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Weed plan for Western Australia

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A WEED PLAN FOR WESTERN AUSTRALIA



Prepared by the
STATE WEED PLAN STEERING GROUP

October 2001

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One of the most significant environmental challenges facing Western Australia is the minimisation of the impact of weeds. In the relatively short history of this State since European settlement, some 1155 exotic plant species have established as weeds in our diverse and generally fragile ecosystems. While development for agriculture, mining, transport and housing must by its nature result in some change to the State's flora, the introduction of weedy plant species has caused serious impacts which cause great concern.

Weeds now pose a serious threat to many of the State's ecosystems, and impose high annual costs on agricultural industries. Weeds pose a more widespread risk to the State's bioregions than does salinity, recognised as Western Australia's most serious environmental challenge. Without a substantial change in the way weed problems are tackled, the long-term impact of weeds on the economy, environment and community may approach, or even exceed, that of salinity.

Development of *A Weed Plan for Western Australia* (referred to as the 'State Weed Plan') was initiated because a wide range of community, industry and government stakeholders recognised that there "had to be a better way" of reducing the impact of weeds.

The need for a closely coordinated approach, with appropriate participation at all levels, led to the establishment of the State Weed Plan Steering Group in March 1999 with membership broadly representative of stakeholders and issues. I commend and thank the Steering Group members for the commitment, innovation and cooperation they have brought to the development of the draft plan.

The principles on which the State Weed Plan is based, the broad approach adopted in framing a way forward, and the identified priorities have been presented to a wide range of stakeholders. Once again, the commitment of these Western Australians to developing a better way of managing weeds has resulted in very constructive input. Comments provided through public meetings and 80 submissions have been incorporated where appropriate.

The State Weed Plan is, by necessity, a broad, over-arching document in which it is not possible to provide full details of all current, planned and recommended activities. Considerable work has been completed toward drafting a State Weed Action Plan, which will be the work plan for implementing the State Weed Plan. The input of all stakeholders has contributed to development of the draft Action Plan.

The State Weed Plan Steering Group looks forward to your commitment to implementing activities relevant to the priorities outlined in the State Weed Plan. Formal consideration by government, industry and community organisations with respect to initial priorities for implementation should result in more effective, efficient action against the State's most serious weed problems.

Rob Delane
CHAIRMAN
STATE WEED PLAN STEERING GROUP
9 September 2001

ABBREVIATIONS AND ACRONYMS

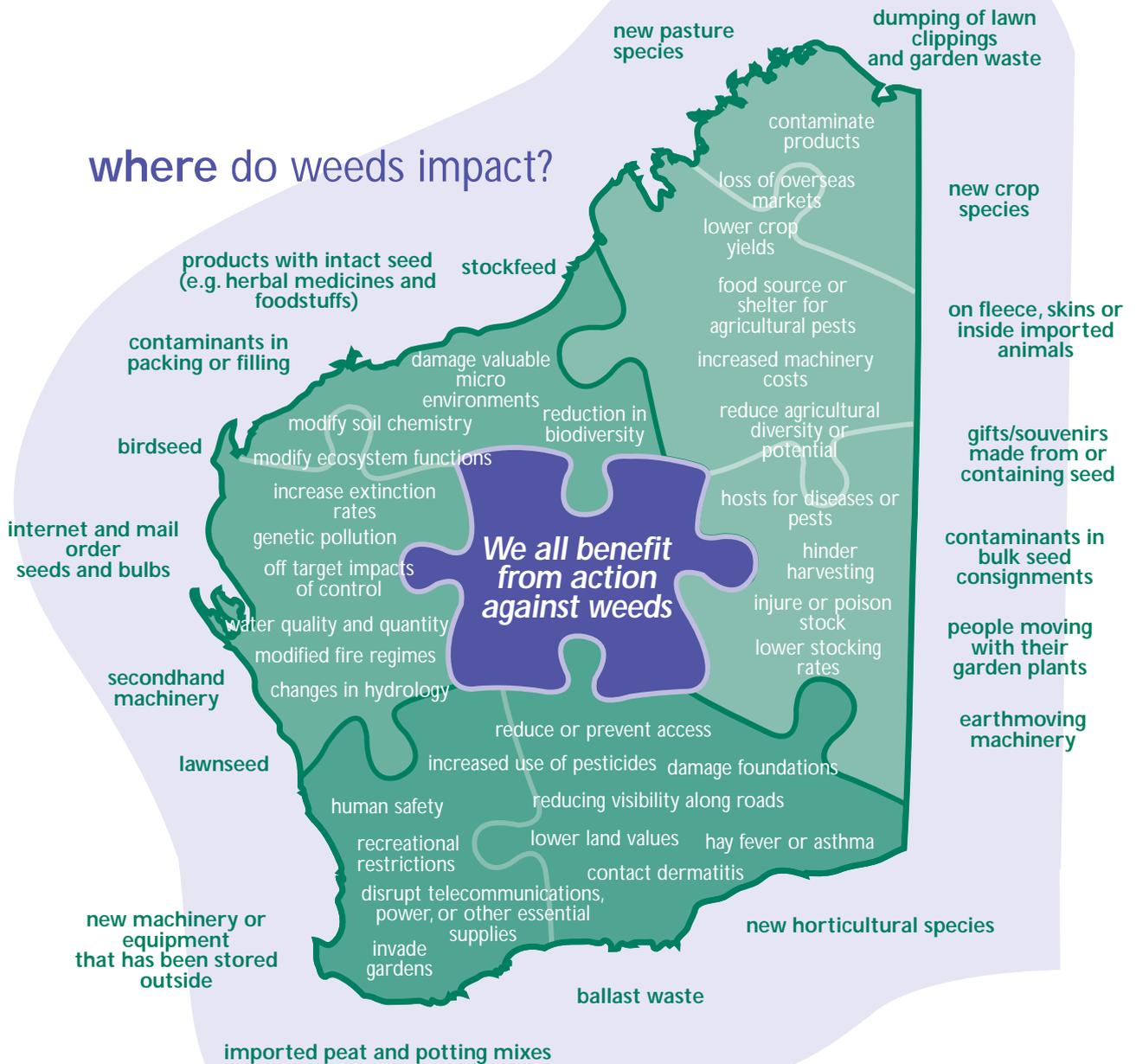
AABR	Australian Association of Bush Regenerators	NGIWA	Nursery and Garden Industry Australia Western Australia (was NIAWA)
ABS	Australian Bureau of Statistics	NHT	Natural Heritage Trust
AGWEST	Department of Agriculture	NRM	Natural Resource Management
ANZECC	Australian and New Zealand Environmental and Conservation Council	NWCC	National Weedbuster Coordinating Committee
APB	Agriculture Protection Board	NWS	National Weeds Strategy
AQIS	Australian Quarantine and Inspection Service	NWSEC	National Weeds Strategy Executive Committee
ARRPA	<i>Agriculture and Related Resources Protection Act 1976</i>	OCPPO	Office of the Chief Plant Protection Officer
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand	PHA	Plant Health Australia
AWC	Australian Weeds Committee	PPS	Plant Protection Society of WA (Inc.)
CALM	Department of Conservation and Land Management	RAC	Regional Advisory Committee
CAWSS	Council of Australian Weed Science Societies	R&D	Research and Development
CRC	Cooperative Research Centre	RCC	Roadside Conservation Committee
CSIRO	Commonwealth Scientific and Industrial Research Organisation	SCARM	Standing Committee on Agriculture and Resource Management
DOLA	Department of Land Administration	SEWG	State Environmental Weed Group (proposed in EWSWA)
DEP	Department of Environmental Protection	SIA	Seed Industry Association
EWAN	Environmental Weeds Action Network (Inc.)	SLCC	Soil and Land Conservation Council
EWSWA	Environmental Weed Strategy for Western Australia	SWCC	State Weed Coordinating Council
GISP	Global Invasive Species Program (of the IUCN)	SWP	State Weed Plan
GRDC	Grains Research and Development Corporation	UWA	The University of Western Australia
IBRA	Interim Biogeographical Regionalisation for Australia	UBC	Urban Bushland Council
IUCN	The World Conservation Union (formerly International Union for the Conservation of Nature and Natural resources)	WAG	Weed Action Group
IWM	Integrated Weed Management	WAHRI	Western Australian Herbicide Resistance Initiative
LCDC	Land Conservation District Committee	WAMA	Western Australian Municipal Association
LGA	Local Government Authority	Weeds CRC	Cooperative Research Centre for Australian Weed Management
MFP	Ministry for Planning	WIN	Weed Information Network
MRWA	Main Roads Western Australia	WONS	Weeds of National Significance
NGIA	Nursery and Garden Industry Australia (was NIAA)	WOSS	Weeds of State Significance
		WRC	Water and Rivers Commission

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how do weeds enter and establish?

where do weeds impact?



what problems do weeds cause?

EXECUTIVE SUMMARY

The State Weed Plan has been developed to help achieve coordinated, effective weed management throughout Western Australia.

Western Australia comprises one-third of the Australian land mass and contains a high diversity of natural ecosystems and primary production areas. Weeds pose a serious threat to such diversity and will only be effectively managed through strategies that successfully integrate existing knowledge and innovation with human effort and other resources at state, regional and local levels.

All Western Australians can help reduce the impact of weeds on the economy, environment, natural resources and human health. This can be achieved through choices about the plants we grow for pleasure or profit, how we dispose of plant wastes, how we manage the land under our control, and our contribution to weed management on public lands and support for publicly funded weed management activities. The way we use our land can dramatically reduce the impact and spread of weeds. Local communities have the most detailed knowledge of public and private land in their area and are the frontline in prevention of, surveillance for, and action against, harmful weeds.

In order to achieve cost-effective weed management, a coordinated approach involving all levels of government, industry, community and individual landholders is required. The State Weed Plan offers such an approach through raising the awareness of all Western Australians of weed problems, by providing opportunities for their involvement in weed management through integrated and prioritised programs, and by support services for landholder and community action.

The State Weed Plan has been established with the following vision and goal:

VISION: Healthy and resilient landscapes where weed impacts on environmental values and primary production are minimised

GOAL: To achieve coordinated, collaborative and effective weed management throughout Western Australia

The State Weed Plan is based on the following principles.

- Weed management is an essential component of sustainable natural resource management.
- Prevention, early detection and early intervention are the most cost-effective means of weed management.
- Effective weed management requires a long-term commitment from managers of both private and public land.
- Effective weed management requires a coordinated approach involving all relevant stakeholders.
- Appropriate and effective policy and legal frameworks are required to support the statewide management of weeds.
- A simple and effective priority setting and planning process is required to best utilise available weed management resources.

- Maintaining public awareness, information, training and research services is an essential part of weed management.
- Contributions to weed management costs will reflect the relative importance of each weed problem and will be shared by the contributors to the problem and the beneficiaries of that management.
- Government will consider support for weed management where economic, environmental and community benefits are demonstrated and technically sound solutions are available or warrant development.

The Weed Plan for Western Australia considers weeds on land and in waterways. The Plan does not include the marine environment.

The State Weed Plan advocates the establishment of a broad, skills-based State Weed Coordinating Council to facilitate the implementation of the Plan.

Key actions under the Plan will include the following activities.

- Increase public awareness to gain community acceptance of the significance of weeds and their responsibilities for weed management.
- Coordinate weed management planning, implementation and monitoring across all land.
- Encourage cooperative local and regional programs based on assessed priorities.
- Apply risk assessment methodology for determining weed management priorities in coordinated management programs.
- Encourage the development and implementation of efficient processes for the identification, reporting and removal of new and existing weed infestations.
- Promote weed management as an integrated process based on the principles of sustainable natural resource management.
- Establish an appropriate policy and legislative base for effective management of all serious weeds across the State.
- Ensure efficient use of new and existing resources in weed management.
- Monitor regularly the implementation and effectiveness of all aspects of the State Weed Plan.
- Encourage all public land and private land managers to act as ‘Good Neighbours’.
- Recognise the role and expertise of volunteers in weed management.

The achievement of the objectives of the State Weed Plan will be realised through the cooperation of all organisations and individuals in Western Australia who will benefit from effective management of weeds – and that is all of us.

1. INTRODUCTION

Western Australia comprises over one-third of the Australian land mass, with a total area of about 2.5 million square kilometres. Over 40 per cent of Australia's bioregions (see textbox) are found within the State, including tropical 'dry' rainforest and savannah woodlands in the north, sandy deserts and spinifex plains in the centre, and sandplain heaths, mallee and tall temperate forests in the south-west. These natural features are contained within a landscape modified by the development of agriculture, mining, urbanisation and transport corridors.

New plants have been introduced to Western Australia since the beginning of settlement for agricultural, horticultural, gardening, forestry, commercial and cultural reasons. Many of these deliberate or accidental introductions have become, or have the potential to become, weeds.

Weeds are a significant threat to primary production, biodiversity and conservation values of Western Australia. With around 13,000 native plant species, Western Australia has one of the most diverse floras of any region in the world, with many species being threatened by weeds. Vertebrate and invertebrate fauna are also affected by weeds.

Weeds also increase the risk of fire, increase costs to infrastructure maintenance and reduce the amenity of recreation areas. Some weeds have well documented and sometimes serious effects on human health.

Sustainable land use is dependent on the retention of natural ecosystem functions to prevent natural resource degradation. Weeds have the potential to adversely alter ecosystem function, reduce primary industry productivity and profitability and seriously limit the long-term sustainability of all the State's agricultural and natural landscapes.

The serious threat posed by weeds will only be effectively and efficiently managed by integrating existing knowledge and innovation with coordinated human effort and other resources.

The State Weed Plan provides a framework that encourages and supports people in Western Australia to work together to achieve more effective

management of existing weeds and to limit the introduction and establishment of new weed species. Implementation of the State Weed Plan will also implement the Environmental Weed Strategy for Western Australia developed in 1999.

BIOREGION: A territory defined by a combination of biological, social and geographic criteria rather than by geopolitical considerations; generally, a system of related, interconnected ecosystems.

1.1 What is a Weed?

The National Weeds Strategy defines a weed as "a plant which has, or has the potential to have, a detrimental effect on economic, social or conservation values" (ARMCANZ, ANZECC and Forestry Ministers, 1997).



Weeds can be plants from other countries, or species from other regions of Australia or the State. Not all weeds are equally important. Many introduced economic plants do not become weeds, while others do and are very invasive and potentially damaging to natural ecosystems. Some plants do not appear to change the composition, structure or function of the natural or production systems they invade. Others are capable of completely dominating and changing the plant communities they invade.

There are some 1155 identified weeds in Western Australia, about half the number of recognised weeds in Australia. Many ecosystems are severely degraded by weeds. Competition from weeds is a major threatening process for rare flora and ecological communities.

1.2 Weeds in Western Australia

In Western Australia's agricultural systems, weed control costs have been estimated at 20 per cent of production costs, representing as much as \$60 per hectare for some grain crops.

Weed invasion is considered to be a significant threat to natural ecosystems and its cost is difficult to measure in monetary terms. No accurate figures are available on the substantial funds spent on the control of weeds by public and private land managers, nor on the time spent by volunteers in weed management.

1.3 National Weeds Strategy

The objective of the National Weeds Strategy, released in 1997, is to "exclude the introduction of new weeds and strengthen action against those that are already established". The strategy focuses on Weeds of National Significance (WONS) (see Table 1.) which have been defined from a larger group of serious weeds by applying criteria relating to invasiveness, current location in relation to potential spread, and the potential and current impacts on primary industry, environment and social values. The strategy encourages complementary State, regional and local weed plans. Western Australia is participating in the national coordinated action against WONS.



COMMON NAME(S)	SCIENTIFIC NAME	STATUS IN WESTERN AUSTRALIA
alligator weed	<i>Alternanthera philoxeroides</i>	Declared Plant, known to be in cultivation in Perth and target for eradication
athel pine	<i>Tamarix aphylla</i>	Widespread in cultivation and naturalised
bitou bush/boneseed	<i>Chrysanthemoides monilifera</i>	Both Declared, boneseed has been found naturalised and in cultivation, bitou bush is not known to be present in Western Australia
blackberry	<i>Rubus fruticosus</i> agg.	Declared Plant, widespread in south-west and subject to biocontrol by the rust fungus <i>Phragmidium violaceum</i>
bridal creeper	<i>Asparagus asparagoides</i>	Widely naturalised through the south-west, also in cultivation, a target for biocontrol by the bridal creeper leaf hopper (BCLH) <i>Zygina</i> sp.
cabomba	<i>Cabomba caroliniana</i>	Declared Plant subject to eradication, in cultivation as it was in the aquarium trade, not known to be naturalised
Chilean needle grass	<i>Nassella neesiana</i>	Not known to be present in Western Australia
gorse	<i>Ulex europaeus</i>	Declared Plant naturalised around Albany
hymenachne	<i>Hymenachne amplexicaulis</i>	Prohibited from entry but possibly already sown in the Kimberley
lantana	<i>Lantana camara</i>	Common in cultivation, also naturalised
mesquite	<i>Prosopis</i> spp.	Declared Plant, naturalised in the north-west, particularly the Pilbara, a target for biological control
mimosa	<i>Mimosa pigra</i>	Declared Plant, not known to be present in Western Australia
parkinsonia	<i>Parkinsonia aculeata</i>	Declared Plant, naturalised in the north-west
parthenium weed	<i>Parthenium hysterophorus</i>	Declared Plant, not known to be present in Western Australia
pond apple	<i>Annona glabra</i>	Not known to be present in Western Australia
prickly acacia	<i>Acacia nilotica</i> ssp. <i>indica</i>	Declared Plant, not known to be present in Western Australia
rubber vine	<i>Cryptostegia grandiflora</i>	Declared Plant subject to eradication, has been found in the Kimberley and in the nursery trade in Perth
salvinia	<i>Salvinia molesta</i>	Declared Plant subject to eradication, commonly found in cultivation throughout Western Australia and occasionally in nurseries and pet shops, occasionally naturalised
serrated tussock	<i>Nassella trichotoma</i>	Not known to be present in Western Australia
willows except weeping willows, pussy willow and sterile pussy willow	<i>Salix</i> spp. except <i>S. babylonica</i> , <i>S. x calodendron</i> and <i>S. x reichardtii</i>	Apart from <i>S. babylonica</i> , <i>S. x calodendron</i> and <i>S. x reichardtii</i> , all <i>Salix</i> spp. are prohibited from entry to Western Australia but several species are in cultivation

Table 1. The 20 Weeds of National Significance. See <www.weeds.org.au> for more information about WONS.

2. PRINCIPLES OF WEED MANAGEMENT

Successful action against weeds will require coordinated action based on the following key principles of weed management.

2.1 Sustainable Natural Resource Management

The National Strategy for Ecologically Sustainable Development, adopted by the Commonwealth Government in 1992, has the following core objectives.

- Enhance individual and community welfare by following a path of economic development that safeguards the welfare of future generations.
- Provide for equity within and between generations.
- Protect biological diversity and maintain essential ecological processes and life support systems.

The sustainability of Western Australia's natural resource base is threatened through the impacts of weeds on biodiversity and primary production.

By their nature, agricultural and pastoral land uses result in significant modification of the original ecosystem, as do land use changes for urban, mining and service/infrastructure development. The current and future challenge is to sustain productive land use whilst retaining ecosystem function to maintain viability and biodiversity. Environmentally responsible weed management is essential in order to improve productivity, reduce costs and retain functional ecosystems.

2.2 Prevention is easier than a cure

Prevention, early detection and rapid intervention are the best strategies, and in many cases the only effective strategies, that can be used to avoid long-term weed management costs and impacts. Western Australia is currently free from many damaging weeds whilst others are limited in their spread. Vigilance is required at quarantine check-

points, where seeds and plants are sold, where soil, animals, machinery and plant produce is moved, and wherever a new weed infestation is detected.

2.3 Risk and hazard assessment

Weed species present different levels of risk and hazard in different bioregions and production systems. Both risk and hazard are essential components in helping to define priorities for weed prevention and management.

The term 'risk' refers to the probability that a deleterious event may occur. The risk of a weed establishing in a new location increases with proximity to an existing infestation and increasing effectiveness of dispersal mechanisms, such as seeds spread by wind, by bird and animal faeces or through transport of agricultural commodities.

The term 'hazard' refers to the potential impact of a species. Thus the hazard presented by a non-invasive species with slow growth, few viable seeds and narrow habitat requirements may be low. Conversely, a species presents a high hazard if it reproduces rapidly, and can rapidly dominate the landscape (see Figures 1 and 2).

Weed risk assessment for import quarantine examines aspects of the known biology, particularly reproductive biology, ecology and behaviour. For species already present within Western Australia, local knowledge can be used, together with assessing the potential distribution by using climatic matching software.

Criteria for determining the potential hazard for weed species have been developed by a number of Australian and overseas agencies, usually as a way to set priorities for weed management. Measures of invasiveness and potential distribution are common to all models, as are potential impacts on biodiversity and socio-economic impacts.



Figure 1. Low risk - despite being widely cultivated, safflower (*Carthamus tinctorious*) is found rarely as a roadside weed. Photo by Charles Webber, used with permission of the California Academy Sciences.



Figure 2. High risk - saffron thistle (*Carthamus lanatus*) is a widespread weed of crops, roadsides and remnant vegetation

2.4 Setting priorities

A system of setting priorities for weed management is critical to ensure that resources are focused to maximise the benefits of management. Priorities for weed management can be set in terms of weed species (weed-led control), or in terms of assets to be defended (site-led control). These assets may include, but are not limited to, natural systems, crops, or catchments.

Weed priorities will change over time as effective means of control are found for some species, and as other species reach their potential distribution limits. This may include ‘sleeper’ species, which initially appear to have limited distribution and impact, but may later be serious weeds.

There are a number of appropriate models for prioritising weeds. One model has been developed for the National Weeds Strategy to determine a short list of WONS.

The *Environmental Weed Strategy for Western Australia* (EWSWA) prioritised 1155 weed species based on measures of invasiveness, distribution (present and potential) and environmental impacts.

A ranking system has been developed for the State Weed Plan (Randall, 2000). The criteria used for ranking species include invasiveness, impacts and present and potential distribution. The site-led (high value sites) and weed-led (threatening species) system developed by the New Zealand Department of Conservation is also useful (Timmins and Owen, 2001).

2.5 Coordination and responsibility of landholders

All land owners and managers have a responsibility to preserve and protect the land for future generations. This includes all land under their control, whether in active use or not. Land includes associated water resources which can be at considerable risk from aquatic weeds. A collective action is required where the weed management problem exceeds the capacity of individual landowners.

Therefore, in order to achieve effective weed management a coordinated approach involving individual landholders as well as all levels of

government, industry and community is required.

Different land uses and people's different perceptions of the impact or benefit of the same plant can cause conflict (see Figures 3 and 4). It is desirable for landowners to adopt a 'Good Neighbour' approach to ensure that the level of weed management adopted on their property does not adversely impact on neighbouring properties.

Government needs to ensure that an appropriate framework of legislation, awareness, coordination, research and education is in place to manage weeds. It is important for government to provide leadership and coordination in weed management through its commitment to managing weeds on land under its control.

2.6 Plan of action

The State Weed Plan will only be effective if relevant stakeholders take up opportunities and assume responsibilities for implementing its recommendations. Immediate development and implementation of a State Weed Action Plan by the proposed State Weed Coordinating Council is recommended.

This Action Plan should identify roles and responsibilities, actions, proposed outcomes, resource requirements and timelines. It should also include performance criteria to assess the effectiveness of the strategies.

2.7 Revision and monitoring

Although the State Weed Plan will provide a sound basis for integrated and adaptable management of Western Australia's weeds, the priorities, control methodologies and community expectations will change over time. Therefore, it is important that the State Weed Plan is reviewed regularly to ensure its ongoing relevance.

A monitoring program will assist in assessing the effectiveness of the plan. The monitoring program will need to clearly identify what will be monitored, how and by whom. For example, local and regional monitoring data could be collated and analysed and used to provide feedback in regard to specific initiatives and progress against high priority weeds.



Figure 3. Tagasaste (*Chamaecytisus palmensis*) provides useful fodder, but can invade remnant vegetation.



Figure 4. Introduced as a garden plant, Paterson's curse (*Echium plantagineum*) is used by beekeepers for honey yet is a serious weed of agriculture, roadsides and remnant vegetation.

3. COMPONENTS OF THE STATE WEED PLAN

The State Weed Plan is based on the following approaches:

- All people in Western Australia have a role to play in minimising the impact of weeds.
- Effective weed management can only be achieved through a coordinated approach involving all levels of government, industry, community and individual landholders.
- Effective weed management will require focus on small geographic areas (patch/property and local) with support and coordination provided at an appropriate level (regional, State and national). See Figure 5.

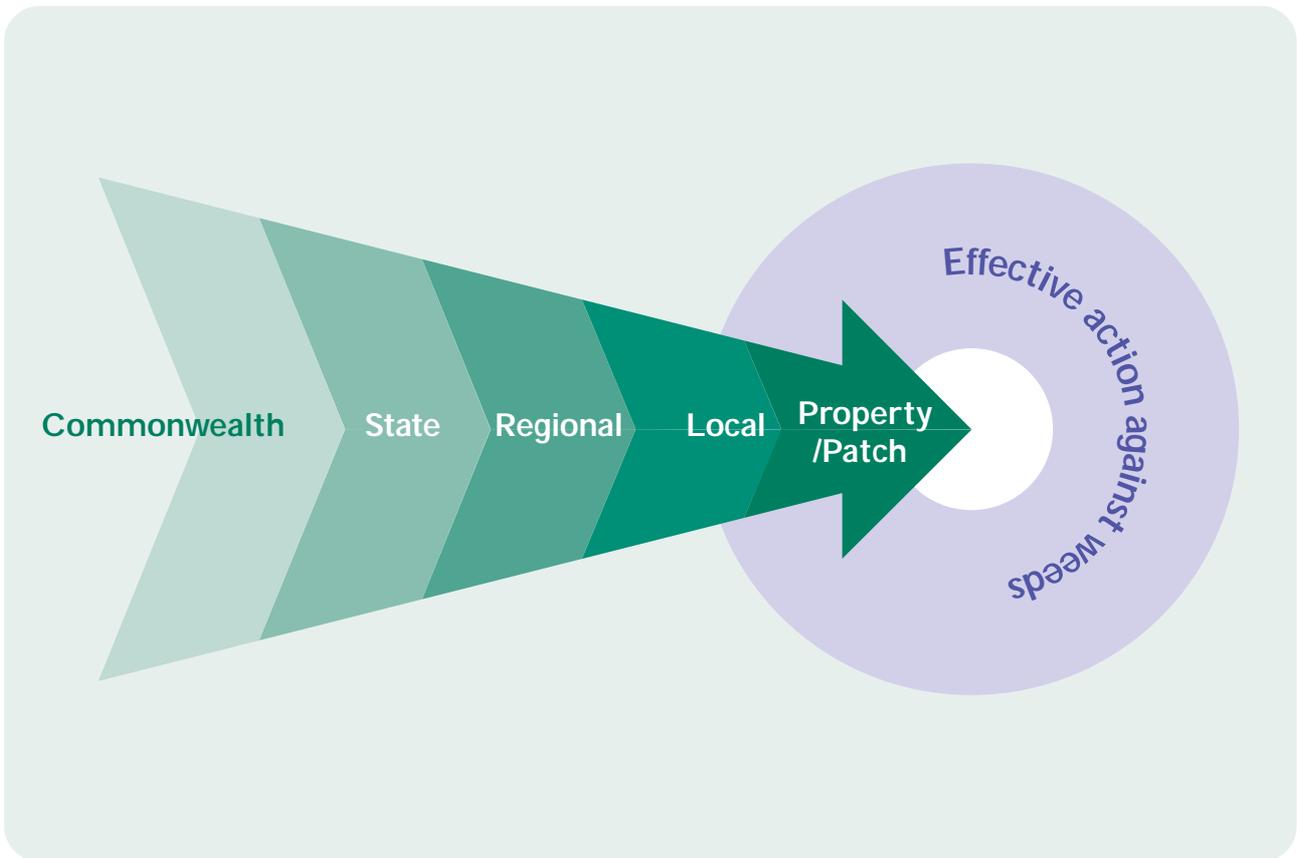


Figure 5. Effective weed management requires appropriate action at all levels.

The State Weed Plan establishes a framework for action based on the nine components and desired outcomes listed below.

1. Coordination, Integration and Public Awareness

Coordinated and effective participation of land and water managers and users, policy makers and other stakeholders in weed management.

2. Roles and Responsibilities

Stakeholders aware of and committed to their roles and responsibilities in weed management.

3. Priorities and Planning

Objective processes established for setting priorities and planning weed management programs at State, regional and local levels.

4. Introduction and Spread

Effective controls over the entry of potential weed species, and the early detection and response to new infestations. Adoption of best management practices to minimise the spread of existing weeds.

5. Integrated Weed Management

An effective and adaptive integrated weed management process against all weeds.

6. Policy Support and Regulation

An appropriate policy and legal framework to support patch, local, regional and statewide management of weeds.

7. Resources

Objective allocation and efficient use of all government, industry and community resources available for weed management programs.

8. Education, Training and Research

Increased community and industry knowledge of and skills in weed management.

9. Monitoring and Evaluation

Ability to evaluate changes in the status of weeds and to maintain the relevance of the State Weed Plan.

The following section outlines the desired outcome for each component, and a series of strategic actions to achieve each outcome. Some of the actions are relatively simple and achievable within the existing management framework and resources. Others are more complex and challenging and will require the cooperation of government, industry, community groups and individual landowners in the efficient use of existing and new resources.

COMPONENT 1: COORDINATION, INTEGRATION AND PUBLIC AWARENESS

Desired outcome: Coordinated and effective participation of land and water managers and users, policy makers and other stakeholders in weed management.

Coordination and Integration

Weed problems can cross all administrative and land tenure boundaries. A successful strategic approach to weed management requires a high degree of coordination and integration between the different stakeholders. Best outcomes are achieved when all levels of government, industry, community groups and individual landholders work together to efficiently and effectively use resources to manage weeds.

Coordination and integration are currently an informal part of weed management activities at various management levels throughout the State. Groups and individuals working at patch and property levels coordinate with local and State Government authorities and industry. Likewise, regional groups are increasingly undertaking coordination efforts to achieve better weed management.

Developing further opportunities for better coordination and integration of weed management at the different management levels is an important part of the State Weed Plan. For example, at a local level, local governments, catchment groups, Land Conservation District Committees (under the *Soil and Land Conservation Act 1945*) or other local community groups have the opportunity to help coordinate weed management activities at patch and property levels.

At a regional level there is an opportunity for existing groups such as the Regional Advisory Committees (under the *Agriculture and Related Resources Protection Act 1976*) or Regional Catchment Councils to help coordinate weed management over larger areas.

The proposed approach to achieving the required coordination and integration at the State level is through the formation of a state-level policy and coordinating council to guide and monitor implementation of the State Weed Plan. The group should have a membership based on skills and expertise and be drawn from State and Local Government, private landholders, research institutions, industry and community groups.

A body such as the proposed State Weed Coordinating Council (SWCC) will have terms of reference enabling it to take a lead role in fostering efficient and effective weed management in Western Australia. The SWCC should be appointed jointly by the Ministers for Primary Industry and Environment, and be supported by appropriate government agencies.

Effective coordination and integration will be facilitated through good communication. It requires the recognition and acknowledgment of the roles and contributions of all stakeholders to the weed management effort. The State and Commonwealth Governments will need to provide leadership and resources to ensure that effective coordination and integration is achieved in weed management.

Public Awareness

Part of the solution to managing weeds in Western Australia is raising public awareness of the causes and appropriate responses to the problem. Often people are not aware of the impact that weeds have on the natural environment and primary production or that they may be contributing to the problem through their own actions, for example, dumping weed-infested garden refuse in bushland or by distributing weed seeds by vehicles, animals and produce.

An important role for the State Weed Coordinating Council will be to promote and guide industry and community information programs on weed management issues and strategies. Public awareness campaigns such as National Weedbuster Week need to be given a high priority by SWCC. The responsibility for implementing public awareness campaigns will need to be shared by the public and private sector, as well as community organisations.

Ethnic communities need to be involved because of long held cultural values associated with certain plant species that have the potential to become serious weeds.

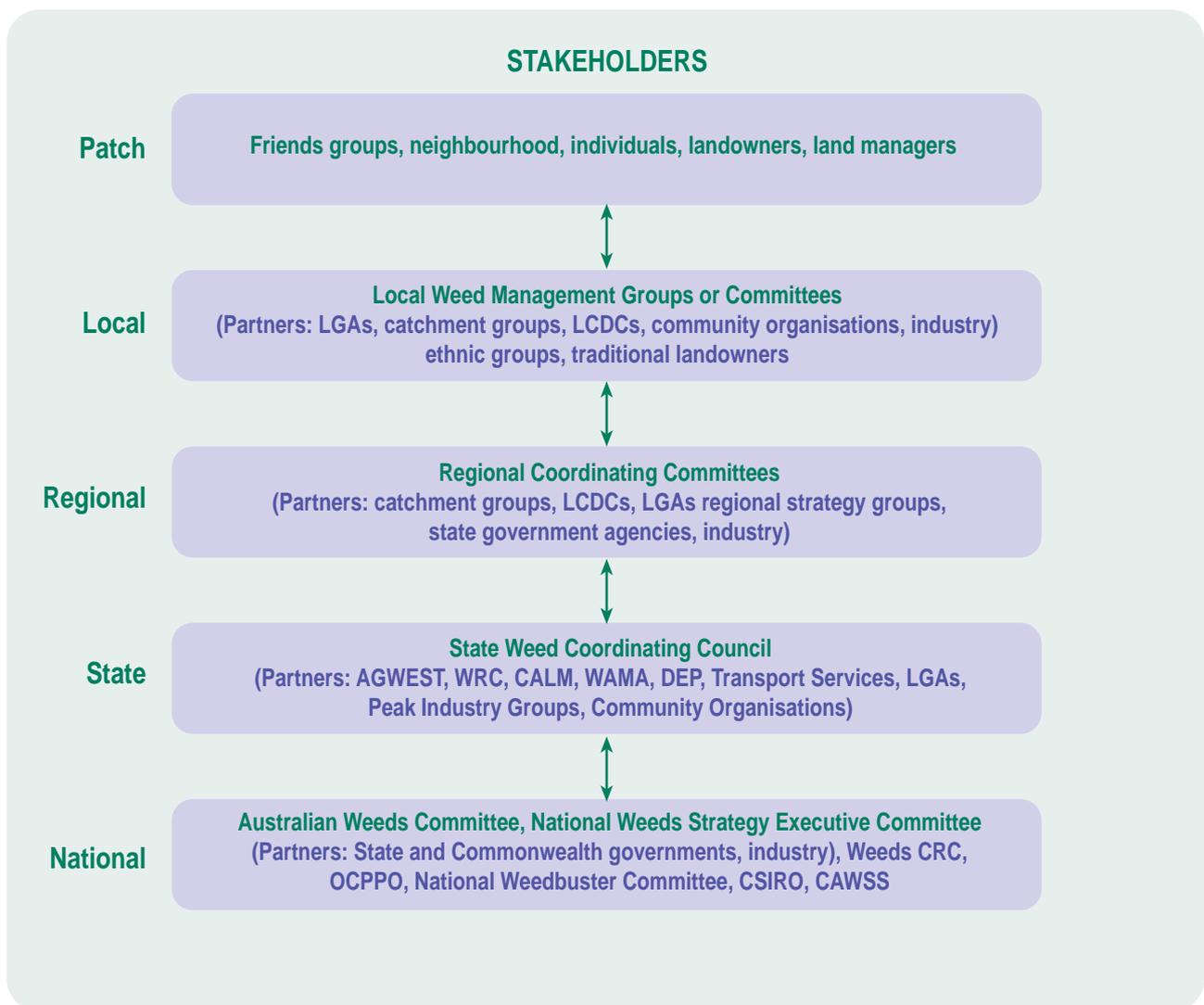
Traditional landowners should be consulted on the potential impact of introduced plants on the heritage value of significant sites and on ways that these plants should be treated as part of the State Weed Plan.

All examples of weed management planning and implementation at local levels should be documented. This will increase the available fund of knowledge on weed management, and encourage action by community groups by both demonstrating what can be achieved and facilitating the activity.

Commitment by all Western Australians will be improved and maintained by publicising the successful outcomes of the State Weed Plan.

The diagram for Component 1 illustrates the stakeholders who can make a valuable contribution to implementation of the State Weed Plan by participation at appropriate levels.

Component 1. Coordination, integration and public awareness levels



National Weedbuster Week is in October each year <www.weedbusterweek.info.au>

Recommended strategic actions

ACTION NO.	RECOMMENDED STRATEGIC ACTION	PARTNERS	POTENTIAL PARTNERS
1.1	Establish a broad, skills-based State Weed Coordinating Council (SWCC) with terms of reference to lead implementation of the State Weed Plan.	Ministers for Primary Industry and Environment	State agencies, LGAs, community members
1.2	Develop a coordinated work program (State Weed Action Plan) for the State Weed Plan.	SWCC	
1.3	Foster the involvement of all relevant government, industry and community organisations in coordinated weed management at all levels.	SWCC	Ministry for Planning
1.4	Foster coordinated weed management planning, implementation and monitoring across all land tenures in conjunction with appropriate groups.	SWCC	Ministry for Planning
1.5	Facilitate regional weed management planning through linkages with appropriate government agencies.	SWCC, LGAs, AGWEST, CALM	Ministry for Planning, Catchment Groups, LCDCs, Regional NRM groups
1.6	Develop public awareness programs for the community, and link into existing programs such as National Weebuster Week.	SWCC, WAMA, DEP, WRC, AGWEST, CALM	LCDCs, LGAs, Weeds CRC, NWCC, PPS, EWAN
1.7	Encourage production of weed awareness literature and events.	SWCC, LGAs, DEP, WRC, AGWEST, CALM	
1.8	Seek suitable opportunities, such as field days and garden shows, to promote weed awareness.	SWCC, AGWEST, LGAs	LCDCs, RACs
1.9	Support and reward those individuals and groups adopting responsible mechanisms for weed management.	SWCC, EWAN	

COMPONENT 2: ROLES AND RESPONSIBILITIES

Desired outcome: Stakeholders aware of and committed to their roles and responsibilities in weed management

All users and managers of the State's natural resources share a responsibility to ensure their sustainable management, include individual land owners and lessees, government agencies community and industry groups who are involved in natural resource management. All these parties need to adopt the principles of the State Weed Plan if effective weed management is to be successful. Communicating the roles and responsibilities of government agencies, industry and private landowners and coordinating their response is important to the success of the State Weed Plan.

At a local level it is recognised that members of catchment, bush regeneration and other community groups play the main role, though this responsibility should not fall solely upon volunteers and individuals. Support of this local effort is essential for successful action against many types of weeds.

Developing and gaining acceptance of 'Good Neighbour' principles and 'Codes of Practice' as they apply to weeds will help define the responsibility for weed management of individual landowners and managers including farmers and local and State Government agencies. Development of generic Codes of Practice will assist weed management being more broadly incorporated into existing and new industry Codes of Practice.

Examples of roles through which all people in Western Australia can contribute to weed management are shown below.

Individuals

- Know the important weeds and take responsibility for those on their land.
- Improve their weed knowledge and skills to make their efforts more effective and sustainable.
- Plan and cooperate with neighbours.

Communities

- Coordinate group action and links to plans at a regional level.
- Raise awareness and improve education on weed issues.

Community and industry organisations

- Provide information on weed issues to members.
- Develop industry codes of practice.

Local Government

- Provide information, coordination and support for community groups.
- Manage weeds on their own lands.

State Weed Coordinating Council

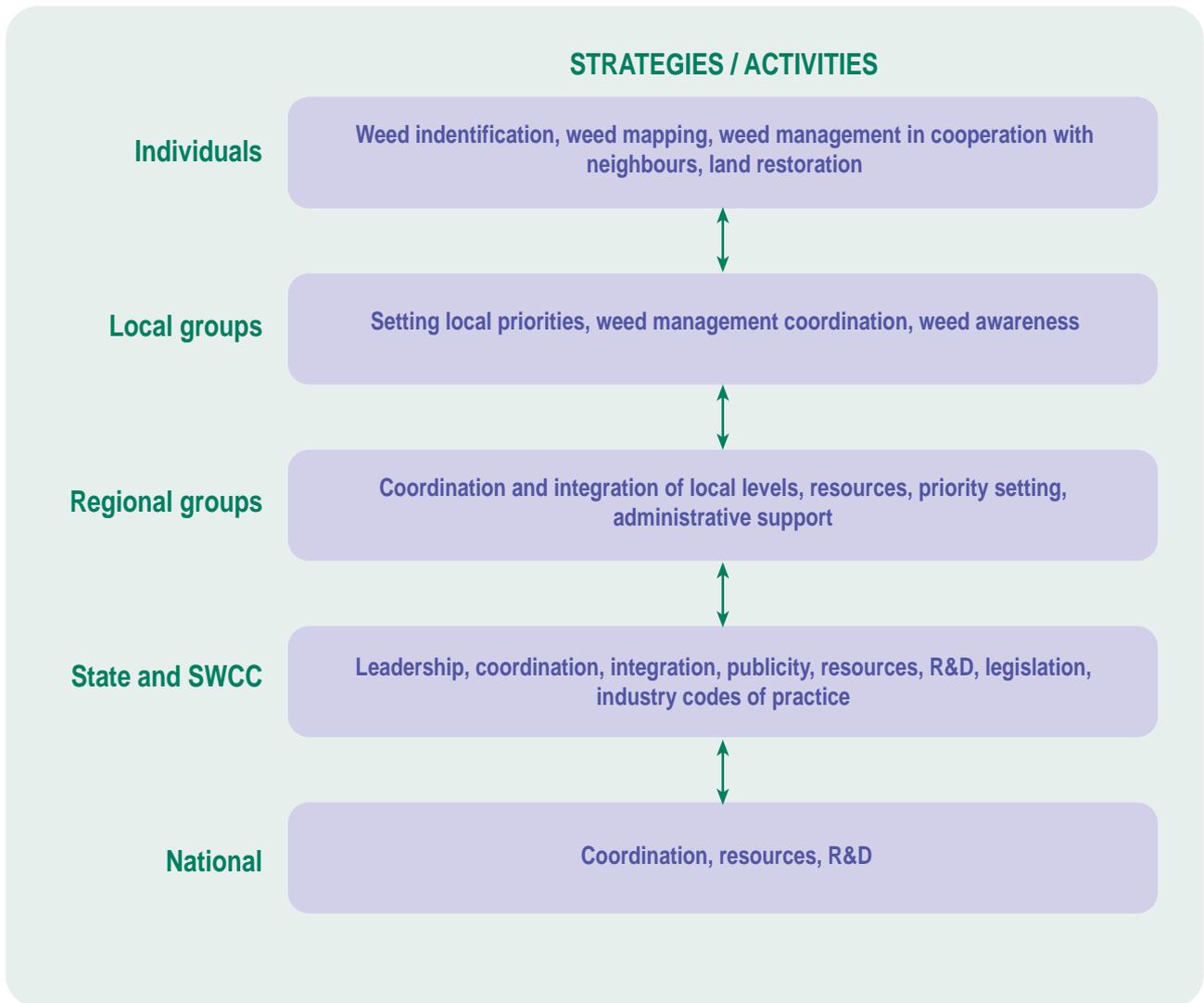
- Lead implementation of the State Weed Plan and evaluate its effectiveness over time.
- Develop the State Weed Action Plan.
- Foster the involvement of all relevant government, industry and community organisations in coordinated weed management at regional and local levels.
- Develop risk assessment and priority setting methods.
- Manage public awareness and promotion campaigns.
- Facilitate the development of training in weed identification and management.
- Coordinate the development of information systems (databases) on distribution, weed ecology and management options.
- Foster Codes of Practice relevant to industries with a stakeholding in weed management.
- Foster and support research and development of weed management systems based on best management practice.
- Coordinate the development of a spatial information system for recording weed location and management.
- Identify the Weeds of State Significance (WOSS) as high priority targets for action.

State Government

- Ensure maintenance of appropriate regulation and policies.
- Provide leadership in research, risk assessment, education, advisory services and public awareness.
- Assist improved weed management at all levels by providing appropriate support for weed management from government agencies.
- Manage weed problems on State Government land in cooperation with neighbours.



Component 2. Roles and responsibility levels



Recommended strategic actions

ACTION NO.	RECOMMENDED STRATEGIC ACTION	PARTNERS	POTENTIAL PARTNERS
2.1	Encourage all public and private land managers to act as 'Good Neighbours'.	SWCC, LGAs, relevant State agencies	Industry and community organisations
2.2	Encourage joint and cooperative local and regional programs based on a clear understanding of responsibilities	SWCC, LGAs, relevant State agencies	Regional NRM groups
2.3	Promote acceptance at all levels of the significance of weeds and the responsibilities of individuals, groups and agencies for weed management	SWCC, WAMA, Community groups, State agencies, Weeds CRC	Regional NRM groups
2.4	Development of generic Code of Practice to assist weed management being more broadly incorporated into existing and new industry Codes of Practice	SWCC, appropriate State agencies	

COMPONENT 3: PRIORITIES AND PLANNING

Desired outcome: Objective processes established for setting priorities and planning weed management programs at State, regional and local levels.

Western Australia has a diverse set of bioregions as well as various administrative boundaries. Planning and prioritisation for weed management needs to occur within appropriate management units. Options include the use of catchments or local government boundaries for administration and regulation to provide close links to the community and a single local administrative framework; and the use of Interim Biogeographical Regionalisation for Australia (IBRA) regions to provide a logical environmental basis for weed risk and priority assessments. The option chosen must meet the majority of needs and be able to be efficiently managed.

Resources will never be sufficient to attempt eradication of all weeds in Western Australia. Available resources should be efficiently applied to the highest priority weeds, and a sound case made for investment of additional resources.

Developing a coordinated approach to weed management will require application of process that is species, scale and location sensitive to objectively determine the risk posed by individual weeds in specific situations. This process will need to be applicable to all weed management levels (patch/property, local, regional and State) and to both existing and potential weeds. The methodology will need to build upon those used in international and interstate risk assessment, the existing statutory basis for assessing agricultural weeds, those recommended in the Environmental Weed Strategy for Western Australia and the National Weeds Strategy. This is essential to ensure a consistent approach to weed prioritisation in Western Australia.

This process should lead to the production of a list of Weeds of State Significance (WOSS).

Component 3. Priorities and planning levels



Recommended strategic actions

ACTION NO.	RECOMMENDED STRATEGIC ACTION	PARTNERS	POTENTIAL PARTNERS
3.1	Establish a priority setting process suitable for use at all levels of planning and priority setting.	SWCC, AGWEST, CALM	NWS
3.2	Maintain and communicate lists of priority weeds when developed, including Weeds of State Significance (WOSS).	SWCC, AGWEST, CALM	NWS
3.3	Develop a risk assessment methodology for determining weed management priorities.	AGWEST, CALM, LGAs	Community groups, LCDCs, RACs
3.4	Define and promote appropriate regions for the management of weeds (for example, bioregions, catchments).	SWCC	RACs, Regional NRM groups
3.5	Promote the inclusion of cost-benefit principles in regional and local priority setting.	SWCC	AGWEST, CALM
3.6	Promote integrated regional, local and patch priority setting and planning for effective weed management.	SWCC, LGAs, CALM, AGWEST, WRC, Community	Regional NRM groups, LCDCs, Community groups
3.7	Encourage the inclusion of weed management planning in all land use changes.	SWCC, AGWEST, Ministry for Planning	LCDCs, LGAs
3.8	Encourage all agencies and communities to allocate resources based on consistent priority setting processes.	SWCC	CALM, AGWEST, WRC, LGAs
3.9	Participate in working groups developing national strategies for WONS.	AGWEST, CALM, WRC	NWS

More information on IBRA regions and biodiversity can be found on the Environment Australia website at www.environment.gov.au.

Information about the Weeds of National Significance (WONS) and national strategies for managing them can be found on the National Weeds Strategy homepage www.weeds.org.au.

COMPONENT 4: INTRODUCTION AND SPREAD

Desired outcome: Effective controls over the entry of potential weed species, and the early detection and response to new infestations. Adoption of improved practices to minimise the spread of existing weeds

The introduction of a new plant species (potential weed species) at national, State, regional, local or patch level has the potential for impacts on ecosystem function and primary production. Once detected it is important that protocols for containment and management of a new weed are effectively and efficiently observed. Good border quarantine control is important in minimising the entry of potential new weeds. It must be recognised that plants not currently regarded as weedy could become weeds with changes to the environment. Global warming, for example, may lead to the spread of weeds that currently have a limited distribution. Similarly, the introduction of new pollinators such as bumblebees could lead to increased seed production of species that are currently poor reproducers.

Quarantine restrictions are in place at national and State borders under the *Commonwealth Quarantine Act 1908*, *Plant Diseases Act 1914* and *Agriculture and Related Resources Protection Act 1976*. These provide a strong legal basis for protection against accidental and deliberate plant introductions but only cover quarantinable weeds and declared plants. For more details, see Component 6.

However, many potential weed species are not regulated and are being brought into the State or moved within the State. Restraining the movement of these non-regulated weeds which pose significant risk to agriculture and the environment provides a challenge for local groups and industries.

The nursery and seed merchant industries could make a significant contribution to reducing the introduction and spread of potentially weedy species through the voluntary adoption of Codes of Practice which should include labelling systems which identify potential weeds.

The increasing popularity of mail order seed and plant sales, and the potential for ordering of material from other countries via the internet, needs to be addressed both through the public awareness program and maintenance of rigorous mail checking systems. Possibilities for coopera-

tive awareness programs with authorities in other countries should be explored.

A number of initiatives can be undertaken at regional, local and patch levels to prevent the introduction and spread of weed species. These include:

- Good biosecurity practices – for example, ensure vehicles, machinery, stock, footwear and clothing are properly cleaned of weed seed before moving from site to site. Codes of Practice and vendor declaration schemes can be used to good effect by individuals and organisations.
- Attention to weed control on road and rail reserves.
- Census of weed flora – knowledge of the weed flora in a patch, local or regional area will enable identification of new introductions. The preparation of regional, local and patch herbaria should be actively promoted.
- Containment – rapid identification, isolation and action is required to ensure the containment of new weed species.
- Timely response to events such as floods, fires or land development which are likely to provide opportunities for weeds to spread.

Rapid response

Early detection of new localised weed populations enables their eradication or containment. A concerted effort early in the invasion process can save considerable effort or loss of ability to control the weed in the long term. The eradication of kochia (*Bassia scoparia*) from Western Australia provides a good example of the success possible through rapid action. Introduced legally as a saltland rehabilitation plant, its weed potential was recognised and a nationally-funded eradication successfully implemented.

Eradication campaigns usually succeed only if the following criteria are met.

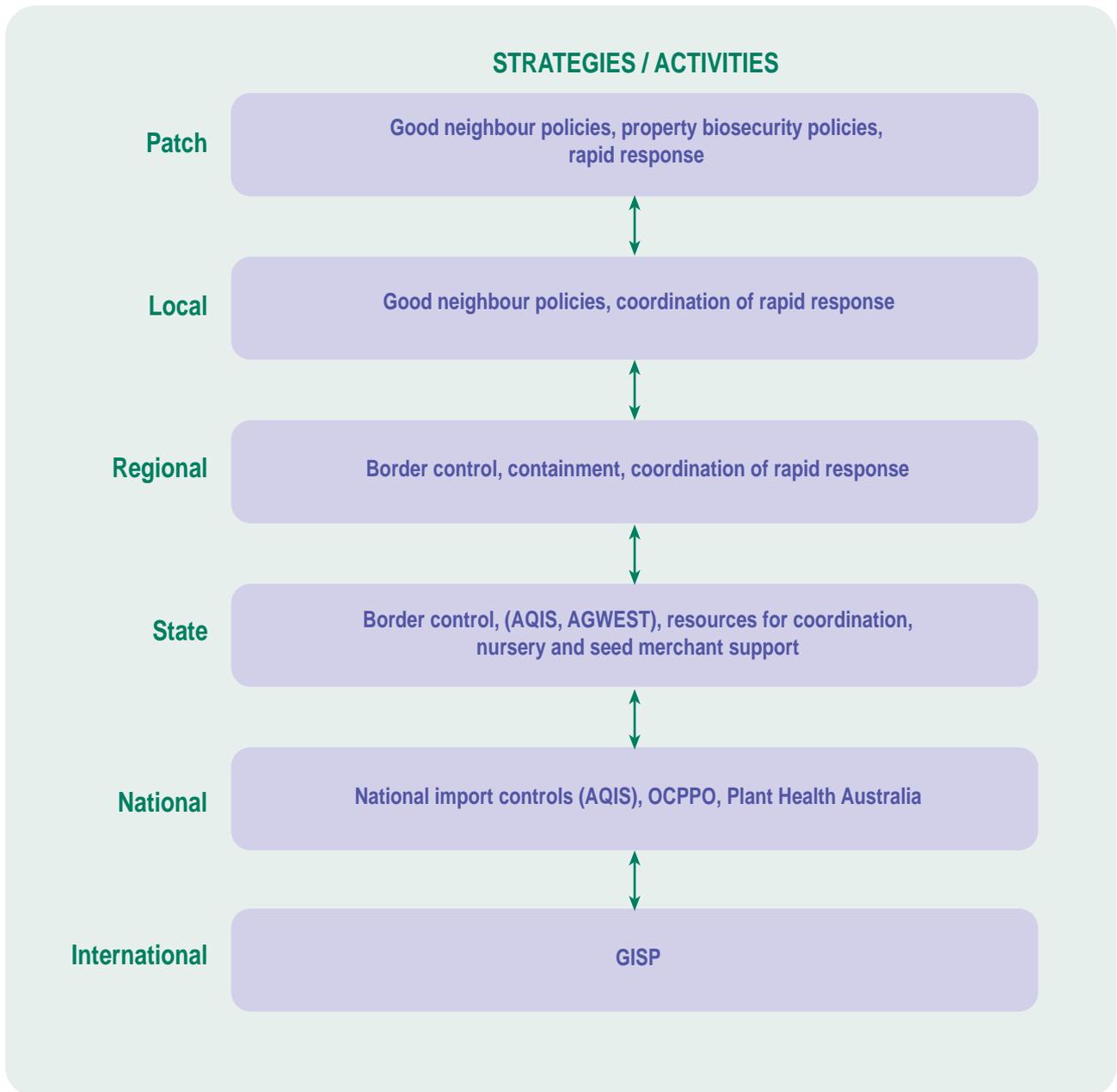
- The population of the target species must be highly localised and the boundaries of the population known.
- An effective control method is available.
- The area is not continuously reinfested from seed reserves in the soil, from surrounding areas, or from nearby cultivated specimens.

Waterways are of special concern because of the potential for rapid downstream spread of aquatic weeds. Containment and control in waterways is sometimes more difficult than in terrestrial systems.

An early warning and rapid response system must be maintained to minimise the spread of an introduced weed.



Component 4. Introduction, spread and response levels



Recommended strategic actions

ACTION NO.	RECOMMENDED STRATEGIC ACTION	PARTNERS	POTENTIAL PARTNERS
4.1	Maintain effective quarantine strategies to minimise weed introductions to Western Australia, and detect exotic weed outbreaks.	AGWEST, AQIS	
4.2	Support the implementation of rigorous weed risk assessment processes for all plant material imported into Western Australia.	SWCC, AGWEST, AQIS, R&D agencies	Industry and community organisations
4.3	Establish and promote an efficient process for the identification and appropriate reporting of new weed infestations.	AGWEST, CALM, WRC, SWCC, MRWA, OCPPO	LCDCs, RACs, community groups, LGAs
4.4	Encourage the development of a rapid response process and its use for weed infestations at all levels.	AGWEST, OCPPO, AWC	CALM, WRC
4.5	Facilitate the development of appropriate training in weed identification to enable early detection of new incursions.	SWCC, CALM, AGWEST, WRC	LGAs, community groups
4.6	Encourage the development and adoption by industry of Codes of Practice and company protocols, and other provisions to minimise the introduction and spread of weeds.	SWCC, NGIWA	NGIA, Seed Industry Association
4.7	Encourage the inclusion of weed spread prevention measures in weed action plans	SWCC, AGWEST, Ministry for Planning	LCDCs, LGAs
4.8	Encourage a timely response where natural events (for example fires, floods) cause invasion of weeds.	SWCC	All landholders
4.9	Encourage appropriate attention to road verges, waterways and other avenues of spread.	SWCC, WRC, LGAs, MRWA, Westrail, DOLA	RCC
4.10	Recognise herbicide-resistant weeds as a special form of “new” weeds by ensuring appropriate recording of locations and monitoring.	SWCC, AGWEST	All landholders, Agribusiness, Industry organisations
4.11	Encourage public land managers to implement a Good Neighbour Program to minimise weed invasion.	SWCC	DOLA, CALM, WRC, MRWA, Westrail
4.12	Recognise genetically modified and/or herbicide-resistant crops as a potential form of a new weed and ensure appropriate planning and response.	AGWEST, Agribusiness	RACs, Industry organisations

COMPONENT 5: INTEGRATED WEED MANAGEMENT

Desired outcome: An effective and adaptive integrated weed management process against all weeds

The use of a single, isolated weed control method generally will not succeed. Persistent use of herbicides has, for example, resulted in herbicide-resistance development in some weed species.

Integrated weed management involves the planned use of a number of control methods to achieve effective weed management. It should include the restoration and rehabilitation of land as weeds are removed.

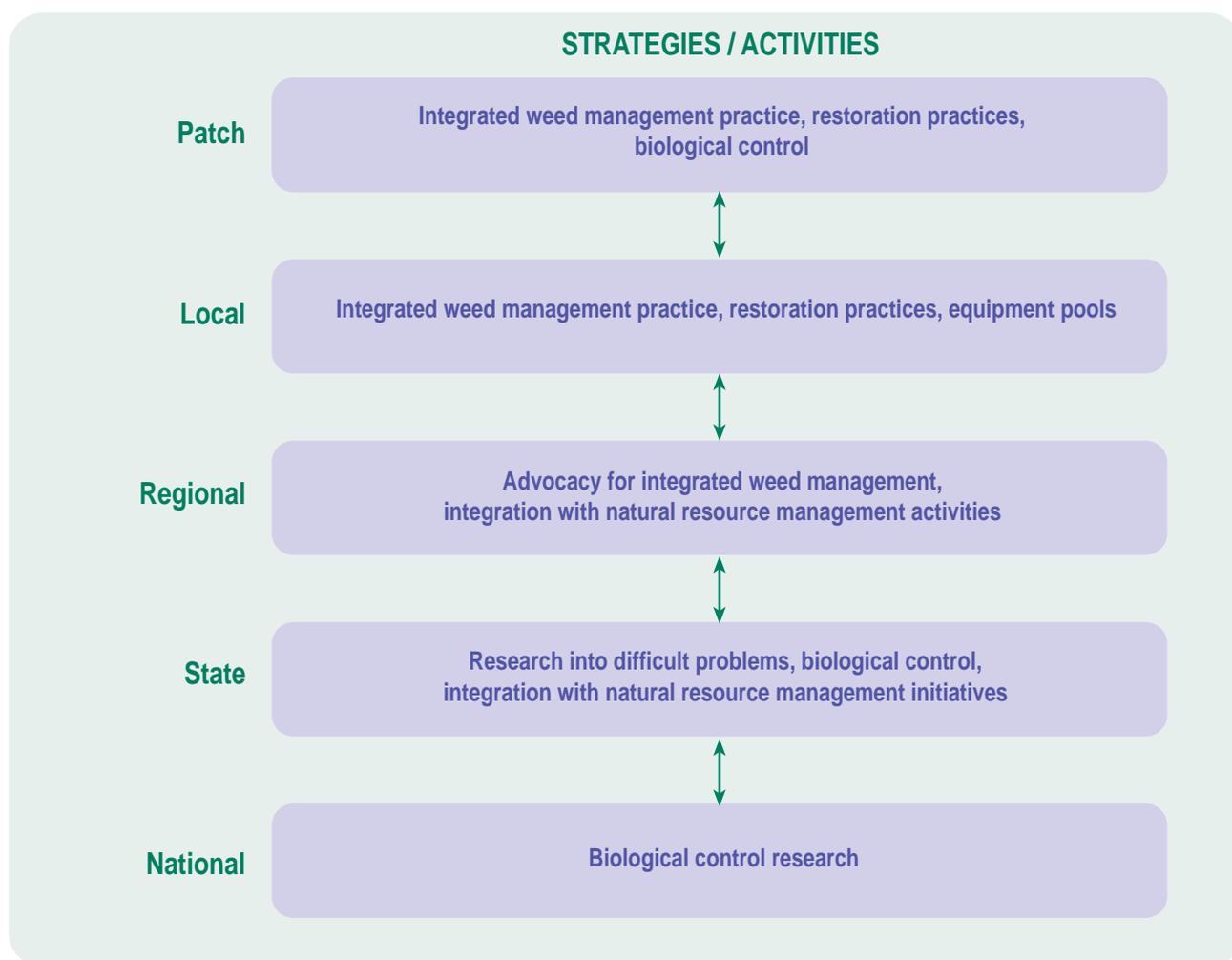
Primary producers and other land users should integrate a range of methods including mechanical control, biological control, chemical control and optimum pasture, cropping and grazing management to achieve sustainable weed control.

Integrated weed management in natural and semi-natural ecosystems involves using mechanical methods, biological control, chemical control, weed suppression devices (such as fibre matting, mulch), cultivation and ecosystem management (such as fire, revegetation and disturbance management). Integrated weed management in natural areas needs to be part of the process of ecological restoration in order to develop long-term sustainable ecosystems.

The scale of some weed infestations makes biological control the only feasible option.

The adoption of integrated weed management approaches at all levels and its promotion through training and extension programs is an important part of implementation of the State Weed Plan. Integrated Weed Management can be defined as 'a sustainable management system that combines all appropriate weed control options' (Sindel 2000).

Component 5. Integrated weed management levels



Recommended strategic actions

ACTION NO.	RECOMMENDED STRATEGIC ACTION	PARTNERS	POTENTIAL PARTNERS
5.1	Promote appropriate best practice for integrated weed management on all land.	SWCC, AGWEST, CALM, WRC, LGAs, Community and Catchment groups, Weeds CRC	
5.2	Encourage the inclusion of integrated weed management in natural resource management plans at all levels.	CALM, AGWEST, WRC, LGAs, Transport Authorities, all land managers	
5.3	Advocate the inclusion of specific weed management methods in land management and rehabilitation plans.	SWCC, CALM, WRC, LGAs	
5.4	Produce information resources and guidelines for developing integrated weed management programs at all levels to ensure effective use of resources.	SWCC, AGWEST, CALM, LGAs, WRC, Weeds CRC	
5.5	Promote the application of biological control agents where appropriate.	SWCC, CSIRO, Weeds CRC	
5.6	Development of integrated weed management plan for specific weed problems where appropriate.	SWCC, AGWEST, CALM, WRC, LGAs	

COMPONENT 6: POLICY SUPPORT AND REGULATION

Desired outcome: An appropriate legal and policy framework to support patch, local, regional and statewide management of weeds

Legislation supports the national and State plant quarantine systems, the management of many serious agricultural weeds (as Declared Plants) within the State and gives local government power to prescribe Pest Plants for the purposes of local management.

The legislation can only work successfully where there is a high level of public awareness and broad cooperation on weed management issues. Whilst legislation is necessary it can be perceived as negative, and can be costly to police. It is important that local weed action plans and policies gain the voluntary support of the community, rather than relying heavily on enforcement to achieve objectives.

The importation into Australia of plants, including potential weeds, is controlled under the *Commonwealth Quarantine Act 1908* and the *Wildlife Protection (Regulation of Exports and Imports) Act 1982* and is managed by the Australian Quarantine and Inspection Service (AQIS).

The *Plant Diseases Act 1914*, and to a lesser extent the *Agriculture and Related Resources Protection Act 1976*, control the movement of plants and seeds into Western Australia. This system needs to be maintained against pressures for commercial introduction of plants with known weed potential and increased movement of potentially contaminated produce.

Only plant species on the 'Permitted List' under the *Plant Diseases Regulations 1989*, or those approved under specific conditions, can be imported into Western Australia. The Permitted List is based on an assessment of the weed risks posed by the plant. Plant species which have not been previously assessed are subject to a formal weed risk assessment.

Plants declared under the *Agriculture and Related Resources Protection Act 1976* are excluded from entry to the area of the State detailed in the declaration. This legislation also prescribes actions that landholders must undertake when Declared Plants are present on their land, and includes various levels of control and prevention of the movement or spread of the weeds. Ensuring

implementation of the Declared Plant requirements is the responsibility of the Agriculture Protection Board (APB), which is constituted under the *Agriculture Protection Board Act 1950*.

While the assessments of potential Declared Plants made by the APB are comprehensive, usually plants are only declared if they pose a threat to agriculture. Many freshwater aquatic weeds have the potential to impact upon irrigation resources and the Declared Plant list includes those of concern known to be present in Western Australia or posing a risk of entry from other states. All serious aquatic weeds are Declared Plants and outbreaks in Western Australia are currently subject to eradication programs. Weeds such as bridal creeper, caltrop and pampas grass, which are primarily environmental weeds, are not Declared Plants.

Under the *Agriculture and Related Resources Protection Act 1976* and the *Local Government Act 1995*, local government can make local laws requiring landholder attention to Pest Plants occurring in the shire area. Pest Plants cannot also be Declared Plants in the same area. Pest Plant provisions are proving an effective local means of raising awareness and achieving increased weed control on public and private land.

Under the *Land Administration Act 1997*, pastoralists are limited in the introduction of exotic species for grazing improvement and are also required to manage Declared Plants.

The Environmental Weed Strategy for Western Australia recommended the introduction of legislation to support the management and classification of environmental weeds, and relevant legislation (proposed Biodiversity Conservation Bill) is currently under consideration.

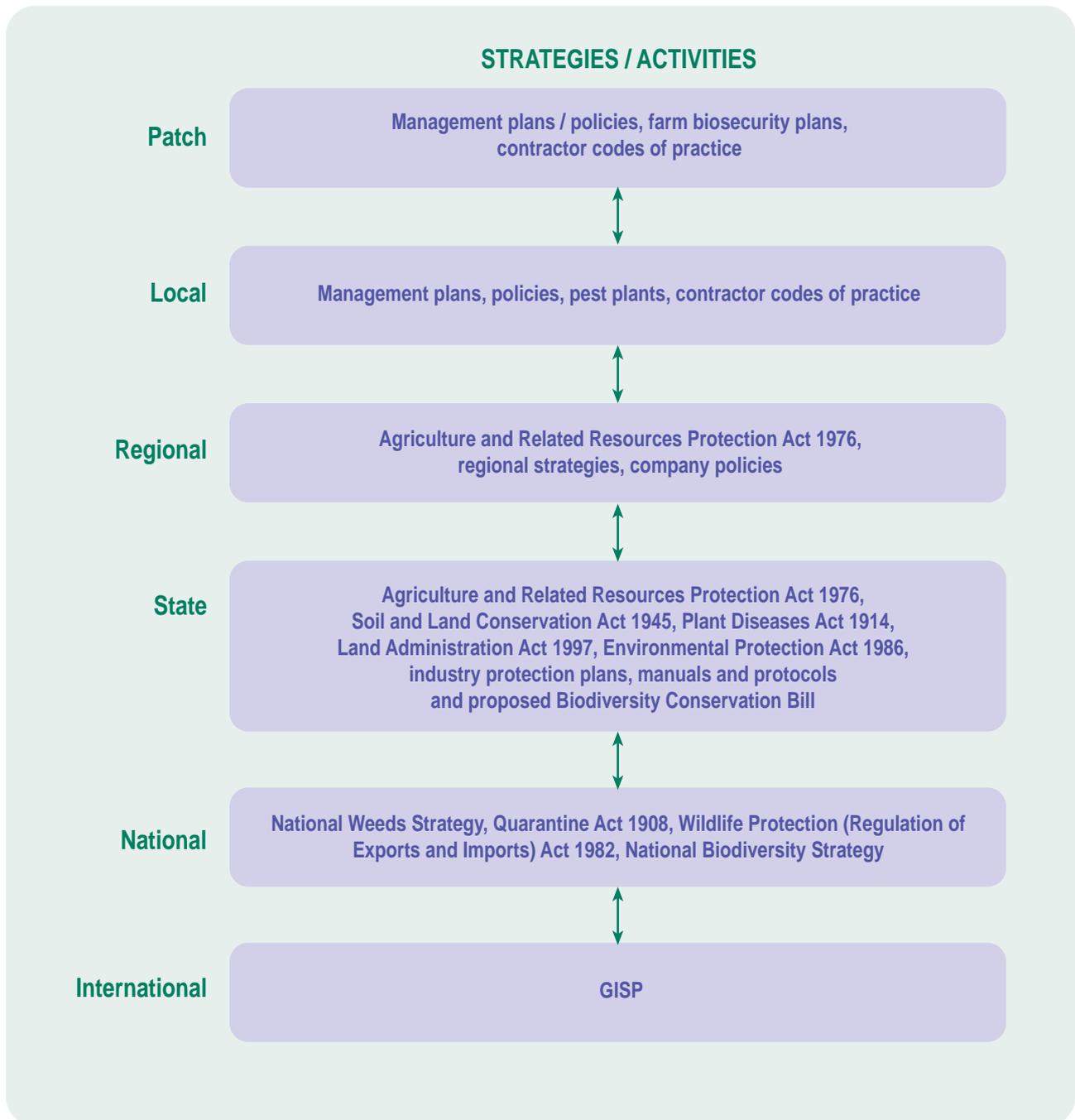
The Seed Industry Association of Australia's Code of Practice is an appropriate example of policies to minimise the movement of weeds into Western Australia, and such an approach should be considered by other industry groups involved in the movement of potential weeds, or potentially contaminated produce.

Successful implementation of the State Weed Plan will require strong voluntary contribution at all levels, backed by consistent implementation of regulation where action from landholders falls below community standards.



The Permitted list is available on the AGWEST webpage <www.agric.wa.gov.au/progserv/plants/weeds/Weedsci.htm>

Component 6. Policy support and regulation levels



Recommended strategic actions

ACTION NO.	RECOMMENDED STRATEGIC ACTION	PARTNERS	POTENTIAL PARTNERS
6.1	Promote sound weed management through appropriate policies and codes of practice.	SWCC	
6.2	Investigate an appropriate legal framework to support community action against serious weeds at a local level.	SWCC, AGWEST, CALM	
6.3	Encourage the linkage of weed management initiatives with other state, national and international policies and programs such as the National Weeds Strategy and the National Resource Management Initiative.	SWCC, CALM, AGWEST, WRC, LGAs	NWSEC, AWC
6.4	Promote the development of property level biosecurity and a quality assurance program for weed management.	AGWEST, CALM, WRC	
6.5	Promote the Pest Plant provisions as a means of achieving the regulation of locally important weeds.	SWCC, APB	LGAs
6.6	Promote effective and timely compliance and enforcement programs for regulated weeds.	APB, CALM, SWCC, LGAs	

COMPONENT 7: RESOURCES

Desired outcome: Objective allocation and efficient use of all government, industry and community resources available for weed management programs

Successful implementation of the State Weed Plan requires a commitment to provide sufficient resources by all levels of government and the private sector. Current resources applied to weed management need to be identified and redirected as necessary, to achieve the improved efficiency and effectiveness of resource use. This will help identify resource deficiencies and provide a basis for value-adding through the targeted application of more resources. Groups and agencies should identify their resource commitments as a contribution towards national and State weed management objectives.

People

Committed people are the key to the management of weeds in the State. Through awareness programs, individuals can create the impetus within their community to take action. Individual roles and approaches may differ but with adequate training, resources and recognition, each person can contribute to more effective weed management.

Involving all stakeholders in the development of weed management programs will maximise the ownership of the program and optimise implementation. Existing skills and knowledge of community participants in weed management need to be identified and recognised so that this knowledge base can be fully utilised to the benefit of all local weed management programs. Training is required to broaden the numbers of individuals involved and increase the skill levels of new recruits and volunteers generally.

Community groups and individuals need effective support from relevant government authorities. This includes administrative support and coordination, training (or assistance with meeting training costs), technical advice and insurance. Experience in other areas of natural resource management has shown that to effectively harness the resources available within the community, the involvement of a number of extension officers around the State will be needed to facilitate coordinated weed management at local and regional levels.

Information

Currently, good levels of information are available for some weed species and very little for others. The demand for information on weeds, their impacts and management is expanding rapidly.

Further development of WeedBase (a CD-ROM of the biological characteristics, distribution and control of Western Australian weeds), and its availability via the internet, will enable existing information to be distributed quickly and effectively. It will also provide a conduit through which the range of information on all weed species and their distribution can be improved. General use of common computer databases and mapping systems will greatly assist weed management by community groups and agencies.

Programs to improve weed-knowledge management and generation must be developed and the extension of this new knowledge promulgated. Coordinated information management and accessibility across the State is required to ensure that the greatest benefit is derived by stakeholders. The SWCC should consider establishment of an information service to provide information and referrals relating to activities consistent with the State Weed Plan.

Funding

To sustain effective weed management in all high priority areas, sufficient support is required to ensure long-term community and industry commitment to coordinated weed management programs.

Where possible, the resources associated with any weed management program should reflect the relative importance of each weed problem and should be borne by both the contributors to the problem and the beneficiaries of effective weed management. However, this is often difficult to determine when the benefits of weed control are often not immediately identifiable or attributable to any one group in society.

Government should consider support for weed management where broad economic, environmental and community benefits are demonstrated and technically sound solutions are available or warrant development. Research and regulation services are also core considerations for State and Commonwealth Governments.

Local Government will have improved opportunities for contribution under the State Weed Plan, including support for local community actions.

Local, regional and statewide coordination of weed management, through implementation and monitoring weed management plans, will assist in ensuring that both recurrent funding and grants are used effectively and that the benefits of these programs are delivered to the widest possible spectrum of stakeholders.

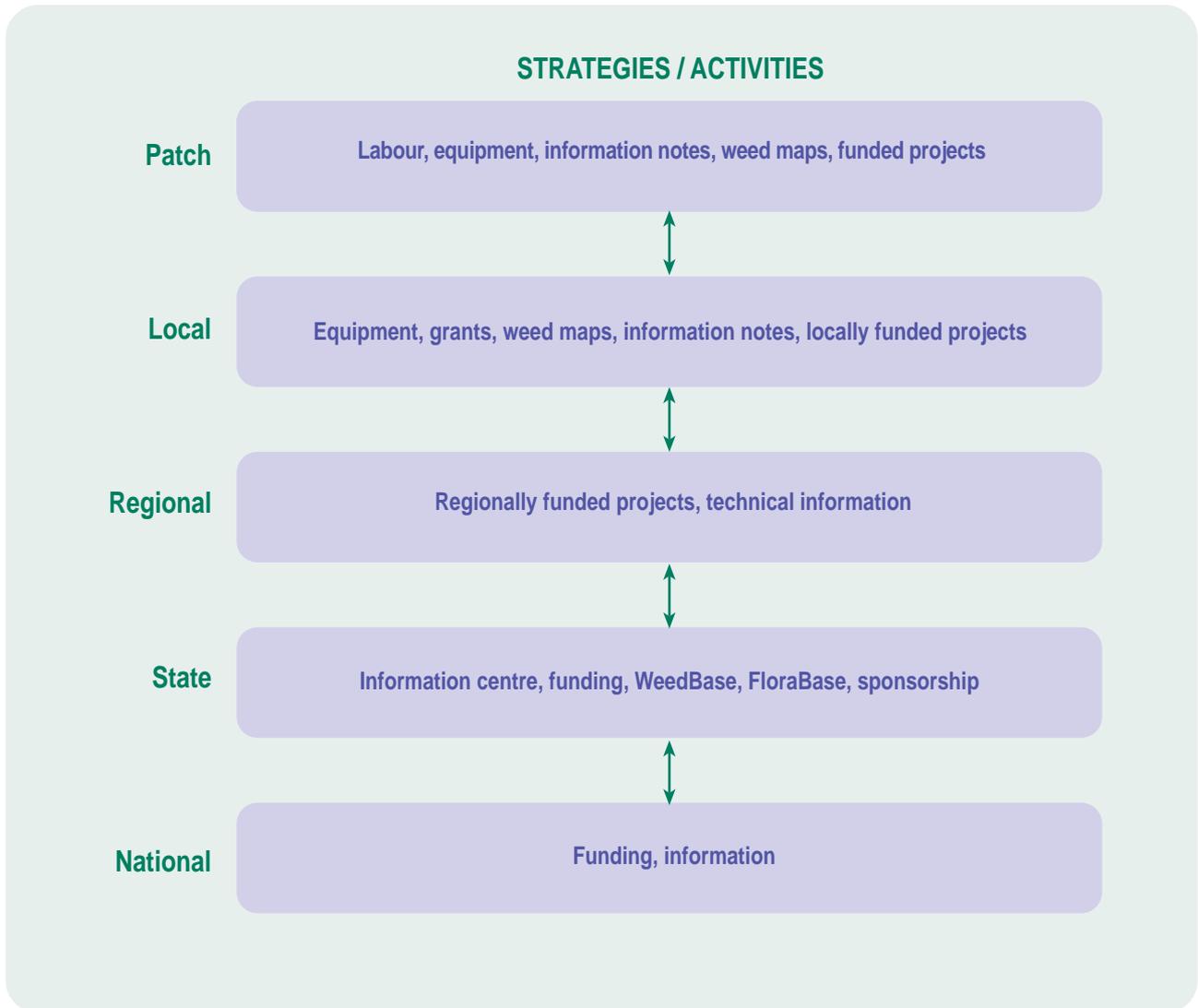


FloraBase can be accessed on the CALM Internet site <www.calm.wa.gov.au>

Declared Plant and other weed information can be found on the AGWEST Internet site <www.agric.wa.gov.au>

Those keen to know more about weed issues and weed management ideas should try the AGWEST weed links page <www.agric.wa.gov.au/progserv/plants/weeds/links.htm> and the Weeds Australia search <www.weeds.org.au>

Component 7. Resource levels



Recommended strategic actions

ACTION NO.	RECOMMENDED STRATEGIC ACTION	PARTNERS	POTENTIAL PARTNERS
7.1	Continue to develop accessible databases and mapping systems for known and potential weeds, their distribution and abundance, characteristics, options for control and key contact personnel, such as WeedBase.	CALM, AGWEST	
7.2	Obtain funds to implement the State Weed Plan (three to five years).	SWCC, CALM, AGWEST, and other State agencies.	DOLA, MRWA, WRC, Westrail
7.3	Facilitate projects and submissions for resources involving partnerships between government agencies, community groups and industry.	SWCC	
7.4	Provide technical support for local government and community groups.	SWCC, CALM, AGWEST, WRC	
7.5	Identify specialist extension officers to support community groups in the development of participatory management programs.	CALM, AGWEST, WRC, MRWA, community groups	
7.6	Identify and promote government, industry and community resources and skills available for weed management.	SWCC	
7.7	Identify and promote sources of funding for the coordinated management of weeds.	SWCC	
7.8	Encourage all participants in weed management programs to work cooperatively to gain maximum use of all resources.	SWCC, LGAs	
7.9	Facilitate the establishment of an information service.	SWCC	

COMPONENT 8: EDUCATION, TRAINING AND RESEARCH

Desired outcome: Increased community and industry knowledge of, and skills in, weed management

Education and training

Education and training in weed management needs to be addressed at an integrated and coordinated level throughout the State. Education programs need to be broadened at tertiary levels to include all natural sciences and other disciplines associated with land development. Accredited training and education for community groups, land managers and local government employees also needs to be developed to include courses such as bush regeneration, herbicide use, research and monitoring.

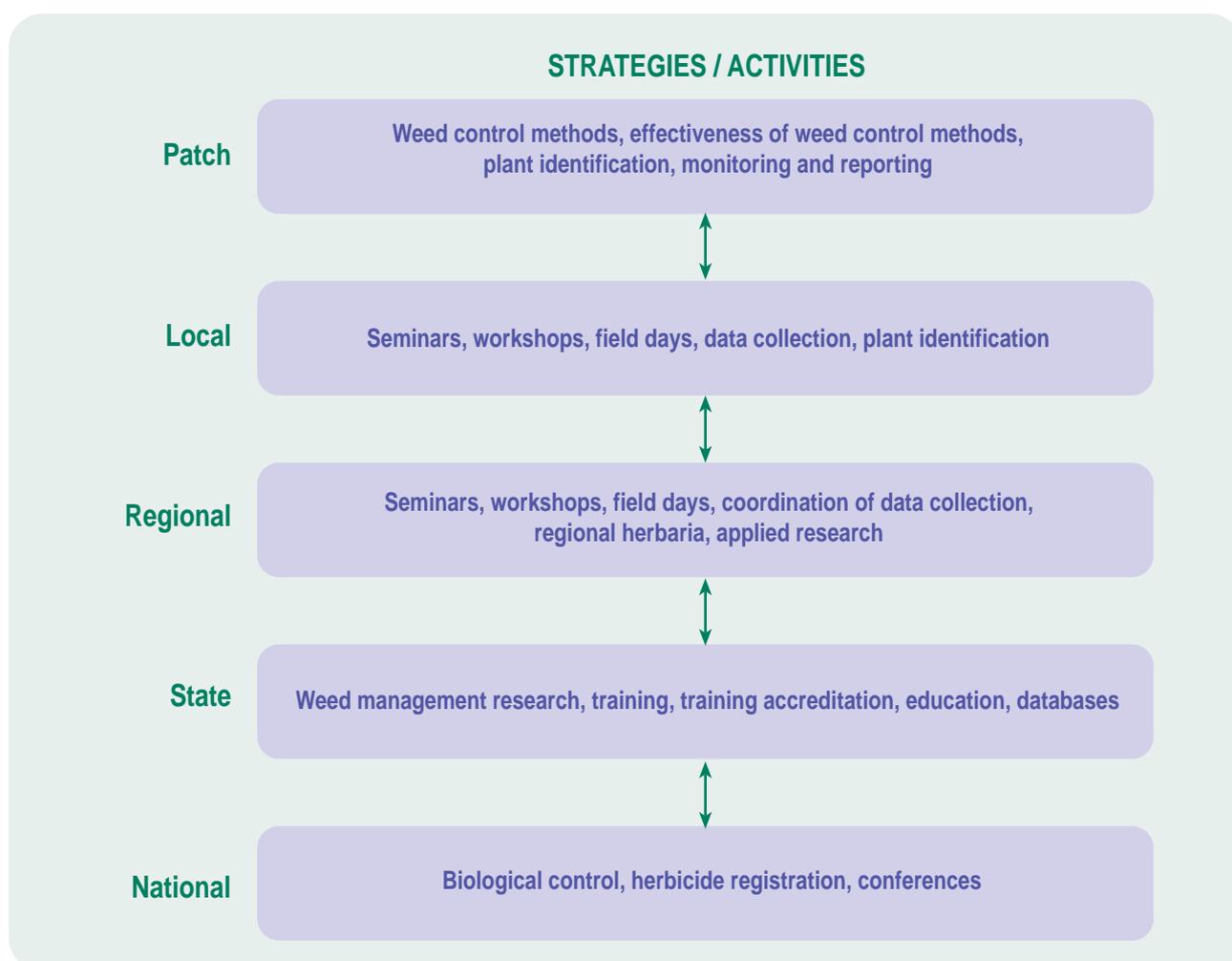
The further development of digital information tools such as WeedBase has the potential to provide an effective aid to community involvement in weed identification, reporting and management.

Research

Research into, and training in, weed management in Western Australia is carried out by a number of government and non-government agencies including:

- Government and other agencies addressing weed biology, impacts on primary production, weed distribution, weed control, biological control or plant taxonomy
- AGWEST
- CSIRO
- Botanic Gardens and Parks Authority
- Universities
- CRC for Australian Weed Management
- CALM
- Research and Development Corporations (including the GRDC-supported WA Herbicide Resistance Initiative)
- Industry: weed control, herbicide development, weed biology

Component 8. Education, training and research levels



- Community and Landcare groups: weed control, weed distribution, ecosystem regeneration.

Much of the research is aimed at overcoming specific problems, particularly with respect to agricultural production. Little research is aimed at developing integrated solutions at a landscape level to achieve both robust production systems and ecosystem resilience. Research needs to be better integrated and well resourced in order to tackle weed management across the State. Links between State research programs and Commonwealth programs need to be identified and consolidated to ensure successful outcomes and

avoid duplication of effort. Increased research by chemical companies is needed into herbicides suitable for use in protecting native ecosystems.

A strong commitment is required to ensure that 'action-learning' and 'adaptive management' approaches are successfully applied. The experiential results of all weed managers need to be captured to ensure that practical knowledge is made available to all current and future participants in weed management programs.

Recommended strategic actions

ACTION NO.	RECOMMENDED STRATEGIC ACTION	PARTNERS	POTENTIAL PARTNERS
8.1	Identify, document and promote current research activities conducted by State and national agencies and groups.	SWCC	
8.2	Identify and prioritise research programs to support integrated weed management.	SWCC	NWS
8.3	Identify funding sources and opportunities for weed research, including appropriate incentives.	Commonwealth, Industry, Weeds CRC	AGWEST, CALM
8.4	Develop and implement more effective training and education programs for all parties involved in weed management for example, development of best management practice and demonstration sites.	SWCC, LGAs, AGWEST, CALM, Weeds CRC	NIAWA, EWAN
8.5	Incorporate weed management education into existing curricula at all levels.	Universities, TAFE, Schools, Weeds CRC	LGAs
8.6	Coordinate development and distribution of endorsed information on weed management.	SWCC, State agencies, Weeds CRC	LGAs
8.7	Encourage greater communication and liaison between groups involved in weed management.	SWCC, AGWEST, community groups	LGAs
8.8	Promote uptake of training in weed identification and integrated weed management, and the development of new training opportunities where gaps exist.	SWCC, AGWEST, CALM, WRC, Weeds CRC	LGAs, peak landcare body

COMPONENT 9: MONITORING AND EVALUATION

Desired outcome: Ability to evaluate changes in the status of weeds and to maintain the relevance of the State Weed Plan

Monitoring and evaluation need to be undertaken to measure the success of the strategies implemented under the State Weed Plan and to make appropriate changes.

Performance indicators will need to be developed in order to objectively assess the success of activities associated with the Plan. This will contribute to its accountability where public and private sector funds are involved and provide a mechanism for modifying strategies where desired outcomes are not being adequately achieved.

Both short- and long-term monitoring programs will need to be part of the overall monitoring strategy. Progress in implementing State Weed Plan strategies should be reported annually. The State Weed Plan's impact and overall progress in weed management should be reviewed every five years.

Component 9. Monitoring and evaluation levels



Recommended strategic actions

ACTION NO.	RECOMMENDED STRATEGIC ACTION	PARTNERS	POTENTIAL PARTNERS
9.1	Establish criteria to evaluate the implementation and effectiveness of all actions under the State Weed Plan.	SWCC	
9.2	Undertake regular surveys of land managers, industry groups and the wider community to gauge the level of awareness of weed issues and participation in weed management and to identify opportunities and impediments to the achievement of State Weed Plan objectives.	SWCC	
9.3	Establish regular reporting to stakeholders on progress of the State Weed Action Plan.	SWCC	
9.4	Recommend changes to State Weed Action Plan and negotiate changes with stakeholders as required.	SWCC	
9.5	Review the State Weed Plan every five years.	SWCC	
9.6	Promote a consistent system for monitoring weed status.	SWCC	
9.7	Conduct regular regional forums to review stakeholder participation and support.	SWCC	
9.8	Records costs to implement the State Weed Plan and evaluate efficiency through cost/benefit analysis or similar means.	SWCC	

REFERENCES

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ARMCANZ, ANZECC and Forestry Ministers (1997) *The National Weeds Strategy: A Strategic Approach to Weed Problems of National Significance*. Agricultural and Resource Management Council of Australia and New Zealand, Australian and New Zealand Environmental and Conservation Council, Forestry Ministers.

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Sindel, B.M. (ed.) (2000) *Australian Weed Management Systems*. R.G. and F.J.

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Thackway, R. and Cresswell, I.D. (1995) *An Interim Biogeographic Regionalisation for Australia: A framework for establishing the national system of reserves*. Version 4.0. Canberra: Australian Nature Conservation Agency.

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Thorp, J.R. (1998) *Weeds of National Significance*. Standing Committee on Conservation. Out of Session Paper.

Virtue, J. and Cooke, D. (1997) *National Weeds Strategy: "National Significance" Criteria Survey*. Animal and Plant Control

VALUABLE INTERNET SITES

Commission, South Australia.

AFFA <www.affa.gov.au>

Department of Agriculture <www.agric.wa.gov.au>

AQIS <www.aqis.gov.au>

Department of Conservation and Land Management <www.calm.wa.gov.au>

Council of Australian Weed Science Societies <<http://avoca.vicnet.net.au/~weedss/>>

CSIRO Entomology (for biological control) <www.ento.csiro.au>

Environment Australia <www.environment.gov.au>

Environmental Weeds Action Network (Inc.) <<http://members.iinet.net.au/~ewan/>>

National Weeds Strategy Homepage <www.weeds.org.au>

Office of the Chief Plant Protection Officer
<www.affa.gov.au/outputs/animalplanthealth.html>

Permitted List (for importing seeds or plants into Western Australia)
<www.agric.wa.gov.au/progserv/plants/weeds/Weedsci.htm>

Plant Health Australia
<www.planthealthaustralia.com.au>

Plant Protection Society of WA (Inc.) and 13th Australian Weeds Conference
<<http://members.iinet.net.au/~weeds>>

Sandy's Links Page <www.agric.wa.gov.au/progserv/plants/weeds/links.htm>

Weedbuster Week <www.weedbusterweek.info.au>

Weeds CRC <www.waite.adelaide.edu.au/CRCWMS/>

MEMBERS OF THE STATE WEED PLAN STEERING GROUP

Name	Title/Organisation
Mr Rob Delane	(Chairman)Executive Director, Agriculture Protection Department of Agriculture
Mr Roger Armstrong	Senior Environmental Protection Officer CALM
Dr Ken Atkins	Chairman Roadside Conservation Committee
Mr Frank Batini	Manager, Environmental Protection Branch CALM
Ms Lillias Bovell	Policy Manager Western Australian Municipal Association
Mr David Bright	President Australian Association of Bush Regenerators (WA)
Mr Ben Carr	Environmental Officer D E P
Mr Damian Collopy	Manager, Plant Pests and Diseases Department of Agriculture
Mr Rex Edmondson	Chairman Soil and Land Conservation Council
Mrs Keryl Enright	Chairman Agriculture Protection Board
Mrs Judy Fisher	Committee Member Environmental Weeds Action Network
Mr Rowland Gwynne	Manager, Plant Health Department of Agriculture
Ms Verity Klemm	Waterways WA Program Coordinator Water and Rivers Commission
Ms Sandy Lloyd	Executive Officer, State Weed Plan Department of Agriculture
Mrs Diane Matthews	Conservation Council of Western Australia (Inc.) and Wildflower Society of WA (Inc.)
Ms Margo O'Byrne	Community Involvement Coordinator (Ecoplan) Department of Environmental Protection
Mr Sandy Pate	Development Officer Nursery Industry Association (WA)

MEMBERS OF THE STATE WEED PLAN STEERING GROUP

Prof. Stephen Powles	Director, WA Herbicide Resistance Initiative The University of Western Australia and Weeds CRC
Mrs Joanna Seabrook	Chairperson Environmental Weeds Action Network
Ms Rachel Siewert	Coordinator Conservation Council of Western Australia (Inc.)
Ms Clare Walsh / Ms Linda Raynor	Environmental Policy Officer Western Australian Municipal Association

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- Department of Agriculture
- Water and Rivers Commission
- Main Roads WA
- Westrail
- Department of Environmental Protection.

STATE WEED PLAN STEERING GROUP

The Steering Group to develop the State Weed Plan was formed in March 1999, with a broad representation of the skills, experience and issues relevant to stakeholders. The Steering Group has encouraged wide participation, and several additional members have brought with them additional skills and new perspectives.

Stakeholder contributions

In addition to the broad input to development of the State Weed Plan achieved via the diverse membership of the Steering Group, the following methods have been used to ensure maximum capture of ideas and definition of priorities.

- State Weed Plan Reference Group – A broad stakeholder group has contributed via two workshops and input through the Steering Group members. The Reference Group has 67 members, and includes representatives of 53 government, industry and community organisations.
- Plan Discussion paper – 3000 copies of a State Weed Plan discussion paper were distributed.
- Public meetings – Presentations by the Steering Group Chairperson and consultants, and public discussions of issues, ideas and priorities were held at:
 - Busselton - 39 attendees from community and industry groups, LGAs and government agencies
 - Katanning - 20 attendees from community and industry groups, LGAs and government agencies
 - Moorra - 12 attendees from community and industry groups, LGAs and government agencies
 - South Perth - 27 attendees from the Environmental Weeds Action Network, Urban Bushland Council and other community groups
 - Bentley - 11 attendees from Local and State Governments.
- Consultations – the consultants to the Steering Group met individually with a number of key stakeholders.
- Public submissions – 12 written submissions from members of the public were received by the Executive Officer.
- Draft plan distribution – 3500 copies of the draft State Weed Plan were distributed to all identified stakeholder organisations and to public libraries throughout the State.
- Comments on the draft State Weed Plan – 80 written submissions from members of the public were received by the Executive Officer.