

A Resilient Blackwood Basin in a Changing Climate

Concept Plan



The Blackwood River

Prepared by the Landcare Officers of the Blackwood Basin Group, Katanning LCDC, Dumbleyung Landcare Zone, Wagin-Woodanilling Landcare Zone, Lower Blackwood LCDC and West Arthur Landcare, with input from the Blackwood Basin Group Committee.

Co-ordinated by Ella Maesepp, Katanning LCDC

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1.0 Aim

To strengthen the ecosystem of the Blackwood River Basin, South West WA, to be resilient in the face of climate change, habitat fragmentation, biodiversity decline and other environmental challenges.

2.0 Objectives

- To establish the entire length of the Blackwood River and its upstream major tributaries (Arthur River, Hillman River, Beaufort River, Coblinine River, Carrolup River, Buchanan River), as a single continuous vegetation corridor, linking the entire Basin and intersecting with the western end of Gondwana Link.
- To provide connectivity between currently isolated habitat areas across the landscape of the Basin – both remnant and newly vegetated - to protect, maintain and restore critical ecosystem processes and functions.
- To reinforce the ecological function of transitional zones between IBRA regions within the Blackwood Basin to support faunal and floral migration and adaptation to climate change.
- To better understand the ecosystem and dispersal requirements of local native flora and fauna, and how they are likely to respond to climate change.
- To educate, empower and support the Blackwood community to care for their River Basin in partnership with a range of stakeholders and land uses, including agriculture.

3.0 Background Information

3.1 The Blackwood River Basin

The Blackwood River Basin is located in the south-west biodiversity hot-spot of Western Australia and covers approximately 22,000 square kilometres (Figure 3.1.1). The Blackwood is the longest river in the south-west, stretching for 300km. The region has a Mediterranean climate, with cool, wet winters and hot, dry summers. Annual rainfall varies throughout the basin from an average of 350mm in the upper catchment to 1400mm in the lower reaches.

The upper section of the catchment consists of a series of broad lakes, interconnected by poorly-defined river channels. These have become highly saline as a result of increased land salinization following broadscale clearing for agriculture. The upper catchment only flows to the lower catchment rivers, which are fresher, a few times each century following significant rainfall.

The Blackwood is one of six sub-catchments within the South West NRM Region.

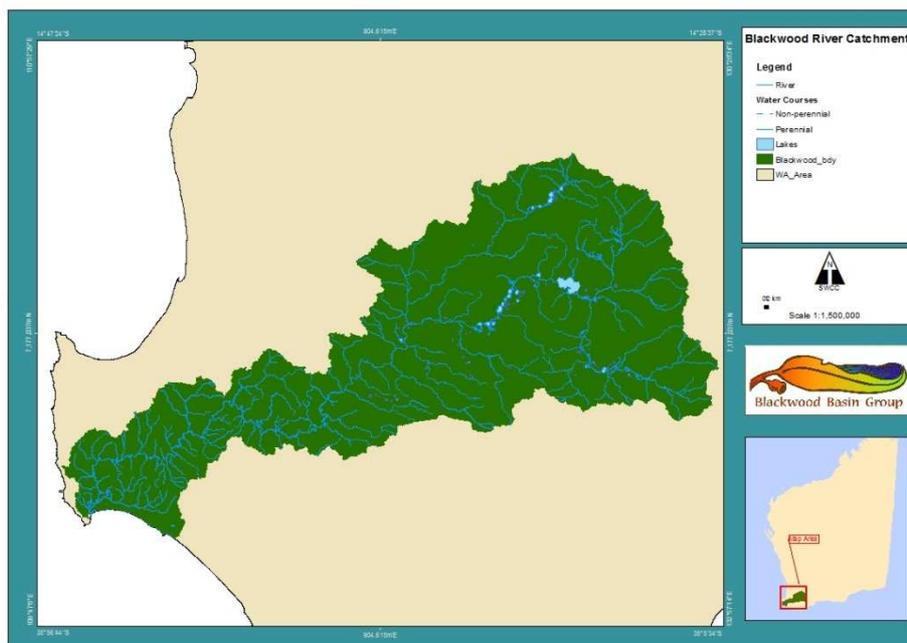


Figure 3.1.1 Map showing location of the Blackwood within Western Australia

An estimated 78% of the catchment is devoted to agriculture and as a result, large areas of land have been cleared (Figure 3.1.2). This clearing has led to a number of serious environmental and social issues, including dryland salinity, loss of biodiversity and water quality decline.

3.2 A Transitional Place

The Blackwood River Basin traverses a complex diversity of landscapes, from the tall timbers of the high rainfall Augusta-Margaret River area at the western-most extent, through the Jarrah (*Eucalyptus marginata*) forests along the Darling Escarpment, and east into the woolbelt and broadacre grain-belts dominated by Wandoo (*Eucalyptus wandoo*) then mallee country.

There are four IBRA (Interim Biogeographic Regionalisation of Australia) regions in the Blackwood – the Warren, Jarrah Forest, Avon Wheatbelt and the Mallee (Figure 3.2.1). Each has its own unique ecological assemblages, formed over thousands of years and closely linked with soil type and rainfall.

These give rise to transitional areas, with residual ancient vegetation types formerly associated with high rainfall tropical climates interspersed with younger vegetative families. Together they give hope for the future as their combined gene pool, if given the chance to disperse, will provide adaptive responses to an ever changing climate.

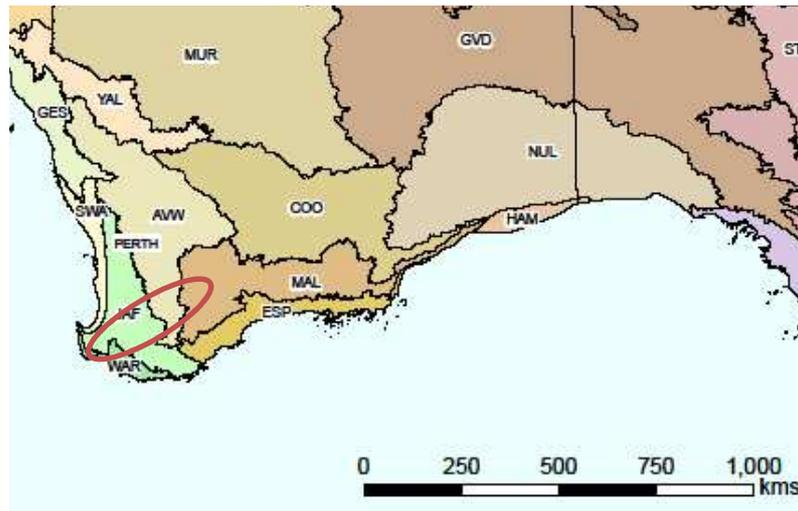


Figure 3.2.1 Map showing area of the Blackwood crossing four IBRA Regions.

The Blackwood Basin is located within the South West Biodiversity Hot-spot, one of 35 identified locations around the world containing more than 1500 endemic species. There are a large number of rare and threatened plant and animal species within the Blackwood Basin (Table 3.2.1).

Table 3.2.1 Some of the priority species found within the Blackwood Basin.

Common Name	Scientific Name	Conservation Status
Caranbys Cockatoo	<i>Calyptorhynchus latirostris</i>	Endangered
Red Tailed Phascogale	<i>Phascogale calura</i>	Endangered
Wagin Banksia	<i>Banksia oligantha</i>	Endangered
Drummonds Conostylis	<i>Conostylis drummondii</i>	Declared Rare Flora
Chuditch	<i>Dasyurus geoffroii</i>	Vulnerable

The Blackwood Basin contains Lake Toolibin, a Ramsar listed wetland, and also contains Listed Important Wetlands from Lakes Coyrecup and Dumbleyung in the upper catchment through to the lower (western) reaches of the Blackwood.

3.3 Landcare in the Blackwood

The Blackwood catchment is divided into nine Landcare Zones (Figure 3.3.1), each with their own management committee comprising of local volunteers and representatives whom co-ordinate the Landcare activities undertaken in their Zone. Many of the Zones employ local Landcare Officers who work in direct collaboration with community groups and landholders to deliver Landcare outcomes. The Blackwood Basin Group (BBG) provides an umbrella role for the Landcare Zones, assisting with strategic co-ordination across the Basin.

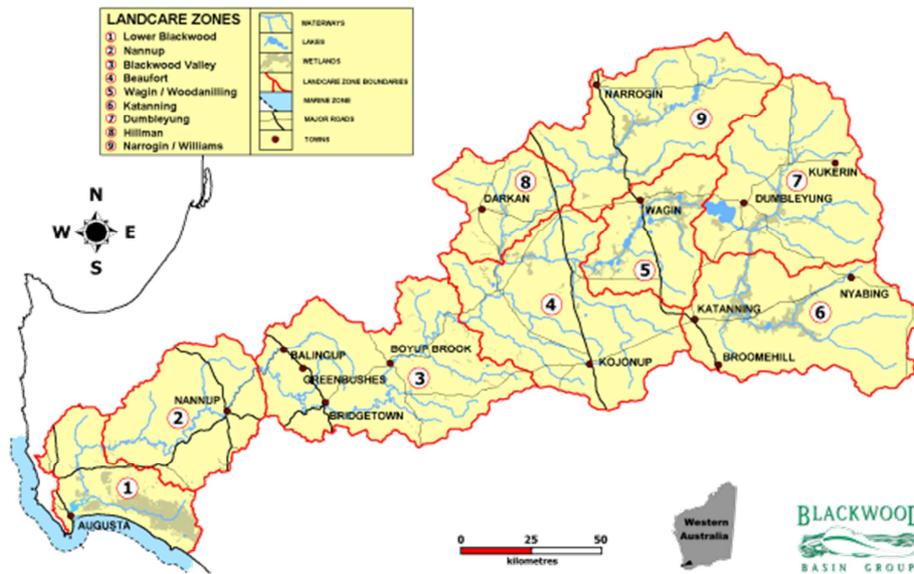


Figure 3.3.1 Map of the Landcare Zones within the Blackwood Basin

The Blackwood Basin has a strong history of successful Landcare. The BBG is the only Australian winner of the coveted Thies International Riverprize (2001). The prize money enabled the establishment of the Blackwood River Foundation to further support environmental work in the Basin through philanthropy.

Throughout the Landcare Zones there is strong local engagement in Landcare, due to the trust and relationships established between landholders and their local Zone, Landcare Group and Officer over a period of over 20 years. State and National Awards have been won throughout the Basin, including:

- Wagin-Woodanilling Landcare Zone – Winner Community Group Category, National Landcare Awards 2005
- John & Dianne Pickford – Winner Primary Producer Category, WA Landcare Awards 2003
- Katanning Creek Catchment Group – Winner Catchment Category, National Landcare Awards 1999
- Tim Harris – Winner Young Landcare Leader Category, WA Landcare Awards 2011
- Blackwood Basin Group - BestFarms project. Winner for Environmental Excellence, Landcorp Environmental Sustainability Award category, Regional Achievement and Community Awards
- Blackwood Basin Group – BestFarms project. Winner, Environmental Responsibility category, Australian Business Awards 2007

The philosophy of the Blackwood is that community ownership of catchment problems will produce appropriate solutions, given adequate resources and technical assistance.

4.0 Threats to the Blackwood Basin

4.1 Climate Change

The South-West of WA is predicted to get drier under climate change, with reductions in rainfall of the order of 20% predicted - some of the most dramatic changes in Australia. As a result, the current rainfall isohyets (Figure 4.1.1) are predicted to move west. There is also the risk of increased extreme weather events such as flooding and droughts which impact on management decisions.

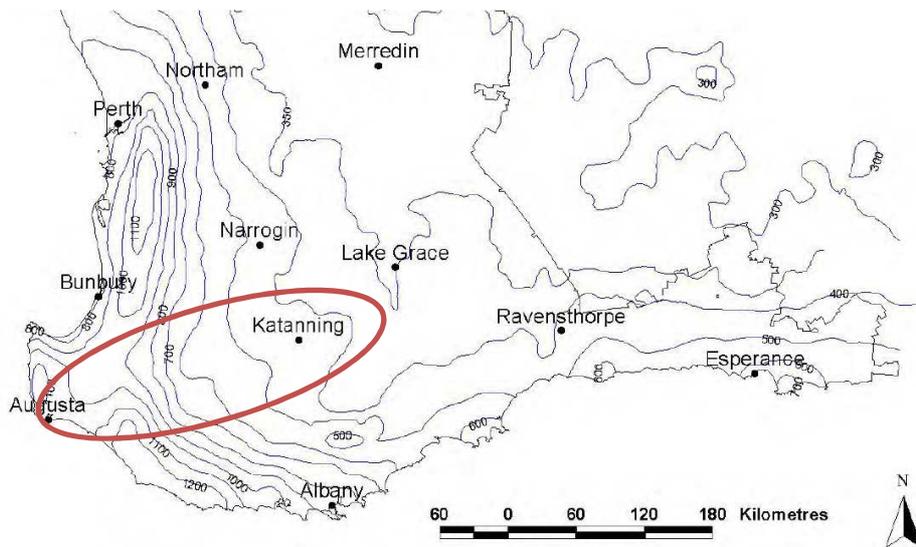


Figure 4.1.1 Rainfall Isohyets (1961 – 1990) for the SW of WA, with the Blackwood indicated. (BoM via DAFWA)

Within each IBRA region, providing that the local vegetation is in good enough condition and well connected, there is capacity for the suite of plants, animals, cryptogams and other species to shift west with the drying conditions whilst remaining within their required habitat type.

However, along the boundaries of the IBRA regions, the ability to adapt to climate change is significantly reduced. As the area dries, species will need to migrate further west. However at these transitional points, the species will be moving into areas that are not their natural habitat, and therefore may not provide the ecosystem services they require. This may present significant challenges for the conservation of biodiversity within the Blackwood - but if managed effectively can potentially increase species richness, particularly with regard to the high level of endemism present with the catchment.

4.2 Altered Hydrological Regimes

With the broadscale clearing of native vegetation for agriculture, the natural hydrological systems of the Blackwood Basin have been significantly altered.

Groundwater tables in the eastern part of the Blackwood have risen substantially, creating wide areas of waterlogged valley floor. Salts dissolved from the soil profile have been brought to the surface causing secondary salinization of soil and waterways. There is concern that the large amount of salt now stored in the upper catchment will cause damage to the environment of the lower river

next time the waters connect following significant rainfall. Rehabilitation of saline areas in the upper catchment will assist to reduce this risk.

Native species that cannot grow in waterlogged and/or saline soils have died. In some places, natural recolonisation or revegetation have brought in species that can grow in these conditions and provide the necessary ecosystem services. These can become important patches to improve habitat availability across the landscape. In other areas, there has been a loss of vegetation completely leaving soil susceptible to erosion and decline in soil biota.



Figure 4.2.1 Loss of vegetation due to altered hydrological regimes, east of Katanning.

The flooding cycles of natural watercourses and waterbodies have been altered since European colonisation. With an increase in runoff from cleared agricultural lands, systems are taking greater volumes of water, often of poorer quality, introducing further waterlogging and erosion issues. Some changes in agricultural practices, such as no-till, has decreased run-off.

4.3 Fragmentation

The jarrah forest section in the lower Blackwood is largely intact and does not suffer major issues from habitat fragmentation.

However, the rest of the Blackwood Basin has been significantly cleared, for agricultural and urban expansion. Almost 78% of the Basin is cleared. This has resulted in many small pockets of remnant vegetation, some at or below the critical size for being self-sustaining, scattered across the landscape. Of even greater significance is the isolation of these patches, with many not being connected to other patches of remnant vegetation.

Without linking corridors, the ability for animals and plants to disperse across the landscape is reduced, impacting on the ability to maintain genetic diversity, escape from threats or shift in response to climate change.

4.4 Pests and Weeds

Introduced pests and weeds compete with native species for light, nutrients, food, water and shelter. The incursion of pests and weeds can threaten the survival of native species, adversely impacting on biodiversity and the resilience of ecosystems. A range of pest and weed species currently occur in the Blackwood (Table 4.4.1), and significant investment is being made in their control.

With the onset of climate change, there is concern that ideal conditions for certain pests and weeds will occur across a larger area of the Basin, increasing their threat to native species. Opportunistic spread, such as response to increased summer rains, will also occur.

Table 4.4.1 Some of the key pests and weeds in the Blackwood Basin.

Weeds		Pests	
Bridal Creeper	<i>Asparagus asparagoides</i>	Foxes	<i>Vulpes vulpes</i>
Arum Lilly	<i>Zantedeschia aethiopica</i>	Rabbits	<i>Oryctolagus cuniculus</i>
Spiny Rush	<i>Rudus acuta</i>	Cats	<i>Felis catus</i>
Silverleaf Nightshade	<i>Solanum elaeagnifolium</i>	Pigs	<i>Suinae sp.</i>
Boneseed	<i>Chrysanthemoides monilifera</i>	Goats	<i>Capra aegagrus hircus</i>
European Blackberry	<i>Rubus fruticosus aggregate</i>		

4.5 Dieback and Other Fungal-Borne Diseases

Dieback (*Phytophthora cinnamomi*) has infected large tracts of jarrah forest, killing native plants particularly those in the *Proteaceae* genera. Dieback is easily spread through soil movement from vehicles, feral pigs, water and feet. Treatment is slow and expensive, and cannot cover all of the currently affected areas. The threat of spread is very real particularly via recreational vehicles travelling between infection zones and undertaking no control measures. Other fungal-borne diseases can also spread through these pathways.

4.6 Fire

Wildfire and its positive effects on native vegetation are well known. Of concern however, is the lack of knowledge and an appropriate Fire Management Plan specific to the middle catchments with the aim to preserve life, conserve native vegetation and reduce the influx of invasive species. Conflicting information exists which requires a major investment in time and resources to ensure a best management approach is taken. Little is understood of post-fire management which has seen a rapid invasion by weedy grasses into once pristine bushland, further increasing the risk of fire in the future.

4.7 Decline in Community Capacity

No management can take place without humans, and the scale of the Blackwood and its environment is beyond the capacity of government agencies to manage alone. Landholders, traditional owners, Landcare Groups and other volunteers are integral, and a loss in capacity amongst these groups would be detrimental to the Blackwoods environment. Reduced funding for community groups, increasing time pressures on individuals, stricter legislative controls and rising costs of environmental management activities could all have a negative impact on the resilience of the Blackwood environment.

5.0 Strategies

This Concept Plan should be developed into a full Implementation Plan to guide the community of the Blackwood Catchment towards creating a continuous corridor following the river system and connected to its hinterland, whilst placing particular emphasis on strengthening the transitional zones between IBRA regions ready for climate change. The Plan will draw upon a range of strategies to achieve the Aims and Objective as set out in this Concept Plan.

Table 5.0.1 Strategies to achieve the Aims of this Concept Plan

Number	Strategy
1	Draw upon current information and knowledge to prepare an Implementation Plan for the <i>Resilient Blackwood Basin in a Changing Climate</i> program, with appropriate review mechanisms in place to update the Plan as more information becomes available.
2	Identify gaps in baseline knowledge through identifying existing species and their population levels, mapping extent of pest species and identifying TEC's within those areas of the Blackwood Basin which have not been monitored or in which current information is critically out of date.
3	Access and utilise scientific information, existing documents and technology to better understand the predicted impacts of climate change on the Blackwood Basin environment, and methods to manage that change.
4	Use scientific and community information and feedback to underpin planning and investment decisions.
5	Undertake on-ground actions to increase connections both between remnant vegetation patches, between those patches and the River system, and along the River system itself.
6	Undertake on-ground actions to improve the resilience of native vegetation stands to threats such as climate change, with particular emphasis on the IBRA transitional zones.
7	Undertake on-ground actions to support critical processes for native animals, including habitat, food, shelter, dispersal and protection from predation threats.
8	Undertake on-ground actions to control pests, weeds and diseases which threaten ecosystem values.
9	Educate the community about the environmental values and threats in the Blackwood, and techniques to protect and enhance the ecosystem particularly in respect to climate change.
10	Co-ordinate, support and empower landholders, land managers, community groups and other partner organisations to engage in Landcare and sustainable agriculture activities within the Blackwood.

6.0 Proposed Actions

The Actions listed below are indicative of the range of actions that would be required to implement the Strategies in order to achieve the *Resilient Blackwood Basin in a Changing Climate* program Aims.

Category	Action	Strategy Area
Planning	Work with stakeholder groups to gather information and agreed outcomes for a <i>Resilient Blackwood Basin in a Changing Climate</i> Implementation Plan and program.	1, 2, 3
	Prepare maps that show current and predicted rainfall, vegetation and habitat zones under predicted climate scenarios.	2, 3
	Develop criteria to guide investment prioritisation against each of the Aims of the Plan.	4
	Investigate the suitability of using the <i>Hardy Inlet Water Quality Improvement Plan</i> and the <i>Augusta-Margaret River Shire Conservation Action Plan</i> models to prioritise works in other Blackwood Landcare Zones.	4
	Ensure investment decisions are made with both technical and community input.	4, 10
	Develop hydrological plans for major tributaries and catchment areas to address degraded and flooded systems to guide landholder works such as surface water management, strategic plantings, riparian restoration and change in land management practice. Include public assets such as roadways and culverts where existing or planned corridors traverse the landscape.	4
	Support the Landcare Zones within the Blackwood Basin to incorporate climate change planning into their Local Action Plans.	3, 4, 10
Research & knowledge	Participate in research to better understand the values and risks of using plants from an adjacent rainfall zone to prepare the landscape for climate change.	3
	Participate in other relevant research conducted through research organisations.	2, 3
	Undertake mapping at locally appropriate scales and intervals to identify condition and status of corridors, remnants and populations, to use in prioritisation, decision making and monitoring.	1, 2, 3, 4
	Participate in species ID (endemic and invasive flora and fauna) research projects in those areas of the basin where no such information exists, is scanty or is out of date	2
	Identify priority populations and TEC's in those areas where this data has yet to be gathered or is provided in a readily available format	1, 2, 4
	Host community and technical workshops with knowledgeable guest speakers on relevant topics.	9
	Invest in alternative and innovative practices to translate knowledge into on-ground actions.	4, 5, 6, 7
Partnerships	Foster partnerships with research organisations studying ecosystems, species and climate change within the Blackwood.	2, 3

	Foster a working relationship with Gondwana Link, through a common western end to both corridors.	10
	Work collaboratively with land managers, industry and community groups to achieve on-ground outcomes.	9, 10
	The Blackwood Basin Group to act as an umbrella organisation to co-ordinate collaboration and partnerships between Landcare and other relevant groups within the Basin to implement this program.	10
	Develop partnerships with funding providers, including the WA and Australian Governments and private industry to resource the implementation of the Plan.	10
	Employ skilled Officers and support them with appropriate training and development to undertake implementation activities and support communities.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
On-Ground	Strengthen existing wildlife corridors eg roadways, fencelines and waterways through fencing, revegetation, weed control, regeneration, habitat enrichment (eg nesting boxes) and other appropriate techniques.	5, 6, 7, 10
	Fence existing native vegetation to exclude stock and/or feral animals, and encourage regeneration and/or revegetation as appropriate.	6, 10
	Establish new wildlife corridors between patches of existing vegetation, and between vegetation patches and the River system.	5, 7, 10
	Create new patches of native vegetation to expand the area of native habitat available, reduce the distance that new corridors need to traverse between patches and minimise salinity.	5, 6, 7, 10
	Fence and revegetate / regenerate waterways.	5, 7, 10
	Control weeds and diseases at invasion fronts and in outlier populations.	6, 8, 10
	Undertake co-ordinated feral animal control.	7, 8, 10
	Undertake appropriate on-ground activities, as identified through research, to strengthen IBRA transitional zones.	6, 10
Monitoring & Evaluation	Monitor animal populations at the transitional boundaries to gauge their response to climate change and to guide investment decisions.	1, 2, 3, 4
	Undertake an annual review of the <i>Resilient Blackwood Basin in a Changing Climate</i> Implementation Plan, incorporating new learnings and data gathered through research and practice.	1, 4
	Collect GIS information on completed works to incorporate into Basin mapping.	1
	Prepare communication materials to share successes and lessons learnt with other corridor projects in Australia and overseas.	9

7.0 Key Stakeholders

- Farmers
- Landholders
- Landcare Groups and other associated environmental & sustainable agriculture groups
- Blackwood Basin Group
- South West Catchments Council (Regional Body)

- State Government Agencies
- Local Government
- Australian Government
- Traditional indigenous owners
- Research organisations
- Industry operating within the Blackwood

8.0 Links to other Frameworks and Plans

- National Wildlife Corridors Plan (draft)
- South West Catchments Council Regional Strategy
- Gondwana Link
- Australia's Biodiversity Conservation Strategy 2010 – 2020 (draft)
- Australian Framework for Landcare
- Australia's Native Vegetation Framework
- Zone Action Plans including:
 - Wagin Woodanilling Landcare Zone Action Plan 2006
 - Dumbleyung Zone Action Plan 2002
- Wagin Lakes Management Plan
- Blackwood Basin Group Strategic Action Plan
- Hardy Inlet Water Quality Improvement Plan
- Augusta – Margaret River Shire Conservation Action Plan
- River Action Plans
- Restoring Lake Ewlyamartup Concept Plan 2010

Blackwood Basin Group

PO Box 231 Boyup Brook WA 6244

Ph 08 9765 1555

blackwoodbasingroup@westnet.com.au