WEED MANAGEMENT STRATEGY 2018 –2023

Phillip Island NATURE PARKS

June 2018

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Phillip Island Nature Parks
Ranger

Phillip Island Nature Parks
Weed Management Strategy 2018-2023

Contents

Acknowledgments

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Contributions

To the staff, contractors, agencies, and community members who have been generous with their time and expertise, and to Mark Merryfull for the Summerland Estate Case Study (appendix 4).

Abbreviations

ACUP	Agricultural Chemical Users Permit
BSCS	Bass Coast Shire Council
CaLP Act	Catchment and Land Protection Act 1994
CMA	Catchment Management Authority
'S' weeds	State Prohibited Weeds
'P' weeds	Regionally Prohibited Weeds
'C' weeds	Regionally Controlled Weeds
'R' weeds	Restricted
CVA-GA	Conservation Volunteers Australia – Green Army
DELWP	Department of Environment, Land, Water and Planning
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DOEE	Department of the Environment and Energy

EVC	Ecological Vegetation Class
FCUC	Farm Chemical Users Course
IPAPF	Invasive Plants and Animals Policy Framework
GIS	Geographic Information System
GPS	Global Positioning System
PICS	Phillip Island Conservation Society
PILG	Phillip Island Landcare Group
Nature Parks or PINP	Phillip Island Nature Parks
TAFE	Technical and Further Education
RBGM	Royal Botanic Gardens Melbourne
PP&WCMA	Port Phillip and Westernport Catchment Management Authority
WONS	Weed of National Significance

Executive Summary

Purpose of Strategy

The Phillip Island Nature Parks Weed Strategy 2018-23 establishes goals, strategic actions, performance measures and timeframes for weed management within the Nature Parks. Furthermore, the strategy provides a suitably resourced framework to guide best practice weed management that is supported by decision makers and the community. A major challenge to managing weeds in the Park is to optimise existing knowledge and resources and to find new and innovative ways to tackle weed issues within predicted resource levels.

For the purposes of this weed strategy a weed is defined as "plants that have, or may have, a negative impact on environmental, economic or socio-cultural values."

Guiding Principles of weed management within the Nature Parks

- Prevent new and emerging weeds from establishing in the Nature Parks
- Minimise the impact of established priority weed problems
- Minimise the impact of weeds on the Park values: environmental, social and cultural values.
- Minimise the risk of weeds that have originated within the Park spreading to adjacent land.
- Research, monitor and control new and emerging weeds.
- Establish partnerships for effective weed management with other public land managers, private landholders and community groups.
- Establish a long-term management regime that is sustainable into the future.
- Enhance capacity and commitment to solve Park weed problems

Disclaimer

Whilst every effort will be made to follow this strategy, unforeseen opportunities may increase or diminish resources that may necessitate the modification of the works program within annual budget levels. Programs and budget will be reviewed annually against achievements to date to reset priorities for the following year's works plan.

Achieving best practice weed management within the Nature Parks

Listed weeds have been ranked (high, medium, low) reflecting the Nature Parks obligations under the CaLP Act 1994, biosecurity legislation, invasiveness, and threat posed to Park and community values. The highest priority should be given to protect highly significant values at highly significant locations. Resources should first be targeted towards actions that will have a lasting effect. However, within this context overall ecosystem services and biosecurity must be maintained. Following weed removal and site rehabilitation using integrated weed management techniques, monitoring and ongoing maintenance is required where reinvasion is likely to occur. Future assessments should include the role of climate change to increase the risk of weed species extending their range or becoming more invasive.

One of the highest priority 'strategic actions' for effective weed management over the next five years will be to contain and where possible eradicate the eleven 'Weeds of National Significance' and the forty weed species listed under the Victorian Catchment and Land Protection Act 1994.

Introduction

Park Setting

The Phillip Island Nature Parks (Nature Parks) is located on Phillip Island approximately 120 kilometres from Melbourne **(figure 1)**. Phillip Island is part of the traditional lands of the Bunurong/Boon Wurrung people and the Nature Parks contains over 217 registered sites of cultural significance. Phillip Island is approximately 100 square kilometres in area and supports a diversity of environments and activities. Phillip Island is within the 'Mornington Peninsula and Western Port Biosphere Reserve', and the Gippsland Plain bioregion. Approximately 90 percent of the island has been cleared and comprises farming and urban areas, while the remainder consists of woodlands, wetlands, saltmarsh, beaches and spectacular coastlines.

The Nature Parks was created in 1996 by the State Government of Victoria to integrate the management of public land on Phillip Island and to facilitate innovation in wildlife management, visitor services and tourism experiences. The Park consists of a number of Crown Land Reserves spread across the Island with a total area of 1,805 hectares **(figure 2)**. A Board appointed by the Minister for Planning is responsible for the management of the Park's flora and fauna (Phillip Island Nature Park Board of Management Incorporated).

Figure 1: Regional Locality Plan

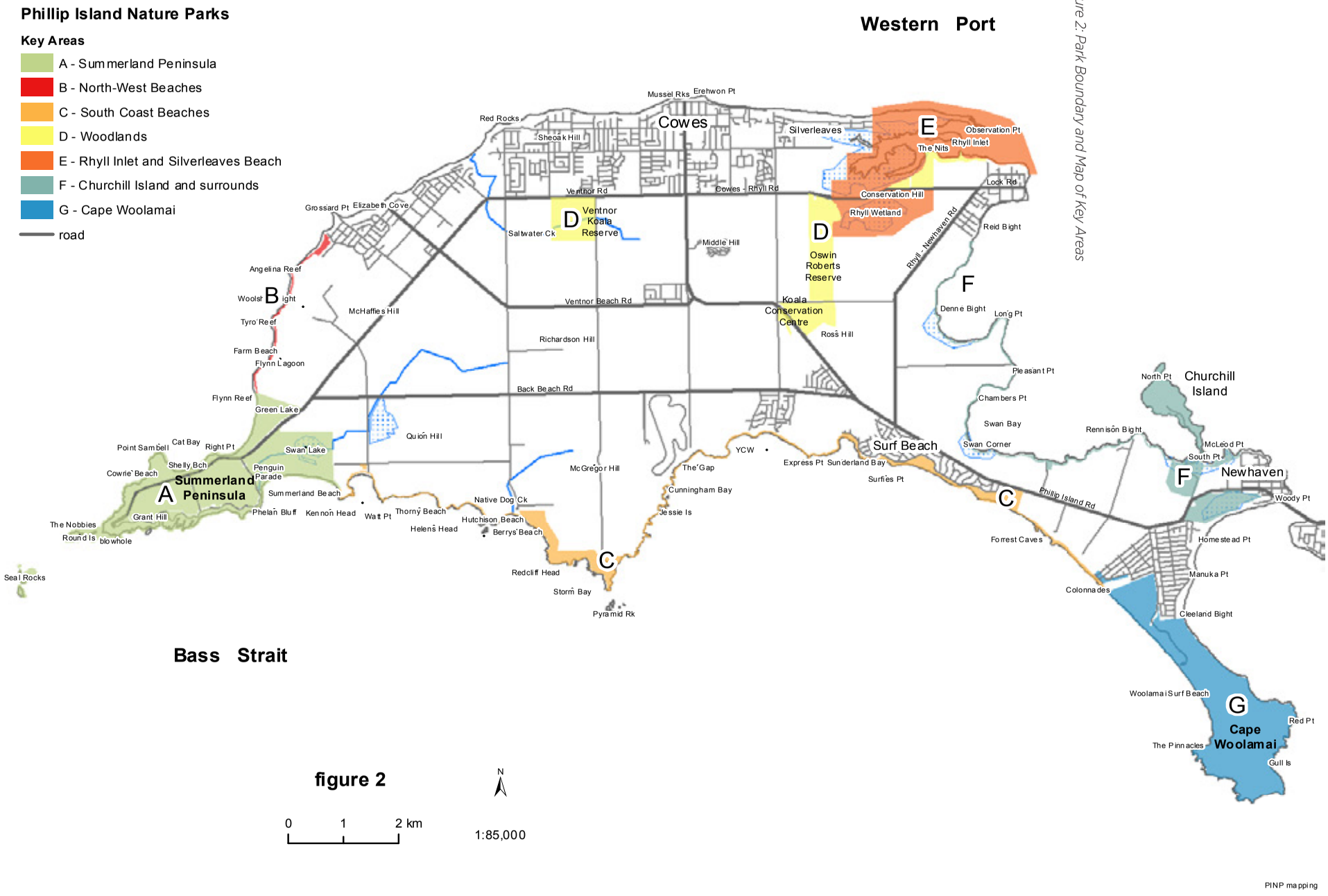


Figure 2: Park Boundary and Map of Key Areas

Framework for Weeds Management

Weeds threaten wildlife and habitat, rare or threatened species, Ecological Vegetation Classes (EVC's), vegetation communities and intact areas of vegetation. Weeds can be classified in terms of invasiveness and the stage of invasion, ie. new and emerging, or established weeds. It is most cost effective to prevent new weeds establishing **(figure 3)** and small infestations should be eradicated followed by containment or asset based protection. Key Area plans and a number of vegetation plans will assist with setting priorities for weed management.

For Victoria, the 'Invasive Plants and Animal Policy Framework 2010 (IPAPF) is an overarching approach to the management of existing and potential invasive species within the context of the Whole of Government Biosecurity Strategy. It incorporates a biosecurity approach and ensures that Victoria maintains a comprehensive planning framework to guide future policy, planning and community activity specific to invasive species. The framework is the basis of the regional Port Phillip and Western Port Catchment Strategy and the PP&WP Invasive Plant and Animal strategy.

National, state and regional weed legislation, policy, strategies and plans underpin priorities for private and public land managers. This framework **(figure 4)** provides for the allocation of resources to priority locations and forms the basis of this five year weed strategy. This strategy will specify strategic actions (p17) for on-ground works, extension, education and training, enforcement, monitoring and evaluation.

The level of impact and potential that weeds have on Park values and the community will guide the setting of objectives and expected outcomes for weed management. Identification of high value areas and their protection and management (NRE 2001), (DSE 2006) is important. For instance, once cultural heritage or biodiversity has been lost, such as when a vegetation community is cleared, it cannot easily or practically be replaced. The highest priority is given to actions that will have a lasting positive effect at high value locations where biodiversity and habitat can be maintained or enhanced.

The purpose of this strategy is to provide a suitably resourced framework to guide best practice weed management that is supported by decision makers and the community. A major challenge to managing weeds in the Park is to optimise existing knowledge and resources and to find new and innovative ways to tackle weed issues within predicted resource levels. To maintain the relevance of this strategy, priority actions, resources, costs and training requirements will be determined annually following a review of performance measures towards achieving objectives. This strategy forms a part of the Park's overall land management and extension activities to protect biodiversity and promote ecological sustainability.

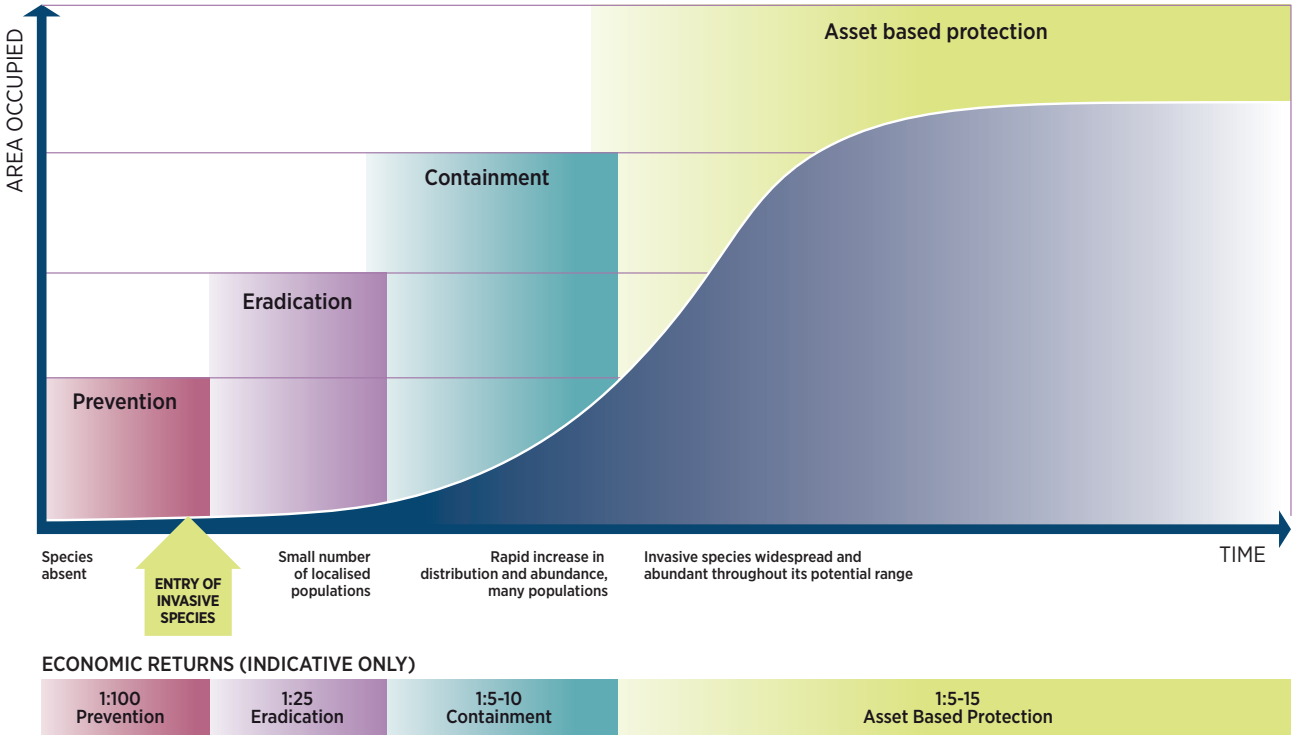
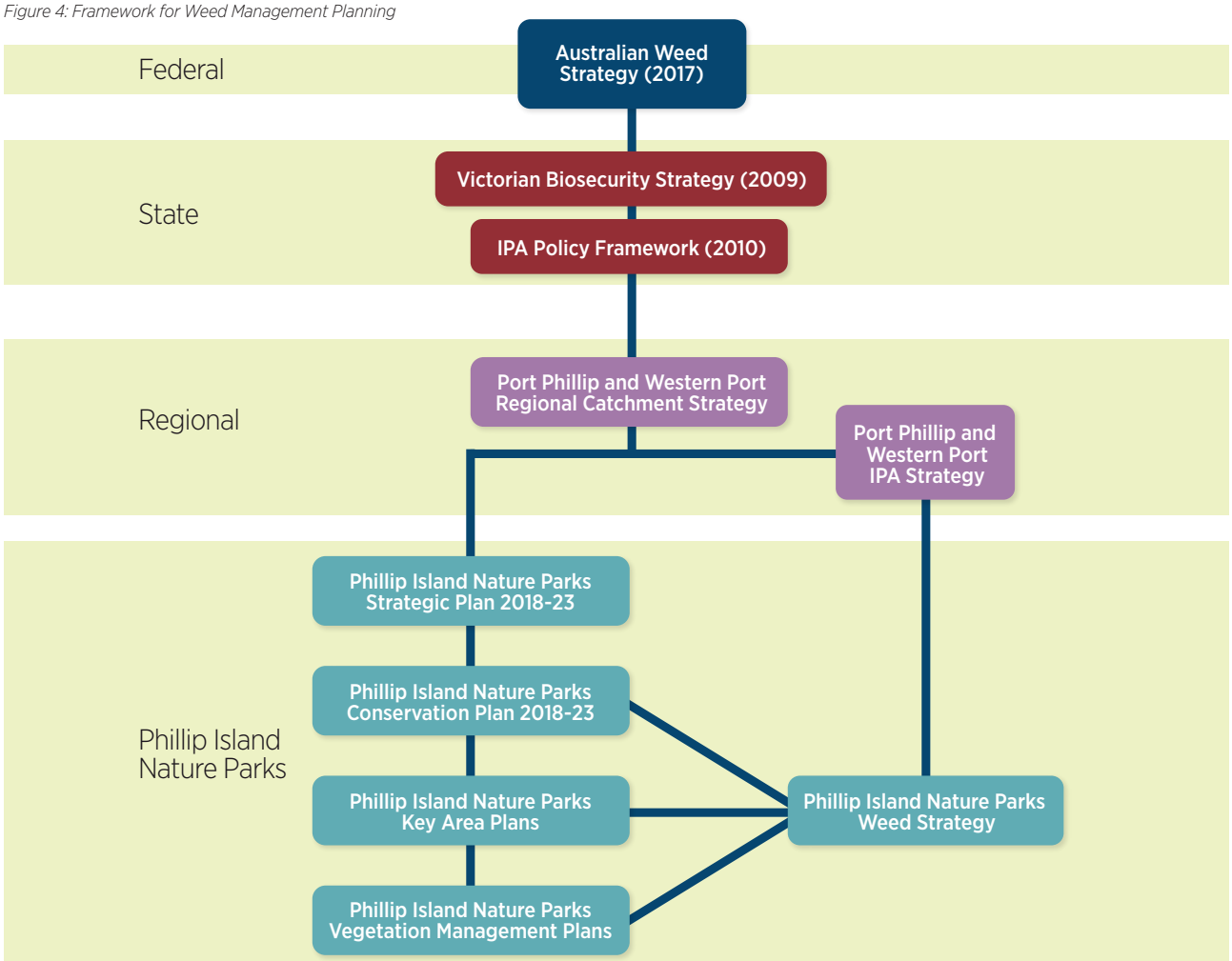


Figure 3: Generalised invasion curve showing actions appropriate to each stage
[Source: Agriculture Victoria – Invasive Plants and Animals Policy Framework 2016 (www.agriculture.vic.gov.au)]

Figure 4: Framework for Weed Management Planning



Key Documents

- **Australian Weeds Strategy 2017 to 2027**, Invasive Plants and Animals Committee 2016, Australian Government Department of Agriculture and Water Resources, Canberra.
- Weeds of National Significance (The National Weed Strategy 1999) (Thorp J. R. & Lynch R. 2000)
- Invasive Plants and Animals Policy Framework 2016 (www.agriculture.vic.gov.au)
- Our Catchments, Our Communities, Integrated Catchment Management in Victoria 2016–19
- Victorian Pest Management – A Framework for Action – Weed Management Strategy 2002: (NRE. 2002a), (NRE. 2002b), (NRE. 2002d)
- Port Phillip and Western Port Regional Catchment Strategy 2015 (www.ppwrcs.vic.gov.au))
- Port Phillip and Western Port Native Vegetation Plan (PP&WCMA 2006)
- Port Phillip and Westernport Invasive Plants and Animals Strategy (PP&WCMA 2011)
- Interim Guidelines and Procedures for Managing the Environmental Impacts of Weeds on Public Land in Victoria 2006 (Environmental Weeds Working Group 2006)
- Prescribed measures for the control of noxious weeds, Catchment and Land Protection (CaLP) Act 1994 Regulations 2012
- Phillip Island Nature Parks – Strategic Plan 2012 – 17
- Phillip Island Nature Parks – Strategic Plan 2018 – 23
- Phillip Island Nature Parks – Environment Plan 2012 – 17
- Phillip Island Nature Parks – Conservation Plan 2018 – 23

Phillip Island Nature Parks – Strategic Plan 2018-23

The Nature Park's Strategic Plan outlines key aspirations and guiding principles across five programs: Conservation Excellence; Extraordinary Visitor Experiences; Community Partnerships; Sustainable Future; and Agile Organisation & Inspired People.

Actions 1.2 and 1.3 within the Conservation Excellence program underpin the philosophy for weed management on Phillip Island:

- Action 1.2: Investing in habitat restoration and developing innovative wildlife protection solutions
- Action 1.3: Enhancing Phillip Island as a safe haven for wildlife through identifying and controlling threats

Phillip Island Nature Parks – Conservation Plan 2018-23

The purpose of the Conservation Plan 2018-23 is to provide a five-year planning framework for the Conservation Department, identifying goals and actions the Nature Parks will undertake in planning, conservation and community partnerships in the medium to long term. Day to day work plans, including maintenance schedules are the purpose of departmental Annual Work Plans.

Reporting and Review

Reports on actions outlined in the Conservation Plan 2018-23 will be provided to the Nature Parks Board quarterly. The weed management strategy is an evolving document and will be regularly reviewed through management meetings and consultation with stakeholders and the community. A detailed report and review will take place at the end of the five year period.

Background

Weeds in Victoria

The Victorian government's roles and responsibilities for managing invasive species are primarily delivered by the Department of Economic Development, Jobs Transport and Resources (DEDJTR) with the management of parks and reserves directed through Parks Victoria.

The State government is supported in the implementation of the CaLP Act by the Victorian Catchment Management Council (VCMC) and Natural Resource and Catchment Authorities (NRCAs). The VCMC has a statutory function of an advisory nature while the CMAs have statutory functions to co-ordinate and implement invasive species activities at a regional level and advise the Minister for Environment and Climate Change on any matter referred to it by that Minister, including advice on any proposal to declare or revoke a noxious weed (http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds)

Biosecurity Officers are employed by Agriculture Victoria (DEDJTR) to enforce provisions of the Act. The Victorian 'Declared Noxious Weed' list is reviewed from time to time and may change during the life of this strategy.

Noxious weeds

The Act defines four categories of noxious weeds and the responsibilities of land owners. For more detail on each of these categories please refer to Appendix 1.

- State Prohibited Weeds, (none recorded in the Park).
- Regionally Prohibited Weeds (1 recorded in the Park) must be eradicated or controlled within the Park, but not on roadsides where it is the responsibility of the relevant road manager.
- Regionally Controlled Weeds (32 recorded in the Park) must be prevented from growing or spreading within the Park and on adjoining roadsides.
- Restricted Weeds (6 recorded in the Park) are prohibited for trade.

Environmental weeds

Plants which threaten natural ecosystem values, reduce biodiversity and result in the loss of habitat for native animals (DSE, 2006). A number of serious environmental weeds such as the grass Kikuyu; woody weeds such as Polygala and Mirror Bush; and creepers such as Dolichos and English Ivy are not listed under the CaLP Act. While most serious weeds have been introduced from outside Australia other, non-indigenous native species such as Sweet Pittosporum and White Kunzea have spread beyond their natural range and also have the potential to damage local plant communities.

Agricultural weeds

Plants which threaten crops, horticulture and pasture production. Both agricultural and environmental weeds may also be noxious weeds.

Declared Noxious Aquatic Species

Aquatic plant species (none listed for PINP) proclaimed under the Fisheries Act 1995.

Weed management within the Nature Parks

Categories for weed priority determination

- **'New and emerging weeds'** also known as 'sleeper weeds': the goal is prevention and eradication
- **'High priority established weeds':** the goal is containment and eradication
- **'Other established weeds'**: medium and low priority, the goal is containment and suppression

Criteria for weed priority determination

- **Invasiveness**
- **Potential for spread**
- **Capacity to control** eg. small annuals can be difficult
- **Impacts:** environmental, cultural, economic, amenity

Listed weeds (Appendix 3) have been ranked **(high, medium, low)** reflecting the Nature Parks obligations under the CaLP Act, biosecurity legislation, invasiveness, and threat posed to Park and community values. The highest priority should be given to protect high significant values at high significant locations. Resources should first be targeted towards actions that will have a lasting effect (DSE 2006). However, within this context overall ecosystem services and biosecurity must be maintained.

Following weed removal and site rehabilitation using **integrated weed management** techniques, monitoring and ongoing maintenance is required where reinvasion is likely to occur. Future assessments should include the role of climate change to increase the risk of weed species extending their range or becoming more invasive.

Weed Management Principles

- Weed prevention and hygiene
- Early detection and eradication
- Integrated weed management: biological, physical and chemical control measures
- Ongoing maintenance and maintain capacity

Planning for effective weed management

- Information gathering
- Set goals and objectives based on knowledge, priorities and resources
- Develop and implement actions to achieve objectives with partners
- Monitor performance and review and revise plan as necessary

Expected outcomes for weed management

- Increased protection of identified key priority assets from the threat of weeds for the future.
- An integrated approach to the protection of Park assets.
- Increased recreational and ecotourism opportunities.
- The establishment of good working relationships between the Nature Parks neighbours and the community.

Weed species within the Nature Parks

There are 362 weeds listed which threaten Park values including 'weeds of national significance' (WONS) (11 recorded in the Park) and 'declared noxious weeds' (40 recorded in the Park). The remaining 311 plant species recorded are environmental weeds including exotic weeds (286), non-indigenous Victorian native plants (20) and 5 indigenous plants to Phillip Island that are considered weedy where they are extending beyond their natural range on Phillip Island and invading other vegetation communities (Appendix 2). Weeds can be classified by a number of growth and reproductive characteristics such as annuals, biennials or perennials. Identification of the life cycle of each weed is crucial to stop further seeding and for setting priorities for weed management, timing, and management methods.

Pest plants will always be present in a disturbed landscape such as Phillip Island, and significant weed infestations occur throughout the Park and continue to threaten Park values. Many weeds have established on Phillip Island through the process of European settlement. Native vegetation was cleared or modified and non-indigenous plants introduced as crops, pasture or ornamental plants around dwellings. Weeds have also been carried, externally or internally, by stock, vermin and native animals. Along with the fragmentation of habitat there has been a modification of ecological processes such as the loss of native pollinators and seed vectors for native species to the advantage of weed species. While some weeds have been introduced deliberately or unintentionally by human activity, others have found their way into the Nature Parks and have spread through natural processes such as air, sea, birds and other animals.

Much of the early weed control on the Island was to control weeds that had a cost to agriculture such as thistles in wool and Cape Weed in pasture. The Phillip Island Shire Council (amalgamated to form the Bass Coast Shire Council), and Lands Department followed by Parks Victoria, all controlled noxious weeds such as Blackberry, Gorse, Boxthorn and Ragwort in coastal reserves and other reserves that now make up the Nature Parks such as Ventnor Koala Reserve, Oswin Roberts and Rhyll Inlet, Churchill Island and Cape Woolamai. They were aided in their work by local conservationists, many of whom went on to form local conservation groups such as the Phillip Island Conservation Society, Phillip Island Landcare Group and Coastcare groups. In 2000 the Phillip Island Landcare Group in consultation with the Bass Coast Shire Council, the Nature Parks and community groups, released the weed control program '10 weeds in 10 years' and the '10 weeds in 20 years' to target both listed noxious weeds and high priority environmental weeds (PINP 2007).

Setting Priorities for Weed Management

Listed weeds have been ranked high (72 in the Park), medium (68 in the Park), and low (222 in the Park) reflecting the Park's legal obligations and the invasiveness and threat posed to Park values (Thorp J. R. & Lynch R. 2000). New and emerging weeds (18 in the Park) receive the highest priority and the aim is to eradicate infestations before they spread. All the species listed in the priority weed list (Appendix 3) are of varying threat to wildlife habitat, native flora and fauna, including rare or threatened plants.

In coastal areas, priority has been given to highly invasive weeds such as Boxthorn, Gorse and Kikuyu that threaten Little Penguin and Short-tailed Shearwater habitat and provide harbour for foxes, cats and rabbits. In other areas, a wide range of grasses, creepers and woody weeds have invaded and out-competed native vegetation - limiting the recruitment of shrub and tree species that are essential as food, shelter and nesting habitat for animals such as possums, bats and birds. There is need for further refinement of the weed assessment process to better understand the impact of these weeds. This may be best achieved through future fauna and bird surveys correlated to weed information.

Areas such as Rhyll Inlet and associated wetlands, Point Grant and sections of the south coast, parts of Oswin Roberts Reserve, Cape Woolamai and Churchill Island include important intact remnant vegetation requiring special management (Cropper 1993). Many of these areas have serious weed infestations that threaten native flora and fauna, including a number of rare or threatened species, some listed under state and federal legislation and international agreements.

Past achievements

The 'Phillip Island Nature Park – Weed Strategy 2007-12' set a new direction for weed management by focusing on asset protection, integrated techniques and working with Park neighbours and the community.

More resources were allocated, the average annual staff time of 750 hours (1998 to 2006) increased to over 2700 hours per annum for the period 2007-2016 (which excludes significant contractor time). Volunteers and local conservation group involvement was a valuable way to connect with the community through sharing knowledge and responsibility for weed management. The purchase of better equipment such as Quikspray units, better vehicles and the use of GIS mapping technology allowed for more efficient time in the field, record keeping and follow up. To compliment this there was increased use of contractors with specialist skills and equipment, ie, arborists and abseilers, tractors, backhoes and winches, helicopters, Rmax micro-helicopter, Ecoblade, drone surveillance, steam units, etc.

Of enormous help has been the completion of various rare plant surveys and vegetation plans which included updating the EVC mapping and recommendations for weed management and vegetation protection. Duncan Sutherland (Deputy Research Manager PINP) has mapped the entire shearwater and penguin habitat on Phillip Island which has been used to plan weed management when birds are not breeding. A spinoff of this increased knowledge has been that the weed list has increased (appendix 3). The majority of these new weeds have been found during vegetation surveys.

Between 2013 and 2015 the Nature Parks was part of the Western Port Biosphere's 'Growing Connections project' along with nineteen other organisations in the region. The grant of $38,000 was used for weed management, revegetation and the restoration of remnant vegetation to improve habitat corridors and increase biodiversity and formed part of major projects at the Summerland Peninsula, Berrys Beach, Surf Beach and Cape Woolamai.

Major projects

Summerlands Estate Rehabilitation:

An example of successful Nature Parks weed control is Summerland Estate where one of the threats to the viability of the Little Penguin population was the smothering of nesting sites by the weeds Couch, Kikuyu and Buffalo Grass. The estate and surrounds were transformed by the removal of housing infrastructure, weeds and pest animals; the site was then rehabilitated for penguins and shearwaters. More detail on this case study is included in Appendix 4.

Boxthorn:

Ten years ago there were major boxthorn infestations island-wide often in difficult or sensitive locations. In the last ten years most of these large bushes have been removed through partnerships with Landcare and neighbouring farmers. The main techniques have been cut stump, foliar spray and winching. In 2006 the project extended to Cape Woolamai, the success of the project was due to the long term partnership with local contractor Ian McFee who developed tractor mounted winch technology and a tine grab, and later on with John Baulch with his skidsteer mounted 'EcoBlade' to handle broad scale regrowth. This project was included as a case study in the Weeds of National Significance, African Boxthorn - National best practice manual (Noble M, 2013).

Cape Woolamai – African Boxthorn ***Lycium ferocissimum***

Major projects continued

Grassy weeds:

Grassy weeds particularly Kikuyu and Buffalo Grass smother Shearwater habitat. The breeding cycle of the birds does not allow for control when the grasses are actively growing during spring. Despite this most of the small infestations in Shearwater habitat have be eradicated and the large infestations have been contained and broken up into smaller areas for long term eradication. In 2015 Serrated Tussock was found by an Envirogain contractor in the Summerland Estate and this has been the subject of intensive search, containment and staff training, highlighting the ongoing need to monitor and detect these highly invasive weeds before they become established.

Chilean Needle Grass:

The partnership with Landcare, BCSC, DEDJTR, VicRoads, and landholders has helped to contain this WONS. All known sites have been mapped, annual targets have been planned through a combined Pest Plant and Animal committee and there is ongoing commitment by all parties to reduce its impact.

Gorse:

Gorse is a persistent agricultural weed which also invades woodland and coastal reserves. Management in partnership with Landcare and the Gorse Taskforce over the last twenty years has resulted in the release of Gorse spider mite (biological control), and the reduction of large infestations with foliar spray. Due to the large seed bank a yearly search is conducted to remove small plants before they set seed.

Other projects:

Confidence has grown through the success of some large weed projects to look at other weed issues that once seemed impossible. Following the removal of Sea Spurge from all coast reserves, work has started to manage coastal grassy weeds such as Marram Grass and Sea Wheat Grass that have a negative effect on coastal processes, dune profiles and beach nesting birds such as Hooded Plover and Red-capped Plover.

*Gorse **Ulex europaeus** infestation – Gap Rd 2004*

*Gorse **Ulex europaeus** control – Gap Rd 2018*

Monitoring and Evaluation

Monitoring of weed populations is in progress throughout the Nature Parks and mapped weeds have been included a geographic information system (GIS).This is an invaluable tool to assess the risk to other mapped assets and features. Future assessments should also include the role of climate change to increase the risk of weed species extending their range or becoming more invasive.

Much is known regarding the flora, fauna, and physical environment of the Nature Parks. Surveys of plants, birds, mammals, reptiles and invertebrates, geology and salinity have been completed or are underway by the Nature Parks' Conservation Department. This on-going program of physical and biological surveys is an invaluable guide for weed management for the Nature Parks'. In particular, a detailed survey with GIS mapping of the plant communities within the Nature Parks has been completed (Sutter and Downe 2000). In more recent years, a number of vegetation management plans have been conducted in all Key Areas (see figure 2). These plans have included detailed flora species lists and mapping and descriptions of Ecological Vegetation Classes as well as listed weeds and recommended weed management actions (Oates & Frood 2010, 2011(a), 2011(b), 2013, 2015, 2016, 2017). In 2003 a list of fifty-eight rare or threatened plants that were known or suspected of occurring on Phillip Island was compiled (Cropper 2003). Oates & Frood have also listed and described rare or threatened plants for each of the Key Areas of Nature Parks except for Key Area F. A number of these rare or threatened terrestrial taxa previously recorded from Phillip Island have been surveyed and mapped for the GIS within the Park and threats and management recommendations have been identified (Cropper 2005), (Crowfoot 2006), (Oates & Frood 2011(a), 2011(b), 2013, 2015, 2016, 2017).

Rangers are now able to monitor for a number of rare or threatened plants and plan appropriately. The on-going program to map values such as Penguin and Shearwater rookeries will allow for increased surveillance and a quick response to weed threats. Monitoring of vermin such as foxes, cats and pest birds etc will allow correlation between the occurrence of weed species and these pests e.g. Boxthorn is a known harbour for foxes and cats and its removal in key locations can greatly disadvantage these species remaining in an area. As information accumulates in reports, site assessments and the GIS etc, an evaluation and review of weed management actions will result in better outcomes for the conservation of Park values.

*Serrated Tussock **Nassella trichotoma** audit by DEDJTR staff*

Key Partnerships

Department of Environment, Land, Water and Planning

- Established to bring together the state's responsibilities for sustainability of the natural and built environment.
- Areas of responsibility include; coast and marine, conservation and environment, fire and other emergencies, forests, heritage, land management, parks and reserves, planning, plants and animals, property, titles and maps, recreation and tourism, research and water.
- DELWP has policy interpretation and legislative responsibility, in conjunction with Agriculture Victoria, for weed and biodiversity management and coordinates the implementation of the Government's management programs.
- The primary responsibility for weed management on public land is the relevant public land manager however DELWP can provide community support for on-ground actions to protect biodiversity through small community grants.
- A representative of DELWP is an observer on the Phillip Island Nature Parks Board with a governance role reflecting the importance the Department places on the Nature Parks and the partnership between the agencies.

Department of Economic Development, Jobs, Transport and Resources

- DEDJTR promotes the sustainable development of primary industries for the benefit of all of Victoria.
- DEDJTR supports the agriculture, fisheries, petroleum, minerals, energy and forest industries in Victoria and they are responsible for research into the biological control of pest plants.
- DEDJTR undertakes community, industry, education and awareness related programs to enhance understanding of the laws that protect resources.
- DEDJTR has an enforcement role within the regulatory framework.

For a list of Acts and regulations: http://agriculture.vic.gov.au/about-us/legislation/acts-and-regulations

Port Phillip and Western Port Catchment Management Authority

- Empowered under the *Catchment and Land Protection Act* 1994 (CaLP Act) to develop a Regional Catchment Strategy and to coordinate and monitor its implementation.
- Identify regional priorities and develop and guide the implementation of underlying plans, ie Port Phillip and Western Port - Invasive Plants & Animals Strategy
- Advise on regional priorities and resource allocation to land and water managers in the region. The priorities for funding, ie federal and state initiatives, within regions are determined by Regional Assessment Panels.
- Report on the condition of the land and water resources in the region.
- Promote community awareness and understanding of the importance of land and water resources, their sustainable use, conservation and rehabilitation.

Parks Victoria

- Provide services to the State and its agencies for the management of parks, reserves and other public land as specified under the *Parks Victoria Act 1998* which are delivered under powers derived through the *National Parks Act 1975*.
- Manage all National and Marine Parks in Victoria, and areas reserved under the *Heritage Rivers Act* 1992 and also manage some metropolitan waterways and nominated Crown Land.
- Responsible for the planning for all Ramsar sites and management of some sites.
- Responsible for piers and jetties in Port Phillip Bay and Western Port and recreational boating.

VicRoads

- VicRoads has specific obligations under the CaLP Act to limit the spread of and/or eradicate listed noxious weeds and animals on the declared road network. VicRoads is also involved with adjacent landowners and other stakeholders in the management of environmental weeds that may cause degradation to the environmental quality of the roadside or abutting land.
- The encroachment of weeds into any environmentally significant roadside area is of concern.

*Liaising with neighbours following the discovery of the new weed Haas Grass **Tribolium uniolae** at Rhyll.*

Melbourne Water

- Manage Melbourne's water supply catchments, remove and treat most of Melbourne's sewage, and manage rivers and creeks and major drainage systems throughout the Port Phillip and Westernport region.
- A key action from 'Our Water Our Future - Action Plan' in June 2004 was the extension of Melbourne Water's waterway and drainage boundary to cover the majority of the Port Phillip and Westernport catchment. The Minister for Water Resources made a formal announcement on 1 December 2005 making Melbourne Water the responsible authority for waterways, regional drainage and floodplain management within the Port Phillip and Westernport Region including Phillip Island.

Phillip Island Landcare Group

- The Nature Parks has a long standing special relationship with the Phillip Island Landcare Group (PILG). Formal ties have been strengthened through a Memorandum of Understanding, enabling long term work on projects of common interest. PILG has strong links with the community, they plan and undertake projects and currently have staff working on biodiversity, wildlife corridors, pest plants and animals, and Urban Landcare. The two organisations provide mutual support for projects and grants.

The Office of Aboriginal Victoria

- The Minister for Aboriginal Affairs is the responsible authority for all indigenous cultural issues within Phillip Island Nature Parks. Any works that could impact on or interfere with an Aboriginal site requires consent from the Minister. In making an assessment, Aboriginal Victoria will consult with relevant Aboriginal community groups.

Bass Coast Landcare Network

- Draws together local support and funding from a wide range of federal, state and regional natural resource management organisations such as NHT, DELWP, DEDJTR, CMA, BCSC etc. Formed in 2003, the network employs facilitators to provide support for our local Landcare Groups.

Bass Coast Shire Council

- Is the local government authority responsible for governing approximately 854 square kilometres of South West Gippsland including Phillip Island. The Council has relatively broad powers in relation to environmental control, protection and conservation, and are the land manager for 35km of foreshore reserve and other Crown Land reserves. The Council determines the appropriate use and development of land through the planning scheme.
- Phillip Island Nature Parks and the Council have worked on joint projects, ie uniform beach signage and seek to develop consistent protocols in relation to management, conservation and enforcement of regulations, ie dog and cat management.
- Bass Coast Shire Council commenced revegetation of the former Rhyll Transfer Station site, which was closed in June 2013, as required by the EPA approved rehabilitation plan. Nature Parks is overseeing this revegetation program for the entire site.
- The Council operates a network of Visitor Information Centres including Newhaven and Cowes and has assisted the Nature Parks with public mail outs.

Western Port Biosphere

- Mornington Peninsula and Western Port Biosphere Reserve Foundation (inaugurated Dec 2003) is a non-profit company established to implement the UNESCO Man and the Biosphere Program.
- The Western Port Biosphere Reserve is located south east of Melbourne. It covers 2,142km^2 (68% terrestrial, 32% marine) and is made up of five local governments: Mornington Peninsula Shire and parts of City of Frankston, City of Casey, Cardinia Shire, Bass Coast Shire, Phillip Island and French Island.
- The Nature Parks supported the biosphere declaration in 2002, has been an active member through the round tables and participated in projects such as Growing Connections and to help manage the Ramsar wetland.

Community Groups

Local community groups and volunteers make an invaluable contribution to the work of the Nature Parks. There are many community members who have worked over many years in habitat rehabilitation and maintenance, interpretation and natural and cultural conservation to preserve lands which are today part of the Nature Parks. Some sections of the Nature Parks were donated by local families and others through the foresight of local conservationists who raised funds and lobbied governments **(table 1)**.

Table 1: List of community groups working with the Nature Parks:

Barb Martin Bushbank
Coast Action Groups
Friends of Churchill Island Society Inc
Friends of the Koalas
Hooded Plover Watch
Phillip Island and District Historical Society
Phillip Island Conservation Society
Phillip Island Landcare Group
Penguin Study Group
Smiths Beachcomber Association Inc
Silverleaves Conservation Association
Schools and students
BirdLife Bass Coast
Western Port Seagrass Partnership
Woolamai Beach Surf Life Saving Club

Steps to achieve best practice weed management: Phillip Island Nature Parks

Goal 1
Prevent new and emerging weeds from establishing within the Parks

Objective 1.1 – Find and assess new and emerging (N&E) weeds

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
1.1.1 Gather information to identify N&E weeds as the highest priority	■ All PINP reserves are inspected regularly for N&E weeds. ■ There are effective partnerships to identify new weeds and potential sources. ■ All new weeds are identified, mapped and photographed.	PINP	DEDJTR, DELWP, PPWCMA, PILG, BCSC, BCLN, industry, utilities, community groups, RBGM	Ongoing
1.1.2 Assess threat and prepare plan: *e.g.* government, community or in-house	■ State Prohibited weeds are reported to DEDJTR within 48 hours (a legal requirement is that plants are not to be touched without authority). ■ Protect sites and assess other N&E weeds for management response (ref: Biosecurity Legislation, CaLP Act). ■ Prepare plan to contain and eradicate N&E weeds in consultation with stakeholders.	PINP	DEDJTR, DELWP, PPWCMA, PILG, BCSC, industry, utilities, community groups, Aboriginal Victoria	Ongoing
1.1.3 Assess the role of climate change in new weeds entering the Park	■ Monitor for weeds extending their normal geographic range. ■ Alter works plan with weed species life cycle changes. ■ Ensure herbicides are applied in suitable weather conditions.	PINP	DEDJTR, DELWP, PPWCMA, PILG, BCSC, BCLN	Ongoing

Note: as required, reallocate resources from lower priority projects to control and monitor N&E weeds and assist in government procedures.

Objective 1.2 – Eradicate new and emerging weeds and protect, manage and restore sites

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
1.2.1 Eradicate 'Weeds Of National Significance'	■ Works plan is updated to eradicate WONS including State Prohibited and Regionally Prohibited weeds.	PINP, DEDJTR	DELWP, PPWCMA PILG, BCSC, other stakeholders	Ongoing
1.2.2 As resources allow eradicate other N&E weeds of high priority and weeds listed under the CaLP Act	■ Works plan is updated to contain then eradicate new weeds of high priority and weeds listed under the CaLP Act.	PINP	DEDJTR, DELWP, PPWCMA, PILG, other stakeholders	Ongoing
1.2.3 Rehabilitate N&E weed sites, manage and monitor for the long term	■ Weed management priorities are set to protect Park values and the community over the long term and comply with DEDJTR directives.	PINP, DEDJTR	DELWP, PPWCMA, PILG, other stakeholders	Ongoing
	■ Historic records checked every 3 years to ensure eradication.			July 2019, 2022
1.2.4 Document weed management, monitoring and restoration works	■ PINP's 'weed database', photo points and GIS are up to date. ■ PINP Board, Environment Division and DEDJTR reports are completed as required.	PINP	DEDJTR	Ongoing

Objective 1.3 – Reduce the risk of new weeds and pathogens entering the Park and spreading

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
1.3.1 Manage and monitor high risk activities and potential new weed sources	■ High use areas and high risk activities are identified and monitored for new weeds, ie, machinery and stock movement, fodder sales, tracks, car parks, road sides, dumping of garden waste and soil. Incidents are cleaned up within 5 days and monitored. ■ Inspect feed out areas for weeds each winter/spring.	PINP - Churchill Island and KCC staff, DEDJTR	DEDJTR, PPWCMA, BCLN, PILG, BCSC, VicRoads, landowners, contractors, utilities, community groups, schools	Ongoing
1.3.2 Communicate with groups which have a high potential to spread weeds, to raise awareness and minimise risks	■ Participate in pest plant initiatives such as; Landcare 'pest plant subcommittee', field days, Weed Spotter program.	PINP, DEDJTR, PPWCMA, PILG, BCSC,	BCLN, VicRoads, landowners, contractors, utilities, community groups, schools	Attend meetings as scheduled
	■ Educate the community about the effects of weeds on Nature Parks values, two press release per annum to local media.			Biannual
1.3.3 Establish hygiene policy and procedures for new weeds to minimise risks	■ Incorporate hygiene policy and procedures into staff/ contractor induction. ■ Promote AgVic WeedStop training sessions. ■ Develop, publicise and include hygiene procedures in the induction material for the 'Environmental Management System'.	PINP, PILG, DEDJTR	BCLN, VicRoads, landowners, contractors, utilities,	Dec 2018
1.3.4 Establish buffer zones that exclude damaging weeds to protect Park values	■ Map and assess new weeds using GIS and site assessment. ■ Establish and monitor buffer zones adjacent significant flora, fauna, cultural and historic sites. Buffer around wetlands and sources of infestation such as tracks, roads and carparks.	PINP, PILG	VicRoads, BCSC, Landowners and neighbours, Aboriginal Victoria	Ongoing

Goal 2
Minimise the impact of established weed problems

Objective 2.1 – Identify and prioritise established weeds and weed management issues

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
2.1.1 Map and record established weeds to determine distribution, spread and impact on values	■ The listed weed species are mapped to Key Areas and Key Sub-areas. ■ Map priority weeds and sites on PINP GIS database. ■ Determine impact on Park values using the GIS and published report recommendations.	PINP	PINP, BCLN, PILG, BCSC, Aboriginal Victoria	Weeds mapped to key areas by July 2018 and sub areas by July 2023
2.1.2 Determine priorities for established weeds	■ Review 'PINP Weed List' priorities annually **(appendix 3)** with reference to the 'Framework for Weed Management Planning' **(figure 4)** and the 'Park Planning Framework'.	PINP	DEDJTR, PPWCMA, PILG, BCSC, VicRoads, industry, community groups	Annual
	■ Established weeds are prioritised as high, medium, low.			Dec 2018
2.1.3 Identify weed management options and strategies	■ Review and update the 'Best Practice Weed Management Methods' **(table 1)** and identify constraints.	PINP	DELWP, DEDJTR, PPWCMA, PILG, BCSC, industry, community groups, Aboriginal Victoria	Ongoing
	■ Ensure that there is continuous improvement of 'Integrated Weed Management' methods.			Review annually
	■ Prepare work plan for all high priority weeds to determine priority sites, methods and effective working partnerships.			Annually

Objective 2.2 – Implement coordinated and cost-effective weed management

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
2.2.1 Assess the cost of weed management programs and budget	■ Prepare annual works plan and budget in consultation with partners and stakeholders. ■ Provide support for grants and partnership projects (funding or in-kind).	PINP	DEDJTR, PPWCMA, PILG, BCSC, VicRoads, landowners, Contractors, utilities	Annual budget planning
2.2.2 Maximise partner projects for weed management (tenure blind)	■ Apply for grants and form partnerships with relevant organisations, ie. Penguin Foundation, Coastcare Community Grants, Equipment grants.	PINP, DELWP, PILG, BCSC, Greening Australia	BCLN, PILG, BCSC, VicRoads, landowners, utilities, community groups, schools	February Yearly
	■ Resources support partner projects (funding or in-kind) ie Landcare, Green Army, TAFE, traineeships, work placement.			Annual budget planning
2.2.3 Manage weeds according to priority, and plan follow up, rehabilitation and monitoring of sites	■ At monthly ranger meetings, check weed management actions against the annual works plan and budget, and schedule ongoing work actions.	PINP	DEDJTR, PPWCMA, PILG, BCSC, VicRoads, landowners, Contractors, utilities, community groups, schools	Monthly ranger meetings
	■ Ensure annual works plan includes follow up, rehabilitation and monitoring of priority weeds and sites.			November & December
2.2.4 Maintain 'Weed Control Database'	■ The database of weed management works is up to date.	PINP	Contractors	Monthly

Objective 2.3 – Develop weed management that protects values and assets

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
2.3.1 Identify the impact of weeds on environmental, cultural, social, or economic values within the Park	■ Compile information on Park values and the impact of weeds to identify gaps to guide future mapping and research. ■ Measure weed management progress ie: reduction of weed area/density; reduction of threatening processes; an increase in the quality/quantity of threatened Park values.	PINP	DELWP, PPWCMA, PILG, BCSC, VicRoads, landowners, Contractors, utilities, community groups, Aboriginal Victoria	Ongoing Annual Report
2.3.2 Promote local weed issues at regional level	■ PINP to have input into the PPWCMA review process of the 'CaLP Act 1994 – Declared Noxious Weed' list so that the list better reflects PINP weed concerns. ■ Attend relevant Western Port Catchment Committee meetings with partners.	PINP, PPWCMA, BCLN	DELWP DEDJTR, PPWCMA, BCLN, PILG, BCSC, VicRoads, Aboriginal Victoria	As opportunity arises Ongoing
2.3.3 Promote weed control on private land and support compliance and enforcement as required	■ Support DEDJTR, and liaise with Landcare on compliance and enforcement actions on State and Regionally Controlled weeds and seek compliance and enforcement on other high priority weeds.	PINP, DEDJTR, BCLN	DEDJTR, PPWCMA, BCLN, PILG, BCSC, VicRoads, utilities, community groups	Ongoing

Purple Groundsel Senecio elegans

Goal 3
Enhance capacity and commitment to solve Park weed problems

Objective 3.1 – Raise community awareness and motivation to act on weed issues

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
3.1.1 Promote community education and extension programs to reduce the spread of weeds	■ Report to the Community Advisory Committee quarterly.	PINP, BCLN, BCSC, DEDJTR, DELWP	DEDJTR, PPWCMA, BCLN, PILG, BCSC, VicRoads, landowners, Contractors, utilities, community groups, schools	Quarterly
	■ Include weed issues in education and media.			Ongoing
	■ Promote environmental events ie Threatened Species Day, World Habitat Day, Landcare Field Days.			Annually
	■ Promote the BCSC weed brochure, work with the Barb Martin Bush Bank, and assist distribution of information to nurseries and plant distribution points.			Ongoing
3.1.2 Encourage co-operative action and shared responsibility with neighbours	■ Establish cooperative agreements with neighbours on weed issues on case by case basis.	PINP	DEDJTR, PPWCMA, PILG, BCSC, VicRoads, landowners, Contractors, utilities, community groups, schools	Ongoing
3.1.3 Support partners for community projects that protect Park values	■ Gather and provide information for local weed initiatives. ■ Provide information to PINP Education Division and other community education programs such as Coast Action, 'Biolinks Project', Urban Landcare, Friends of the Koala, PICS.	PINP	DELWP , PPWCMA, BCLN, PILG, BCSC, VicRoads, landowners, community groups, schools	Ongoing
3.1.4 Encourage and support local government initiatives to reduce the threat of weeds	■ Promote BCSC initiatives for weed control such as 'Weeds out indigenous plants in' and 'Free green waste disposal'. ■ Promote the BCSC 'weed and indigenous plant identification' brochure.	PINP, BCSC	DELWP, PPWCMA, PILG, BCSC, VicRoads, landowners, community groups, schools	Ongoing
3.1.5 Encourage industries with a high risk of spreading weeds to use best practice hygiene	■ Work with high risk industries to adopt best practice hygiene such as nurseries, garden suppliers, earth moving contractors, arborists, mowing contractors.	PINP, DELWP, DEDJTR, BCLN	DEDJTR, PPWCMA, PILG, BCSC, VicRoads, landowners, contractors, utilities	Ongoing

continued

Objective 3.2 – Build Nature Parks weed management capacity

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
3.2.1 There is sufficient staff, materials, equipment and systems to undertake planned weed management	■ Roster sufficient labour and staff hours to apply for and manage grants and to implement weed management programs.	PINP	DEDJTR, TAFE, Rural Training Council of Australia	Ongoing
	■ Weeds budget covers materials, equipment and maintenance.			April budget
	■ Upgrade the PINP GIS and digital field mapping systems in relation to weed management.			July 2018
	■ Review GIS training during annual performance review.			May 2017
3.2.2 Weed management is safe and professionally administered	■ All staff and contractors are inducted and compliant with Park policies, procedures and the Safety Management System.	PINP	DELWP DEDJTR, PPWCMA, BCLN, PILG, BCSC, contractors, VicRoads	Ongoing
	■ Ensure staff and contractors applying herbicide have a FCUC or recognised equivalent and an ACUP as appropriate.			On induction
	■ Budget is sufficient to fund staffing and weed management programs.			April budget
	■ Planned projects are completed on time and on budget.			Annual review
	■ Sustainability principles are incorporated into all aspects of weed management.			Ongoing
3.2.3 Provide education and training opportunities to continuously improve weed management	■ Identify knowledge and training gaps during annual performance reviews. ■ Staff are encouraged to participate in further training.	PINP, DEDJTR	Universities, Victorian Rangers Federation, DEDJTR, BCLN, TAFE, Rural Training Council of Australia	Annual review
	■ Links are established to educational research and exchange programs.			Ongoing
	■ The training, induction and risk assessments results in no unforeseen damage to values.			Annual review
3.2.4 Establish and maintain a herbarium of weeds and native plants and update library and resource material	■ Weed and native plant specimens are submitted to the RBGM herbarium as appropriate.	PINP	DELWP, RBGM	Ongoing
	■ Maintain photo library and in-house herbarium of weeds and native plants.			Ongoing
	■ Review and upgrade library and resource material annually, and incorporate online resources.			April budget

Objective 3.3 – Manage weeds within consistent policy, legislative and planning frameworks

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
3.3.1 Planning Framework: Integrate national, state, regional, local and in-house, strategies and actions relating to weed management	■ National, state, regional and local plans and strategies are reviewed annually to incorporate new directions and knowledge into strategic planning and annual works plan.	PINP, BCLN	Commonwealth, State and local government, DELWP, PPWCMA, PILG, BCSC, AV	Ongoing
3.3.2 Operating Framework: Integrate weed management with the Nature Parks proposed 'Environmental Management System'	■ The Environment Division's weed management strategies and actions are included in the proposed 'Environmental Management System'.	PINP	PILG, BCSC, PPWCMA,	When implemented
3.3.3 Communication Framework: Build and maintain effective communications with stakeholders and landowners	■ Develop an MOU with Phillip Island Landcare (PILG) and review annually. ■ Participate in external weed forums and committees important to the Parks biosecurity ie PILG.	PINP, PILG	DELWP, DEDJTR, PPWCMA, BCSC, VicRoads, landowners, community groups, schools	April-May 2019 Ongoing

Objective 3.4 – Monitor and evaluate the progress of Nature Parks weed management efforts

Strategic Action	Performance measures	Key responsibility	Partners	Timeframe
3.4.1 Review the performance of the Weed Management Strategy	■ Review the annual works plan progress at bi-monthly Department Meetings. ■ Review 'long term goals in annual works plan. ■ Review resource estimates including budget, staff, equipment and training. ■ Review the 'Weed Strategy' after 5 years.	PINP	DELWP, DEDJTR, BCSC, PILG, PPWCMA, relevant stakeholders	Annually Ongoing May 2023
3.4.2 Report to the PINP Board, partners and wider community	■ Report to the PINP Board and wider community (Board Reports, Annual Report and as requested). ■ Report on the Weed Strategy after 5 years.	PINP	DELWP, PILG DEDJTR, BCSC, PPWCMA, relevant stakeholders	Quarterly, Annually July 2023
3.4.3 Share data and information as appropriate	■ Data is used to maximise weed management, asset protection and biosecurity.	PINP, DEDJTR	DELWP, PILG, DEDJTR, BCSC PPWCMA,	Ongoing
3.4.4 Publicise key weed management outcomes to stakeholders	■ Ensure community input into PINP weed management through the Community Advisory Committees and directly to PINP staff.	PINP	DELWP, PILG DEDJTR, BCSC, PPWCMA, relevant stakeholders	Quarterly, Ongoing

Integrated Weed Management

Threatening Processes

Threatening processes such as weed invasion degrade Park values such as biodiversity, habitat and ecological processes. While weeds are one of the main threat sources, there are others that can combine to degrade areas. The list below has details of threatening processes from Nature Parks' reports and from the DELWP Flora and Fauna Guarantee Act 1988: Potentially Threatening Processes List, Dec 2016. The list contains many of the processes directly or indirectly relevant to weed management through the influence they have on weed establishment by degrading natural processes and therefore resilience.

Weed Competition

- Weed invasion and competition is the most obvious threatening process operating at the Nature Parks. Past management history is important to consider when assessing the condition of certain areas. For example, regular burning and grazing of sheep on Cape Woolamai and Summerland Peninsula is likely to have radically changed the vegetation structure and composition (Sutter and Downe 2000).
- In areas close to settlements, garden escapees are a problem, particularly due to the dumping of garden waste (Sutter and Downe 2000). Animals, birds, wind and water also spread weeds from settlements.
- In the Coastal Dune Scrub on Cape Woolamai, the native species Coast Wattle *Acacia longifolia* var. *sophorae* appears to be dominating. In some contexts, native species such as this can be considered environmental weeds. In this location, it may be considered to be a local environmental weed due to its cover abundance being considerably higher than other dune scrubs on Phillip Island and dune scrubs in general (Sutter and Downe 2000).
- Also in the dune systems adjacent to Flynn's Beach, Coastal Tea-tree *Leptospermum laevigatum* is considered to be an environmental weed for the same reasons. This species is formerly recognised as an environmental weed when it occurs outside its habitat on the coastal fringe. Assessment as to whether a native species should be considered an environmental weed is difficult without having detailed information on vegetation composition and structure before a disturbance of some form occurred in these areas (Sutter and Downe 2000).

Soil Disturbance

- Soil disturbance often provides the opportunity for weeds to invade the disturbed area. New roads, upgrading of roads, construction of walking tracks and other recreational facilities should be planned to keep soil disturbance to a minimum (Sutter and Downe 2000).

Rabbit Grazing

- It is unclear as to the impact of rabbits on the vegetation within the Park. There is likely to be a significant impact in revegetation areas (Sutter and Downe 2000).

Hydrological changes

- Private land holders may affect the drainage into wetlands by building dams or diverting surface runoff (Sutter and Downe 2000). The West Woolamai Drainage Scheme has changed the flow rate into Fishers Wetland and normal water flow has been restricted from reaching Newhaven Swamp.

Drought

- Prolonged drought can alter vegetation and impact native wildlife. There is a lack of predator (fox or cat) pressure on herbivores such as wallabies and rabbits that can further impact vegetation during drought conditions. This can led to large changes in species composition, often providing the opportunity for weed invasion and possibly a permanent change in the flora of wetland areas (Sutter and Downe 2000).

Altered fire regimes

- Since European settlement, most managed areas in Nature Parks have probably experienced significantly less fires, except for perhaps the headland area of Cape Woolamai and Summerland Peninsula. Fires that have occurred have been controlled and have unnatural boundaries. The patchy or mosaic pattern of fire has been largely eliminated. It is difficult to determine if altered fire regimes is a threatening process without data to support a change having taken place (Sutter and Downe 2000).

Disease and pathogens

- The soil fungus *Phytophtora* was recently confirmed present at the Koala Conservation Centre. Whilst not confirmed to species level as *P. cinnamomi,* hygiene practices will be put into place by the Park as if it were confirmed positive.

Integrated Weed Management – principles and methods

In general, there will be an emphasis on the containment then eradication of new and emerging weeds and high priority established weeds through the integration of weed control techniques. Work will be scheduled to minimise adverse effects on breeding populations with a view to protecting and restoring natural ecosystems and biodiversity.

Because of the diversity of species and habitat types affected, the management of environmental weeds needs to be adopted on a case-by-case basis, not just for each weed species, but also considering the particular environments each weed has invaded (Sindel 2000). With this in mind, projects that are well planned and documented, site specific and use integrated weed management principles and methods **(table 2)** will have the best chance of success.

Weed management principles:

- Land managers are responsible for weeds on their land and to prevent weeds spreading to neighbouring property. Weeds should be managed on a landscape scale.
- The management response should be directly linked to the value that is being threatened by the weed.
- Programs should be holistic, adopting an asset-based risk management approach.
- Prevention and early intervention are the most cost effective option for weed control.
- Integrated, long term management programs have the greatest chance of success especially as part of broader management of land and water resources.
- An adaptive management approach ensures continuous improvement.
- Evidence-based decision making is useful in determining investment and setting priorities.
- Improved weed control outcomes can often be achieved through partnerships with community, government and industry.
- Programs should be ecologically sustainable and budgeting for weed control and allocation of resources determined by the environmental, economic and social risk posed by the weed and the costs and benefit of addressing those risks.
- Public funding and resources will be invested responsibly and according to greatest public benefit.
- The investment in weed management should be proportional to the significance of the value under threat.
- The community should be engaged in the strategic planning and management of public land and their views on priorities and actions incorporated into the planning process.
- Legislation and government policy must be followed.
- Weed management should proceed to prevent serious environmental damage with as much information as is available at the time.

Weed management methods:

- Herbicides: *check label and material data safety sheet. In Victoria it is legal to use chemicals other than 'restricted use' chemicals off-label by following Agriculture Victoria guidelines http://agriculture.vic.gov.au*
- Hand control
- Mechanical control
- Cultivation
- Mulching and smothering
- Competition
- Fire / Heat
- Biological Control
- Grazing

Useful reference: CRC for Australian Weed Management (2004)

Table 2: Best Practice Weed Management Methods (adapted from Muyt A. 2001)

Method	Benefits	Issues
Herbicides Spot or boom spraying: *e.g. back pack, spray unit, aerial application – (helicopter or UAV), liquid or granular formulation*	■ Selectivity depends on choice, timing, plant life cycles, operator skill ■ Can inhibit seeding ■ Use on small and large areas ■ Minimum soil disturbance ■ Low cost	■ Off target damage to local flora ■ Potential impact on broader environment ■ High skill level required to use the right herbicide (mode of action) and dose in the right way ■ Operator, public and environment health risks
Herbicides Woody weed treatments: *e.g. cut & paint, drill & fill, frilling, basal bark spraying, Wet blade 'Ecoblade'*	■ Highly selective ■ Low risk to local flora ■ Alter conditions in favour of local flora ■ Reduce fuel loads ■ Prevent seeding and vegetative spread ■ Low cost on small infestations	■ Potential for excessive site disturbance ■ Removal can promote weed growth ■ Can destroy native fauna habitat ■ High cost and labour intensive on large infestations ■ Operator / public hazard
Hand Control Weeding, seed removal, ringbarking, grubbing: *e.g. hand/chain-saw, secateurs, mattock etc.*	■ Selective for most weed types ■ Low risk to local flora ■ Supplement other controls ■ Effective for small infestations containment and follow-up	■ Potential for excessive soil disturbance ■ Labour intensive ■ Inappropriate for some weeds ie bulbs, toxic and large plants ■ Operator manual handling risks
Mechanical Control Backhoe, bulldozer, grooming, winching	■ Can be quick ■ Can be cost effective on large infestations ■ Highly suitable for thorny weeds	■ May cause significant disturbance ■ Machinery hygiene risks ■ High cost for small infestations ■ Comprehensive follow-up and rehabilitation may be required
Mechanical Control Slashing, mowing and cutting: *e.g. brushcutters, mowers, slashers*	■ Low soil disturbance ■ Low risk to local flora ■ Can prevent seeding and spread ■ Can reduce foliage for follow up treatment methods ■ Low cost	■ Low chance of weed eradication ■ Can inhibit seeding of local flora ■ Can spread weeds ■ Machinery hygiene risks ■ Can promote weed growth ■ Can increase dry fuel load
Cultivation Soil cultivation and scalping	■ Can eradicate weeds ■ Reduce nutrient loads ■ Removes weed seedbank in soil ■ Can aid site preparation and rehabilitation	■ Non-selective ■ High soil disturbance, erosion, runoff ■ May spread weeds ■ Destroys habitat ■ Removes local flora seedbank in soil ■ Site rehabilitation required ■ High skill level required
Competition Direct seeding, planting and natural revegetation through recruitment	■ Inhibit weed growth ■ Alter light and nutrient levels ■ Restore vegetation structure ■ Increase biodiversity and habitat	■ Altered conditions may favour weeds ■ Can introduce inappropriate flora ■ Intensive establishment input and expertise ■ Can be high cost and labour intensive
Competition Smother weeds with mulch, brush-matting	■ Prevent weeds seeding and spread ■ Aid to site stabilisation and rehabilitation ■ Soil stabilisation and condition ■ Aesthetic improvement	■ Often non-selective ■ Can encourage weed growth ■ Can prevent local flora growth ■ Can introduce or spread weeds ■ Can alter soil chemistry and condition ■ Requires maintenance ■ Can be high cost and labour intensive

Table 2: Best Practice Weed Management Methods (adapted from Muyt A. 2001)

Method	Benefits	Issues
Competition Solarisation with plastic sheeting	■ Can be selective ■ Can control tenacious weeds ■ Can prevent seeding and spread ■ Supplements other methods ■ Appropriate for small infestations ■ Low cost	■ Often non-selective ■ Ineffective on many weeds ■ High cost for large infestations ■ Can inhibit seeding of local flora ■ Can alter soil chemistry and condition ■ Requires maintenance
Fire / heat Control burns, spot burns, incineration to destroy dried weed propagules, steam	■ Can reduce foliage for follow-up treatment ■ Encourages local flora regeneration ■ May kill weed seeds or promote germination for follow-up treatment ■ Disposal of infected material ■ Low cost	■ Damaging to non-fire adapted ecosystems and habitat features such as coarse woody debris and hollow-bearing trees. ■ Seasonal and timing limitations ■ Weed growth encouraged ■ May increase soil erosion ■ Risks to people, property and fauna ■ Costly set up of fire breaks/control lines ■ High level of skill and planning required
Biological Control Using the weeds natural controls *e.g. insects, organisms like fungi or rust*	■ Selective ■ Suppression of weed growth and spread ■ Supplements other methods ■ Low cost and labour in the field ■ Low environmental impact	■ Timing limitations ■ Limited to a few species ■ Variable results ■ Weeds not eliminated ■ Other controls required
Grazing Grazing or browsing herbivores; *e.g. cows, sheep, wallabies etc.*	■ Can be selective ■ Can reduce foliage for follow-up treatment ■ Supplements other methods ■ Low cost	■ Timing limitations ■ Can damage, limit seeding of local flora ■ Soil disturbance, altered nutrient levels ■ Can introduce or spread weeds ■ Toxic plants a danger to stock ■ Other controls required

Kikuyu infestation in Shearwater habitat

Kikuyu after selective herbicide application

continued

Integrating Weed Management Examples

Making landscapes resistant to weed invasion requires the planned integration of control techniques (DEH 2004).

- Use an ecological burn to kill fire sensitive mature weeds e.g. Pittosporum, and stimulate the seed bed. Then mulch, hand pull, spray and out-compete regrowth. (Avoid large areas of soil exposure and steep slopes)
- Use selective herbicides on grassy weeds like Kikuyu where it invades native vegetation, cut and paint any woody weeds then infill with native plants to compliment natural regeneration as necessary.
- Cut and paint Boxthorn or Gorse in low density or sensitive areas then mechanically remove and spray regrowth in monoculture areas which can be mulched and replanted as necessary.
- Remove seed heads of Agapanthus, Chilean Needle Grass, Thistles etc. then grub or spot spray.
- Remove or mow creepers e.g. Blue Periwinkle, Cape Ivy, Dolichos then spot spraying fresh regrowth.
- Use biological control/grazing to reduce weed density/ reproduction then manually remove, burn or spot spray.

Examples of integrating weed management with the wider community and skill levels:

- Link weed management across boundaries to make the best use of capabilities, capacity and resources, and reduce the risk of weeds re-entering or leaving the Nature Parks.
- Utilize Nature Parks staff or contractors to undertake work such as herbicide spraying, burning, chainsaw work or heavy equipment use that require licences, special equipment and training. Hand weeding, cutting and painting, weed mapping and monitoring, planting and rehabilitation works can be undertaken under supervision by the community: TAFE, CVA, Green Army, etc as appropriate. To protect site values a range of weed control methods are usually required, careful on ground work and follow up in high value areas is best.

Contractor, Ian McFee, winching large boxthorn from coastal dunes at Woolshed Bight

Weed Steaming by contractor in highly sensitive areas such as picnic areas or wetlands

Contractor, John Baulch, at Cape Woolamai, slashing boxthorn regrowth with his Ecoblade

Mulching and replanting or direct seeding following weed removal

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Appendix 1

Invasive plant classification for Victoria

State Prohibited Weeds

These invasive plants either do not occur in Victoria but pose a significant threat if they invade, or are present. They are defined as posing a serious threat and can reasonably be expected to be eradicated. If present, infestations of a State prohibited weed are relatively small.

They are to be eradicated from Victoria if possible or excluded from the State. The Victorian Government is responsible for their eradication, but under Section 70(1) of the CaLP Act, it may direct land owners to prevent their growth and spread.

Regionally Prohibited Weeds

Regionally Prohibited Weeds are not widely distributed in a region but are capable of spreading further. It is reasonable to expect that they can be eradicated from a region and they must be managed with that goal. Land owners, including public authorities responsible for crown land management, must take all reasonable steps to eradicate regionally prohibited weeds on their land.

Regionally Controlled Weeds

These invasive plants are usually widespread in a region. To prevent their spread, ongoing control measures are required. Land owners have the responsibility to take all reasonable steps to prevent the growth and spread of Regionally Controlled Weeds on their land.

Restricted Weeds

This category includes plants that pose an unacceptable risk of spreading in this State and are a serious threat to another State or Territory of Australia. Trade in these weeds, and their propagules, either as plants, seeds or contaminants in other materials is prohibited.

Noxious Aquatic Plants

Some aquatic plants pose a serious threat to fisheries, the aquatic environment or human health. The *Fisheries Act 1995* has declared some species as noxious aquatic plants. It is an offence to bring them into Victoria or possess, sell, transport or release them.

Thistles – Helens Head

Appendix 2

Key to Weed Species List: significance and priority (Phillip Island Nature Parks)

- **Regional Status**: Declared noxious weeds proclaimed under the Catchment and Land Protection (CaLP) Act 1994, July 20 update, Port Phillip (East) listing. The Fisheries Act 1995 lists declared noxious aquatic species
- **National Status**: Weed of National Significance
- **Weed origin**: Australian native or introduced from overseas
- **PINP status:** New and Emerging Weeds and Established Weeds
- **Priority rating** to Phillip Island Nature Parks

	Status	Symbol	Number for PINP 2007-12	Number for PINP 2018-23
CaLP Act	State Prohibited	S	0	0
CaLP Act	Regionally Prohibited	P	2	1
CaLP Act	Regionally Controlled	C	22	33
CaLP Act	Restricted	R	2	6
Fisheries Act 1995	Noxious Aquatic Species	F	1 potential *(Spartina spp)*	1 potential *(Spartina spp)*
National Weed Strategy	Weed of National Significance	NS	5	11
Weed origin	From overseas	*	192	337
Weed origin	Weedy natives	#	17	20
Weed origin	Weedy indigenous	+	n/a	5
PINP status	Established	E	200	344
PINP status	New and Emerging	N&E	9	18
Priority to PINP	Low	L	132	222
Priority to PINP	Medium	M	37	68
Priority to PINP	High	H	40	72
Total Listed weeds	**PINP**		**209**	**362**

PINP Key Area	Location
A	Summerland Peninsula
B	North-West Beaches
C	South Coast Beaches
D	Woodlands
E	Rhyll Inlet
F	Churchill Island & Surrounds
G	Cape Woolamai

Appendix 3

Weed Species List: significance and priority (Phillip Island Nature Parks)

Taxon ID	Origin	Scientific Name	Common Name	Family Name	Regional Status	National Status	PINP Status 2017	Priority 2017	Key Area A	Key Area B	Key Area C	Key Area D	Key Area E	Key Area F	Key Area G
500045	#	Acacia implexa	Lightwood	Mimosaceae			E	L				x			
500014	*	Acacia baileyana	Cootamundra Wattle	Mimosaceae			E	**M**				x	x		
500031	*	Acacia elata	Cedar Wattle	Mimosaceae			E	**M**				x			
500036	#	Acacia floribunda	White Sallow-wattle	Mimosaceae			E	**M**				x			
505128	#	Acacia longifolia subsp. longifolia	Sallow Wattle	Mimosaceae			E	**M**	x		x	x	x		x
500088	+	Acaia longifolia subsp. sophorae	Coast Wattle	Mimosaceae			E	L							
500077	#	Acacia pravissima	Ovens Wattle	Mimosaceae			E	L				x			
503649	*	Acacia prominens	Gosford Wattle	Mimosaceae			E	**M**				x			
500084	*	Acacia saligna	Golden Wreath Wattle	Mimosaceae			E	**M**			x	x			
502966	*	Acetosella vulgaris	Sheep Sorrel	Polygonaceae			E	L	x		x	x	x		x
505162	*	Aeonium arboreum	Golden Aeonium	Crassulaceae			E	**M**			x				
503638	*	Agapanthus praecox subsp. orientalis	Agapanthus	Alliaceae			E	**H**							x
500139	*	Agave americana	Century Plant	Agavaceae			E	L							
505373	*	Agonis flexuosa	Willow Myrtle	Myrtaceae			E	L				x			
500153	*	Agrostis capillaris	Brown-top Bent	Poaceae			E	L			x	x	x		
500160	*	Agrostis stolonifera	Creeping Bent	Poaceae			E	L	x		x	x			
500164	*	Aira caryophyllea subsp. caryophyllea	Silvery Hair-grass	Poaceae			E	L			x	x	x		x
500165	*	Aira cupaniana	Quicksilver Grass	Poaceae			E	L				x	x		x
500166	*	Aira elegantissima	Delicate Hair-grass	Poaceae			E	L	x		x	x	x		x
500167	*	Aira praecox	Early Hair-grass	Poaceae			E	L	x				x		x
500179	*	Allium triquetrum	Angled Onion	Alliaceae	R		E	**H**	x		x	x	x		
507818	*	Aloe ciliaris var. ciliaris	Climbing Aloe	Xanthorrhoeaceae			E	L			x				
503651	*	Aloe maculata	Common Soap Aloe	Xanthorrhoeaceae			E	L			x				
508106	*	Aloe spp.	Aloe	Xanthorrhoeaceae			E	L		x					
508038	*	Amaranthus spp.	Amaranth	Amaranthaceae			E	L							x
503643	*	Amaryllis belladonna	Belladonna Lily	Amaryllidaceae			E	L							
500205	*	Ammophila arenaria	Marram Grass	Poaceae			E	**M**	x	x	x		x		x
500236	*	Anthoxanthum odoratum	Sweet Vernal-grass	Poaceae			E	L	x	x	x	x	x		x
500249	*	Aptenia cordifolia	Heart-leaf Ice-plant	Aizoaceae			E	**M**	x						
500255	*	Arctotheca calendula	Cape Weed	Asteraceae			E	**M**		x	x	x	x		x
500259	*	Arenaria serpyllifolia subsp. serpyllifolia	Thyme-leaved Sandwort	Caryophyllaceae			E	L							x
500274	*	Asparagus asparagoides	Bridal Creeper	Asparagaceae	R	**NS**	E	**H**	x	x	x	x	x	x	x
507556	*	Asparagus filicinus	Fern Asparagus	Asparagaceae			E	**H**				x			
500276	*	Asparagus scandens	Asparagus Fern	Asparagaceae		**NS**	E	**H**				x	x		x
500297	*	Aster subulatus	Aster-weed	Asteraceae			E	L	x		x	x	x		
500318	*	Atriplex prostrata	Hastate Orache	Chenopodiaceae			E	L	x	x		x	x	x	x
500339	*	Avellinia michelii	Avellinia	Poaceae			E	L					x		
500340	*	Avena barbata	Bearded Oat	Poaceae			E	L	x	x	x				x
500341	*	Avena fatua	Wild Oat	Poaceae			E	L					x		

Taxon ID	Origin	Scientific Name	Common Name	Family Name	Regional Status	National Status	PINP Status 2017	Priority 2017	Key Area A	Key Area B	Key Area C	Key Area D	Key Area E	Key Area F	Key Area G
508098	*	Avena spp.	Oat	Poaceae			E	L							
508117	*	Banksia spp.	Banksia	Proteaceae			E	L				x			
503202	*	Billardiera heterophylla	Bluebell Creeper	Pittosporaceae			N&E	**H**							x
508143	#	Brachychiton spp.	Kurrrajong	Malvaceae			E	L				x			
500488	*	Brassica fruticulosa	Twiggy Turnip	Brassicaceae			E	L							x
500491	*	Brassica nigra	Black Mustard	Brassicaceae			E	L							x
500495	*	Briza maxima	Large Quaking-grass	Poaceae			E	L	x		x	x	x		x
500496	*	Briza minor	Lesser Quaking-grass	Poaceae			E	L	x		x	x	x		x
500498	*	Bromus catharticus	Prairie Grass	Poaceae			E	L	x	x	x	x	x		x
500500	*	Bromus diandrus	Great Brome	Poaceae			E	L	x	x	x	x	x		x
500501	*	Bromus hordeaceus subsp. hordeaceus	Soft Brome	Poaceae			E	L	x	x	x	x	x		x
500503	*	Bromus madritensis	Madrid Brome	Poaceae			E	L	x	x	x	x			x
508150	*	Bromus spp	Brome	Poaceae			E	L				x			
500520	*	Cakile edentula	American Sea Rocket	Brassicaceae			E	L		x					x
500521	*	Cakile maritima subsp. maritima	Sea Rocket	Brassicaceae			E	L	x	x	x		x		x
508176	*	Callistemon spp.	Bottlebrush	Myrtaceae			E	L				x	x		
508177	*	Callitriche spp. (naturalised)	Water Starwort	Plantaginaceae			E	L				x			
500574	*	Callitriche stagnalis	Common Water-starwort	Plantaginaceae			E	L				x			
505022	*	Cardamine hirsuta	Common Bitter-cress	Brassicaceae			E	L				x	x		x
500620	*	Carduus pycnocephalus	Slender Thistle	Asteraceae	C		E	**H**	x	x	x	x			x
500621	*	Carduus tenuiflorus	Winged Slender-thistle	Asteraceae	C		E	**H**		x	x	x	x		x
500654	*	Carpobrotus aequilaterus	Angled Pigface	Aizoaceae			E	**M**			x				
500655	*	Carpobrotus edulis	Hottentot Fig	Aizoaceae			E	**M**			x				
508196	*	Carpobrotus hybrids	Pigface	Aizoaceae			E	**M**			x				
507065	*	Dianthus spp.	Carnation	Caryophyllaceae			E	L							x
500687	*	Catapodium rigidum	Fern Grass	Poaceae			E	L	x		x		x		x
502451	*	Cenchrus clandestinus	Kikuyu	Poaceae			E	**H**	x	x	x	x	x	x	x
500702	*	Centaurium erythraea	Common Centaury	Gentianaceae			E	L	x		x	x	x		x
500705	*	Centaurium tenuiflorum	Slender Centaury	Gentianaceae			E	L	x	x	x	x	x		x
500717	*	Cerastium diffusum	Sea Mouse-ear Chickweed	Caryophyllaceae			E	L			x				x
505238	*	Cerastium glomeratum s.s.	Sticky Mouse-ear Chickweed	Caryophyllaceae			E	L	x	x	x	x	x		x
505239	*	Cerastium semidecandrum s.s.	Little Mouse-ear Chickweed	Caryophyllaceae			E	L	x						
508213	*	Cerastium spp.	Mouse-ear Chickweed	Caryophyllaceae			E	L				x			
500736	*	Chenopodium album	Fat Hen	Chenopodiaceae			E	**M**			x	x			x
500746	*	Chenopodium murale	Sowbane	Chenopodiaceae			E	L			x	x			x
500770	*	Chrysanthemoides monilifera	Boneseed	Asteraceae	C	**NS**	E	**H**	x			x	x		
500777	*	Cicendia quadrangularis	Square Cicendia	Gentianaceae			E	L	x						x
500781	*	Cirsium arvense	Perennial Thistle	Asteraceae	C		E	**H**							
500782	*	Cirsium vulgare	Spear Thistle	Asteraceae	C		E	**H**	x	x	x	x	x		x
500803	*	Conium maculatum	Hemlock	Apiaceae	C		E	**M**		x					

Appendix 3: Weed Species List: significance and priority (Phillip Island Nature Parks)

Taxon ID	Origin	Scientific Name	Common Name	Family Name	Regional Status	National Status	PINP Status 2017	Priority 2017	Key Area A	Key Area B	Key Area C	Key Area D	Key Area E	Key Area F	Key Area G
500823	*	Coprosma repens	Mirror Bush	Rubiaceae			E	H	x	x	x	x			x
504393	*	Cordyline australis	New Zealand Cabbage-tree	Agavaceae			E	L							
500825	*	Cortaderia selloana	Pampas Grass	Poaceae			E	H			x	x	x		
508259	*	Cortaderia spp.	Pampas Grass	Poaceae			E	H			x	x			
505544	*	Corymbia citriodora subsp. citriodora	Lemon-scented Gum	Myrtaceae			E	L				x			
507114	*	Corymbia ficifolia	Flowering Gum	Myrtaceae			E	L		x					
501295	#	Corymbia maculata	Spotted Gum	Myrtaceae			E	L				x			
500843	*	Cotoneaster glaucophyllus var. serotinus	Large-leaf Cotoneaster	Rosaceae			E	M			x				
500848	*	Cotula coronopifolia	Water Buttons	Asteraceae			E	L	x			x	x	x	
505186	*	Crassula multicava subsp. multicava	Shade Crassula	Crassulaceae			E	M							
500863	*	Crassula natans var. minus	Water Crassula	Crassulaceae			E	L	x			x		x	
508265	*	Crassula spp.	Crassula	Crassulaceae			E	M			x				
500867	*	Crataegus monogyna	Hawthorn	Rosaceae	C		E	H				x			
500875	*	Crocosmia x crocosmiiflora	Montbretia	Iridaceae			E	M			x				
500886	*	Cucumis myriocarpus	Paddy Melon	Cucurbitaceae			E	L							
500888	*	Cupressus macrocarpa	Monterey Cypress	Cupressaceae			E	L		x	x				
508279	*	Cupressus spp.	Cypress	Cupressaceae			E	L				x			
500906	*	Cynara cardunculus	Artichoke Thistle	Asteraceae	C		E	H	x						
504554	*	Cynodon dactylon var. dactylon	Couch	Poaceae			E	M	x	x	x	x	x	x	x
500912	*	Cynosurus echinatus	Rough Dog's-tail	Poaceae			E	L			x	x	x		x
500918	*	Cyperus eragrostis	Drain Flat-sedge	Cyperaceae			E	M		x		x	x		
500948	*	Dactylis glomerata	Cocksfoot	Poaceae			E	L	x	x	x	x	x		x
500984	*	Datura ferox	Long-spine Thorn-apple	Solanaceae	C		E	M		x					
500986	*	Datura stramonium	Common Thorn-apple	Solanaceae	C		E	M							
503118	*	Delairea odorata	Cape Ivy	Asteraceae			E	H					x		
501048	*	Digitaria sanguinalis	Summer Grass	Poaceae			E	L					x		
508595	*	Dimorphotheca spp.	Cape Marigold	Asteraceae			E	M				x			
501069	*	Dipogon lignosus	Common Dipogon (Dolichos Pea)	Fabaceae			E	H				x	x		x
501077	*	Dittrichia graveolens	Stinkwort	Asteraceae	C		N&E	H	x		x		x	x	
503696	*	Drosanthemum candens	Rodondo Creeper	Aizoaceae			E	M			x				
501123	*	Echium plantagineum	Paterson's Curse	Boraginaceae	C		E	H							
501124	*	Echium vulgare	Viper's Bugloss	Boraginaceae	C		E	M	x						
501128	*	Ehrharta erecta var. erecta	Panic Veldt-grass	Poaceae			E	L	x	x	x	x	x		x
501129	*	Ehrharta longiflora	Annual Veldt-grass	Poaceae			E	L	x	x	x	x	x		x
501147	*	Eleusine indica	Goose-grass	Poaceae			E	L							
501187	*	Eragrostis curvula	African Love-grass	Poaceae	C		N&E	H	x						
501210	*	Erica lusitanica	Spanish Heath	Ericaceae			E	H							
500812	*	Erigeron bonariense	Flaxleaf Fleabane	Asteraceae			E	L	x	x	x	x	x		x
500813	*	Erigeron canadensis	Canadian Fleabane	Asteraceae			E	L							x
500815	*	Erigeron primulifolius	Rough Conyza	Asteraceae			E	L							x
501232	*	Erodium cicutarium	Common Heron's-bill	Geraniaceae			E	L					x		x
501235	*	Erodium moschatum	Musky Heron's-bill	Geraniaceae			E	L					x		

Taxon ID	Origin	Scientific Name	Common Name	Family Name	Regional Status	National Status	PINP Status 2017	Priority 2017	Key Area A	Key Area B	Key Area C	Key Area D	Key Area E	Key Area F	Key Area G
501252	#	Eucalyptus blakeleyi	Blakely's Red-gum	Myrtaceae			E	L				x			
501254	#	Eucalyptus botryoides	Southern Mahogany	Myrtaceae			E	L					x		
501283	#	Eucalyptus globulus subsp. bicostata	Eurabbie	Myrtaceae			E	**M**							
501285	#	Eucalyptus globulus subsp. pseudoglobulus	Gippsland Blue-gum	Myrtaceae			E	**M**				x			
507127	*	Eucalyptus lehmannii	Bushy Yate	Myrtaceae			E	**M**							
501293	#	Eucalyptus leucoxylon	Yellow Gum	Myrtaceae			E	L				x	x		
501294	#	Eucalyptus macrorhyncha	Red Stringy-bark	Myrtaceae			E	L				x			
501313	#	Eucalyptus radiata	Narrow-leaf Peppermint	Myrtaceae			E	L					x		
509283	*	Eucalyptus spp.	Eucalypt	Myrtaceae			E	L	x			x			
501330	*	Euphorbia lathyris	Caper Spurge	Euphorbiaceae			N&E	**H**							
501331	*	Euphorbia paralias	Sea Spurge	Euphorbiaceae			E	**H**	x	x	x		x		x
501332	*	Euphorbia peplus	Petty Spurge	Euphorbiaceae			E	L	x	x			x		x
501356	*	Festuca arundinacea	Tall Fescue	Poaceae			E	**M**	x		x				x
501363	*	Festuca rubra	Red Fescue	Poaceae			E	L					x		
505516	*	Ficus carica	Fig	Moraceae			E	L							x
501365	*	Ficus macrophylla subsp. macrophylla	Moreton Bay Fig	Moraceae			E	L							x
501370	*	Foeniculum vulgare	Fennel	Apiaceae	R		E	**M**		x					
504301	*	Fraxinus angustifolia	Desert Ash	Oleaceae			E	**M**	x						
508446	*	Freesia spp.	Freesia	Iridaceae			E	L							
508452	*	Fuchsia spp.	Fuchsia	Onagraceae			E	L							
501382	*	Fumaria muralis subsp. muralis	Wall Fumitory	Fumariaceae			E	**M**					x		
508447	*	Fumaria spp.	Fumitory	Fumariaceae			E	**M**	x		x	x			
501402	*	Galium aparine	Cleavers	Rubiaceae			E	**M**	x	x	x	x	x		x
501412	*	Galium murale	Small Goosegrass	Rubiaceae			E	L	x			x	x		x
501470	*	Gamochaeta purpurea	Spike Cudweed	Asteraceae			E	L							x
501371	*	Gazania linearis	Gazania	Asteraceae			E	**H**			x				
507761	*	Gazania rigens var. uniflora	Trailing Gazania	Asteraceae			E	**H**			x				x
501421	*	Genista linifolia	Flax-leaf Broom	Fabaceae	C	**NS**	E	**H**							
501422	*	Genista monspessulana	Montpellier Broom	Fabaceae	C	**NS**	E	**H**				x			
508471	*	Genista spp.	Broom	Fabaceae			E	**H**			x				
501426	*	Geranium dissectum	Cut-leaf Crane's-bill	Geraniaceae			E	L			x				
501428	*	Geranium molle	Dove's Foot	Geraniaceae			E	L					x		x
501438	*	Gladiolus undulatus	Wild Gladiolus	Iridaceae			N&E	**H**	x					x	
501439	*	Glaucium flavum	Yellow Horned-poppy	Papaveraceae			E	**M**	x						
500273	*	Gomphocarpus cancellatus	Broad-leaf Cotton-bush	Apocynaceae			E	L	x						
507157	*	Grevillea robusta	Silky Oak	Proteaceae			E	L				x			
501550	#	Grevillea rosmarinifolia	Rosemary Grevillea	Proteaceae			E	L				x			
508496	*	Grevillea spp.	Grevillea	Proteaceae			E	L					x		
502216	*	Hainardia cylindrica	Common Barb-grass	Poaceae			E	L	x		x	x	x		x
505767	*	Hakea drupacea	Sweet Hakea	Proteaceae			E	**M**	x		x	x			x
505747	*	Hakea laurina	Pinkcushion Hakea	Proteaceae			E	L			x	x			
505748	*	Hakea salicifolia	Willow-leaf Hakea	Proteaceae			E	**M**			x				
501571	#	Hakea sericea s.l.	Bushy Needlewood	Proteaceae			E	L				x			
508516	*	Hakea spp.	Hakea	Proteaceae			E	**M**				x			

Appendix 3: Weed Species List: significance and priority (Phillip Island Nature Parks)

Taxon ID	Origin	Scientific Name	Common Name	Family Name	Regional Status	National Status	PINP Status 2017	Priority 2017	Key Area A	Key Area B	Key Area C	Key Area D	Key Area E	Key Area F	Key Area G
501574	#	Hakea ulicina	Furze hakea	Proteaceae			E	L				x			
501599	*	Hedera helix	English Ivy	Araliaceae			E	**M**				x	x		
502511	*	Helminthotheca echioides	Ox-tongue	Asteraceae			E	L	x	x	x				x
501690	*	Hirschfeldia incana	Buchan Weed	Brassicaceae			E	L							x
501692	*	Holcus lanatus	Yorkshire Fog	Poaceae			E	L	x	x	x	x	x	x	x
508542	*	Hordeum (monospecific)	Barley	Poaceae			E	L					x		
515429	*	Hordeum hystrix	Mediterranean Barley-grass	Poaceae			E	L	x		x	x	x		
501701	*	Hordeum leporinum	Barley-grass	Poaceae			E	L			x		x		x
515430	*	Hordeum marinum	Sea Barley-grass	Poaceae			E	L				x			
503695	*	Hordeum murinum s.l.	Barley-grass	Poaceae			E	L			x				
501745	*	Hypericum tetrapterum var. tetrapterum	St Peter's Wort	Clusiaceae	C		E	L							
501747	*	Hypochaeris glabra	Smooth Cat's-ear	Asteraceae			E	L	x		x	x			x
501748	*	Hypochaeris radicata	Flatweed	Asteraceae			E	L	x	x	x	x	x		x
501762	*	Ipomoea indica	Blue Morning-glory	Convolvulaceae			E	**M**							
501778	*	Isolepis hystrix	Awned Club-sedge	Cyperaceae			E	L	x		x	x			
500936	*	Isolepis levynsiana	Tiny Flat-sedge	Cyperaceae			E	L	x		x	x	x		
501802	*	Juncus acutus subsp. acutus	Sharp Rush	Juncaceae	C		N&E	**H**	x					x	
501806	*	Juncus articulatus	Jointed Rush	Juncaceae			E	L	x			x			
501813	*	Juncus capitatus	Capitate Rush	Juncaceae			E	L	x			x			
501828	*	Juncus microcephalus	Tiny-headed Rush	Juncaceae			E	L				x	x		
503820	*	Kniphofia uvaria	Red-hot Poker	Asphodelaceae			E	**M**							
501854	#	Kunzea ambigua	White Kunzea	Myrtaceae			E	**H**	x			x			
501860	*	Lactuca serriola	Prickly Lettuce	Asteraceae			E	L		x					
508633	*	Lactuca spp.	Lettuce	Asteraceae			E	L				x			
505751	*	Lagunaria patersonia	Pyramid Tree	Malvaceae			E	**H**	x			x			
501864	*	Lagurus ovatus	Hare's-tail Grass	Poaceae			E	L	x	x	x		x		x
508643	*	Lavandula sp.	Lavender	Lamiaceae			E	L			x				
501895	*	Leontodon saxatilis subsp. saxatilis	Lesser Hawkbit	Asteraceae			E	L	x		x	x	x		x
501896	*	Lepidium africanum	Common Peppercress	Brassicaceae			E	L					x		x
501957	+	Leptospermum laevigatum	Coast Tea-tree	Myrtaceae			E	L	x						
505853	*	Leptospermum petersonii	Lemon-scented Tea-tree	Myrtaceae			E	L				x			
504604	*	Leucanthemum X superbum	Shasta Daisy	Asteraceae			E	**H**			x				
503840	*	Limonium hyblaeum	Sicilian Sea Lavender	Plumbaginaceae			N&E	**H**							
502018	*	Linum trigynum	French Flax	Linaceae			E	L			x	x			
502034	*	Lolium loliaceum	Stiff Rye-grass	Poaceae			E	L	x			x	x		
502036	*	Lolium perenne	Perennial Rye-grass	Poaceae			E	L	x	x	x	x	x		x
502037	*	Lolium rigidum	Wimmera Rye-grass	Poaceae			E	L	x	x	x	x	x		
504706	*	Lolium temulentum var. temulentum	Darnel	Poaceae			E	L			x				
502053	*	Lonicera japonica	Japanese Honeysuckle	Caprifoliaceae			E	**H**							
500141	*	Lophopyrum ponticum	Tall Wheat-grass	Poaceae			E	**H**			x			x	

Taxon ID	Origin	Scientific Name	Common Name	Family Name	Regional Status	National Status	PINP Status 2017	Priority 2017	Key Area A	Key Area B	Key Area C	Key Area D	Key Area E	Key Area F	Key Area G
502056	*	Lotus angustissimus	Slender Bird's-foot Trefoil	Fabaceae			E	L	x			x	x		
505188	*	Lotus corniculatus var. corniculatus	Bird's-foot Trefoil	Fabaceae			E	L			x	x			
503831	*	Lotus corniculatus var. tenuifolius	Narrow Bird's-foot Trefoil	Fabaceae			E	L	x			x			
503848	*	Lotus creticus	Lotus	Fabaceae			N&E	**H**			x				x
502060	*	Lotus subbiflorus	Hairy Bird's-foot Trefoil	Fabaceae			E	L	x	x	x	x	x		x
502075	*	Lycium afrum	Kaffir Box-thorn	Solanaceae			E	**H**					x		
502078	*	Lycium ferocissimum	African Boxthorn	Solanaceae	C	**NS**	E	**H**	x	x	x	x	x		x
500223	*	Lysimachia arvensis	Pimpernel	Primulaceae			E	L	x	x	x	x	x		x
502121	*	Malva nicaeensis	Mallow of Nice	Malvaceae			E	L		x	x		x		
502122	*	Malva parviflora	Small-flower Mallow	Malvaceae			E	L					x		x
502123	*	Marrubium vulgare	Horehound	Lamiaceae	C		E	**H**	x						
502134	*	Medicago arabica	Spotted Medic	Fabaceae			E	L			x		x		x
502140	*	Medicago polymorpha	Burr Medic	Fabaceae			E	L	x	x	x		x		x
508722	*	Medicago sp.	Medic	Fabaceae			E	L				x			
NA	*	Melaleuca decora	White-feather Honey-myrtle	Myrtaceae			E	L							x
502145	#	Melaleuca armillaris subsp. armillaris	Giant Honey-myrtle	Myrtaceae			E	**M**	x	x		x	x		
505278	*	Melaleuca diosmifolia	Green Honey-myrtle	Myrtaceae			E	**M**		x		x			
502147	+	Melaleuca ericifolia	Swamp Paperbark	Myrtaceae			E	L							
507526	*	Melaleuca linariifolia	Flax-leaved Paperbark	Myrtaceae			E	L				x			
505679	*	Melaleuca nesophila	Showy Honey-myrtle	Myrtaceae			E	L				x			
502154	#	Melaleuca parvistaminea	Rough-barked Honey-myrtle	Myrtaceae			E	L			x		x		
508723	*	Melaleuca spp.	Honey-myrtle	Myrtaceae			E	L				x			
502161	*	Melilotus indicus	Sweet Melilot	Fabaceae			E	L	x	x	x		x		x
507533	*	Metrosideros excelsa	New Zealand Christmas Tree	Myrtaceae			E	L							
502198	*	Minuartia mediterranea	Fine-leaved Sandwort	Caryophyllaceae			E	L							x
502213	*	Modiola caroliniana	Red-flower Mallow	Malvaceae			E	L	x			x	x		x
502214	*	Moenchia erecta	Erect Chickweed	Caryophyllaceae			E	L				x			
501695	*	Moraea flaccida	One-leaf Cape Tulip	Iridaceae	C		N&E	**H**							
502239	+	Myoporum insulare	Boobialla	Myoporaceae			E	L							
502247	*	Myosotis sylvatica	Wood Forget-me-not	Boraginaceae			E	**M**					**x**		
507648	*	Narcissus jonquilla	Jonquil	Amaryllidaceae			E	L							
504329	*	Narcissus pseudonarcissus	Common Daffodil	Amaryllidaceae			E	L							
503282	*	Nassella neesiana	Chilean Needle Grass	Poaceae	R	**NS**	N&E	**H**	x						
502263	*	Nassella trichotoma	Serrated Tussock	Poaceae	C	**NS**	N&E	**H**	x						
502948	*	Nasturtium officinale	Watercress	Brassicaceae			E	L							x
508810	*	Oenothera spp.	Evening Primrose	Onagraceae			E	L							
502336	*	Onopordum acanthium subsp. acanthium	Scotch Thistle	Asteraceae	P		E	**H**	x						
502353	*	Opuntia stricta	Common Prickly-pear	Cactaceae	C	**NS**	E	**M**	x						

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Taxon ID	Origin	Scientific Name	Common Name	Family Name	Regional Status	National Status	PINP Status 2017	Priority 2017	Key Area A	Key Area B	Key Area C	Key Area D	Key Area E	Key Area F	Key Area G
502367	*	Orobanche minor	Lesser Broomrape	Orobanchaceae			E	L			x				
502383	*	Oxalis incarnata	Pale Wood-sorrel	Oxalidaceae			E	**M**			x				
502387	*	Oxalis pes-caprae	Soursob	Oxalidaceae	R		E	**M**			x	x	x		
502388	*	Oxalis purpurea	Large-flower Wood-sorrel	Oxalidaceae			E	**M**							
508835	*	Oxalis spp.	Wood-sorrel	Oxalidaceae			E	**M**				x			
502418	*	Parapholis incurva	Coast Barb-grass	Poaceae			E	L	x		x	x	x		x
502419	*	Parapholis strigosa	Slender Barb-grass	Poaceae			E	L					x		
500169	*	Paraserianthes lophantha subsp. lophantha	Cape Wattle	Fabaceae			E	**M**			x				
502421	*	Parentucellia viscosa	Yellow Bartsia	Orobanchaceae			E	L			x				x
502430	*	Paspalum dilatatum	Paspalum	Poaceae			E	**M**	x	x	x	x	x		x
502431	*	Paspalum distichum	Water Couch	Poaceae			E	L	x			x		x	
503932	*	Passiflora tarminiana	Banana Passion-fruit	Passifloraceae			E	**M**							
508868	*	Pelargonium sp.	Pelargonium	Geraniaceae			E	L			x				
502476	*	Phalaris aquatica	Toowoomba Canary-grass	Poaceae			E	**H**	x	x	x	x	x	x	
502477	*	Phalaris arundinacea	Reed Canary-grass	Poaceae			E	**H**			x				
505288	*	Phormium tenax	New Zealand Flax	Xanthorrhoeaceae			E	**M**			x				
502510	*	Phytolacca octandra	Red-ink Weed	Phytolaccaceae			E	**H**		x	x	x	x		x
502538	*	Pinus pinaster	Cluster Pine	Pinaceae			E	**M**			x				
502539	*	Pinus radiata	Radiata Pine	Pinaceae			E	**M**			x	x			
502543	#	Pittosporum undulatum	Sweet Pittosporum	Pittosporaceae			E	**M**	x		x	x	x		x
502553	*	Plantago coronopus	Buck's-horn Plantain	Plantaginaceae			E	L	x	x	x	x	x		x
502561	*	Plantago lanceolata	Ribwort	Plantaginaceae			E	L	x	x	x	x	x		x
502562	*	Plantago major	Greater Plantain	Plantaginaceae			E	L				x			
507710	*	Plumbago auriculata	Cape Leadwort	Plumbaginaceae			E	L							
502582	*	Poa bulbosa	Bulbous Meadow-grass	Poaceae			E	L	x		x				
502580	*	Poa annua	Annual Meadow-grass	Poaceae			E	L	x	x	x	x	x		x
502606	*	Poa pratensis	Kentucky Blue-grass	Poaceae			E	L	x				x		
504848	*	Poa trivialis subsp. trivialis	Rough Meadow-grass	Poaceae			E	L		x	x				
503950	*	Podalyria sericea	Silky Podalyria	Fabaceae			E	**M**			x				
502622	*	Polycarpon tetraphyllum	Four-leaved Allseed	Caryophyllaceae			E	L	x	x	x	x	x		x
502624	*	Polygala myrtifolia	Myrtle-leaf Milkwort	Polygalaceae			E	**H**					x		x
502626	*	Polygonum aviculare	Prostrate Knotweed	Polygonaceae			E	L					x		x
502640	*	Polypogon monspeliensis	Annual Beard-grass	Poaceae			E	L	x	x	x	x	x	x	x
502684	*	Portulaca oleracea	Pigweed	Portulacaceae			E	L							
502757	*	Prunella vulgaris	Self-heal	Lamiaceae			E	L					x		
508936	*	Prunus spp.	Prunus	Rosaceae			E	**M**			x				
502775	*	Psoralea pinnata	Blue Psoralea	Fabaceae			N&E	**M**							
502884	*	Quercus robur	English Oak	Fagaceae			E	L		x					
502897	*	Ranunculus muricatus	Sharp Buttercup	Ranunculaeae			E	L				x			
502932	*	Rhamnus alaternus	Italian Buckthorn	Rhamnaceae			N&E	**M**							
502942	*	Romulea rosea	Onion Grass	Iridaceae			E	**M**	x	x	x	x	x		

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502950	*	Rosa rubiginosa	Sweet Briar	Rosaceae	C		E	H				x	x		
502054	*	Rostraria cristata	Annual Cat's-tail	Poaceae			E	L			x				x
502959	*	Rubus anglocandicans	Common Blackberry	Rosaceae			E	H				x			
502952	*	Rubus fruticosus spp. agg.	Blackberry	Rosaceae	C	NS	E	H			x	x	x	x	
502962	*	Rubus ulmifolius var. ulmifolius	Elm-leaf Blackberry	Rosaceae			E	H					x		
502969	*	Rumex conglomeratus	Clustered Dock	Polygonaceae			E	L	x	x	x	x	x		
502970	*	Rumex crispus	Curled Dock	Polygonaceae			E	L	x	x		x	x		x
502974	*	Rumex pulcher subsp. pulcher	Fiddle Dock	Polygonaceae			E	L			x	x			
502985	*	Sagina apetala	Common Pearlwort	Caryophyllaceae			E	L			x		x		x
502986	*	Sagina maritima	Sea Pearlwort	Caryophyllaceae			E	L					x		
502987	*	Sagina procumbens	Spreading Pearlwort	Caryophyllaceae			E	L							x
502992	*	Salpichroa origanifolia	Pampas Lily-of-the-valley	Solanaceae	C		N&E	H							
503185	*	Senecio angulatus	Climbing Groundsel	Asteraceae			E	H	x		x				
503105	*	Senecio elegans	Purple Groundsel	Asteraceae			E	L	x	x	x	x	x		x
503113	*	Senecio jacobaea	Ragwort	Asteraceae	C		E	H				x			
503242	*	Senecio pterophorus	African Daisy	Asteraceae	C		E	M							
503138	*	Sherardia arvensis	Field Madder	Rubiaceae			E	L			x				
503151	*	Silene gallica	French Catchfly	Caryophyllaceae			E	L							x
503156	*	Silybum marianum	Variegated Thistle	Asteraceae	C		E	H			x				x
503163	*	Sisyrinchium iridifolium	Striped Rush-leaf	Iridaceae			E	L			x	x			
503168	*	Solanum americanum	Glossy Nightshade	Solanaceae			E	M	x						
503127	*	Solanum furcatum	Broad Nightshade	Solanaceae			E	M			x				
503178	*	Solanum linnaeanum	Apple of Sodom	Solanaceae	C		E	H	x		x				x
503183	*	Solanum nigrum s.l.	Black Nightshade	Solanaceae			E	M		x	x	x	x		x
505322	*	Solanum nigrum s.s.	Black Nightshade	Solanaceae			E	M	x			x			
503187	*	Solanum pseudocapsicum	Madeira Winter-cherry	Solanaceae			E	H				x			
503199	*	Soliva sessilis	Jo Jo	Asteraceae			E	L							
505713	*	Sonchus asper subsp. glaucescens agg.	Blue Sow-thistle	Asteraceae			E	L							
504923	*	Sonchus asper subsp. asper	Rough Sow-thistle	Asteraceae			E	L	x	x	x	x	x		x
503204	*	Sonchus oleraceus	Common Sow-thistle	Asteraceae			E	L	x	x	x	x	x		x
509082	*	Spartina spp.	Spartina	Poaceae	F		N&E	H							
503219	*	Spergularia rubra	Red Sand-spurrey	Caryophyllaceae			E	L							x
509084	*	Spergularia spp.	Sand Spurrey	Caryophyllaceae			E	L					x		
503226	*	Sporobolus africanus	Rat-tail Grass	Poaceae			E	M	x	x	x	x	x		x
503251	*	Stellaria media	Chickweed	Caryophyllaceae			E	L		x	x	x	x		x
503253	*	Stellaria pallida	Lesser Chickweed	Caryophyllaceae			E	L							
503260	*	Stenotaphrum secundatum	Buffalo Grass	Poaceae			E	H		x	x				x
503296	*	Taraxacum Sect. Hamata	Garden Dandelion	Asteraceae			E	L				x			
509122	*	Taraxacum spp.	Dandelion	Asteraceae			E	L	x		x	x			x
503344	+	Tetragonia tetragonioides	New Zealand Spinach	Aizoaceae			E	L							
500142	*	Thinopyrum junceiforme	Sea Wheat-grass	Poaceae			N&E	H	x	x	x		x		x

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503416	*	Tradescantia fluminensis	Wandering Creeper	Commenilaceae			E	L							
505581	*	Tribolium acutiflorum s.s.	Crested Desmazeria	Poaceae			E	L			x				
505580	*	Tribolium obliterum	Desmazeria	Poaceae			E	L	x		x	x	x		
504004	*	Tribolium uniolae	Haas Grass	Poaceae			N&E	**H**						x	
503423	*	Trifolium angustifolium var. angustifolium	Narrow-leaved Clover	Fabaceae			E	L			x				x
503424	*	Trifolium arvense var. arvense	Hare's-foot Clover	Fabaceae			E	L		x					x
503425	*	Trifolium campestre var. campestre	Hop Clover	Fabaceae			E	L			x	x	x		x
503426	*	Trifolium cernuum	Drooping-flower Clover	Fabaceae			E	L	x	x					
503427	*	Trifolium dubium	Suckling Clover	Fabaceae			E	L	x	x	x	x	x		x
503428	*	Trifolium fragiferum var. fragiferum	Strawberry Clover	Fabaceae			E	L			x				
503429	*	Trifolium glomeratum	Cluster Clover	Fabaceae			E	L	x	x		x	x		x
503435	*	Trifolium repens var. repens	White Clover	Fabaceae			E	L			x	x	x		x
503436	*	Trifolium resupinatum	Shaftal Clover	Fabaceae			E	L	x	x					x
503440	*	Trifolium subterraneum	Subterranean Clover	Fabaceae			E	L	x		x		x		
503442	*	Trifolium tomentosum var. tomentosum	Woolly Clover	Fabaceae			E	L	x						
504006	*	Tropaeolum majus	Nasturtium	Tropaolaceae			E	L							
503471	*	Ulex europaeus	Gorse	Fabaceae	C	**NS**	E	**H**	x		x	x	x		x
NA	*	Uredo rangelii	Myrtle Rust	Incertae sedis			N&E	**H**							
503477	*	Urtica urens	Small Nettle	Urticaceae			E	L							x
503491	*	Vellereophyton dealbatum	White Cudweed	Asteraceae			E	L							x
503494	*	Verbascum thapsus ssp. thapsus	Great Mullein	Scrophulariaceae	R		E	**H**							x
503495	*	Verbascum virgatum	Twiggy Mullein	Scrophulariaceae			E	**H**							
503502	*	Veronica arvensis	Wall Speedwell	Plantaginaceae			E	L					x		
503510	*	Veronica peregrina	Wandering Speedwell	Plantaginaceae			E	L					x		
503516	*	Vicia hirsuta	Tiny Vetch	Fabaceae			E	L				x			
505053	*	Vicia sativa subsp. nigra	Narrow-leaf Vetch	Fabaceae			E	L	x	x	x	x			
505054	*	Vicia sativa subsp. sativa	Common Vetch	Fabaceae			E	L	x		x	x	x		x
503519	*	Vicia tetrasperma	Slender Vetch	Fabaceae			E	L			x				
503524	*	Vinca major	Blue Periwinkle	Apocynaceae			E	**H**	x			x			x
503544	*	Vulpia bromoides	Squirrel-tail Fescue	Poaceae			E	L	x	x	x	x	x		x
503547	*	Vulpia fasciculata	Dune Fescue	Poaceae			E	L	x	x	x				x
503548	*	Vulpia muralis	Wall Fescue	Poaceae			E	L			x		x		x
503546	*	Vulpia myuros f. megalura	Fox-tail Fescue	Poaceae			E	L	x						
504181	*	Vulpia myuros f. myuros	Rat's-tail Fescue	Poaceae			E	L			x	x	x		x
503562	*	Watsonia meriana var. bulbillifera	Bulbil Watsonia	Iridaceae	C		E	**H**				x			x
503586	*	Xanthium spinosum	Bathurst Burr	Asteraceae	C		E	**H**							
503599	*	Zantedeschia aethiopica	White Arum-lily	Araceae			E	**H**							

Appendix 4:

Summerland Estate Case Study: Integrated Weed Removal and Habitat Restoration

Background

The Summerland estate was subdivided in 1927 into 774 residential lots. By the mid 1980's, this included 183 houses, a hotel, shop and a museum. Over the course of years, the penguin population had begun to decline. By the early 1980's it was feared the penguin colony would go the way of other such colonies on Phillip Island, extinct by the year 2000.

Threats included:

- large numbers of penguins killed by cars, dogs and cats
- predation by foxes
- loss of nesting and breeding habitat, to garden escapee weeds
- habitat destruction and hazards such as septic tanks and drains
- fires from houses and power poles

In 1985 the Victorian Government accepted that the use and development of private land on Summerland Estate posed an ongoing threat to the Little Penguin population and introduced a buy-back program of the land over a period of 15 years to ensure the future of the Little Penguin colony.

A buyback scheme was initiated and $1 million/year was allocated for the purchase of houses, land transfers, demolition and removal of houses. By 2010 the buyback was complete and the next stage of the Summerland Rehabilitation program began.

Summerlands Rehabilitation Project; 2011-2013

A $3.4 million grant from DSE was approved to finish the buyback project, remove remaining infrastructure, install 1500 penguin boxes, plant 120,000 indigenous plants and remove/control vast areas of environmental weeds. Before any large scale revegetation work could begin the weed issue needed to be addressed.

Major weed Issues included garden escapees, noxious and environmental weeds, including Weeds of National Significance.

Wildlife issues included working in sensitive wildlife areas with ground nesting birds such as Little Penguin, Short-tailed Shearwater, Cape Barren Geese, Masked Lapwing, Purple Swamphen and Swamp Harrier.

As the key species, Little Penguins and Short-tailed Shearwaters are spring-summer breeding birds so the majority of the habitat restoration work needed to occur during winter when there was no breeding, fewer penguins and the shearwaters were away on migration.

Summerland Housing Estate in the 1980's

House removal, Summerland Estate. 2000

Major Weed Projects on the Summerland Peninsula

Major infestations of woody weeds removed from the Summerland housing estate included Gorse *(Ulex europaeus),* Boxthorn *(Lycium ferocissimum),* Radiata Pine (*Pinus radiata),* Monterey Cypress *(Hesperocyperis macrocarpa),* Hakea *(Hakea* spp*),* Bushy Yate *(Eucalyptus lehmannii),* Giant Honey-myrtle *(Melaleuca armillaris* subsp*. armillaris),* Myrtle-leaf Milkwort (*Polygala myrtifolia),* Sweet Pittosporum *(Pittosporum undulatum),* African Boxthorn (*Lycium ferocissimum)* and Boneseed *(Chrysanthemoides monilifera.* Other highly invasive weeds included Bridal Creeper (*Asparagus asparagoides*), Agapanthus (*Agapanthus praecox* subsp. *orientalis*), Cape Ivy (*Delairea odorata*), Climbing Groundsel (*Senecio angulatus*), Blue Periwinkle (*Vinca major*), Angled Onion (*Allium triquetrum*) and thistles.

The principal technique used to control the woody weeds was complete removal with the exception of Gorse which was treated with herbicide either as cut-stump or foliar spray and left to break down on site. Because of its thorny nature, boxthorn was cut and removed to be burnt off site. Most of the other woody weeds were put through a chipper and removed from site as mulch. This had a number of benefits including the removal of weed seed, reduction of fire threat by removing fuel biomass, a more rapid conversion of sites to suitable penguin habitat, ease of access for follow-up weed control and better visual appeal for the public. Although large and relatively expensive to remove, woody weeds were not the greatest challenge to restoring function to the natural plant ecosystems.

Smothering by stoloniferous grass species including Kikuyu (*Cenchrus clandestinus)*, Couch (*Cynodon dactylon)* and Buffalo Grass (*Stenotaphrum secundatum)* are very difficult to control and even more difficult to selectively remove from tussock grassland containing penguin burrows. These grasses have a particularly detrimental effect on burrowing bird species like Little Penguins and Short-tailed Shearwaters as the birds are unable to penetrate the root mass or walk through the dense tangle which can be more than half a metre thick. There were large areas rendered unsuitable for nesting due to the linear spread along some road sides which formed a barrier between the sea and potential burrow sites.

Kikuyu in particular was the most wide spread and challenging weed to contend with due to site constraints, limited control options and when well established will grow in a tangled smothering mass which displaces native vegetation. Control is very difficult without adverse effects on non-target native species. Fire, which is a good way to reduce biomass, could not be used at all in the penguin habitat. Thus, a very labour intensive combination of hand removal from the native tussock grass, then follow-up with selective and non-selective herbicides, then careful whipper snipping and spot spraying of regrowth was carried out. This was often done a number of times then bare areas were replanted with tussock grass and other grassland species. A particular emphasis was placed on kikuyu control as there were instances where penguins were found caught in the roots.

A Little Penguin caught in Kikuyu grass

Revegetation works at Summerland Estate following house removal

Treated kikuyu with native tussock grass

Infill planting of native grassland species

Volunteers install penguin boxes, hand weed, then plant and guard tube stock seedlings. Mulched woody weeds used to suppress weeds.

Mature Poa spp. tussock grass near Shelly Beach.

Covering artificial Penguin nesting boxes with soil then planting with native grassland species can help with insulation during the summer breeding season.

Although follow up weed control will be required for many years to come, Penguins now inhabit and thrive in what was a housing estate.

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Weed Management Strategy
2018 –2023