserve was recorded by members of the local TIC Group together with the curators of the Naturaliste Herbarium (Hazel Cole, Don Carter, Judy

Henderson, Sarah Comer, Pauline Clay and Brian Clay) on August 28, 1998, and again briefly on December 13, 2002. The surveys, which examined the vegetation in the southeast corner of Marri Reserve (to the north of the Fire Station and Ambulance Hall), identified a vascular native flora of 81 taxa from 28 families (B. Clay, pers. comm., 2003). It must be noted that this is unlikely to be an exhaustive flora list for Marri Reserve, rather it is a list of native species which are known to occur within the Reserve (Appendix 2) (Note: Some species identified by Keating and Trudgeon (1986) in Marri Reserve, see section 3.2.1, are not included on the TIC Group's flora list for the reserve). Further survey work is likely to reveal more taxa than have already been recorded. Families that were recorded to have the highest diversity of taxa are:

Papillionaceae (12 taxa)
Proteaceae (12 taxa)
Myrtaceae (10 taxa)
Haemodoraceae (6 taxa)
Mimosaceae (5 taxa)

3.2.3 SIGNIFICANT FLORA

A number of flora that were recorded in Marri Reserve by the TIC Group and the Cape Naturaliste Herbarium have been identified by Keighery *et. al.* (1996) to be of particular interest in Carbunup Reserve, also on the southern edge of the Swan Coastal Plain, because they are either uncommon, have restricted distributions, are at the limits of their range, represent outstanding records for the species, have not been previously recorded or are uncommon on the Swan Coastal plain, or have unusual or unique growth habits or forms. They are:

Johnsonia lupulina
Pentapeltis peltigera
Anigozanthos flavidus
Acacia divergens
Callistachys lanceolata

Keating and Trudgeon (1986) identified a further three species found in Marri Reserve to be significant species records for the area:

Geographically restricted species for which the record is outside of their usual range:
Acacia mooreana
Acacia semitrullata

The record represents an extension to the previously known range for the species:
Aotus cordifolia

During a brief examination of Marri Reserve in August 1999, Consulting Botanist Arthur Weston identified what he believed to be a species of *Leptomeria*, closely related to *L. Pauciflora* (identified in the Reserve by the TIC Group and the curators of the Cape Naturaliste Herbarium), which differed from all specimens of all *Leptomeria* species housed by the Western Australian Herbarium in South Perth (A. Weston, pers. comm. to Ron Glencross, dated August 31, 1999).

3.2.4 RARE AND PRIORITY FLORA

Whilst no rare or priority flora have been positively identified within either Reserve, there has been unconfirmed sightings of one orchid species, the critically endangered Dunsborough Spider Orchid *Caladenia viridescens,* which is gazetted as Declared Rare Flora (DRF). DRF are specially protected by the Western Australian Wildlife Conservation Act (1950), the Conservation and Land Management Act (1984) and the Federal Environment Protection and Biodiversity Conservation Act (1999). The Dunsborough Spider Orchid was last sighted within the area now occupied by the Fire Station and Ambulance Hall in Marri Reserve, approximately seven years ago (around 1996) (M. Winchcombe, pers. comm., 2003). The Dunsborough Spider Orchid is known to occur at several locations nearby Marri Reserve (M. Spencer, CALM, pers. comm., 2003). CALM has identified Marri Reserve as suitable habitat for both the critically endangered Dunsborough Spider Orchid and the endangered orchid *Caladenia excelsa* (also DRF). Surveys for these orchids are planned to occur during the flowering season in 2003 (M. Spencer, CALM, pers. comm., 2003).

Although there is no rare or priority flora currently known to occur in either Reserve, it must be noted that there have been no systematic, thorough surveys of the flora of either Reserve. Because of the pristine nature of much of Marri Reserve, further survey work may reveal the presence of DRF or other priority flora.

3.2.5 VEGETATION CONDITION

The vegetation of the Marri Reserve is in very good condition (using the vegetation condition criteria identified by White, 2002 – see figure 4). Weed invasion into the bushland is low, and is limited to a narrow band along the perimeters and alongside the firebreak, drains, detention basins and flood protection levee. There are several small areas which appear to be affected by dieback disease (alongside Cape Naturaliste Road and the firebreak), where there has been selective loss of susceptible species (*Banksia* species, pea family, *Xanthorrohoea* and *Macrozamia* species). Some residents along Marri Drive and Alanta Elbow use the perimeter of the Reserve to dump garden refuse.

The vegetation of Armstrong Reserve is in very good condition, with areas adjacent to the drain and detention basin, the Shire Depot, CWA Hall carpark, Gifford Road and Armstrong Place in good condition (using the vegetation condition criteria of White, 2002 – see figure 4). Disturbance to the natural flow of water through this area, particularly the *Melaleuca* Low Woodland on the northwestern side of the Reserve, is associated with the drainage line which was a natural streamline that has been artificially deepened and channelised to accommodate stormwater flows from the surrounding urban areas. A C shaped stormwater detention basin has been constructed in the bush along the drainage line also. Disturbance along the access tracks, particularly areas where the soil has been disturbed and piled in mounds as a result of clearing by a bobcat, creates an ideal situation for the establishment and invasion of weeds. Currently, weed invasion into the bushland is low, with weeds confined to a narrow band along the perimeter of the Reserve, alongside the drain and stormwater detention basin, and alongside the main access track. Other disturbances are related to the incursion of the Shire Depot and the CWA Hall carpark into the Reserve, and the dumping of garden refuse along Armstrong Place and behind Cygnet Cove.

3.2.6 ENVIRONMENTAL WEEDS

A total of 106 introduced environmental weeds (48 monocotyledons, and 58 dicotyledons) were recorded in both Reserves in November 2002 (Glencross, 2002 – see Appendix 3). Of these, only one species (Arum lily *Zantedeschia aethiopica*) is a plant which has been declared by the Agriculture Protection Board under the Agriculture and Related Resources Protection Act (1986), while none are listed as pest plants by the Shire of Busselton under the same Act. If a plant is a declared plant, landowners are obliged to control that plant on their properties, while Shire Councils are authorised to enforce control of any listed pest plants within the boundaries of their Shire.

Because the vegetation of both Reserves is generally in very good condition, weeds are confined to the disturbed areas of the Reserves, including narrow bands along the Reserve's perimeters, firebreaks, access tracks, drains and stormwater basins. In addition, there is one isolated patch of Kikuyu Grass *Pennisetum clandestinum* within the dense vegetation of the *Melaleuca* Woodland in Marri Reserve which appears to be a remnant from an illegal Cannabis crop.

3.2.7 DIEBACK DISEASE CAUSED BY *PHYTOPTHORA CINNAMOMI*

There has been no formal interpretation or mapping of the pattern or extent of dieback disease caused by the introduced fungus *Phytopthora cinnamomi* within either Reserve to date (M. Spencer, CALM, pers. comm., 2003). There are small areas of dead and dying *Banksia* species, pea family, *Xanthorrohoea* and *Macrozamia* species in Marri Reserve, along Cape Naturaliste Road near the Fire Station, and along the firebreak at the northwestern end of the Reserve. It is possible that these deaths were caused by *P. cinnamomi*.

3.3 *Fauna*

3.3.1 NATIVE FAUNA

There has been no systematic research on, or trapping of, the fauna within either Reserve to date. Both Marri and Armstrong Reserves are within the species distribution ranges of several fauna which, although not positively recorded within the Reserves, are highly likely to be present based on the existing habitat within the Reserve (G. Voigt, CALM, pers. comm., 2003). They are:

Western ringtail possum (*Pseudocheirus occidentalis*)
Brushtail possum (*Trichosurus vulpecula*)
Brush-tailed phascogale (*Phascogale tapoatafa*)
Western grey pygmy-possum (*Cercartetus concinnus*)
Bush rat (*Rattus fucipes*)
Quenda or Southern Brown Bandicoot (*Isoodon obesulus*)
Dugite Snake (*Psuedonaja affinis*)
Western Tiger Snake (*Notechis scutatus*)
Common Bobtail Lizard (*Tiliqua rugosa*)
King's Skink (*Egernia kingii*)
Sandswimming Skinks (*Lerista spp.*)

It is possible (although less likely) that several uncommon fauna may also be present within the Reserve (G. Voigt, CALM, pers. comm., 2003). They are:

Chuditch (*Dasyurus geoffroii*)

Honey possum (*Tarsipes rostratus*)
Dunnarts (*Smithopsis* species)
Quokka (*Setonix brachyurus*)

Western Ringtail Possums and Brushtail Possums are occasionally sighted by local residents, and infrequently they are killed by passing traffic on the roads adjacent to the Reserve. Quenda diggings can be observed within the Marri and Banksia Woodland vegetation of Marri Reserve.

All native fauna is protected by the WA Wildlife Conservation Act (1950) and the Conservation and Land Management Act (1984), while gazetted rare fauna (those fauna listed under the WA Wildlife Conservation Act's Specially Protected Fauna Notice) are also afforded protection by the Commonwealth Environmental Protection and Biodiversity Conservation Act (1999). The Western Ringtail Possum, the Chuditch and the Quokka are listed under Schedule 1 of the WA Specially Protected Fauna Notice as 'Fauna that is rare or likely to become extinct'. All three are rated as 'Vulnerable'. In addition, the Brush-tailed Phascogale and the Quenda are listed as 'Priority Species' by CALM (P3 – taxa with poorly known populations, and P4 - conservation dependent taxa respectively).

3.3.2 INTRODUCED FAUNA

Introduced fauna that are likely to occur in the Reserves include:

Rabbits
European rats
House mice
Domestic pets

Because of the mainly urban surrounds, foxes are unlikely to be present in the Reserves.

3.4 *Watercourses, drainage and detention basins*

Marri and Armstrong Reserves are traversed by a natural watercourse (a seasonal creek) and contain seasonal *Melaleuca* damplands in the lower lying areas of the Reserves (figure 5). In addition, parts of both Reserves play vital flood protection roles for residential areas downstream through the drainage and detention of some of Dunsborough's urban stormwater (figure 5).

The unnamed creek has a small catchment, with its headwaters located approximately 1 km upstream of the Reserves on the northern side of Caves Road. From its headwaters, the creek runs through a cleared paddock, some of which is currently being subdivided for a medium density residential development, then through a small area of privately owned remnant vegetation, and into Marri Reserve, Armstrong Reserve and then via underground pipes, into Geographe Bay. The condition of the natural creek line in Marri Reserve is in excellent condition, excepting the point where the creek enters the Reserve at Cape Naturaliste Road, and at the confluence of the creek and the drain along Naturaliste Terrace. The headwaters of the creek (where it runs through the cleared paddock) is extremely degraded and with no native vegetation remaining, it is experiencing serious soil erosion. In places, the creek is about 8 m wide and 5 m deep whereas downstream, in Marri Reserve, the channel of the same creek is about 50 cm wide and 25 cm deep. The bulk of the

soil which has been eroded from the paddock has moved downstream as a visible 'sand slug' which is now smothering understory vegetation in the remnant of bush on private land upstream of Marri Reserve (visible on figure 2). This creek flows into Marri Reserve via a low capacity culvert under Cape Naturaliste Road (the 'small culvert' on figure 5) which discharges into Marri Reserve at the western end of the firebreak. The creek flows for about 50 m along the firebreak before entering the vegetation and its natural channel again. There is an area of deep, soft sands derived from upstream erosion being deposited along the start of the firebreak and this, combined with the lack native vegetation along the firebreak, makes it difficult to discern the channel of the creek through this area.

It appears that the entire 'sand slug' has not moved downstream into Marri Reserve because the small diameter of the culvert under Cape Naturaliste Road seems to cause the water flow to be slowed upstream of the road, allowing the majority of the sediment to settle in the vegetation there. It appears that the water then runs in a northerly direction through the bush remnant into the adjacent paddock (on the northern side) where it is then flows under Cape Naturaliste Road via a much larger diameter culvert (the 'large culvert' on figure 5). The water exiting the large culvert then flows through an area of bush earmarked for residential development (Lot 74 an figure 5) to join the creek which flows down the firebreak from Cape Naturaliste Road approximately 50 m downstream of the road (figure 5). As part of the Shire approvals for development of the St Georges Aged Care Village on Alanta Elbow (Lot 74), approval was granted to divert the flow of the creek through stormwater pipes next to Cape Naturaliste Road in Reserve 46465. These works, which have not yet been undertaken, will see the stormwater discharge from a pipe at the northwestern corner of Marri Reserve.

There are a number of channelised stormwater drains and stormwater detention basins in each Reserve (figure 5). In Marri Reserve, there is a small stormwater detention basin in the northern corner, adjacent to Newberry Street. The basin, which was installed about 5 years ago, detains stormwater flows coming from the adjacent subdivision (Alanta Elbow), which then flows in a drain located next to Naturaliste Terrace to a second artificial stormwater detention basin, installed in 2000, located on the corner of Naturaliste Terrace and Marri Drive. A second drain, which takes stormwater from the subdivision on the southerly side of Marri Reserve (Hakea Way and Marri Drive), runs from the Ambulance Hall east along Marri Drive and then veers into the bushland to discharge into a natural seasonal wetland. Sheet flow from this natural wetland area then discharges into the stormwater detention basin located on the corner of Naturaliste Terrace and Marri Drive. During a heavy rainfall event in 1990, a levee bank was installed into the centre of Marri Reserve, across the natural creek line, to protect downstream areas from flooding. The levee slows the flow of water downstream through the use of a small diameter culvert on the natural creek line, which also discharges into the drain along Naturaliste Terrace. The confluence of the creek line and the drain is eroding severely, with headcutting up to 1.7 m currently occurring. The drain has very vertical banks and the bed of the drain is incising because the shoulders of the drain are well vegetated, and as a result, the banks are slumping in several places. While there is some natural revegetation occurring along the shoulder and banks of the drain, many of the species are introduced weeds, predominantly *Juncus microcephalus*, *J. capitatus* and *Isolepis prolifera*. The stormwater detention basin located near Newberry Street is densely vegetated with some native sedges, including *Juncus pallidus*, and the introduced weed species *J. microcephalus* and *J. capitatus*

Stormwater detained within the basin on the corner of Marri Drive and Naturaliste Terrace (Marri Reserve) discharges via several small culverts under Naturaliste Terrace into what was formerly the natural creek line through Armstrong Reserve. The creek was channelised and straightened about 10 years ago and now it drains the stormwater into an artificial C-shaped stormwater detention basin installed behind the Shire Depot around the same time. From the detention basin, stormwater is carried via the remnant of the natural streamline to another drain which runs along the edge of Armstrong Reserve, adjacent to Gifford Road. This drain takes stormwater from Gifford Road and the adjacent subdivisions to a culvert under Gifford Road, from where it is piped directly to the shore of Geographe Bay. The condition of the drain upstream of the stormwater detention basin is good, and it has been naturally recolonised mostly by native sedge species, although there are some introduced weeds, particularly along the track which runs on the top of the spoil heap created by the construction of the drain. The banks of the stormwater detention basin have been replanted with a number of native tree and shrub species however there is only sparse stands of native sedges. The drain along Gifford Road contains several native sedges and tree species however there is a considerable infestation of the introduced sedges *Juncus microcephalus* and *J. capitatus*.

3.5 *Firebreaks and Access Tracks*

Both Marri Reserve and Armstrong Reserve have strategic firebreaks located along their northwestern boundaries where residential developments abut the Reserves (figure 6). There are no other firebreaks in Armstrong Reserve, and many of the local residents regularly use the existing firebreak as a walk path between Naturaliste Terrace and Gifford Road. In Marri Reserve, there is also a firebreak around the emergency services buildings (figure 6). The firebreaks, which are maintained by the Shire of Busselton, were last cleared in 2002. There are no major areas of erosion, however the soil has been disturbed and piled in mounds along the edges of the firebreaks, particularly in Armstrong Reserve, as result of clearing with a bobcat.

In addition to strategic firebreaks, in Armstrong Reserve there are a number of other tracks that are infrequently used as walking paths by the local community (figure 6). Two of these small, single file paths follow the drains through the Reserve from the Shire Depot carpark to Gifford Road. There is a small single file, winding path through the corner of the Reserve, from the CWA Hall carpark to Armstrong Place, which links up to a public walkway to the foreshore reserve. This track is frequently used. There is no vehicle access through the Reserve and, although cars could enter the firebreak off Naturaliste Terrace, none appear to do so.

There is only one point where vehicles can gain access to Marri Reserve, at the Naturaliste Terrace end of the firebreak, however there is no access through to Cape Naturaliste Road at the other end of this firebreak (figure 5). Vehicles and pedestrians are able to gain access to the centre of Marri Reserve via a flood protection levee built off the main firebreak, which slows the passage of floodwaters down a natural streamline by the use of a culvert. It appears that vehicles use this levee and the firebreak very infrequently.

3.6 *Fencing*

Pine-pole and cyclone wire fencing has been erected along the boundary between the private properties on Alanta Elbow and Marri Reserve, and there is a ringlock and starpicket fence at the rear of the emergency services buildings (figure 5). The remainder of Marri Reserve is unfenced. There is a ringlock and starpicket fence along the Gifford Road boundary of Armstrong Reserve, and there is a tall cyclone

wire fence between the Shire Depot and the Reserve (Figure 5). Few of the landowners along Cygnet Cove have erected fences along their boundaries with Armstrong Reserve, and all other boundaries of the Reserve are unfenced.

3.7 *Fire History*

Little is known about the fire history of either Reserve. Anecdotal evidence suggests both reserves have had a fire as recent as 1996. There are burn scars evident on trees in both Reserves, including high up on tall *Melaleuca* trees in Marri Reserve.

3.8 *Current Recreational and Educational Uses*

Currently, there are no recreational or educational facilities provided within either Reserve, and there are no school or university groups that use the Reserves as a study site. As both Reserves are heavily vegetated, they are not used for recreational bushwalking. Currently, the firebreak and walk path that runs between Naturaliste Terrace and Gifford Road, and the small path that links the CWA Hall car park and Armstrong Place (both in Armstrong Reserve) are the only paths that are regularly used by Dunsborough residents and visitors. Local children also use the firebreak in Armstrong Reserve and the surrounding bush to play in.

3.9 *Other Uses*

Some local residents use the firebreaks of both Reserves to exercise their dogs. There are remnants, mostly rubbish like broken chairs and beer bottles, of squatters camps within the Reserves. Neighbouring residents use the perimeters of both Reserves to dump garden refuse.

3.10 *History*

3.10.1 ABORIGINAL HERITAGE

The Aboriginal heritage of the Dunsborough townsite has not been investigated to date. Traditionally, the Aboriginal people of the south-west were part of a cultural bloc distinguished by their initiation practices, which consisted of nasal septum piercing and scarring of the upper body rather than circumcision, which was practiced by their northern and inland neighbours (Bates, 1985). This cultural bloc has come to be known as Nyungar, however, prior to settlement these people recognised themselves and their culture as *Bibbulmun* (Bates, 1985). The Bibbulmun people occupied all of the land to the west of a line drawn roughly from Jurien Bay on the west coast to Esperance on the south coast (Bates, 1985). Within the Bibbulmun, there were around 13 tribes that were distinguished by linguistic differences. The Bibbulmun people who occupied the coastal areas from Bunbury to Augusta called themselves, and were called by their inland neighbours, *Waddarndi Bibbulmun* (Bates, 1985).

The Wardandi Bibbulmun (current spelling) migrated seasonally from the coastal plain to Nannup, Augusta and areas between, to exploit various food resources as they became abundant each year. Many of the tracks used by the Bibbulmun people were used by the early settlers to explore the land, and eventually to create roads. Many of these early roads still follow similar alignments, and often link areas of traditional importance, such as Busselton (known as *Yoonberup*), Augusta (*Talanup*) and Dunsborough (*Quedjinup*) (Collard, 1994). Quedjinup and the Yallingup Caves (*Ngilgi* Cave) were important places to the Wardandi Nyungars, providing good hunting and food gathering areas.

On May 31st, 1801, the French corvettes *Le Geographe* and *Le Naturaliste* (Baudin's Expedition) anchored off Dunsborough and observed smoke from Aboriginal fires.

When a party went ashore at Wonnerup four days later, they found well used Nyungar walking tracks and established camp grounds where fires were freshly made (Baudin, cited in Collard, 1994). Descendants of the local Wardandi Aboriginals claim that the coastal walking path that links Dunsborough and Eagle Bay in the Meelup Regional Park is a traditional Aboriginal walk pad (Vilma Webb, pers. comm., 2001). As a result, it is possible that both Reserves were used by the traditional Wardandi Nyungars.

The Indigenous Affairs Department's Sites Registry lists no Aboriginal heritage sites within either Reserve or the immediate surrounds. However, sites may exist that have not yet been recorded or entered onto the register. The Aboriginal Heritage Act (1972) protects all Aboriginal heritage sites in Western Australia, whether they are known to the department or not. If any future development of either Reserve is planned, particularly the addition of amenities such as car parks or toilet blocks (which are not recommended in this plan), or works along watercourses (which are recommended in this plan), consultations with appropriate Aboriginal community representatives and archaeological surveys are a requirement of the Aboriginal Heritage Act (1972).

3.10.2 EUROPEAN HISTORY

Marri reserve was first gazetted as a recreation reserve in 1967. Rumours started by the local butcher at the time led the Dunsborough residents to believe that the reserve was set aside for a railway station as it was planned (the butcher said...) that the railway line was to be extended from the old Quindalup jetty to the Dunsborough townsite (Mrs. J. Smith, pers. comm., 2003). Hence, many of Dunsborough's older residents know Marri Reserve as the Railway Reserve. In 1984, the purpose of the reserve was changed to 'Community and Cultural Centre and Recreation' to allow for community buildings to be established on the site.

4 Management Issues and Strategies

Management issues affecting Marri and Armstrong Reserves were identified through consultation with relevant agencies (Busselton Shire, GeoCatch, CALM, AgWA), interested groups (TIC Group, DCALC, Meelup Park Management Committee), and members of the local community. In this section of the plan, objectives have been formulated to guide the management of specific issues, which are highlighted. A number of recommendations have been developed to address these issues, and to assist and guide the implementation of the management plan (section 5).

The recommendations are prioritised as either high, medium or low to indicate the relative importance of each recommendation. Many of the recommendations require ongoing action which should be continued until review deems them unnecessary. Other recommendations address issues in an interim manner only, as current information is insufficient for adequate management, particularly knowledge of the vegetation and flora, extent of dieback and native fauna populations. Review of some of the recommendations will be necessary as further information becomes available. Many of the recommendations are very general to allow flexibility and choice in the way that they are implemented. Specific ideas and information to guide and assist implementation of the recommendations have been included in the text of the management plan.

Responsibility for the implementation of each recommendation has been assigned to al least one group or agency. Any responsibility allocated to the MRFG or DCALC is not a statutory obligation, rather it is a guide to activities that the MRFG, DCALC and

the local community can undertake. The Shire of Busselton may provide assistance with most of these activities.

4.1 *Vesting and Purpose*

4.1.1 OBJECTIVE

- To ensure that the vesting and purpose of both Reserves provides adequate protection for and reflects the regional conservation value of the Reserves.

4.1.2 PROTECTION AFFORDED BY VESTING AND PURPOSE

Currently, Marri Reserve (28685) is vested with the Shire of Busselton as a 'C' class Reserve for the purpose of 'Community and Cultural Centre and Recreation'. Armstrong Reserve (25229, including drainage reserve 40445) is a 'C' class reserve vested with the Shire of Busselton for the Purpose of 'Recreation'. The level of protection afforded to the Reserves by their current 'C' classification is probably inadequate, given both of the Reserve's regional conservation values. Under the Land Act (1933), only Ministerial approval is necessary to alter the vesting and purpose of 'C' Class land. Reclassifying the Reserves to 'A' Class will afford the Reserves greater protection. To reclassify both Reserves to 'A' Class, which would reflect the Reserves' regional conservation values, the approval of both houses of Parliament will be necessary.

At present, the purpose of Marri Reserve is 'Community and Cultural Centre and Recreation', and Armstrong Reserve is 'Recreation' which also does not adequately reflect the regional conservation values of the Reserves. Additionally, because the Community and Cultural Centre has now been built in Dunsborough Lakes, Marri Reserve is no longer needed for this purpose. Due to the high regional conservation value of the Reserve's vegetation communities, its native fauna, and the community's desire to see both Reserves conserved in their current state in perpetuity, the most appropriate purpose for the Reserves would be 'Conservation of Flora and Fauna'. However, both Reserves play vitally important functions in flood protection for residential areas downstream of the Reserves and Flood Protection Measures (FPM) are of primary importance to public safety and property protection. As there are no other means by which this flood protection can be achieved, the existing drainage and flood protection functions must be allowed to continue. As a result, it is suggested that the purpose of the Reserves be changed to 'Landscape Protection and Drainage'.

A small part of the southwestern corner of Marri Reserve has been developed for emergency services including a Fire Station and St. Johns Ambulance services. It is noted by the Shire that there is a possible need for an additional area to be set aside for SES facilities (max 2000m^2) within this reserve .

Recommendation	Responsibility	Priority
4.1a Investigate reclassifying the status of the Reserves as 'A' class to provide the Reserves with greater protection.	Shire of Busselton	High
4.1b Investigate changing the purpose of Marri Reserve from 'Community and Cultural Centre and Recreation' to 'Landscape Protection and Drainage' to ensure that the conservation significance of the Reserve is highlighted, while	Shire of Busselton	High

Recommendation	Responsibility	Priority
allowing necessary drainage and flood protection functions to continue.		
4.1c Investigate changing the purpose of Armstrong Reserve from 'Recreation' to 'Landscape Protection and Drainage' to ensure that the conservation significance of the Reserve is highlighted, while allowing necessary drainage and flood protection functions to continue.	Shire of Busselton	High

4.1.3 RATIONALISING ADJACENT RESERVES

Three small community purpose reserves are located in the southwestern corner of Armstrong Reserve. These are: a Busselton Shire works depot site (Reserve 36468), the Country Women's Association Hall and rest room (Reserve 24962), and an old Bush Fire Brigade depot, which is now being used by the SES (Reserve 34732) (figure 2). Both the Shire of Busselton and the CWA Hall users are currently using parts of Armstrong Reserve for charity bins, a stockpile area, and car parking. There is no alternative location for the works depot site or charity bins within the Dunsborough town site, and the car parking facilities at the CWA Hall are frequently used by a number of community groups that use the CWA hall. As a result, the area of Armstrong Reserve currently being used by the Busselton Shire and the CWA Hall users should be officially added to the areas already reserved for these purposes.

There is a corridor of bushland on the northeastern side of Marri Reserve which is currently vested with the Shire of Busselton as part of the Naturaliste Terrace road reserve (figure 2). This strip of land, which contains the stormwater detention basins and drain, will no longer be required for the purpose of widening Naturaliste Terrace because Cape Naturaliste Road, on the other side of Marri Reserve, has been developed as the main feeder road through this area. This vegetation, which has been previously disturbed by the construction of the stormwater drain, acts as an important buffer to the Reserve, protecting pristine vegetation from litter and common roadside weeds. As a result, the area no longer required for a road reserve should be permanently amalgamated into Marri Reserve.

Recommendation	Responsibility	Priority
4.1d A formal request should be made to DOLA to alter the cadastral boundaries of the Busselton Shire works depot site (Reserve 36468) and the CWA Hall and rest room (Reserve 24962) to reflect the areas currently being used by these organisations.	Shire of Busselton	High
4.1e A formal request should be made to DOLA to amalgamate the area of Naturaliste Terrace Road Reserve no longer required for road widening into Marri Reserve (Reserve 28685).	Shire of Busselton	High

4.1.4 FORMAL NAMING OF THE RESERVES

Neither Reserve has been formally named and both are known by several different names. As many Dunsborough community members are unaware that either parcel of bush is indeed a Shire reserve, formal naming may help to raise their public profile. Community input should be sought as part of the formal naming process.

Recommendation	Responsibility	Priority
4.1f Formal names should be adopted for both Reserves. Community input should be sought as part of the formal naming process.	Shire of Busselton	High

4.2 *Protection and Rehabilitation of Native Vegetation*

4.2.1 OBJECTIVES

- To conserve and protect the native flora and vegetation communities within the Reserves.
- To protect rare and priority flora and vegetation communities.
- To enhance community awareness of the Reserves' flora and vegetation communities.

4.2.2 CONSERVATION AND PROTECTION OF NATIVE FLORA AND VEGETATION COMMUNITIES

Prior to settlement, Banksia, Marri, and Marri/Jarrah (*Banksia* sp., *Eucalyptus calophylla* and *E. marginata*) dominated woodlands and forests were widespread on the eastern side of the southern Swan Coastal Plain (the Abba Plain, figure 3). However, the extent of remnant vegetation remaining on the Swan Coastal Plain has declined significantly due to clearing for grazing and agriculture. Within the Geographe Bay catchment, it has been estimated that less than 7% of the original area of Abba Plain vegetation communities remains (mostly located on private land) and less than 1% is reserved for conservation (Connell *et al.* 2000:7). Marri and Armstrong Reserve, at a combined total of 13 ha, if conserved in perpetuity, would increase the area of Abba Plain vegetation communities in conservation reserves by about 15% (see section 3.2.1).

The exact type and extent of vegetation communities in the Reserves has never been systematically and thoroughly studied, and as a result, information about the Reserves' vegetation and flora is fragmentary and incomplete. Currently, the available information indicates that several of the Reserves' vegetation units are unique, and have very high regional conservation value (see section 3.2). A systematic survey of both Reserves' vegetation and flora should be undertaken as soon as possible. The survey should accurately map the variation in vegetation types throughout the Reserves and should highlight the conservation significance of each of the vegetation types. This will enable the Shire of Busselton, DCALC and MRFG to prioritise management actions to protect the areas with the highest conservation values. Suitably qualified or experienced botanists from the TIC Group, Cape Naturaliste Regional Herbarium, Busselton Naturalist's Club, or university students should be encouraged to undertake this work on a voluntary basis. Alternately, DCALC may apply for funding to enable a consulting botanist to undertake the work with the assistance of local volunteers. On completion of accurate vegetation mapping for the Reserves, the recommendations of this plan will need to be reviewed to ensure that all management actions serve to protect vegetation and flora with high regional conservation values.

Maintaining healthy, undisturbed vegetation and soils is the best way to prevent weed invasion and vegetation stress, which in turn increases the susceptibility of the vegetation to infection by insect parasites such as borers and leaf miners, and diseases such as the honey fungus *Armillaria* sp., and canker fungi. As the vegetation of Marri Reserve and most of Armstrong Reserve is in very good

condition, protection of the vegetation will be best achieved by minimising any disturbance to the soil or native vegetation during any management activities.

Many native plants, particularly *Banksia* sp., are very sensitive to, and may be killed by, high levels of phosphate, whilst increased nutrient levels also encourage the establishment of weeds. Excess nutrients may enter the Reserves from the surrounding town site gardens and urban stormwater. To minimise nutrient addition to the vegetation at the Reserves' boundaries, surrounding residents should use fertilisers judiciously, applying the minimal amount necessary and taking care to ensure that the fertiliser cannot run off into the Reserves (see section 4.3.4). Nutrients are also added to the Reserves as garden waste which is being regularly dumped around the boundaries of both Reserves. This practice also introduces new exotic species to the Reserves and should be actively discouraged (see section 4.3.4).

Recommendation	Responsibility	Priority
4.2a A systematic survey of both Reserves' vegetation and flora should be undertaken as soon as possible and should accurately map the variation in vegetation types present in both Reserves.	Shire of Busselton and DCALC	High
4.2b Following a systematic vegetation survey, the recommendations of this plan should be reviewed to ensure that all management actions are prioritised to protect the areas with the highest conservation values.	Shire of Busselton	High
4.2c All due care should be taken to minimise disturbance to both the soil and native vegetation during any management activities within the Reserves.	All agencies involved in the management of the Reserve	High

4.2.3 MANAGEMENT OF DIEBACK DISEASE CAUSED BY *PHYTOPTHORA CINNAMOMI*

As there has been no formal mapping of the extent of dieback disease caused by the fungus *Phytopthora cinnamomi* within the Reserves, a formal assessment should be undertaken by an accredited *Phtyopthora cinnamomi* interpreter as soon as possible. It will be necessary to review some of the recommendations of this management plan following the assessment, particularly those relating to drainage, access tracks and firebreaks.

In the interim, to minimise the spread of the disease and to reduce the risk of new infestations occurring within the Reserves, the following procedures should be followed (as suggested by Kilgour, 1999:21):

Planning

- Schedule all activities that involve soil disturbance for the low rainfall months (November to March) when the soil is dry.
- Minimise the number of tracks in the Reserves and ensure that all tracks are well drained. Avoid the construction of tracks on the higher ground and plan tracks so that they do not pass from the infested to uninfested parts of the Reserves.
- Minimise soil disturbance at every opportunity – choose to mow, slash or use herbicide rather than grade or plow.
- Minimise drainage into the Reserves, particularly from roads as the disease impact is greatest in wet sites.

For All Management Activities

- All vehicles, machinery, tools and equipment should be free of all mud and sand when entering the Reserves, and when they are moved from one area to another within the Reserves.
- Vehicle access into the Reserves should be avoided where possible, particularly when the access tracks are wet. If a vehicle is needed within the Reserves, it should stay on the dry areas of the tracks and avoid any puddles or wet areas.
- Footwear should be free of all mud and soil when entering the vegetation and when moving from infested to uninfested areas of the Reserves.

Earthworks

- Avoid bringing any soil, gravel or sand into the Reserves. If such material needs to be introduced, it should be tested to ensure that it is disease free or should be purchased from a supplier that has Nursery Industry Association Accreditation.
- Non-certified materials can be used in the infested areas.
- Soil and plants should not be moved from infested areas to uninfested areas.

Weed Control

- If weeds are being manually removed, care should be taken to ensure that any soil and plant matter is contained at the site where the weeds have grown and is not dropped in other parts of the Reserves.

Revegetation

- Revegetation has a high risk of introducing *P. cinnamomi* so it should be avoided in areas that are free from the disease.
- If revegetation is necessary in disease free areas, consider:
    - Direct seeding rather than planting seedlings.
    - Plant when the soil is moist but not wet.
    - Purchase plants from suppliers that have Nursery Industry Association Accreditation or nurseries that have excellent hygiene practices (such as the Geographe Community Landcare Nursery – see Appendix 1 for contact details).
    - Do not use mulch or only use mulch that has been well composted as the heating part of the composting process kills *P. cinnamomi*.
    - Water used should be from mains supply or if sourced from a creek, dam or river, it should be sterilised by adding pool chlorine at a rate of 6 mL for every 10 L of water.
- Select plants that are resistant to *P. cinnamomi* for use in infested areas.

Access

- Reserve visitors should be encouraged to stay on the tracks.
- Avoid walking through the vegetation from infested areas to uninfested areas and when the soil is wet.

Protecting vegetation

- Treat susceptible vegetation in the Reserves with Phosphite. Trees should be injected and all other vegetation should be sprayed (see Kilgour, 1999 for instruction on how to use Phosphite).

Fire

- Mow, slash or use herbicides on firebreaks rather than plow or grade.
- Construct or maintain firebreaks in the uninfested parts of the Reserves first and then move into the infested areas.

Recommendation	Responsibility	Priority
4.2d A suitably accredited *Phytopthora cinnamomi* interpreter should be contracted to formally assess the pattern and extent of dieback disease caused by the fungus within the Reserves.	DCALC and the Shire of Busselton	High
4.2e Following a formal *Phytopthora cinnamomi* assessment, the recommendations of this management plan should be reviewed to ensure that all management actions prevent or limit the further spread of dieback disease within the Reserves.	Shire of Busselton	High
4.2f All management activities that involve soil disturbance should be planned to occur during the low rainfall months (November to March) when the soils are dry.	DCALC and the Shire of Busselton	High
4.2g All materials (including soils, brushing, mulch and plants) and machinery brought into the Reserve for any management activity must be free of the *Phytopthora cinnamomi* fungus.	MRFG and the Shire of Busselton	High
4.2h Appropriate dieback management procedures (see section 4.2.3) should be followed when planning or undertaking any management activities within the Reserves.	DCALC, MRFG and the Shire of Busselton	High

4.2.4 MANAGEMENT OF RARE FLORA

There have been several unconfirmed sightings of the critically endangered Dunsborough Spider Orchid *Caladenia viridescens* within Marri Reserve. The Dunsborough Spider Orchid is listed as DRF, which is specially protected by the State Wildlife Conservation Act (1950), the Conservation and Land Management Act (1984) and the Federal Environment Protection and Biodiversity Conservation Act (1999). Any actions that have the potential to impact in any way on DRF require the approval of both CALM and Environment Australia (EA) prior to the commencement of any activity. CALM consider Marri Reserve to be potential habitat for the Dunsborough Spider Orchid and possibly the endangered orchid *Caladenia exelsa*. Surveys are planned for the flowering season in 2003 (M. Spencer, CALM, pers. comm., 2003). If the orchid is positively identified within the Reserve, both CALM and EA will need to be notified during the planning phase for any activities that may impact on them. Each agency can provide advice on how to appropriately mitigate potential threats to the DRF during the specified activity. Ideally, CALM should be notified of any planned actions that may impact on DRF at least one spring/summer growing season (Sept – February) prior to the activity to allow for thorough flora surveys to be undertaken (M. Spencer, CALM, pers. comm., 2003).

CALM usually monitor the locations of populations of DRF orchids during September – November each year, which is the flowering time for native orchids. Any volunteer assistance with this activity can greatly increase the capacity of the monitoring program.

Recommendation	Responsibility	Priority
4.2i CALM should undertake surveys for the critically endangered Dunsborough Spider Orchid *Caladenia viridescens* and the endangered orchid *Caladenia exelsa* within the Reserves during the flowering season in 2003.	CALM	High

Recommendation	Responsibility	Priority
4.2j If any DRF or are identified within the Reserves, both the Shire of Busselton and the DCALC should be notified immediately.	CALM	High
4.2k If any DRF are located within the Reserves, any management activities that may impact on the DRF will need to be referred to both CALM and EA during the planning phase for the activity.	Shire of Busselton and the DCALC	High
4.2l Volunteer assistance to survey the Reserves for populations of DRF should be provided to CALM wherever possible.	DCALC and the MRFG	Medium

4.2.5 REHABILITATION OF NATIVE VEGETATION

Although the vegetation of the Reserves is mostly in very good condition, there are a few areas that have been disturbed and could benefit from rehabilitation of the natural plant communities. In Marri Reserve, areas around the detention basins and drains could be assisted to regenerate naturally. In Armstrong Reserve, areas behind the CWA Hall and SES shed, and around the stormwater detention basin could also be assisted to regenerate naturally, while the area of cleared ground around the Shire works depot will need to be rehabilitated using a combination of direct seeding and seedlings (tubestock).

Natural regeneration of the Reserves' vegetation should be achieved using the Bradley method of rehabilitation (Bradley 1988). The Bradley method of bush regeneration uses minimal disturbance techniques to remove weeds, allowing the native vegetation to re-establish itself where sufficient propagules, such as seeds, tubers or root-stock, are present. Where there are insufficient propagules of the local plants present at a site, native plants may be re-established by the use of direct seeding or planting of tubestock. Three basic principles guide the Bradley method of bush regeneration:

- Principle 1: Work from areas in good condition towards degraded areas.
- Principle 2: Disturb the soil as little as possible.
- Principle 3: Let the regeneration of native plants govern the rate of weed removal.

Irrespective of the rehabilitation method used, it is important that any seed or plant stock used within the Reserves is collected from local provenance stock, which are plants that grow at, or as close as possible to, the site to be replanted. This is to ensure that the genetic integrity and diversity of the Reserves' flora is retained. In addition, it is vital that all plants are grown at a dieback accredited nursery (such as the Geographe Community Landcare Nursery – see Appendix 1 for contact details) to ensure that dieback is not spread by any revegetation activities.

Richard Clarke, a local representative for the Greening Australia Seedbank project, has the necessary skills and equipment to assist the MRFG to undertake seed collection within the Reserves to establish a seedbank for local revegetation projects (contact details are provided in Appendix 1). In Western Australia, all native flora growing on public land is protected under the Wildlife Conservation Act (1950), which is administered by CALM. Under the provisions of the Act, a license is required to take any flora, flowers, seeds, or any other parts of plants from any Crown land.

General advice on bush regeneration and the rehabilitation of native vegetation is provided in Scheltema and Harris (1995) and Buchanan (1989), whilst assistance

and advice on planning may be obtained from CALM's Bushcare Program, Greening Western Australia or the Australian Association of Bush Regenerators. Training for seed collection and bush regeneration activities can be provided by the training agency APACE Aid, located in Fremantle (contact details are provided in Appendix 1).

Recommendation	Responsibility	Priority
4.2m In Marri Reserve, areas around the detention basins and drains should be assisted to regenerate naturally.	MRFG	Low
4.2n In Armstrong Reserve, areas behind the CWA Hall and SES shed, and around the stormwater detention basin should be assisted to regenerate naturally.	MRFG	Low
4.2o The area of cleared ground around the Shire works depot in Armstrong Reserve will need to be rehabilitated using a combination of direct seeding and seedlings (tubestock). (see recommendations 4.2p and 4.2q).	MRFG	High
4.2p Only local provenance seed stock should be used for any revegetation or rehabilitation activities within the Reserves to maintain the genetic integrity and diversity of the Reserves' flora.	MRFG and the Shire of Busselton	High
4.2q All plants used for any revegetation or rehabilitation activities should be grown at a nursery accredited for *Phytopthora cinnamomi* (dieback disease) control.	MRFG and the Shire of Busselton	High
4.2r Prior to the collection of any native seed or any plant specimens, a license should be obtained from CALM.	MRFG and the Shire of Busselton	High

4.2.6 COMMUNITY AWARENESS OF THE FLORA

To assist the MRFG and the community to identify and recognise the flora within the Reserves, a herbarium of the local species is very useful. Herbaria contain mounted, dried specimens of the flora, together with information on where the plant grows, soil types, growth habit, habitat description, associated species and its conservation status. A herbarium can be used to identify suitable species for revegetation activities, and can provide a baseline of the flora against which any long-term changes can be assessed.

The TIC Group has created a herbarium of species growing within the Cape Naturaliste area. This herbarium is a vouchered collection, meaning that it has been verified by and registered with the Western Australian Herbarium in Perth, which is a costly process. Many of the plants which are found in the Reserves are already included in the herbarium, so the MRFG may wish to use the herbarium to identify local species.

A herbarium of the flora of the Reserves could also be created as part of the TIC Group's Cape Naturaliste Regional Herbarium. This will help to significantly reduce the cost of building a herbarium for the Reserve, as many specimens will not require re-verifying by the WA Herbarium. The Cape Naturaliste Regional Herbarium, which currently contains over 550 specimens and is still being added to, will eventually be housed at the Busselton Shire Offices to make the collection of regional plants available to the public for education purposes. Presently, the herbarium is managed and maintained by Mr. Don Carter from the Toby Inlet Catchment Group (contact

details in Appendix 1). DCALC and the MRFG should contact Mr. Carter for assistance with establishing a herbarium for the Reserves. Two specimens should be collected for each plant in each Reserve so that one may be added to the Cape Naturaliste Regional Herbarium, and one may be retained for the MRFG's collection. Information on the collection of plant specimens for a community herbarium is provided by Patrick (1997).

To assist the local community to identify the flora within the Reserve, small, unobtrusive signs identifying plants could be added along the main walk tracks, as has occured at Ambergate Reserve. Both the Ambergate Reserve Herbarium and the Cape Naturaliste Regional Herbarium, and local botanists from the Busselton Naturalists Club may be able to assist the MRFG to identify the plants.

Recommendation	Responsibility	Priority
4.2s The Cape Naturaliste Regional Herbarium could be used to identify the flora of the Reserves.	MRFG	Low
4.2t A vouchered herbarium of the flora of the Reserves should be created as part of the Cape Naturaliste Regional Herbarium (see recommendation 4.2r).	MRFG	Low
4.2u Small, unobtrusive signs to identify common local plants species should be placed along the main walk tracks.	MRFG	Low

4.3 *Weed Management*

4.3.1 OBJECTIVES

- To identify, monitor, and control exotic weed species in the Reserves.
- To protect rare flora from the impacts of weeds and weed control measures.
- To raise community awareness of weed control and the prevention of further weed invasion.

4.3.2 IDENTIFICATION, MONITORING AND CONTROL OF WEEDS

Environmental weeds are problematic exotic species that directly compete with native flora for nutrients and light, inhibit growth and discourage natural regeneration, create habitat for other introduced plants and animals, and represent a significant fire hazard in summer when the weeds die off. Marri and Armstrong Reserves, like many bush remnants, are small areas of bush surrounded by residential housing and fragmented by roads, drains and access tracks. This fragmentation increases the risk of weed invasion.

One hundred and six weed species have been identified within the two Reserves, although most are confined to the perimeters of the Reserves, alongside roads only (see Appendix 3 for a complete report on the weeds within the two Reserves). Only one weed species, Arum Lily *Zantedeschia aethiopica* is a declared weed requiring immediate attention (see section 3.2.6). Arum Lily are present in small isolated patches along Gifford Road and Cape Naturaliste Road only (see figure 6). Areas where weeds are prevalent (figure 6) include the road verges, the drains, the stormwater detention basins, the levee, the firebreaks, borders shared with private residences, and areas around the Shire depot and CWA Hall. There are few areas of isolated weeds within the vegetation, excepting small patches alongside the levee in Marri Reserve, and alongside the drain and stormwater detention basin in Armstrong Reserve.

Priority for weed control should be given to any isolated patches of weeds and areas where weeds are surrounded by native vegetation, particularly along the levee, drains and stormwater detention basins in Marri Reserve, and alongside the drains and stormwater detention basins in Armstrong Reserve. There is also a small patch of kikuyu along the drain line that veers into the bush just north of the emergency services buildings in Marri Reserve. Eradication of weed alongside roads will be extremely difficult to achieve (if not impossible) and efforts should be directed to prevent the spread of roadside weeds into the Reserves rather than complete removal of the weeds.

Weed species which are priority for removal because of their invasiveness or because they are currently limited to small isolated patches which can be successfully eradicated (mostly garden escapees) are (see figure 6 and Appendix 3 for locations of these species):

Dolichos pea *Dipogon lignosis*
Tagasate *Chamaecystis*
Syndey wattle *Acacia longifolia*
Black Wattle *Acacia melanoxylan*
Periwinkle Blue *Vinca major*
Black nightshade *Solanum nigrum*
Tangier pea *Lathyrus tingitamus*
Blue lupin *Lupinus consentini*
Arum lily *Zantedeschia aethiopica*
Freesia *Freesia* spp.
Nasturtium *Tropaelum majus*
Wavy gladioli *Gladiolus undulatus*
Watsonia *Watsonia* spp.
Pelargonium *Pelargonium* spp.
Bridal creeper *Asparagus asparagoides*
Veldt Grass *Ehrharta longiflora*

Two new publications, *Bushland Weeds: A practical guide to their management* (Brown and Brooks, 2002) and *Southern Weeds and Their Control* (Moore and Wheeler, 2002), provide the latest advice on how to best control these weed species. Both books are available for loan at the Geocatch Network Centre in Busselton (see Appendix 1 for contact details).

Suitable weed control strategies for use in the Reserve are mowing or slashing (to remove immature flower heads), or hand pulling before the flowers mature, with the primary aim of preventing the weeds from setting seed. These are useful techniques to prevent the spread of roadside weeds into the Reserves. Herbicide wipe and spot spraying are useful techniques to eradicate isolated weed infestations however broad-scale spraying should not be used within the Reserves. MRFG volunteers acting under the Shire of Busselton's Friends Group insurance policy are only able to undertake weed control using Roundup Biactive (Glyphosate). If other herbicides are required, the work will need to be undertaken by Shire of Busselton staff or suitably qualified and licensed contractors. For the safety of the general public, when MRFG members are undertaking weed control, they must use 'Weed Spraying in Progress' signs which area available for loan from the Shire of Busselton. Burning should not be used for weed control as it generally exacerbates the problem by favouring further weed invasion, whilst accidental escapes of fire may be dangerous to the community or detrimental to the ecology of the Reserve.

Weed control programs should be undertaken several times per year, during winter and spring to reduce vegetative growth, and should occur before the weeds have set seed. Weeding and herbicide application should be repeated within two months to reduce regrowth. Some weed species have large seed banks stored within the soil. To ensure that the long-term spread of weeds is controlled within the Reserves, weed control efforts will need to be continued from year to year.

Ongoing monitoring of all disturbed areas within the Reserves will be necessary to identify areas where weeds are invading, and to prioritise annual weed control efforts within the Reserves. Ongoing monitoring is also important to gauge the success of the weed control program. Taking photographs regularly at the same places within the Reserves can be a useful record to monitor the success of weed control and rehabilitation programs, and highlight areas where problems are worsening. Brown and Brooks (2002) provide helpful advice on establishing weed control programs and ongoing monitoring in native bushland.

Weeding, like all bush regeneration activities, should follow the Bradley method (Bradley, 1988; see section 4.2.5), which attacks weed infestations by working from the least infested areas to the worst, so that existing vegetation can regenerate naturally into the areas that weeds are removed from. Only small areas are tackled at any time, so that natural regeneration can occur at the same pace. All due care should be taken to minimise disturbance to the soil surface when undertaking weed control activities, as disturbance will favour the re-establishment of weeds rather than native species.

For practical advice on weed mapping, planning control programs and control techniques, see Brown and Brooks (2002), Moore and Wheeler (2002), or Scheltema and Harris (1995). Hussey *et al.* (1997) and Moore and Wheeler (2002) are useful keys to identify the weeds species of Western Australia. These books are available for loan to community groups at the Geocatch Network Centre, while AgWA can provide further advice and assistance with weed control programs (contact details provided in Appendix 1).

Recommendation	Responsibility	Priority
4.3a Priority for weed control should be given to any isolated patches of weeds and areas where weeds are surrounded by native vegetation – alongside the levee, drains and stormwater detention basins in Marri Reserve, and alongside the drains and stormwater detention basins in Armstrong Reserve.	DCALC, MRFG and the Shire of Busselton	High
4.3b Priority weeds for removal are: Dolichos pea *Dipogon lignosis,* Tagasate *Chamaecystis palmensis,* Syndey wattle *Acacia longifolia,* Black Wattle *Acacia melanoxylan,* Periwinkle Blue *Vinca major,* Black nightshade *Solanum nigrum,* Tangier pea *Lathyrus tingitamus,* Blue lupin *Lupinus consentini,* Arum lily *Zantedeschia aethiopica,* Freesia *Freesia* spp., Nasturtium *Tropaelum majus,* Wavy gladioli *Gladiolus undulatus,* Watsonia *Watsonia* spp., Pelargonium *Pelargonium* spp., Bridal creeper *Asparagus asparagoides,* and Veldt Grass *Ehrharta longiflora.*	DCALC, MRFG and the Shire of Busselton	High

Recommendation	Responsibility	Priority
4.3c Suitable measures to control weed within the Reserves include mechanical methods (mowing or slashing), hand removal, spot spraying, and herbicide wipe.	MRFG and the Shire of Busselton	High
4.3d For insurance purposes, the use of herbicides other than Roundup Biactive (Glyphosate) should only be undertaken by Shire of Busselton staff or suitably qualified and licensed contractors.	DCALC, MRFG and the Shire of Busselton	High
4.3e Broadscale weed spraying and burning should not be used to control weed species within the Reserves.	DCALC, MRFG and the Shire of Busselton	High
4.3f Weed control programs should be undertaken several times per year, and should occur before the weeds set seed.	DCALC, MRFG and the Shire of Busselton	High
4.3g An ongoing monitoring program focussing on disturbed areas, access tracks, drains and stormwater detention basins should be established to locate areas where weeds are invading and need attention, to identify new weeds, and to prioritise annual weed control efforts within the Reserves.	DCALC and the Shire of Busselton	High

4.3.3 PROTECTION OF RARE FLORA

There are unconfirmed reports that Marri Reserve contains the critically endangered Dunsborough Spider Orchid *Caladenai viridescens* which is listed as DRF and possibly another endangered orchid *Caladenia exelsa.* These flora are specially protected by State and Federal statutes and agreements that require either CALM or EA to grant approval for any activity with the potential to impact on them. As a result, if surveys undertaken during the flowering season 2003 (see section 4.2.4) reveal the presence of DRF within the Reserves, any weed control activity that occurs in the vicinity of the DRF will need to be documented and referred to both CALM and EA. Ideally, this should occur during the planning phase for each years weed control activities (see section 4.3.2).

Recommendation	Responsibility	Priority
4.3h Any weed control activity with the potential to impact on any DRF should be referred to CALM and EA for approval as necessary (see recommendations 4.2i, 4.2j and 4.2k).	DCALC and the Shire of Busselton	High

4.3.4 COMMUNITY AWARENESS AND WEED PREVENTION

Ultimately, the best method of controlling weeds is to prevent their introduction in the first place, which is considerably cheaper and easier than eradication at a later date. Dumping of garden refuse within the Reserves can introduce new exotic species into the Reserves, whilst also increasing nutrient levels in the soil, encouraging the establishment of weeds. Dumping of garden refuse within the Reserves should be actively discouraged.

Education of the local community is important to discourage further weed invasion from the surrounding townsite. A leaflet explaining the impacts of garden refuse on the Reserves' vegetation, and the importance of controlling exotic plants in nearby

gardens could be distributed to all of adjoining landholders. The leaflet should also stress the importance of minimising disturbance to both the soil and vegetation, and preventing fertiliser drift from residential gardens, to discourage further weed invasion (see section 4.2.2). CALM's Bushcare Program or Greening Australia may be able to provide information and assist with educative material (contact details in Appendix 1).

Recommendation	Responsibility	Priority
4.3i Community awareness of weed prevention and control, and the effects of fertiliser drift and dumping of garden waste within the Reserves should be raised through the provision of educative material.	DCALC	High

4.4 *Management of Native Fauna*

4.4.1 OBJECTIVES

- To identify, protect and conserve native fauna populations and their habitats within the Reserves.
- To raise community awareness of the native fauna of the Reserves.

4.4.2 COMMUNITY BASED FAUNA SURVEYS

To date, there has been no study of native fauna within Marri or Armstrong Reserves. Given the very good condition of the Reserves' vegetation together with the presence of water, it is highly likely that a number of native fauna are resident within the Reserves. To effectively manage native fauna and their habitats within the Reserves, information on the Reserves' fauna populations is needed.

A community-based fauna survey, undertaken with the assistance of a suitably qualified fauna consultant, could help to identify some of the mammals, birds and reptiles present in the Reserves. Information and options for community based fauna surveys are described by Sanders (1999). Practical assistance and advice for planning may be sought from CALM's Land for Wildlife Program (contact details in Appendix 1).

All native fauna in Western Australia is protected by the Wildlife Conservation Act (1950). A license must be obtained from CALM to trap, catch or handle any native fauna.

In addition to detailed cage and pit-trap surveys, there are a number of simple surveys the community could regularly undertake to identify and monitor a range of native fauna within the Reserves. These activities are non-intrusive and do not involve catching or handling the animals. Rather, they involve observation and do not require licensing with CALM. These include simple birdwatching activities, spotlighting at night to see nocturnal mammals, sound recording, and the use of hair cones to collect hair specimens which can be used to identify fauna. Detailed information on these survey techniques is provided in Sanders (1999).

Undertaking fauna surveys as part of a community group can be a very rewarding and stimulating experience. Not only will the surveys encourage appreciation of the fauna and their habitats, they will also be very enjoyable tasks which can assist to generate community interest and participation in managing the Reserves, and help to develop a sense of community ownership of the Reserves.

Information about the Reserves' fauna or ecology is most useful when it is widely available to all individuals, groups and agencies involved in environmental management. It is important to disseminate any new information gathered on the native fauna of the Reserves to the Shire of Busselton and CALM, and also to the general public via the Busselton Dunsborough Environment Centre.

Recommendation	Responsibility	Priority
4.4a A suitably qualified fauna consultant should be contracted to assist the community to undertake a community based survey of the Reserves' native fauna.	DCALC and MRFG	High
4.4b Ongoing monitoring of the Reserves' fauna and birdlife should be undertaken using simple, non-intrusive survey methods.	MRFG	Low
4.4c Any new information gathered on the native fauna of the Reserves should be made available to the Shire of Busselton, CALM, and the general public at the Busselton Dunsborough Environment Centre.	DCALC and MRFG	High
4.4d Following a detailed fauna survey, the recommendations of this management plan should be reviewed to ensure that all management actions serve to protect or conserve the known populations of native fauna.	Shire of Busselton	High

4.4.3 PROTECTION AND CONSERVATION OF NATIVE FAUNA AND THEIR HABITATS

Dead and decaying trees and hollow logs are important nest and den sites for native birds and fauna. It is important that these habitats are maintained within the Reserves and are not removed by burning, or during any management activities. The DEP has produced a leaflet explaining the importance of hollow logs as fauna habitat. These could be distributed to surrounding landholders along with the DCALC newletter.

Marri Reserve (and possibly Armstrong Reserve) is known to contain the Western Ringtail Possum *Psuedochierus occidentalis* which is specially protected by the WA Wildlife Conservation Act (1950) and the Commonwealth Environmental Protection and Biodiversity Conservation Act (1999), rated as 'Vulnerable'. As a result, any prescribed burns plans for the Reserves will need to be approved by CALM and EA (see section 4.7.5 and recommendation 4.7h).

Recommendation	Responsibility	Priority
4.4e Care should be taken to ensure that dead and decaying trees and hollow logs are not removed from the Reserves or impacted on by any management activities.	All agencies involved in management of the Reserves	High
4.4f Information on the importance of fauna habitat within the Reserves should be provided to the surrounding landholders.	DCALC and MRFG	Low

4.5 *Protection from Feral and Domestic Animals*

4.5.1 OBJECTIVES

- To control and minimise the impact of feral and domestic animals on the native flora and fauna of the Reserves.
- To raise community awareness of the impacts of domestic pets on the Reserves.

4.5.2 IMPACTS OF FERAL AND DOMESTIC ANIMALS ON THE NATIVE FLORA AND FAUNA

Non-native feral animals such as cats, foxes, and rabbits are pests in native bushland as they have a detrimental effect on the native flora and fauna. They prey on and interfere with native fauna, compete with native fauna for food and shelter, and damage the native vegetation and alter habitats by digging, burrowing, grazing and trampling.

Domestic dogs and cats can also adversely impact on the Reserve's flora and fauna in a number of ways:

- Domestic dogs and cats can physically disturb and scare native fauna.
- Domestic cats are opportunistic hunters that will feed on a wide variety of native fauna, including invertebrates, reptiles, birds and mammals.
- Dog droppings, while also being aesthetically unappealing, can infect native fauna with potentially harmful, introduced parasites and diseases.
- Dogs that dig can physically disturb the native flora, while also increasing the potential for weed invasion.
- There is some evidence that dog scents along tracks may form significant physical barriers to the movement of small mammals such as Mardo, Honey possums and native mice (B. Masters, pers. comm.).

4.5.3 CONTROL OF FERAL ANIMALS

Rabbits, European rats and House mice are feral animals likely to be present in the Reserves. Currently, there is no method to control rats or mice in bushland that will not adversely impact on small native mammals, however rabbits and foxes (if they are present) are animals that can be controlled within the Reserves. Because of the small size of the Reserves, and the close proximity to residences with domestic pets, 1080 poison baits cannot be used within the Reserves. These feral animals can only be controlled by fumigation of their dens. Aluminium phosphide tablets (Phos-toxin) should be used opportunistically to fumigate any active rabbit warrens or fox dens identified within the Reserves. Phos-toxin is a very dangerous poison that requires careful handling and storage. As Phos-toxin is an S7 poison, any person undertaking fumigation in the Reserves must have completed a Chem-Cert course in chemical handling.

Recommendation	Responsibility	Priority
4.6a Any active rabbit warrens or fox dens identified within the Reserves should be fumigated using aluminium phosphide tablets (Phos-toxin). NB: As Phos-toxin is listed as an S7 poison, any person undertaking fumigation in the Reserves will need to have completed a Chem-Cert course in chemical handling.	DCALC, MRFG and the Shire of Busselton	High

4.5.4 REDUCING THE IMPACTS OF DOMESTIC ANIMALS

To ensure that the Reserves remain in good condition, the impacts of domestic pets on the native flora and fauna must be controlled. Surrounding residents should be encouraged to contain their dogs and not allow them stray into the Reserves unaccompanied. Information about the impacts of domestic pets on the Reserves flora and fauna should be provided to surrounding residents to assist them to understand the importance of containing their pets when living in close proximity to a reserve that is being managed for the conservation of native flora and flora.

As dog walking has been a regular community activity along the firebreak in Marri Reserve and along the main access tracks in Armstrong Reserve, it will continue to be permitted. However, to minimise impacts to the Reserves, the activity will need to be restricted to these tracks only, and dogs must remain on a leash.

Recommendation	Responsibility	Priority
4.6b Surrounding residents should be encouraged to contain their pets through the provision of information on the impacts of domestic pets on native flora and fauna in the Reserves.	DCALC and MRFG	Medium
4.6c Dog walking should be permitted on the main firebreak in Marri Reserve and along the main access tracks in Armstrong Reserve only, and dogs must remain on a leash.	Shire of Busselton	High

4.6 *Management of Watercourses, Drainage and Detention Basins*

4.6.1 OBJECTIVES

- To provide vital flood protection for areas downstream of the Reserves.
- To maintain and enhance the ecology of all watercourses within the Reserves, including drains and detention basins, so that they are able to act as biofilters, thereby improving the quality of water entering Geographe Bay.

4.6.2 PROVIDING VITAL FLOOD PROTECTION TO AREAS DOWNSTREAM OF THE RESERVES

Currently, Marri and Armstrong Reserves play vital roles in the protection of residential areas downstream of the Reserves from flooding. Stormwater from residential subdivisions either side of Marri Reserve and Cape Naturaliste Road is detained in stormwater detention basins in Marri Reserve before entering Armstrong Reserve, where a second stormwater detention basin further detains water from upstream together with stormwater from Naturaliste Terrace. In Armstrong Reserve, drains along Gifford Road take the detained stormwater together with stormwater from subdivisions located either side of Armstrong Reserve into pipes that discharge directly into Geographe Bay at the foreshore.

The Shire of Busselton may need to upgrade the existing stormwater detention capacity within the Reserves to ensure that areas downstream of the Reserves do not flood in extreme rainfall events. However, because of the high regional conservation value of the Reserves' vegetation (see section 1.2), the Shire of Busselton should endeavour to provide flood protection solutions that do not impact on the vegetation of either of the Reserves. As part of the planning process, all new development guide plans should incorporate stormwater detention basins to detain all runoff onsite. These should be designed and constructed by suitably qualified contractors to ensure that they will provide the required detention capacity. Currently,

the lack of vegetation along the creek line upstream of the Reserves allows stormwater to rapidly run off the sloping hillside and quickly fill the existing stormwater detention basins in the Reserves. Rehabilitation and revegetation of this streamline may significantly reduce the rate and volume of runoff into the Reserves (see section 4.6.3).

The community members consulted as part of the planning process for this management plan indicated that they were strongly opposed to the use of either Reserve, particularly Marri Reserve, for future stormwater detention upgrades. However, as they are aware that there may be an unavoidable need for future upgrades of the system's capacity, they supported the use of Armstrong Reserve for this purpose. As Armstrong Reserve is smaller, more fragmented and more degraded than Marri Reserve, the existing stormwater detention basin within the Reserve should be increased in size if necessary. The area already degraded by the extension of the Shire depot should be excavated to increase the size of the basin, rather than impacting on the undisturbed native vegetation to the northwest of the basin. To minimise unnecessary impacts to the surrounding vegetation, earthmoving equipment should access the site via the back of the Shire depot. To facilitate the establishment of native vegetation to act as a biological filter, the sides of the detention basin should be battered to a slope of not less than 1:4.

The vegetation of Marri Reserve is in very good condition with natural wetland areas densely vegetated with native sedges that are difficult to propagate and are commercially unavailable. As this type of vegetation is poorly conserved and has high regional conservation values (see section 3.2.1), Marri Reserve should not be disturbed to provide flood protection for areas downstream.

Recommendation	Responsibility	Priority
4.6a As part of the planning process, the Shire of Busselton should ensure that all new development guide plans include provisions for stormwater detention basins to detain all runoff onsite.	Shire of Busselton	High
4.6b If there is an unavoidable need to upgrade the stormwater detention capacity within the Reserves, the existing detention basin in Armstrong Reserve should be increased in size by digging out the area of degraded vegetation behind the Shire depot.	Shire of Busselton	High
4.6c The vegetation within Marri Reserve should not be disturbed to provide flood protection for areas downstream.	Shire of Busselton	High

4.6.3 MAINTAINING AND ENHANCING THE ECOLOGY OF THE RESERVES' WATERWAYS

Currently, the unnamed creek line upstream of Marri Reserve, where it runs through private land earmarked for future residential development, is extremely degraded. It is suffering severe sheet erosion and gully erosion (channel incision) because of a lack of native riparian vegetation and as a result, a large 'slug' of sediment has moved downstream and is smothering previously healthy, dense understory vegetation immediately upstream of Marri Reserve. If left unchecked, the sediment, which is starting to deposit along the western end of the firebreak in Marri Reserve, may begin smothering the very healthy, dense understory vegetation in the Reserve with potentially devastating results. Immediate action is required to arrest erosion along the creek line and to stabilise the sediment slug in its current location. Due to

the extremely degraded nature of the creek line and the scale and complexity of the erosion problems, the site was referred to the Soil and Land Conservation Commissioner in March 2003. Immediately following, the site was inspected by a Land Conservation Officer from AgWA who prepared an earthworks and revegetation plan which was commenced immediately to arrest the erosion. Because of the imminent threat to the vegetation of Marri Reserve, it is vitally important that the actions are successful. The Shire of Busselton should closely monitor the progress of rehabilitation works at the site to ensure that satisfactory progress is being made. Rehabilitation of this creek line may significantly reduce the volume and rate of stormwater run off from this site into the Reserves, thereby reducing pressure on the capacity of the system within the Reserves (see section 4.6.2).

Planting stormwater detention basins and drains with native riparian vegetation can assist to significantly improve the quality of stormwater entering Geographe Bay. Native riparian plants, particularly rushes and sedges, are excellent biological filters for removal of excess nutrients and heavy metal pollutants, common constituents of stormwater, and they assist in the aeration of sediments which facilitates microbial degradation of excess nutrients as well. Excess nutrients and heavy metal pollutants can have adverse impacts on the seagrass meadows within the Bay (which are listed on the Register of the National Estate) and the important fish nursery habitat that it provides (Elscot and Bancroft, 1998). For these reasons, stormwater detention basins in both Reserves should be replanted using native riparian plants. Native sedges found in Marri and Armstrong Reserves include *Lepidosperma tetraquetrum* and *Cyathochaeta clandestina,* however these species do not propagate readily and are very difficult to source commercially. The following native sedge species, chosen for their ability to assimilate nutrients, rapid growth rate and commercial availability, are suitable for use in the stormwater detention basins in both Reserves:

Juncus pallidus
J. kraussii
Baumea juncea
B. articulata
B. vaginalis
Schoenoplectus validus
S. pungens
Isolepis nodosa

Suitable shrubs and trees for use on the banks of the detention basins are:

Melaleuca raphiophylla
Viminaria juncea
Oxylobium lineare
Agonis linearifolia
Astartea fascicularis
Eucalyptus rudis
Agonis flexuosa

There are a number of drains in both Reserves that vary in condition from good to poor. The drains that run adjacent to Naturaliste Terrace and along Marri Drive in Marri Reserve and along Gifford Road in Armstrong Reserve have very steep banks and the beds of the drains are incising. While the toe of the bank (the bottom edge) is actively eroding causing slumping in some areas, there is natural revegetation occurring along the shoulder and upper edges of the banks, although many of the species are introduced weeds (see section 3.4). This indicates that the channel of the

drains are probably larger than necessary, so it should be possible to stabilise the erosion by installing logs and rocks and planting native sedges along the toe of the bank without impeding flow within the drains. The introduced weed species present in the channel of the drain should be removed and the shoulder of the banks should be replanted with locally occurring shrub species (listed above). Because of its ability to tolerate both inundation and drying, and its low stature which should not impede the flow during flooding events, the native sedge *Baumea juncea* should be used for any replanting within the channel of the drains. *Juncus pallidus* is suitable for planting along the shoulder of the drains.

The confluence of the natural creek line and the drain along Naturaliste Terrace is headcutting and if left unchecked, the erosion will continue to accelerate. To arrest this erosion, the slope of the water flow will need to be reduced through the introduction of a pool – riffle sequence by installing several small rock riffles in the base of the drain. As this type of erosion is difficult to control, these works should be designed and installed by suitably qualified contractors.

The course of the natural creek line where it enters Marri Reserve is difficult to discern because it currently runs along the western end of the firebreak, through sand deposited from upstream erosion, before it enters its natural stream channel some 50 m downstream. The course of stream will need to be realigned, so that it runs along the edge of the firebreak, rather than down the centre and it should be revegetated using locally occurring species. As the sedges which are growing along this streamline are not available commercially, sedges which are growing adjacent to the Reserve on Lot 74 (St Georges Aged Care Village on Alanta Elbow), should be salvaged and transplanted along the creek line when clearing works occur. The native shrubs and trees listed above should also be planted along the realigned creek line.

Recommendation	Responsibility	Priority
4.6d The Shire of Busselton should closely monitor rehabilitation works along the degraded creek line upstream of Marri Reserve to ensure that satisfactory progress is being made towards achieving the recommendations made by the AgWA Land Conservation Officer.	Shire of Busselton	High
4.6e All stormwater detention basins within the Reserves should be planted with native riparian vegetation.	Shire of Busselton and DCALC	High
4.6f Eroding and incising drains within the Reserves should be stabilised by installing logs and rocks and planting native sedges along the toe of the bank without impeding flow within the drains.	Shire of Busselton and DCALC	High
4.6g Introduced weeds which are establishing in the channel of the drains should be removed and replaced with native riparian plants.	Shire of Busselton and DCALC	High
4.6h Headcutting at the confluence of the natural creek line and the drain along Naturaliste Terrace should be arrested by installing several small rock riffles in the base of the drain which should be designed to reduce the water slope without impeding the flow.	Shire of Busselton and DCALC	High

Recommendation	Responsibility	Priority
4.6i Where it enters Marri Reserve, the natural creek line should be realigned so that it flows alongside the firebreak rather than down the middle as it currently does.	Shire of Busselton and DCALC	High
4.6j The realigned creek line should be replanted with sedges to be salvaged from clearing works planned for Lot 74 (St Georges Aged Care Village on Alanta Elbow), and locally occurring tree and shrub species.	Shire of Busselton and DCALC	High

4.7 *Fire Management*

4.7.1 OBJECTIVE

- To manage fire within the Reserves to provide protection from wildfire to human life and property as a priority, while also protecting, maintaining and enhancing biodiversity where possible.

4.7.2 FIRE AS A MANAGEMENT TOOL[1]

Fire has been a natural element of the Australian landscape for thousands of years which, along with other natural disturbances such as drought, has shaped the Australian environment and its native plants and animals. Many of the Australian native species have developed specific mechanisms that allow them to survive and tolerate periodic fires, while some species even require fire for regeneration or other critical life stages. For example, some species resprout readily after fire, while others rely on fire to crack their hard seed pods so that seeds are scattered in the resulting ashbeds in a nutrient-rich and competition-free environment for rapid regeneration after rain.

The effect of fire on native vegetation and fauna is extremely variable and depends on the frequency, intensity and season of fires. Too frequent fire can reduce the number of native species present in an area by depleting the seed bank contained within the soil, especially when fires occur before species become reproductively mature and are able to replenish the soil seed store over a number of flowering years. Based on current research, a period of 10 – 15 years without fire is considered necessary to allow all of the plant species within southwest woodland communities to reach reproductive maturity following a fire. Burning too frequently will favour native species that are able to grow and reach maturity rapidly. Too frequent fire also increases the amount of nutrients and light available to plants and reduces competition, which also encourages weed invasion. Long periods without fires can reduce species diversity by not allowing regeneration of the fire dependant flora.

Low intensity fires favour the regeneration of some types of native plants, and burns the litter on the forest floor in a patchy manner, leaving a mosaic of unburnt vegetation which are refuges for native fauna and also provide a source of plant seed for colonisation of the burnt area. In contrast, high intensity fires consume most of the above-ground plant material, and may kill some native plants and animals, while also favoring the regeneration of other native species.

[1] Most of this information has been drawn from a special edition of *Landscope* magazine, published by the Department of Conservation and Land Management in 2000, which is a compendium of articles on the role, impacts and use of fire as a management tool in Western Australia.

The time of year in which the fire occurs will also have a considerable effect on the impact of the fire. The season of burn affects the intensity and scale of the fire, which will always be hotter and more intense during the summer and early autumn when the bush and soils are very dry. Late autumn, winter and early spring fires that occur when the vegetation and soils are moist will usually burn much cooler and patchier than hotter burns. Critical life stages of plants and animals are also affected differently depending on the time of the burn. Spring burns will tend to occur when a large proportion of the vegetation is flowering and may prevent plants from setting seed, whilst autumn burns allow seeds to sprout when rain will be readily available, but may also encourage winter weed establishment. Winter burns disrupt flowering and seed set for some species, and do not cause soil-stored seed to germinate. Winter burns also encourage the growth of pasture weeds.

Each year in Western Australia, around 500 unplanned wildfires occur. While most of these fires are lit by humans, either as an act of arson or by accident, lightning is also a major cause, particularly in the southwest forests. While every effort is made to contain them when they occur, the best method to prevent wildfires is planned burning to reduce fuel levels, particularly in areas where life and property are at significant risk. In Western Australia, CALM use fire in a number of different ways to reduce the threat of wildfire to life and property, whilst also maintaining and enhancing biodiversity. Ultimately, the type of fire regime that is used in any particular area will be decided by the particular management objectives that need to be achieved. Because of the significant risk to nearby residents in the event of a wildfire, the use of prescribed burning to protect life and property will be a priority in Marri and Armstrong Reserves. Burning to maintain and enhance biodiversity should be considered when planning burn prescriptions for the Reserves.

4.7.3 PROTECTION OF LIFE AND PROPERTY FROM WILDFIRE

In the event of an unplanned summer wildfire, the close proximity of the Reserves poses a significant threat to nearby residents and their property. Both Reserves are thought to have remained unburned since 1984 (19 years), and present fuel loads are very high. For the safety of nearby residents, controlled burns are due to be carried out in both Reserves as soon as possible.

The Shire of Busselton, the Dunsborough Fire and Rescue Service and the Dunsborough Bush Fire Brigade require that firebreaks in both Reserves are upgraded so that controlled burns can be undertaken safely, and wildfire suppression is possible. The existing firebreaks in Marri and Armstrong Reserve (see figure 6) will need to be maintained so that a 3 m wide area (to 5 high) is clear of all plant material. Any firebreak maintenance activities within the Reserves should use equipment and techniques that minimise soil disturbance and do not widen or deepen the existing firebreak. To prevent weed invasion, care should be taken to ensure that soil is not mounded on the edge of the firebreaks, and that the Reserves' native vegetation is not disturbed by the maintenance activities (see section 4.2.2). Appropriate dieback disease hygiene procedures should be followed (see section 4.2.3).

There is an immediate need to install a new 3 m wide firebreak within Marri Reserve to enable the rescue services to protect life and property from the potentially devastating effects of a wildfire within the Reserve. As the community identified a potential future need for a track linking Cape Naturaliste Road and Naturaliste Terrace, the new firebreak should be installed as dual-use, formal walk path. This will help to prevent the proliferation of tracks, thereby reducing the potential for weed invasion and further fragmentation of the Reserve. The path could be installed in an

aesthetically pleasing manner, meandering through the bush following the drier ridge line (figure 5). To prevent the spread of dieback disease, the route should avoid the seasonally wet areas (figure 6). When planning the installation of the new firebreak, dieback disease control will need to be considered (see section 4.2.3 and recommendations 4.2f, 4.2g and 4.2h) and a formal survey of the extent of dieback disease will need to be undertaken (recommendation 4.2d). Surveys for DRF will also be needed.

To adequately assess the risk of wildfire in the Reserves, and to identify areas requiring fuel reduction burns, fuel levels should be monitored regularly. CSIRO recommend that hazard reduction burns should be undertaken when fuel levels reach 8 tones per hectare, which is the level at which a fire brigade can suppress a fire in a direct attack (P. Wild, Shire of Busselton, pers. comm.).

Recommendation	Responsibility	Priority
4.7a To protect Dunsborough town site residents from the threat of wildfire, controlled burns should be undertaken in both Reserves as soon as possible.	Shire of Busselton and Dunsborough Fire and Rescue Service	High
4.7b Existing firebreaks within the Reserves should be maintained to 3 m wide (to 5 m high) using equipment and techniques that minimise soil disturbance and do not widen or deepen the existing track.	Shire of Busselton	High
4.7c One new 3 m wide firebreak should be installed within Marri Reserve, running between Cape Naturaliste Road and Naturaliste Terrace. The firebreak should be installed as a formal, meandering, dual-use walking path, following the drier ridge line and avoiding seasonally wet areas (see recommendations 4.8c and figures 5 and 6).	Shire of Busselton	High
4.7d When planning the exact route of the new dual-use firebreak and path in Marri Reserve (prior to its installation), dieback disease surveys will be required (see recommendation 4.2d) and CALM will need to survey for DRF. Appropriate dieback disease hygiene procedures should be followed during the installation of the firebreak (see section 4.2.3)	Shire of Busselton	High
4.7e No further firebreaks should be installed within the Reserves.	Shire of Busselton and Dunsborough Fire and Rescue	High
4.7f To identify areas requiring controlled burns, fuel levels within the Reserves should be monitored annually.	Shire of Busselton	High

4.7.4 USE OF FIRE TO MAINTAIN AND ENHANCE BIODIVERSITY

Fire management for nature conservation objectives aims to ensure that fires do not occur more frequently than the time needed for all plants to reach adequate reproductive capacity following a fire (either by seeding or resprouting), and that a variety of habitats for fauna are provided.

CALM do not support a continual regime of cool, autumn fires only. Rather, to maintain and enhance biodiversity, a variety of disturbance types (i.e different intensity or season of fires) is necessary to produce a diversity of ecological responses and habitats. To manage the flora and vegetation of southwest forest ecosystems for the highest biodiversity, CALM generally recommends a controlled burning regime of several late spring/autumn burns, followed by a spring burn, and then a no burn period, with a minimum rotation of 7 – 8 years between each burn. Longer intervals between burns, such as every 10 – 15 years are more preferable.

To identify the appropriate burning regime to conserve and maintain biodiversity in any native bushland, information about the fire response of each plant species present, particularly the method of regeneration and the length of time after fire to first flowering, is required. Information on native fauna is also required. CALM scientists are constantly researching the fire responses of Western Australia's native flora and fauna. This information can be used to determine appropriate minimum burn frequencies for the Reserves' vegetation communities. Current knowledge suggests that a minimum period of 10 – 15 years between fires is required to maintain the Reserves' Marri woodland community, however future research may suggest changes. Fire is generally excluded from wetland areas for a variety of reasons and as a result, the minimum fire free period required by these communities is presently not known.

Recommendation	Responsibility	Priority
4.7g To maintain and enhance the Reserves' biodiversity, the controlled burn regime should vary the season and intensity of the burn (by using both spring and autumn burns) to achieve a mosaic of varying burn ages within the Reserves' vegetation. The period between controlled burns (fire frequency) should be as long as is possible (determined by regular monitoring of fuel levels within the Reserves – recommendation 4.7d).	Shire of Busselton and Dunsborough Fire and Rescue Service	High

4.7.5 PROTECTION OF RARE FLORA AND FAUNA

The Reserves are potential habitat for two rare orchids that are listed as DRF, which are specially protected by the Western Australian Wildlife Conservation Act (1950), the Conservation and Land Management Act (1984) and the Federal Environment Protection and Biodiversity Conservation Act (1999) (see sections 3.2.4 and 4.2.4). The Reserves are also home to the vulnerable Western Ringtail Possum *Pseudocheirus occidentalis* which is specially protected by the Western Australian Wildlife Conservation Act (1950) and the Federal Environment Protection and Biodiversity Conservation Act (1999). Under the provisions of these Acts, approval must be sought from CALM, the State Minister for the Environment, EA and the Commonwealth Minister for the Environment and Heritage, before any prescribed burn can occur in the vicinity of any DRF or specially protected fauna species. In the event of a wildfire, CALM should also be notified so that steps can be taken to protect any DRF or fauna that may be at risk.

Recommendation	Responsibility	Priority
4.7h Any prescribed burn plans for the Reserves must be referred to CALM for approval during the planning phase.	Shire of Busselton	High

Recommendation	Responsibility	Priority
4.7i In the event of any wildfire, CALM should be immediately notified.	Dunsborough Fire and Rescue Service	High

4.7.6 COMMUNITY FIRE AWARENESS

Residents of nearby subdivisions (particularly along Alanta Elbow, Marri Drive, Naturaliste Terrace, Cygnet Cove and Armstrong Place) are at risk of experiencing a summer wildfire by living in such close proximity to native bushland. Many residents are probably unaware of what they can do to assist to reduce this threat. The Western Australian Fire and Emergency Services Authority (FESA) provides advice to the general public to help them protect themselves from the threat of bushfires. FESA can provide the local residents with the 'Bushfire Survival Manual' (Anon, 1998), which details a number of actions that they could take to reduce the wildfire threat to their properties, and increase their chances of surviving a bushfire. If required by the community, FESA can also organise a community fire awareness course. Contact details for FESA are given in Appendix 1.

Recommendation	Responsibility	Priority
4.7j Local residents should be provided with FESA's 'Bushfire Survival Manual' to assist them to protect themselves from the threat of wildfires.	Shire of Busselton and DCALC	High
4.7k A community fire awareness course could be organised to assist the local residents to protect themselves from the threat of wildfires.	Shire of Busselton and DCALC	Medium

4.8 *Access and Fencing*

4.8.1 OBJECTIVE

- To reduce unnecessary impacts to the Reserves by controlling access.

4.8.2 CONTROLLING ACCESS

Uncontrolled access can have adverse impacts on bushland reserves. Where access is uncontrolled in other Shire bushland reserves adjacent to urban areas, dumping of garden waste and other rubbish, camping, timber collection and the spread of dieback are commonly seen. Fortunately, the lack of vehicle access into Armstrong Reserve, and the density of the vegetation in Marri Reserve has limited these impacts in the Reserves to date. To maintain the quality of the vegetation in both Reserves, it will be necessary to control and formalise access to the Reserves.

To help to minimise impacts on the Reserves' flora and fauna, all vehicles except Shire, management and emergency service vehicles should be prohibited in the Reserves. Currently, vehicles are able to access Marri Reserve at Naturaliste Terrace, near the corner of Newberry Street, and vehicles could access Armstrong Reserve at Naturaliste Terrace, although none appear to do so (figure 6). Vehicles will also be able to gain access to Marri Reserve via a new firebreak (dual-use path) which will link Cape Naturaliste Road and Naturaliste Terrace. To prevent access of public vehicles at these points, non-locked treated pine pole management gates should be erected, with allowance made to permit pedestrians, wheelchairs, bicycles and prams. At each management gate, signage should clearly state that all vehicle

access, excepting Shire, management and emergency vehicles, is prohibited (see section 4.9.5).

The existing main access tracks through the Reserves should be formalised by hardening with raised, crushed limestone paths (see recommendation 4.2c). These types of paths have multiple benefits, they are suitable for use by pedestrians, bicycles, and wheelchairs whilst also helping to prevent the spread of weeds and dieback disease (see section 4.2.3).

Recommendation	Responsibility	Priority
4.8a All vehicles except Shire, management and emergency vehicles should be prohibited within the Reserves.	Shire of Busselton	High
4.8b To effectively control access to the Reserves, non-locked, treated pine pole gates should be erected at all vehicle access points into the Reserves.	Shire of Busselton	Medium
4.8c The main access tracks through the Reserves should be formalised by hardening with raised, crushed limestone paths (see recommendation 4.2c).	Shire of Busselton and DCALC	Medium

4.8.3 FENCING

Fencing, while being a valuable tool to prevent the establishment of new, informal tracks into bush, can be unsightly and Dunsborough community members have expressed a desire to see both Reserves remain unfenced at their boundaries with the surrounding roads (Cape Naturaliste Road, Marri Drive, Naturaliste Terrace, Armstrong Place and Gifford Road). Currently, there is little incentive for new tracks to develop through the Reserves as the existing network of tracks adequately links areas used by the public, and the remaining area is too dense to provide easy passage. As a result, there is no need to fence the Reserves' road boundaries. An existing, damaged fence along Gifford Road should be removed.

Fencing between private property and the Reserves is necessary to delimit the area of the bushland and to prevent the incursion of domestic gardens into the Reserves. Currently, the boundary between Marri Reserve and the residences along Alanta Elbow is adequately fenced using cyclone wire and treated pine poles. Few of the landholders along Cygnet Cove have fenced their back yards and several appear to be moving into Armstrong Reserve. The boundary between Armstrong Reserve and these residences should be resurveyed (if necessary) and visibly marked. Landowners should then be encouraged to erect fencing along this boundary.

Recommendation	Responsibility	Priority
4.8d To enhance the Reserves' aesthetic appeal, the Reserves' road boundaries should remain unfenced until a review of public use deems them necessary.	DCALC and the Shire of Busselton	High
4.8e The damaged ringlock and star picket fence along Gifford Road should be removed.	DCALC and the Shire of Busselton	Medium
4.8f The boundary between Armstrong Reserve and the residences on Cygnet Cove should be resurveyed (if necessary) and visibly marked. Landowners should then be encouraged to erect fencing along this boundary.	DCALC and the Shire of Busselton	High

4.9 *Public Use and Requirements*

4.9.1 OBJECTIVES

- To allow for passive recreational use of the Reserves consistent with the Reserves' regional conservation value.
- To remove existing litter and ensure that the Reserves remain clean and free from litter.
- To promote appropriate use of the Reserves through easily accessible interpretive signage.
- To coordinate signage in the Reserves to limit the proliferation of signs.

4.9.2 EXISTING RECREATION AND IMPACTS

Marri and Armstrong Reserve do not attract many visitors looking for a nature-based experience because of the close proximity of the Meelup Park and the Leeuwin-Naturaliste National Park which offer spectacular scenery and world-class walking tracks. Local residents and tourists regularly use the tracks through Armstrong Reserve to walk between Gifford Road and Naturaliste Terrace, and Armstrong Place and Naturaliste Terrace (figure 6). The main firebreak in Marri Reserve is used less frequently, mostly by nearby residents, because the path does not link any commonly used areas within the townsite (which may change when areas on the western side of Cape Naturaliste Road are developed for private residences). Pedestrian, bicycle and wheelchair access through the Reserves is very low impact and is not of concern unless the public begin to stray from the established paths. Appropriately worded signage should encourage visitors to stay on the established paths only (see section 4.9.5).

Some of the Reserves' visitors like to take their dogs walking with them. The high conservation value of the Reserves' fauna and vegetation communities generally means that dogs should not be permitted within the Reserves. However, as dog walking is an established activity that the community wishes to be able to continue it should be allowed providing that appropriate restrictions are adhered to. To minimise impacts to the Reserves, dog walking should be restricted to the main access tracks in Armstrong Reserve and the main firebreak In Marri Reserve only, and dogs should be excluded from all other areas of the Reserves. To minimise impacts to native flora and fauna, dogs must remain on leashes, and any dog droppings should be removed from the Reserves using the 'poo pouches' provided (see section 4.9.4).

Camping has occurred in the dense bush areas of Marri and Armstrong Reserve in the past. Camping is a cause of litter, and accidental campfire escapes represent a significant fire risk to the Reserves and the surrounding residents. As a result, camping should be prohibited within the Reserves. Prohibiting vehicular access into the Reserves should assist to prevent camping (see section 4.8.2).

Wildflower picking may occasionally occur within the Reserves. As all native flora growing on public lands is protected by the Wildlife Conservation Act (1950), wildflower picking without a license is illegal within the Reserves. Signage should be used to inform visitors of this fact (see section 4.9.5).

Recommendation	Responsibility	Priority
4.9a Dog-walking should be allowed to continue along the main access tracks in Armstrong Reserve and the main firebreak in Marri Reserve only.	Shire of Busselton	High

Recommendation	Responsibility	Priority
4.9b Dogs must remain on a leash and droppings should be removed from the Reserves using the 'poo pouches' provided.	Dog owners	High
4.9c Camping should be prohibited within the Reserves.	Shire of Busselton	High

4.9.3 RECREATIONAL AMENITIES

As the primary objectives of the Reserves' management are conservation of flora and fauna and flood protection, only necessary amenities should be provided. Dunsborough community members are happy with the current lack of amenities within the Reserves, and have requested that the Reserves be maintained in as natural a state as possible. In particular, the community requested that no new walk trails, park or picnic benches, barbecue facilities or toilets be provided within the Reserves. Public toilets, barbecues and picnic benches are available along the Dunsborough foreshore, not far from the Reserves, and car parking is available to the Reserves' visitors at the CWA Hall, adjacent to Armstrong Reserve. As the Reserves are used mostly by local pedestrians who do not need car-parking facilities, no car parking facilities should be provided within the Reserves.

There is no immediate pressure of increased visitation to the Reserves, so no new amenities are immediately needed within the Reserves. However, as the population of the surrounding area slowly increases, new access tracks may be needed through Marri Reserve to provide pedestrian access to the foreshore for residents of future subdivisions on the western side of Cape Naturaliste Road. There is an immediate need to install a 3 m wide firebreak within Marri Reserve to enable the local Fire and Rescue Service and the Bush Fire Brigade to protect life and property from the potentially devastating effects of a wildfire within the Reserve. To prevent the proliferation of tracks within the Reserve, the firebreak should be installed as a formal, dual-use walk trail linking Cape Naturaliste Road and Naturaliste Terrace (see recommendation 4.8c). This will allow the firebreak to be installed in a more aesthetically pleasing manner, meandering through the bush following the ridge line between the two seasonally wet areas (see figures 5 and 6). When planning the installation of the new firebreak and any new tracks or amenities, dieback disease control will need to be considered (see section 4.2.3 and recommendations 4.2f, 4.2g and 4.2h), and a formal survey of the extent of dieback disease will be necessary (see recommendation 4.2d). Prior to the installation of any new tracks, surveys for DRF will also be needed.

Local children use Armstrong Reserve to play in and build cubby houses because there is a lack of playgrounds nearby. The Shire of Busselton should investigate the possibility of installing play equipment for children in either Melaleuca Park or Redgum Place, as they are parkland cleared Shire reserves located nearby.

Visitor numbers to the Reserves should be monitored, and when use of the Reserves appears likely to increase, the provision of public amenities should be reviewed.

Recommendation	Responsibility	Priority
4.9d Amenities such as picnic tables, barbecues or toilets should not be provided within the Reserves.	DCALC and the Shire of Busselton	High

Recommendation	Responsibility	Priority
4.9e No new tracks or amenities (excepting the new dual-use path in Marri Reserve – recommendation 4.7c) should be provided within the Reserves until a review of visitor use deems them necessary.	DCALC and the Shire of Busselton	High
4.9f When planning the installation of any new tracks or amenities in the Reserves, dieback disease control will be need to be considered (see section 4.2.3 and recommendations 4.2f, 4.2g and 4.2h), and surveys for DRF will be needed.	Shire of Busselton and DCALC	High
4.9g The Shire of Busselton should investigate the possibility of installing play equipment for children in either Melaleuca Park or Redgum Place	The Shire of Busselton	Medium
4.9h A program should be established to monitor visitor use of the Reserves, particularly patterns of use and environmental impacts.	DCALC and the Shire of Busselton	Low

4.9.4 LITTER

Fortunately, neither Reserve has been used for large-scale rubbish dumping in the past, as often occurs in urban bushland areas, and the Reserves' vegetation is relatively free of domestic rubbish. There is one small area filled with beer bottles, cans, broken chairs and other rubbish in Marri Reserve, near the confluence of the natural streamline and the drain on Naturaliste Terrace, about 20 m into the bush. There is also a build-up of garden waste being dumped in the Reserves by residents along Marri Drive, Armstrong Place, Cygnet Cove and Alanta Elbow. Several 'clean up' days could be organised by the MRFG to tackle the litter build-up at each of these areas. The Shire of Busselton will provide assistance to remove the collected rubbish.

Small amounts of litter are regularly dumped from cars along the roads surrounding the Reserves, and dropped by pedestrians using the tracks within the Reserve. Regular 'clean up' days (once or twice a year) will be needed to maintain these areas.

Rubbish bins should be provided at the start of the main walking tracks (currently, the northwestern corner of Marri Reserve, on Naturaliste Terrace, and the Gifford Road or Naturaliste Terrace end of the main path through Armstrong Reserve) to assist to reduce litter build up in these areas. Dog 'poo pouches' should be provided at these points, where visitors to the Reserves should be encouraged to bring their litter and 'poo pouches' back to with appropriate signage (see section 4.9.5).

Recommendation	Responsibility	Priority
4.9i Several clean-up days should be organised to remove old litter and garden waste from the Reserves.	DCALC and MRFG	Medium
4.9j The Shire should provide rubbish bins and fortnightly rubbish collection at the start of the main walk tracks.	Shire of Busselton	High
4.9k Dog 'poo pouches' should be regularly supplied to a suitable post next to the rubbish bins.	MRFG and the Shire of Busselton	High
4.9l Regular, community 'clean up' days should be organised to remove litter from the road verges and alongside the main walk tracks.	MRFG	High

4.9.5 INTERPRETIVE SIGNAGE

Signage is an effective way to inform visitors about the Reserves' conservation strategies and any regulations related to use of the Reserves. In Marri and Armstrong Reserve, interpretive signage should be used to inform visitors that:

- Vehicle use is prohibited.
- Camping is prohibited.
- Dumping of litter and green waste is prohibited.
- Wildflower picking is illegal.
- Dogs are prohibited except on a leash.
- Dogs are restricted to the main tracks only.
- Visitors with dogs should use the 'poo pouches' provided.
- To discourage weeds and protect the native flora and fauna, it is very important for visitors and their dogs to stay on the existing walk tracks, and take care to not disturb the fauna, flora or soils within the Reserves.

To ensure that entry points do not end up with a proliferation of signs simply prohibiting specific activities, signage should be carefully coordinated in the Reserves. One Reserve-specific sign should be designed for posting at the major entry points to the Reserves. Ideally, the signs should be eye-catching but simple, incorporate all of the information identified above, and be maintenance free. Wording should be positive and explain why certain activities are not allowed which is generally more effective than a simple list of prohibited activities. Clear icons could also identify what activities are not allowed or discouraged. A simple, colourful map of the Reserves showing the location of walk trails, distances, and other features could be an eye-catching centrepiece to the sign, which should be kept as small as possible. The location of rubbish bins should also be highlighted.

To be effective, signs need to be located in areas where visitors will easily see and use them. In Marri Reserve, the major visitor access point is located at the northern corner, adjacent to Newberry Street, and in Armstrong Reserve, most visitors enter the Reserve at Naturaliste Terrace or Gifford Road (figure 6). Visitor use needs to be monitored to determine which other entry points require signage (see recommendation 4.9h).

A number of other small signs will be needed to assist visitors to use the Reserves appropriately. At the rubbish collection points, simple signage should encourage visitors to bring their rubbish back to that point. The sign should also encourage visitors to use the 'poo pouches' provided to remove their pet's droppings from the Reserves. Signs prohibiting all vehicles except Shire, management and emergency vehicles should also be placed on each management gate.

Recommendation	Responsibility	Priority
4.9m Interpretive signage should be used to inform visitors of the Reserves' regulations and conservation strategies.	DCALC and the Shire of Busselton	Medium
4.9n To avoid the proliferation of signs, all of the information that visitors require at each location should be posted on one eye-catching but simple, positively worded sign.	DCALC and the Shire of Busselton	High
4.9o Interpretive signage should be located at major access points to the Reserves, including the northwestern corner of Marri Reserve, at either end of	DCALC and the Shire of Busselton	Medium

the main walk track through Armstrong Reserve, and at other entry points as appropriate.		
4.9p Signage encouraging visitors to remove litter from the Reserves should be placed at each rubbish collection point.	DCALC and the Shire of Busselton	Medium
4.9q Signage prohibiting all vehicles except Shire and emergency vehicles should be placed at each management gate.	DCALC and the Shire of Busselton	Medium

4.10 *Community Involvement and Education*

4.10.1 OBJECTIVES

- To increase community awareness, understanding, and enjoyment of the Reserves' natural values.
- To educate the community about potential impacts to the Reserves, and any actions that they can take to mitigate these threats.
- To inform and educate the local community about conservation and management strategies being implemented in the Reserves.
- To encourage the local community to participate in managing the Reserves by joining the MRFG.
- To encourage use of the Reserves for educational purposes.

4.10.2 INFORMING, EDUCATING AND INVOLVING THE LOCAL COMMUNITY

Informing and educating the local community can raise awareness and appreciation of the Reserves' natural features and conservation values, and can encourage appropriate behaviour both within and around the Reserves to help minimise impacts to the Reserves' flora and fauna. Within this management plan, a number of recommendations have been made to inform and educate the local community about various impacts on the Reserves, potential threats from living in close proximity to the Reserves, and what they can do to reduce these impacts and threats. Particular information that the local community should be provided includes:

- Information about the Reserves' conservation values.
- Information about weed control, how to prevent weed invasion in the Reserves, the impacts of garden waste on the Reserves, and how to reduce the impacts of residential gardens on the Reserves (recommendation 4.3i).
- Information on the importance of fauna habitat, particularly hollow logs, within the Reserves (recommendation 4.4f).
- Information about the impacts of domestic pets on the Reserves' flora and fauna (recommendation 4.6b).
- Fire awareness information, particularly about things the community can do to help protect themselves and their property from the threat of wildfire (recommendations 4.7j & k).

Some of the information listed above is detailed within specific leaflets published by various government agencies including the DEP (now DEWCAP), AgWA and FESA. The DCALC should contact these agencies to obtain leaflets which can then be distributed to the local community.

Other information could be conveyed via the regular DCALC newsletter, perhaps in a 'Friends of Dunsborough Reserves' section. The newsletter could also be used to inform the local community about specific conservation and management strategies being implemented in the Reserves.

To ensure that responsibility for management of the Reserves is shared amongst a number of committed individuals, so that nobody has too large a task to handle, the DCALC and MRFG should continually strive to increase participation in the groups' activities. Interested local residents should be kept informed about the progress and achievements of both groups, and should be regularly encouraged to lend a hand in any upcoming events.

To encourage community involvement in the DCALC and MRFG activities, social days could also be organised, which can help to bring the community together to appreciate the values that the Reserves provide to the local community, and increase future participation in MRFG activities.

To assist the community to learn about the Reserves' flora and fauna, and various conservation and management measures, including weed and feral animal control, bush regeneration, and non-intrusive fauna surveys, information days could be organised. Assistance with planning and provision of technical advice should be sought from various agencies, including AgWA, GeoCatch, and CALM. Contact details for relevant agencies are given in Appendix 1.

New members for the DCALC and MRFG should be actively sought by regularly advertising in the local press. Placing notices in the Busselton Shire's community information page in the Mail newspaper (via the Shire Environment Officer) and the GeoCatch Network News (contact GeoCatch) is a particularly useful way to reach interested local community members. Notices inviting the public to attend DCALC meetings should also be placed in the local press to ensure that all interested individuals and groups are given the opportunity to participate in the management of the Reserves.

Recommendation	Responsibility	Priority
4.10a The local community should be informed and educated about various impacts and threats to the Reserves, and what they can do to mitigate these threats, via the provision of educative leaflets and newsletters.	DCALC and MRFG	Medium
4.10b The local community should be informed about any potential threats to themselves or their pets from living in close proximity to the Reserve (including bushfire threats and weed and feral animal control programs), and what they can do to protect themselves.	DCALC and the Shire of Busselton	High
4.10c Interested local community members should be informed about the activities, achievements and success of the MRFG, and encouraged to participate in busy bees, social days and information days via the regular DCALC newsletter.	DCALC	High
4.10d The DCALC should actively encourage community participation in DCALC meetings and MRFG activities by placing notices in the local press.	DCALC	High

4.10.3 ENCOURAGING EDUCATIONAL USE OF THE RESERVE

Because of their high regional conservation values, Marri and Armstrong Reserves are a valuable educational resource and research site. It may be a useful site for

environmental studies by schools, TAFE and university groups, local environmental groups and government agencies.

Local high schools, TAFE and universities should be encouraged to undertake any projects which will assist to improve their understanding or appreciation of the Reserves' natural features and conservation values, or research or monitoring programs which may help to better inform and guide future management of the Reserves.

Recommendation	Responsibility	Priority
4.10e Schools, TAFE and universities should be encouraged to use the Reserves for projects that may improve awareness or understanding of the Reserves' natural features and conservation values, or research or monitoring projects that may assist to improve future management of the Reserves.	DCALC and the Shire of Busselton	Low

5 Implementation

5.1 *Dunsborough Coast and Land Care Group and Marri Reserve Friends Group*

5.1.1 THE ROLE OF DCALC AND MRFG

In 2002, the DCALC formally established as an incorporated community group to coordinate and undertake voluntary environmental management projects within the Dunsborough townsite. Formerly, this role was undertaken by the Dunsborough Progress Association. To date, DCALC has successfully coordinated the rehabilitation of sections of two of Dunsborough's urban streams and a number of projects to manage Dunsborough's foreshore. Currently, the membership of DCALC includes many of Dunsborough's committed environmental volunteers and within the group there is considerable existing expertise in coordinating environmental projects and securing external funding. As these committed and experienced individuals are already working together under the auspices of the DCALC, the DCALC would be the most effective organisation to coordinate the implementation of this plan. This would help to integrate community environmental management in the Dunsborough area, and reduce the number of meetings that interested community members need to attend.

Implementation of many of the on-ground works recommended in this plan will require the voluntary efforts of members of the local community as part of a 'Marri Reserve Friends Group' (MRFG), which should be formed as a subgroup of DCALC. Local residents, school groups and other interested community members should be encouraged by the DCALC to actively participate in the Reserves' management as part of the MRFG. The MRFG should be free to join and should allow any interested individuals to come and lend a hand to improve the local environment whenever they can. Allowing people to join the MRFG and come and help without being involved in intimidating and time-consuming meetings and complicated coordination activities may boost the number of volunteers willing to undertake on-ground environmental works. Suitable activities for MRFG volunteers to undertake include: fauna and flora surveys, litter collection, weed control (physical, i.e hand pulling, slashing, mowing, or the use of Roundup Biactive only), vegetation replanting and rehabilitation, seed collection, dieback control (stem injection and vegetation spraying), construction

(trails, shelters and the installation of signage), stream rehabilitation works, and feral animal control.

Recommendation	Responsibility	Priority
5.1a The DCALC should assist the Shire of Busselton to manage Marri and Armstrong Reserves by coordinating the activities of the MRFG within the Reserves consistent with this management plan.	DCALC	High
5.1b The MRFG should be formed as a subgroup of DCALC to undertake on-ground works within the Reserves.	DCALC	High

5.1.2 DCALC RESPONSIBILITIES

The DCALC should allow time at their regular meetings to coordinate and plan the MRFG's activities consistent with this management plan. One member of the MRFG who can attend all DCALC meetings should be delegated to be the MRFG coordinator. The MRFG coordinator should be responsible for organising MRFG volunteers to undertake the work plans as coordinated by DCALC. To inform all groups and agencies involved in environmental management in the area about the planned activities for the MRFG, brief minutes should be recorded at each DCALC meeting and made available to the Busselton Shire, GeoCatch and CALM.

As management of the Reserve will involve ongoing liason with the Shire of Busselton, GeoCatch and CALM, one member of the DCALC should be designated to be the group's agency liason. This person will have the role of contacting and informing the Shire, GeoCatch and CALM of the MRFG's activities. As agencies have found through experience that working with community groups works best when there are delegated contacts within the group, this person should also be the point of contact within the group for each of these agencies.

Representatives of the Busselton Shire, GeoCatch and CALM may be asked to provide advice and assistance to DCALC, and occasionally may be requested to attend DCALC meetings. The Busselton Shire's Environmental Officer is able to assist and advise the DCALC when planning the group's activities, and should be the group's first point of contact within the Shire (contact details in Appendix 1). CALM and GeoCatch should nominate representatives who can provide assistance and advice on bushcare and rivercare to the group as necessary.

To monitor the progress of the DCALC towards achieving the objectives of this management plan, a brief progress report should be prepared by the group each year. The annual report should list all the activities undertaken by the MRFG in the past twelve months including brief notes on their success or otherwise, and specify which of this plan's recommendations each activity addresses. The annual report should be provided to MRFG members, the Shire of Busselton, GeoCatch, CALM and interested community members.

Recommendation	Responsibility	Priority
5.1c The DCALC should allow time at their regular meetings to plan the MRFG's activities and work towards achieving the objectives outlined in this plan by addressing the listed recommendations according to priority.	DCALC	High

Recommendation	Responsibility	Priority
5.1d A MRFG coordinator who is able to attend all DCALC meetings should be appointed to organise volunteers to undertake the work plans as coordinated by DCALC (see recommendation 5.1l).	DCALC	High
5.1e Minutes from the DCALC meetings detailing the MRFG's plans and activities should be made available to the Shire of Busselton, GeoCatch and CALM.	DCALC	High
5.1f One member of the DCALC should be designated to be responsible for informing the Shire, GeoCatch and CALM of the MRFG's activities, and be the point of contact within the group for these agencies.	DCALC	High
5.1g The Shire's Environmental Officer should be the first point of contact within the Shire for the DCALC, and should provide assistance and advice to the group as necessary.	Shire of Busselton	High
5.1h GeoCatch and CALM should nominate representatives who will be available to provide advice and assistance to the DCALC and MRFG as necessary.	GeoCatch and CALM	High
5.1i The DCALC should prepare a brief annual report listing the group's activities and successes or otherwise over the past twelve months to measure progress against the recommendations of this management plan.	DCALC	High

5.1.3 INSURANCE REQUIREMENTS

The Volunteer (Protection from Liability) Act 2002 provides some protection for volunteers for personal legal liability to others for work done on a Shire reserve on a purely volunteer basis (i.e. no payment or reward). The Shire however, does not provide personal injury insurance for volunteers in relation to any injury they may suffer in doing this type of work. People getting involved in works on Marri and Armstrong reserves are advised to join DCALC, a Landcare umbrella organization that can provide such cover to it's members.

Under the Shire Friends of Reserves Strategy DCALC are required to annually confirm in writing that they and MRFG accept the conditions of the Shire's Friends of Reserves Strategy (see Anon, 1999). The strategy requires the establishment of an accurate 'Volunteer Register' which must record the names and contact details of all volunteers attending work days or undertaking any activities within the Reserves. The Shire will also need to be notified in writing of a list of volunteers, one of whom will always be onsite to direct activities as the MRFG Coordinator. The MRFG Coordinator must ensure that all volunteer details are accurately recorded in the volunteer register.

Recommendation	Responsibility	Priority
5.1j For insurance purposes, the DCALC will need to annually confirm in writing that the DCALC and MRFG accept the conditions of the Shire of Busselton's 'Friends of Reserves Strategy'.	DCALC	High
5.1k The MRFG should establish an accurate 'Volunteer Register' which must record the names and contact details of all volunteers attending work days or undertaking landcare activities within the Reserves.	MRFG	High

Recommendation	Responsibility	Priority
5.1l The Shire will need to be notified in writing of a list of volunteers (the MRFG membership) one of whom will always be onsite to direct activities as the MRFG Coordinator.	MRFG	High

5.2 *Shire of Busselton Assistance*

Management of Marri and Armstrong Reserves has used few Shire resources to date. Adoption and implementation of this management plan will require greater involvement from the Shire in management of the Reserves. The DCALC and MRFG will expect the Shire to provide assistance (such as equipment, herbicides, and other materials) where it is needed and when it is available.

Formation of the MRFG may involve the Shire Council to oversee the management and administration of the Reserves, and provide the DCALC and MRFG with grant-matched funding when it is available to manage the Reserve. To ensure that the DCALC and MRFG receive assistance from the Shire, the DCALC will need to keep the Shire informed of the MRFG's proposed activities. It will be the responsibility of the DCALC to forward their future funding requests and work plans to the Shire to meet deadlines for the Busselton Shire Council's annual budgets and four year projection plans. The Shire's Environmental Officer can provide some advice and assistance to the DCALC to help with work planning and funding requests (contact details in Appendix 1). Information that the Shire requires for its planning processes includes details of any proposed projects and activities, any equipment or technical assistance required, and any costs.

Recommendation	Responsibility	Priority
5.2a The Busselton Shire should be notified well in advance of future projects and requests for funding and assistance so that the Shire can plan its budget accordingly. Ideally, DCALC should forward their work plans and future funding requirements to coincide with the Busselton Shire's annual budgets and 4 year plans.	DCALC	High

5.3 *External Funding Opportunities*

There are many sources of funding from both State and Federal Governments and various non-government organisations which are available to volunteer community groups to undertake conservation and management activities on public lands. The DCALC and the Shire of Busselton should actively seek funding from these sources to assist with the implementation of this plan. Generally, when a recognised community group is seeking to implement the recommendations of a formally adopted management plan, such as this, external funding can be relatively easy to obtain.

A comprehensive Federal Government website that details information about government grants available to community groups can be accessed online at www.grantslink.gov.au. This is a useful starting point to find external funding to assist the group in managing the Reserve.

A selection of funding sources and grants that may be available to the DCALC and the MRFG are:

- Natural Heritage Trust Envirofund Program (Environment Australia) – provides assistance with a variety of conservation related projects.
- Save the Bush Program Grant (Environment Australia) – provides assistance for bushland conservation and rehabilitation projects.
- National Conservation Trust (Environment Australia) – provides assistance for conservation related projects including weed and vermin control, and fencing.
- World Wide Fund Threatened Species Network Community Grants – provides assistance for projects to conserve threatened species
- Gordon Reid Foundation for Conservation (W.A. Lotteries Commission) – provides assistance for flora and fauna surveys, weed and vermin control programs and other conservation related projects.
- Greening Australia WA – provides assistance with bush regeneration and rehabilitation projects.
- Tourism Development Fund (South West Development Commission) – provides assistance with projects to develop interpretive signage.
- Australian Family Foundation – provides assistance with educational projects.

This list is by no means comprehensive, and funding sources are continually changing. To ensure that the DCALC keeps abreast of funding opportunities, the group should register its interest with various agencies, so that it can be placed on mailing lists to receive notification of applications and deadlines for submissions. Agencies to start at include the Busselton Shire, the Lotteries Commission, Environment Australia, Greening Australia WA and the South West Development Commission.

Recommendation	Responsibility	Priority
5.3a External funding opportunities should be actively sought to implement the recommendations of this management plan.	DCALC and the Shire of Busselton	High

5.4 *Tenure, Monitoring and Review of the Management Plan*

Once adopted by the Busselton Shire Council, this management plan should remain active until another plan is adopted.

Throughout the term of this plan, new information about the Reserves' flora and fauna and use by the community will be generated through research and monitoring. The recommendations of this plan will need to be reviewed when important new information becomes available, particularly about dieback disease, native fauna populations, and rare and priority flora, to ensure that the plan's recommendations continue to adequately manage potential impacts to the Reserves' conservation values.

This management plan should be comprehensively reviewed within five years of its adoption to enable the Shire and the DCALC to measure progress against each recommendation, and determine whether the plan continues to protect the Reserves' conservation values and reflect current community attitudes and expectations. Provision should be made to amend the plan as necessary.

Recommendation	Responsibility	Priority
5.4a The recommendations of this management plan should be reviewed as new information about dieback disease, native fauna populations, and rare and priority flora becomes available. If necessary, the recommendations should be amended to ensure that the Reserves' conservation values are protected.	Shire of Busselton	High
5.4b This management plan should be comprehensively reviewed within five years of its adoption by the Busselton Shire Council.	Shire of Busselton	High

6 References and Further Reading

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Figure 1. Location of Marri and Armstrong Reserves, Dunsborough.

Figure 2. Aerial photograph of Marri and Armstrong Reserves showing cadastral boundaries.

Figure 3. Extent of the Abba Plain land system in the Geographe Bay catchment (Tille and Lantzke, 1990).

Figure 4. Vegetation condition in Marri Armstrong Reserves (using the condition criteria of White, 2002).

Figure 5. Access tracks and firebreaks in Marri Armstrong Reserves.

Figure 6. Watercourses, drains and stormwater detention basins in Marri and Armstrong Reserves.

Figure 7. Key weed areas in Marri and Armstrong Reserves.

Appendix 1: Useful Contacts

Busselton Shire
Environment Officer
Shire of Busselton
Southern Drive
BUSSELTON WA 6280
Ph: (08) 9781 0444
Fax: (08) 9752 4958

CALM – Blackwood District
14 Queen Street
BUSSELTON WA 6280
Ph: (08) 9752 5555
Fax: (08) 9752 1432

CALM – Land for Wildlife
Cherie Kemp
CALM Blackwood District
14 Queen Street
BUSSELTON WA 6280
Ph: (08) 9752 5555
Fax: (08) 9752 1432

CALM – Bushcare
CALM Bunbury Regional Office
North Boyanup Road
BUNBURY WA 6230
Ph: (08) 9725 4300
Fax: (08) 9725 4351

Greening Australia WA
APACE Aid
Australian Association of Bush Regenerators (Inc.)
Winter House
1 Johanna Street
NORTH FREMANTLE WA 6159
Ph: (08) 9336 1262
Fax: (08) 9430 5729

Busselton Dunsborough Environment Centre
25 Prince Street
BUSSELTON WA 6280
Ph: (08) 9754 2049

Agriculture Western Australia
Phil Williams
Agriculture Protection Officer
Queen Street
BUSSELTON WA 6280
Ph: (08) 9753 0333
Fax: (08) 9753 1068

Geocatch Network Centre
Unit 2 Palm Court
72 Duchess Street
BUSSELTON WA 6280
Ph: (08) 9781 0111
Fax: (08) 9754 4335

Fire and Emergency Services Authority
Tony Moran
Operations Manager
P.O. Box 1288
BUNBURY WA 6230
Ph: (08) 9780 1900

Toby Inlet Catchment Group (Inc.)
Cape Naturaliste Regional Herbarium
Don Carter
EAGLE BAY WA
Ph: (08) 9756 8080

Geographe Community Landcare Nursery
Lynne Boladeris
Queen Elizabeth Drive
BUSSELTON WA 6280
Ph/Fax: 9754 2049

Greening Australia Seedbank Project (Dunsborough contact)
Richard Clarke
Ph: 9756 8971 or 0427 385 551
Email: rmc@swisp.net.au

Appendix 2: Flora List for Marri Reserve

Appendix 3: Weed Survey for Marri and Armstrong Reserves