African Boxthorn
(Lycium ferocissimum)
Management Plan
for Bushland of the
WildEyre Project area
2013 – 2016

This management plan has been produced by members of the WildEyre Working Group under the project titled “WildEyre Conservation Alliance: Implementing NatureLinks across Eyre Peninsula”, funded through the Australian Federal Governments’ Clean Energy Future Biodiversity Fund.
The purpose of this management plan is to:

- Provide an informed and transparent series of objective based directions for the implementation of control options for African Boxthorn (*Lycium ferocissimum*) throughout the bushland of the WildEyre project area
- Assist in the direction of on-ground delivery of African Boxthorn control activities funded through WildEyre
- Provide information to promote wider adoption of African Boxthorn control on public and private lands
- Facilitate and encourage an improvement in the management of African Boxthorn throughout the WildEyre project area
# Contents

Background information ........................................................................................................................................ 4
Identification ....................................................................................................................................................... 5
African Boxthorn control techniques .................................................................................................................. 7
Weed control strategy .......................................................................................................................................... 9
Monitoring ......................................................................................................................................................... 13
Communication Strategy .................................................................................................................................... 16
WildEyre African boxthorn Management Areas ............................................................................................... 17
References .......................................................................................................................................................... 34
Appendix A ......................................................................................................................................................... 35
Appendix B ......................................................................................................................................................... 36
Background information

African Boxthorn was first introduced to the West Coast of Eyre Peninsula through an active program of planting for hedge establishment by landholders. Since their introduction boxthorns have transitioned from being a desirable species serving a practical purpose in confining stock movements to now being listed as a weed of National Significance (WONS).

African boxthorn is a declared plant under the Natural Resources Management Act 2004, and subject to the associated provisions listed in Schedule 2 of the Declaration of Animals and Plants. These provisions focus largely on restrictions concerning the movement and/or sale of boxthorn plants, fruits or seeds, and the requirement for landholders to undertake actions to control the plant on their land.

African Boxthorn is recognized as having the potential to cause negative impacts throughout the landscape and across most land-uses through a range of actions:

- Competing with native vegetation species for moisture and nutrient, reducing native species abundance and diversity
- Causes injury to humans and livestock (eye injuries to sheep common in drier times)
- Provides safe harbor for rabbits, foxes and starlings to breed and avoid predators
- Fruit provides food source for foxes and starlings
- Forms dense thickets reducing stock movements
- Reduces land available for pasture
- Reduces amenity value of public lands
- Fruit provides a breeding ground for pest insects such as fruit fly, dried fruit beetles and tomato fly
- Once established weed requires considerable resources to treat infestations effectively

A variety of native and introduced animal species make use of the berries produced by African Boxthorn as a source of nutrition, and subsequently deposit seeds from boxthorn at random locations once the digestive processes have taken place. These freshly deposited seeds then offer the potential of new infestations of boxthorn developing.

The main identified vectors involved in the spread of African Boxthorn in the WildEyre Project area are:

- European Starling
- Silver-eye
- Red Fox
Identification

African Boxthorn – *Lycium ferocissimum*

- African boxthorn is a native species of coastal regions of South Africa
- It is a dense woody weed that can grow to over 4m tall and has been found in excess of 10m in diameter (across drip line)
- It has rigid branches that end in spines up to 150mm long
- Leaves are fleshy and smooth, found in small clusters on short stalks, up to 35mm in length
- Flowers can vary from white to light purple
- Fruits when mature have a bright orange to red colour, 10mm in diameter
- Fruits contain 20 or more small seeds, brown to yellow in colour, oval shaped, roughly 2.5mm long
- In coastal areas of Western Eyre Peninsula it can be mis-identified with the Australian native boxthorn (*Lycium austral* – see image 2)

The name explained – *Lycium* is from Lycia a region in Asia Minor where a similar thorny shrub occurs. *Ferocissimum* is from the Latin *ferox* meaning fearless or bold referring to the spininess of the plant.

African Boxthorn is derived from its country of origin (Africa) and the Dutch name for the plant in South Africa, boksdorn (boxthorn).

![Map 1](image_url)
**Lycium ferocissimum**

Photos: S.M. Armstrong & G. Byrne

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**Lycium australis**

Photos: H. Adamson & K.C. Richardson
African Boxthorn control techniques

The control options available for treating African boxthorn are numerous and careful consideration of a range of factors must be made when deciding which control method to implement in a given situation. It is a reasonable expectation that multiple control methods will need to be used on most sites to ensure effective control is achieved whilst having minimal off-target impacts.

Factors influencing control method selection:
- Geographic location (on a steep slope, in a wetland, near houses etc)
- Vegetation composition around the infestation
- Soil type
- Likelihood of water inundation (flooding)
- Likelihood of water movement across the surface
- Size and density of boxthorn plants
- Accessibility of the site
- Surrounding landuse
- Available resources (availability of fresh water for spraying)
- Weather conditions during control activities
- Sensitive native or crop species proximity

The main recognized options for controlling African boxthorn effectively are listed below along with some considerations when deciding if the method is appropriate to a given situation.

Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 4 - Soil injection with residual herbicide
Control 5 - Basal barking with herbicide
Control 6 - Stem injection with herbicide
Control 7 - Mechanical removal

Control 1 - Foliar application of herbicide

Involves the use of herbicide applied to the foliage of a target weed with the use of spraying equipment. For the control of African Boxthorn it is important that the target plants are healthy and actively growing at the time of application to ensure the greatest result.
Control 2 – Cut and swab with herbicide

Involves the use of concentrated herbicide applied directly to the freshly cut stump of the target weed. For the control of African Boxthorn it is important in most cases to apply the herbicide quickly after cutting has occurred (within 30 seconds).

Control 3 – Application of granular residual herbicide

Involves the use of residual herbicides contained within degradable mediums such as clay, applied to the target weed as granules, which over time dissolve and are absorbed through the roots of the weed. For the control of African Boxthorn it is important to apply a sufficient amount of the granular herbicide within the drip line and care should be taken when working on slopes and where water may move the granules.

Control 4 – Soil injection with residual herbicide

Involves the use of a soil injection probe or spraying equipment to place herbicide directly around the soil root zone of the target weed. For the control of African Boxthorn care should be taken when applying to weeds on slopes, in water courses or near desirable vegetation. Caution should be exercised if considering this application method.

Control 5 – Basal barking with herbicide

Involves the application of herbicide to the bark of the lower stems of target weeds and typically involves the use of a suitable carrier fluid such as diesel or kerosene. For the control of African Boxthorn considerations should be given to the ability to access and treat all stems of larger plants to ensure complete control.

Control 6 – Stem injection with herbicide

Involves the direct application of herbicide to a target weed via the drilling of holes with a spear or power drill. For the control of African Boxthorn it is important to treat all stems of plants to ensure complete exposure to the herbicide, and may not be practical for many larger plants due to excessive numbers of stems and inaccessibility.

Control 7 – Mechanical removal

The mechanical removal of African Boxthorn can be effective at controlling mature plants but minimal control will be exhibited on juveniles and regrowth from broken stems is common. The heaping and burning of removed plants can be helpful to prevent further spread of seed and to prevent the establishment of harbour for rabbits and foxes.

Note: throughout this management plan recommended control strategies for specific management areas will make reference to these control techniques.
**Weed control strategy**

**Multi-faceted approach:**
To ensure the long term benefits of any control work undertaken through the project it is important to promote a multi-angled approach to the control of African boxthorn throughout the WildEyre area. The control of boxthorn will be considered in a blind tenure approach, encouraging the investment of time and resources relative to the ability to achieve long term gains in boxthorn exclusion. The implementation of multiple approaches and options for all landholders will be required to achieve a true landscape scale reduction in the impacts and density of boxthorns. This may involve the use of various control methods, selecting the most appropriate for the various landuses or vegetations types on a property, or may involve the use of private contractors to supplement the efforts of landholders and local councils. Consideration of volunteer groups to assist in follow-up control of infestations could be given in some situations and in turn promoting local ownership of the project.

**NRM Act 2004:**
Given the provisions of the Natural Resources Management Act 2004 in relation to African Boxthorn control, it would be a reasonable expectation for all landholders to achieve a high level of control on plants in easily accessible locations. In order to achieve this, formal communication from EPNRM by means of letters, news paper articles and property visits from Authorised Officers may be required to promote a higher level boxthorn control.

**Systematic approach:**
At sites where control is to be undertaken a systematic approach to activities is recommended and the basis for this should be through implementing the broad principles of the “Bradley method” with a focus on the three core principles for effective long term control;

- Work from minimally disturbed sites in towards the most weed infested areas
- Minimise disturbance to the soil
- Allow the rate of native plant regeneration to dictate the rate of weed removal

**Additional support and assistance:**
It is recognised that the control of African Boxthorn in some situations would be beyond the capacity of typical landholders in both a technical and resource sense. In many situations it is these difficult to treat infestations that provide an ongoing seed source for the re-infestation of treated areas. Therefore these sites and infestations may require additional support and assistance to ensure adequate control is achieved.

Areas subject to these situations would fit broadly into 2 main categories:

- Coastal – Sandhills, coastal cliffs, sub-coastal wetlands and associated vegetation
- Native Vegetation – Parks, reserves, roadsides, private land, inland wetlands

For coastal areas, particular reference should be made to the Eyre Peninsula Coastal Action Plan and the cell descriptions for each of the Management areas along with maps indicating a defined coastal boundary (cells EP47 through EP69).

For areas of native vegetation inland from the coastal zone, particular reference should be made to the WildEyre Landscape Linkages Plan for maps and descriptions of areas identified as high priority conservation zones.
Management areas:
The geographic area of WildEyre has been divided into smaller management areas (see map 2) for the purpose of communicating and coordinating control efforts over the duration of this management plan. Each of these 16 smaller management areas has been assessed to determine the current level of boxthorn infestation, what actions should be required to control the infestations and future management requirements to maintain positive gains.
These 16 management areas are:

- Streaky Acraman
- Cape Bauer
- Sceale Bay
- Baird Bay
- Venus Bay
- Mt Camel
- Lake Newland
- Walkers Rock
- Waldegrave
- Anxious / Waterloo Bay
- Locks Well
- Tungketta
- Sheringa
- Lake Hamilton
- Inland fringe
- Inland low density

Map 2
Prioritisation of Weed Control Resources

The allocation of resources to facilitate control of African boxthorn infestations through a prioritised approach takes consideration from a number of sources, with the primary guiding documents being the Eyre Peninsula Coastal Action Plan, WildEyre - Landscape Linkages Plan. A summarised table of prioritisation determinations from these two documents can be found in the table below (Table 1). Consideration for the assignment of resources should also be given to control work undertaken in previous years and all efforts made to build on and compliment previous achievements.

<table>
<thead>
<tr>
<th>Location</th>
<th>Coastal Action Plan - Combined Summarised Conservation Analysis Layer rating (from figure 5.1)</th>
<th>Landscape Linkages Plan rating (from figure 3.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streaky - Acraman</td>
<td>Lowest Priority</td>
<td></td>
</tr>
<tr>
<td>Cape Bauer</td>
<td>Medium &amp; Highest Priority</td>
<td>High Priority</td>
</tr>
<tr>
<td>Scale Bay</td>
<td>Medium &amp; Highest Priority</td>
<td>High Priority</td>
</tr>
<tr>
<td>Baird Bay</td>
<td>Medium &amp; Highest Priority</td>
<td>High Priority</td>
</tr>
<tr>
<td>Venus Bay</td>
<td>Medium &amp; Highest Priority</td>
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</tr>
<tr>
<td>Mt Camel</td>
<td>Highest Priority</td>
<td>High Priority</td>
</tr>
<tr>
<td>Lake Newland</td>
<td>Medium Priority</td>
<td>High Priority</td>
</tr>
<tr>
<td>Walkers Rock</td>
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<td>Locks Well</td>
<td>Medium Priority</td>
<td>High Priority</td>
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<tr>
<td>Tungetta</td>
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<td></td>
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<tr>
<td>Sheringa</td>
<td>Medium Priority</td>
<td></td>
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<td>Lake Hamilton</td>
<td>Medium Priority</td>
<td>High Priority</td>
</tr>
<tr>
<td>Waldegrave Island</td>
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<td>NA</td>
</tr>
<tr>
<td>Inland fringe</td>
<td>NA</td>
<td>High Priority</td>
</tr>
<tr>
<td>Inland low density</td>
<td>NA</td>
<td>High Priority</td>
</tr>
</tbody>
</table>

Table 1

Previous African Boxthorn Control in the WildEyre project area

In most areas of WildEyre some level of African boxthorn control has been undertaken throughout the previous 15 years or more, through work by private landholders, local councils, conservations parks and crown land managers and more recently through environmental projects such as WildEyre. This work has achieved many significant gains in controlling infestations and limiting the ongoing availability of seeds preventing the further establishment of new seedlings.

In planning control activities it is important to consider what work has previously been completed at the site and seek to complete any future in manner that compliments the work previously completed. Additional information regarding previous control work is best accessed through regional DEWNR staff.
Summary Management Area Actions:
The following summary table details the location and activity requirement over the duration of the project and management plan estimated to be required to achieve the plans objectives.

### Activity definitions:

**Initial Control** refers to the initial treatment of African boxthorn within a management area, the aim of this activity is to treat the bulk of any infestations and may make use of any or all of the control techniques described earlier. The marking of treated bushes allows for landowners and the public to identify where control has been completed.

**Follow-up Control** refers to subsequent visits to an area that has previously had initial control completed. The aim of follow-up control is to treat any plants that may have been missed during initial control activities and to treat any newly established seedlings prior to fruiting. Follow-up control may only make use of a small selection of control techniques such as cut and swab or application of granular herbicides.

**Monitor** refers to return visits to sites where Initial and Follow-up control have been completed. The aim of monitoring sites is to determine the effectiveness of control activities and to provide information for the planning of any future follow-up control that may be required. Often it will be more financially viable for an officer undertaking monitoring to control a small number of plants when they are found rather than to send a work team on another occasion to re-locate the same plants or infestation.
Monitoring

Assessment of Infestation Rating of Management Areas

The determination of African boxthorn infestation ratings for management areas provides for an observation-based assessment of the density and distribution of boxthorn at a large scale throughout the project's lifespan. The initial infestation rating will provide the project a basis on which a determination of the success of control programs can be made annually. Infestation rating is directly linked to the abundance of African boxthorn estimated to be observed within an area, this is explained in further detail in the Nature Conservation Society’s Bushland Condition Monitoring Manual: Eyre Peninsula Region.

Infestation ratings are determined around six broad classifications of observable African boxthorn densities:

1. **Low** – Very few plants observed, small isolated infestations (<1% bushland infested)
2. **Low/Medium** – Small isolated infestations with some localised accumulation (<5% bushland infested)
3. **Medium** – Distributed across landscape but not obviously dominant with some localised accumulation (5-25% bushland infested)
4. **Medium/High** – Plants obvious in landscape of various size and/or distributed widely (26-50% bushland infested)
5. **High** – Large obvious plants throughout landscape, some thickets may be present (51-75% bushland infested)
6. **Very High** – Large obvious plants dominating landscape, thickets have formed (>75% bushland infested)

A minimum of three geographically independent sites in the bushland of each management area should be visited annually and visual observations of boxthorn densities made in relation to the classifications previously described. There is no maximum numbers of assessment sites that can be established within a management area.

Sufficient time should be spent at each assessment site to allow for traversing of the variety of land systems and identification of any micro-climate or niche locations that may harbour accumulations of boxthorns.

A field assessment sheet for undertaking infestation level assessments can be found at the end of this management plan.

Selection of assessment site locations should be done to coincide with areas where control activities may be considered into the future and recording of GPS coordinates will enable revisiting of sites in subsequent years to re-monitoring infestation densities.

Staff and contractors undertaking control activities may be asked to complete an African boxthorn infestation assessment prior to completing any control at a site.
Initial Infestation Rating

The determination of an initial infestation rating for each of the Management Areas described in this management plan has been made through consultation with DEWNR staff located within the WildEyre area, Local Council staff, members of the community and landholders. This initial infestation rating map has been produced from a range of observations of the landscape rather than from a standardised monitoring and assessment process, and therefore errors and assumptions of the level of infestations found in any given area may be present. The initial infestation rating map shown below provides a representation of initial African boxthorn density ratings relative to the bushland of the management area and is not directly reflective of the level of infestations found on surrounding agricultural land.

Monitoring throughout the span of this project will allow for the reprojecting of updated data that will provide a more accurate and reflective indication of the current level of boxthorn infestation.

Map 3
Control effort mapping
The recording of information relating to the type, location and effort of control activities will assist the future planning and management of African boxthorn control throughout the WildEyre project area. The information generated through the collection of control effort data will also play a role in describing and quantifying the activities for reporting and further communication of the achievements of the WildEyre project.

Where possible work teams undertaking control of African boxthorn should be provided with an aerial photograph or map of the area in which they have been designated to undertake control activities. At the conclusion of each day of control work, an indication of the area covered should be marked on the printed map and a record of the types of control work recorded on the activity record sheet (see appendix B). This information can then be digitally recorded by a project officer and updated maps and infestation information generated.

Control success determination
Re-assessment of infestation sites where management has occurred should be undertaken on an annual basis to observe the success of previous control work and to determine an updated infestation rating for the site. Monitoring of infestation sites should continue to occur for between 3-5 years after control activities are completed, enabling the detection of emerging seedlings and plants possibly missed in earlier treatments.

Re-assessment of sites should be undertaken using the same methodology used in determination of the initial infestation rating referred to earlier in this management plan.

Successful implementation of this management plan would be considered to have been achieved if the infestation level of all management areas has decreased in rating between 2013 and 2016.
**Communication Strategy**

**Contact with landholders to access or cross their properties**

In many situations it will be necessary for project officers and contractors to access or cross private land in order to access infestations of African boxthorn identified through this management plan. Ideally contact with landholders should be made by the intended supervisor of the control or monitoring works. Initial efforts should be made to make contact with the land manager by phone or in person to discuss the project and the possible control activities or access that may be required in order to undertake boxthorn control. It would be ideal to encourage all landholders during discussions to consider what level of African boxthorn control they may need to undertake to compliment the work of the project and neighbouring properties. Where phone or personal contact can’t be made with a landholder a formal letter from the intended supervisor of the control or monitoring works should be sent to the properties postal address seeking to make phone contact to discuss the project.

**Communication with Crown land managers**

Communication with the DEWNR District Manager Western Eyre Peninsula as to any work intended to occur on land managed as either Crown reserves or Conservations Parks should occur formally via the appropriate means of communication identifying the locations, control methods, personal involved and timing of activities. All efforts should be made to compliment any control work previously undertaken by DEWNR staff on crown land or conservation parks.

**Communication with Local Councils**

Communication with two key Local Councils to ensure knowledge of and support for the ongoing management of African boxthorn throughout the West Coast, these two councils are DC Elliston and DC Streaky Bay. Local Councils are key stakeholders in a number of aspects of this management plan and communication regarding each aspect should be considered on an ongoing basis. This should include Local Governments role as a land manager and assistance that may be provided to control infestations on council owned or managed land, and the effectiveness of control work undertaken by councils on their land.

**Communication with Local Communities**

Communication with the general public and private landholders through various media and public engagement opportunities regarding the control work and monitoring undertaken through the WildEyre project will help facilitate a greater level of public awareness of both the WildEyre project and the importance of controlling boxthorn. Regular articles in local media discussing the methods, rationale and results of the control and monitoring work should help maintain an increase in awareness.

**Fact Sheets**

A number of fact sheets covering the identification and control of African boxthorn can be found on the internet, with the Australian Governments’ Weeds of National Significance website offering a number of boxthorn related documents for download, including a comprehensive CRC published - Weed Management Guide. Some printed copies of fact sheets may be kept within local DEWNR offices and interested landholders should be directed to make contact with their local officer for more assistance.
WildEyre

African boxthorn

Management Areas
Management Area: Streaky Acraman
Management Area Size: 81573Ha
Current 2013 Infestation Level: Medium
Anticipated infestation level 2016: Low / Medium

Management Discussion:
Boxthorn infestations within this management area generally increase in density towards the south and are primarily confined to areas within a few km of the coast in vegetated dune systems. The predominance of sand dunes also increases towards the southern part of this management area increasing the difficulty of access to infestations. Limited work has previously been undertaken in controlling boxthorn infestations on public land in this management area and future site inspections and monitoring of control work will improve the knowledge of infestation sites. It would be anticipated that providing assistance to private landholders in controlling difficult to access infestations will be required along the coastal fringe.

Recommended Management Actions:
2013 - Monitoring of infestations – 0.5 days
2014 - Monitoring of infestations – 0.5 days
2015 – Initial control be implemented – 6 days
2016 - Follow up control be implemented – 4 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Cape Bauer
Management Area Size: 15896 Ha
Current 2013 Infestation Level: High
Anticipated infestation level 2016: Medium

Management Discussion:
Significant investment of time and resources have been made into controlling the large density of African boxthorn previously found in the coastal crown strip of this management area over a period of more than 15 years. This control work has largely been successful, however regular follow up control will be required in order to maintain these areas free of infestations.

Significant populations of Starlings within this management area will influence the rate of reinfestation of previously controlled areas through transfer of seeds, thus making it a priority to communicate with private landholders the value of undertaking appropriate control of any infestations on their land.

Accessibility of infestations within this management area is highly variable and support may be required across all land tenures.

Encouragement of adjoining private landholders to improve the amount of boxthorn control undertaken would complement the work previously completed.

Recommended Management Actions:
2013 – Initial control be implemented – 4 days
2014 - Follow up control be implemented – 8 days
2015 - Monitoring of infestations – 0.5 days
2016 - Follow up control be implemented – 4 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Sceale Bay
Management Area Size: 22813 Ha
Current 2013 Infestation Level: Medium
Anticipated infestation level 2016: Low / Medium

Management Discussion:
Significant control work has been completed over the past 3 years through a project partnership involving the Friends of Sceale Bay, EPNRM, Wirangu and DEWNR, in controlling infestations of African boxthorn throughout this management area. With a complex assortment of vegetation systems involving some very difficult to access terrain, the boxthorn infestations found within this management area may be labour intensive and suitable primarily for cut and swab and granular herbicide treatments.

National Parks undertakes annual control programs within the Conservation Reserves in this management area, consideration should be given to supply additional support for difficult to access infestations.

It will be important to engage the local community in understanding the work that has been completed and to support a higher level of boxthorn control on private land.

Recommended Management Actions:
2013 - Monitoring of infestations – 0.5 days
2014 - Monitoring of infestations – 0.5 days
2015 - Follow up control be implemented – 8 days
2016 - Monitoring of infestations – 0.5 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Baird Bay
Management Area Size: 64714 Ha
Current 2013 Infestation Level: Low / Medium
Anticipated infestation level 2016: Low

Management Discussion:
Significant control work has been completed over the past 3 years through a project partnership involving the Friends of Sceale Bay, EPNRM, Wirangu and DEWNR, in controlling infestations of African boxthorn throughout this management area. With a complex assortment of vegetation systems involving some very difficult to access terrain, the boxthorn infestations found within this management area may be labour intensive and suitable primarily for cut and swab and granular herbicide treatments.

National Parks undertakes annual control programs within the Conservation Reserves in this management area, consideration should be given to supply additional support for difficult to access infestations.

It will be important to engage the local community in understanding the work that has been completed and to support a higher level of boxthorn control on private land.

Recommended Management Actions:
2013 - Monitoring of infestations – 0.5 days
2014 - Monitoring of infestations – 0.5 days
2015 - Follow up control be implemented – 4 days
2016 - Monitoring of infestations – 0.5 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Venus Bay  
Area Size: 28477 Ha  
Current 2013 Infestation Level: Low / Medium  
Anticipated infestation level 2016: Low  

Management Discussion:
The Venus Bay area represents one of the more complex arrangements of environments in which boxthorn control is required, consisting of coastal dunes, coastal cliffs, sub-coastal wetlands, islands, Heritage Agreements areas, Conservation Parks and agricultural land.

National Parks have undertaken regular control activities within the Venus Bay Conservation Park and on the Islands within the Bay over a period of 10 years, and continue to control plants when identified.

DC Elliston has undertaken regular control activities on land under its care and control between Venus Bay township and Pt Kenny consistent with the details of their boxthorn management plan.

Due to the complexity of the landscape in this management area, additional support may be required to assist National Parks, DC Elliston and Heritage Agreement owners to implement control activities in some areas.

Recommended Management Actions:
2013 - Monitoring of infestations – 0.5 days
2014 - Follow up control be implemented – 4 days
2015 - Monitoring of infestations – 0.5 days
2016 - Follow up control be implemented – 2 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide (limited application)
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Mt Camel
Area Size: 5951 Ha
Current 2013 Infestation Level: Low / Medium
Anticipated infestation level 2016: Low

Management Discussion:
Much of this management area has benefited from control activities undertaken through WildEyre since 2008, including control of all known infestations along the vegetated coastal strip. The Elliston DC has undertaken extensive work in the area around Rincon beach as part of its Boxthorn Management Plan. Accessibility has proved difficult in many areas due to thick coastal vegetation and sand dunes, and the use of granular herbicides and cut and swab control methods have been the most efficient methods for achieving effective control. The coastal vegetation area between Talia Caves and Mt Camel consists of a network of Heritage Agreement blocks with limited coastal access tracks; however a minimal density of boxthorn should see this area easily re-treated for any additional seedlings or plants missed during previous control activities. Encouragement of adjoining landholders to improve the amount of boxthorn control undertaken would complement the work previously completed.

Recommended Management Actions:
2013 - Monitoring of infestations – 0.5 days
2014 - Follow up control be implemented – 2 days
2015 - Monitoring of infestations – 0.5 days
2016 - Follow up control be implemented – 2 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
**Management Area:** Lake Newland  
**Area Size:** 33450 Ha  
**Current 2013 Infestation Level:** Medium  
**Anticipated infestation level 2016:** Low / Medium  

**Management Discussion:**
The Lake Newland Conservation Park dominates this management area and control work undertaken by National Parks over the past 15 years has resulted in an ongoing suppression of boxthorn densities. Active control work by private landholders in the area has seen a continual reduction in the density of boxthorn infestations. Difficult to access areas to the west of the wetland systems within Lake Newland still represent some significant infestations of boxthorn in locations with a combination of factors influencing effective control. Site accessibility is low when the plants are most actively growing and suitable for foliar spraying, typically during the wetter cooler months due to muddy/boggy conditions. However when accessibility to these infestations improves during drier months the health of the plants declines and reduces the effectiveness of foliar application of herbicides. The geographic context of these infestations also rules out the use of any residual or soil applied controls due to the potential off target impacts, leaving cut and swab as the most appropriate control method. As a result the amount of time required to achieve effective control will be higher than many other management areas.

**Recommended Management Actions:**  
2013 - Initial control – 8 days  
2014 – Follow up control be implemented – 8 days  
2015 - Monitoring of infestations – 0.5 days  
2016 - Follow up control be implemented – 4 days

**Recommended Control Methods:**  
Control 1 - Foliar application of herbicide  
Control 2 - Cut and swab with herbicide  
Control 3 - Application of granular residual herbicide  
Control 5 - Basal barking with herbicide  
Control 7 – Mechanical removal
Management Area: Walkers Rock
Area Size: 11428 Ha
Current 2013 Infestation Level: Low / Medium
Anticipated infestation level 2016: Low

Management Discussion:
A combination of control activities undertaken by private landholders, DC Elliston, WildEyre and EPNRM over the past 15 years has resulted in minimal infestations of boxthorn within this management area.
The dominance of coastal dunes and associated vegetation makes access and identification of infestations difficult, with many areas only accessible by walking or on ATV units.
The entire coastal zone in this management area is within the Lake Newland Conservation Park.
The presence of a number of sub-coastal wetlands on both public and private lands may require additional assistance to control difficult to access infestations with appropriate methods that do not impact on the broader wet lands system.
The movement of birds from Waldegrave Island into this management area present an ongoing source of seed that will require ongoing attention to avoid an increase in boxthorn plants.

Recommended Management Actions:
2013 - Monitoring of infestations – 0.5 days
2014 - Follow up control be implemented – 4 days
2015 - Monitoring of infestations – 0.5 days
2016 - Follow up control be implemented – 2 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Waldegrave
Area Size: 321 Ha
Current 2013 Infestation Level: Very High
Anticipated infestation level 2016: Very High
EP Coastal Action Plan Cell References: NA

Management Discussion:
Boxthorn infestation densities on West Waldegrave Island represent some of the highest on the West Coast of Eyre Peninsula, with survey work completed in 2011 identifying areas estimated to contain up to 782 plants growing per Ha. Control of such dense infestations of boxthorn present many difficulties and combined with a range of ecological and geographic challenges the options for effectively and economically implementing any control program become quite daunting.

It would be beyond the scope of this management plan to draw together the range of considerations and logistical preparations required to undertake such a control program. However the ongoing management of African boxthorn on the Waldegrave Islands group will continue to provide influence over the regular supply of seed for re-establishment of mainland infestations. This is largely due to the daily movement of numerous bird species, both native and introduced, between mainland farming properties and the islands.

All efforts should be made to progress the development of an accepted control program for African boxthorn on the Waldegrave group of Islands.

Recommended Management Actions:
2013 – Monitoring of infestations & prepare control plan
2014 – Monitoring of infestations & prepare control plan
2015 – Monitoring of infestations & prepare control plan
2016 - Monitoring of infestations & prepare control plan

Recommended Control Methods:
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 6 – Stem injection with herbicide
Management Area: Anxious / Waterloo Bay
Area Size: 8039 Ha
Current 2013 Infestation Level: Low / Medium
Anticipated infestation level 2016: Low

Management Discussion:
Control of boxthorn has been conducted by many landholders in this area for over 20 years, DC Elliston has successfully implemented a boxthorn control program from 2004 and continues to control known infestations annually. EPNRM through annual funding for Crown land management undertakes control as required in the area of sand dunes and coastal vegetation immediately West of the Elliston Jetty and in an area to the South of the township on the cliff top SE of Little Bay.
The council owned wetland area to the North and East of the township may require additional resources to successfully control infestations in dense vegetation.
Control efforts on private land in general have been high and compliment the work achieved on public land, however all landholders should be regularly reminded of the benefits to the district of undertaking control.
Previous control work in this management area has been undertaken through a range of control techniques and due to the varying locations, accessibility and environmental conditions in which infestations may be found a combination of control methods will need to be used into the future.

Recommended Management Actions:
2013 - Monitoring of infestations – 0.5 days
2014 - Follow up control be implemented – 4 days
2015 - Monitoring of infestations – 0.5 days
2016 - Follow up control be implemented – 2 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Locks Well
Area Size: 17183 Ha
Current 2013 Infestation Level: Medium
Anticipated infestation level 2016: Low / Medium

Management Discussion:
A number of years of control work funded through WildEyre and EPNRM have resulted in a significant reduction of both the number and the average size of boxthorn plants found throughout this management area. The Bramfield Parklands managed by the residents of the town have implemented a multi-weed control program which has resulted in the removal of boxthorns from around the township and annual control efforts to remove any seedlings. With a very small area of publically managed land and a narrow strip of coastal cliff dunes and associated vegetation this management area should require minimal control activities. Encouragement of adjoining landholders to improve the amount of boxthorn control undertaken would complement the work previously completed.

Recommended Management Actions:
2013 - Monitoring of infestations – 0.5 days
2014 - Monitoring of infestations – 0.5 days
2015 - Follow up control be implemented – 4 days
2016 - Monitoring of infestations – 0.5 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Tungketta
Area Size: 9923 Ha
Current 2013 Infestation Level: Medium
Anticipated infestation level 2016: Low / Medium

Management Discussion:
A number of years of control work funded through WildEyre and EPNRM have resulted in a significant reduction of both the number and the average size of boxthorn plants found throughout this management area. The area around the Tungketta lakes consists of a combination of Crown and private land, with funds from Crown Lands management contributing towards previous control work. Some sections of privately managed land adjoining the lakes presents a logistical challenge and assistance should be offered to the landholder to compliment control work along the coast and in nearby Crown Land. With a very small area of publically managed land and a narrow strip of coastal cliff dunes and associated vegetation this management area should require minimal control activities. Encouragement of adjoining private landholders to improve the amount of boxthorn control undertaken would complement the work previously completed.

Recommended Management Actions:
2013 - Monitoring of infestations – 0.5 days
2014 – Initial control (Tungketta Lakes) – 4 days
2015 - Follow up control be implemented – 6 days
2016 - Monitoring of infestations – 0.5 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Discussion:
Large areas of mobile sand dunes and coastal vegetation dominate much of the area infested with boxthorn within this management area, making accessibility difficult and limiting the control methods that are logistically possible. A combination of control efforts by DC Elliston, adjoining landholders and work undertaken by WildEyre and EPNRM has resulted in a decrease in boxthorn presence in some of the management area. Planned control work for 2013 should see initial control efforts completed north of the Sheringa Lagoon. Initial control work south of the Sheringa Lagoon will primarily focus on coastal cliffs and associated vegetation.
Additional support may be required to assist private land managers around the Sheringa Lagoon and Round Lake to successfully control boxthorn plants growing in Lake-side vegetation.
Encouragement of adjoining private landholders to improve the amount of boxthorn control undertaken would complement the work previously completed.

Recommended Management Actions:
2013 - Initial control – 6 days
2014 – Initial control – 4 days
2015 - Follow up control be implemented – 6 days
2016 - Monitoring of infestations – 0.5 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Lake Hamilton
Area Size: 43559 Ha
Current 2013 Infestation Level: Medium / High
Anticipated infestation level 2016: Low / Medium

**Management Discussion:**
Limited work has been completed on public land within this management area previously. With the area dominated by steep coastal cliffs with cliff-top dunes and associated vegetation it is anticipated that some boxthorn infestations may be difficult to access and require additional time and resources to effectively control.

Located within this management area is the large wetland complex of Lake Hamilton, with its fringing strip of sedgelands dominated by Gahnia. Within these sedgelands, boxthorns are in areas numerous and will require additional resources to effectively treat them. Access to these infestations will be difficult and control options limited due to the proximity to wetland vegetation, cut and swab may be the most effective option.

Encouragement of adjoining private landholders to improve the amount of boxthorn control undertaken would complement the work previously completed.

**Recommended Management Actions:**
2013 – Monitoring of infestations – 0.5 days
2014 – Initial control – 10 days
2015 – Initial control – 6 days
2016 - Follow up control be implemented – 5 days

**Recommended Control Methods:**
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 5 - Basal barking with herbicide
Control 7 – Mechanical removal
Management Area: Inland fringe
Area Size: 575630 Ha
Current 2013 Infestation Level: Low / Medium
Anticipated infestation level 2016: Low / Medium

Management Discussion:
The inland fringe management area represents a transition from the coastal areas with a higher representation of publicly managed lands with more abundant infestations of boxthorn to the more agriculturally managed inland areas with sparser infestations in isolated pockets of the landscape. Particular focus should be made to monitor for new or existing infestations throughout publicly managed lands and efforts to control them should be made on an annual opportunistic basis. The use of granular herbicides to provide flexibility in the timing of control would be most suited to these situations. Encouragement of adjoining private landholders to improve the amount of boxthorn control undertaken would complement the work previously completed.

Recommended Management Actions:
2013 – Monitoring of infestations – 0.5 days
2014 – Monitoring of infestations – 0.5 days
2015 – Monitoring of infestations – 0.5 days
2016 - Monitoring of infestations – 0.5 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 4 – Soil injection with residual herbicide
Control 5 - Basal barking with herbicide
Control 6 – Stem injection with herbicide
Control 7 – Mechanical removal
Management Area: Inland low density
Area Size: 910201 Ha
Current 2013 Infestation Level: Low
Anticipated infestation level 2016: Low

Management Discussion:
Similar to the Inland fringe management area, however likelihood of boxthorn infestation is low and the need for widespread active management is subsequently also low.
Particular focus should be made to monitor for new or existing infestations throughout publicly managed lands and efforts to control them should be made on an annual opportunistic basis. The use of granular herbicides to provide flexibility in the timing of control would be most suited to these situations.
Any plants found should be controlled and sites recorded for monitoring in future years.

Recommended Management Actions:
2013 – Monitoring of infestations – 0.5 days
2014 – Monitoring of infestations – 0.5 days
2015 – Monitoring of infestations – 0.5 days
2016 - Monitoring of infestations – 0.5 days

Recommended Control Methods:
Control 1 - Foliar application of herbicide
Control 2 - Cut and swab with herbicide
Control 3 - Application of granular residual herbicide
Control 4 – Soil injection with residual herbicide
Control 5 - Basal barking with herbicide
Control 6 – Stem injection with herbicide
Control 7 – Mechanical removal
References


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