CRIMSON BERRY (LEPTECOPHYLLA OXYCEDRUS) RECOVERY ACTION PLAN

Phillip Island NATURE PARKS

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penguins.org.au/conservation

Contents

1.0 Introduction

This Recovery Action Plan (RAP) focuses on the species *Leptecophylla oxycedrus* (Labill.) Jarman (hereafter referred to as Crimson berry). Until recently Crimson berry was classified as *Leptecophylla juniperina* subsp. *oxycedrus*, however following a study undertaken by S. J. Jarman and G. Kantvilas (2017), from the Tasmanian Herbarium, the subspecies *oxycedrus* has been re-instated to specific rank. Currently, Crimson berry is listed as vulnerable under the Department of Environment and Primary Industries (DEPI) advisory list of rare or threatened plants in Victoria (DEPI 2014).

This RAP was a recommendation of further action required from the 2019 Edition 1 Threatened Species Plan produced by Phillip Island Nature Parks (hereafter referred to as Nature Parks).

1.1 Description

Crimson berry is an Australian Heath (Ericaceae) with a densely branched shrub to 3(–5) m high habit; branchlets puberulent. Leaves spreading or reflexed, narrowly lanceolate, 6–16 mm long, 1–1.7 mm wide, mucronate, glabrous and glossy above, glaucous beneath, veins unbranched; margins slightly recurved, smooth to serrulate. Flowers unisexual, solitary or in short spikes, axillary and/or terminal; bracts and bracteoles ovate, collectively c. 8–12, obtuse; sepals ovate-elliptic, 1.8–3 mm long, obtuse; corolla white; tube cylindric-urceolate, 2.2–2.8 mm long in female flowers, 2.6–4.4 mm long in males, sparsely hairy about throat; lobes with acute recurved tips, 1–2 mm long; anthers usually partly exserted from corolla tube; ovary 5–6-locular, style c. 1–1.5 mm long. Fruit spherical, c. 8–9 mm diam., pale to deep pink. Flowers August – November (VicFlora 2020). The tube-like flowers of Crimson berry are most likely pollinated by honey eaters such as New Holland honeyeater (*Phylidonyris novaehollandiae*). These have been recorded near the Gull Rock lookout at Cape Woolamai (S. Woodend pers. comm.). Native bees have also been observed on the flowers at The Gap- YCW. The fruit, being 8-9 mm in diameter may be too large for the smaller honeyeaters to consume but the larger Red wattlebird (*Anthochaera carunculata*) and Little wattlebird (*Anthochaera chrysoptera*) along with other larger birds would be capable of eating them.

Figure 1: Leaves and fruit of Crimson berry (image: Jon Fallaw).

Figure 2: Leaves and flowers of Crimson berry (image: Susan Spicer).

1.2 Distribution

Crimson berry has its stronghold in Tasmania but is also found on numerous islands in Bass Strait and the southern coast of Victoria. Most Victorian populations are in the vicinity of Wilsons Promontory and Corner Inlet, with the populations on Philip Island (*Millowl*) at the north-westernmost limit for the species (Fig. 3). On Phillip Island, Sutter and Downe (2000) mapped Crimson berry in an Aeolian Sand Coastal Headland Scrub / Coastal Tussock mosaic, EVC161/163.

It has been recorded in other EVC's throughout Tasmania and Victoria such as EVC 53 Swamp Scrub at Foster Beach and EVC 5/161/72 Coastal Sand Heathland / Coastal Headland Scrub / Granitic Hills Woodland at Wilsons Promontory. Typically, Crimson berry occurs on granite cliffs. The population at The Gap - YCW uncharacteristically grows on basalt, however there is granite underlying the basalt nearby at Pyramid Rock. Other species present in this vegetation community include Coast tussock (*Poa poiformis*), White correa (*Correa alba*), Coast beard-heath (*Leucopogon parvifflorus*), Bidgee widgee (*Acaena novae-zelandiae*), Coast daisy-bush (*Olearia axillaris*), Coast everlasting (*Ozothamnus turbinatus*), Sea box (*Alyxia buxifolia*), Knobby club rush (*Ficinia nodosa*), Seaberry saltbush (*Rhagodia candolleana*), Coast banksia (*Banksia integrifolia*), Coast tea tree (*Leptospernum laevigatum*), Common boobialla (*Myoporum insulare*) and Cushion bush (*Leucophyta brownii*).

Figure 3: Distribution of Crimson berry. DELWP (2020) Victorian Biodiversity Atlas, accessed: 30/03/2020.

1.3 Phillip Island population information

Table 1: Population information for Crimson berry (source: Cropper, 2005; PINP monitoring)

Location	Latitude	Longitude	Size: plant numbers	Extent
Cape Woolamai #1	145.35756	-38.56516	21-40	3.4 hectares
Cape Woolamai #2	145.35760	-38.56471	2	0.297 hectares
Cape Woolamai #3	145.361961	-38.554864	5-9	0.2 hectares
The Gap- YCW	145.24500906	-38.50736808	33-44	3 hectares

1.3.1 Cape Woolamai

The first record of Crimson berry occurring on Phillip Island was from a sample in the Royal Botanical Gardens Victoria herbarium collected by Baron Von Mueller at Cape Woolamai in 1863. In 1941 Jim Willis, from the Royal Botanic Gardens Victoria herbarium, went in search of these plants and discovered two populations at Cape Woolamai. In an article he wrote for the Victorian Naturalist (vol 58, 1941) he refers to:

> 'A hazardous scramble down scree, among crags of loose and weathered granite, 300 feet above boiling surf at the cliff base, and then — I could hardly believe my eyes — in a declivity

just ahead, the vision of Crimson- berries as Mueller must have come upon them, all aglow with fruit: there were a dozen or more shrubs — gnarled, wind-flattened and hoary with age, yes, but alive and healthy! No young plants were observed, but so inaccessible are the old ones that they will probably endure for generations yet, safe from the depredations of man and beast. Further exploration was rewarded by the location of a smaller colony, comprising three or four large bushes about a mile east.'

In 2004 the Nature Parks employed Simon Cropper to survey the Crimson berry at Cape Woolamai as part of a broader survey of Rare or Threatened Plants of Phillip Island. He located the main population below the beacon (Cape Woolamai #1), however he was unable to locate the smaller population that Willis had referred to and made an assumption that a group of plants on the periphery of the main population may have been it. Therefore in the 2005 survey, this population is referred to as Cape Woolamai #2. A further survey by Susan Spicer in 2010 revealed that Willis's second population was further along the cliff towards the granite quarry (NE and not E of the main population as Willis had written) so this is now referred to as Cape Woolamai #3 (see Table 1).

It is interesting to note that in 1941 Willis did not see any young plants and those he saw were 'hoary with age'. In the present day there is still no recruitment occurring, so the plants surviving are at least 79 years old and possibly even older than 150 years from when Von Mueller first came across them. Von Mueller's visit to Cape Woolamai was prior to the grazing lease issued to John Cleeland in 1870. A requirement of the lessee was to 'develop' the land by clearing and burning (Oates and Frood 2010) and given that the present population is on the steep cliffs and inaccessible to stock, it is possible that the Crimson berry population was much larger prior to 1870.

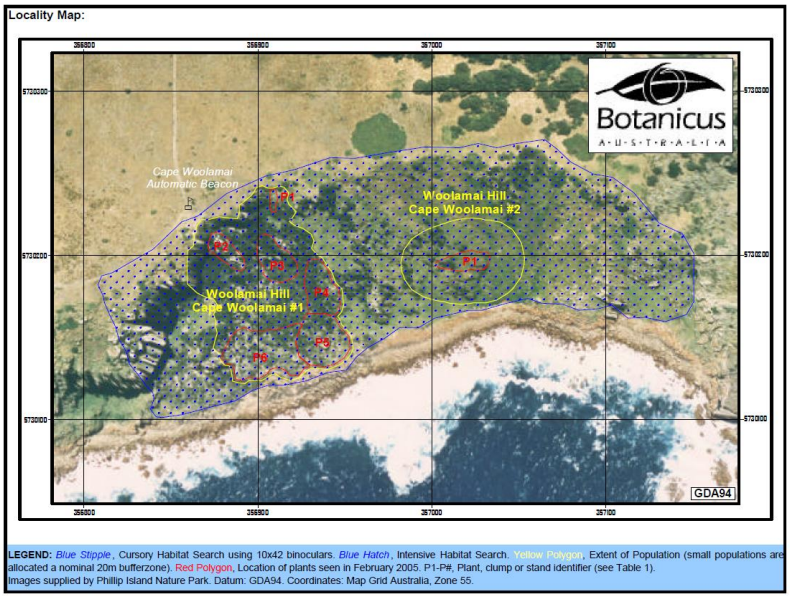

Figure 4: Cape Woolamai Crimson berry populations #1 & #2 mapped in 2004 (Cropper, 2005)

1.3.2 The Gap – YCW

The population at The Gap – YCW was first discovered in late 2003 when Phillip Island Landcare, in collaboration with the Nature Parks established a Gorse (*Ulex europaeus*) control program and included this location as a Gorse spider mite (*Tetranychus lintearius*) release site. The discovery of Crimson berry helped enforce the need by the Nature Parks for the Rare or Threatened Plants Survey that was subsequently undertaken by Simon Cropper in 2004 – 2005.

Unlike all other Crimson berry locations in Victoria, The Gap – YCW population is on a basalt substrate. Like at Cape Woolamai it is restricted to the cliff face, and above the cliff the land is cleared for grazing. Cropper recorded 24 Crimson berry plants in the population. Several more plants have been identified since 2004.

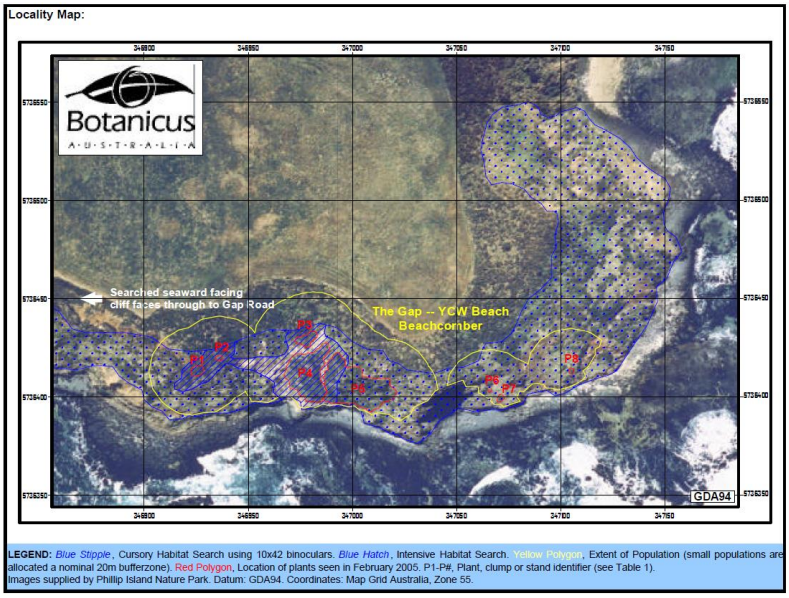

Figure 5: The Gap-YCW populations mapped in 2004 (Cropper, 2005).

2.0 Population Threats

2.1 Lack of recruitment

The lack of recruitment is the greatest threat to the Crimson berry on Phillip Island. All the plants observed at both Cape Woolamai and The Gap - YCW are very old and most likely remnant from pre-European settlement. There are several possibilities requiring further investigation as to why there is no recruitment:

- The Phillip Island populations are small and have been isolated for a long time to the extent of becoming inbred and infertile.
- There are no seed dispersal agents such as fruit eating birds to process the seed and aid germination. Pollination of the flowers is occurring and developing fruit however the berries are remaining on the plants for a long time.
- There is an insufficient area of suitable habitat to support the populations.

- The climate has become unsuitable for seed germination. The Phillip Island populations are at the extreme of the species distribution where the climate is warmer than all other populations.

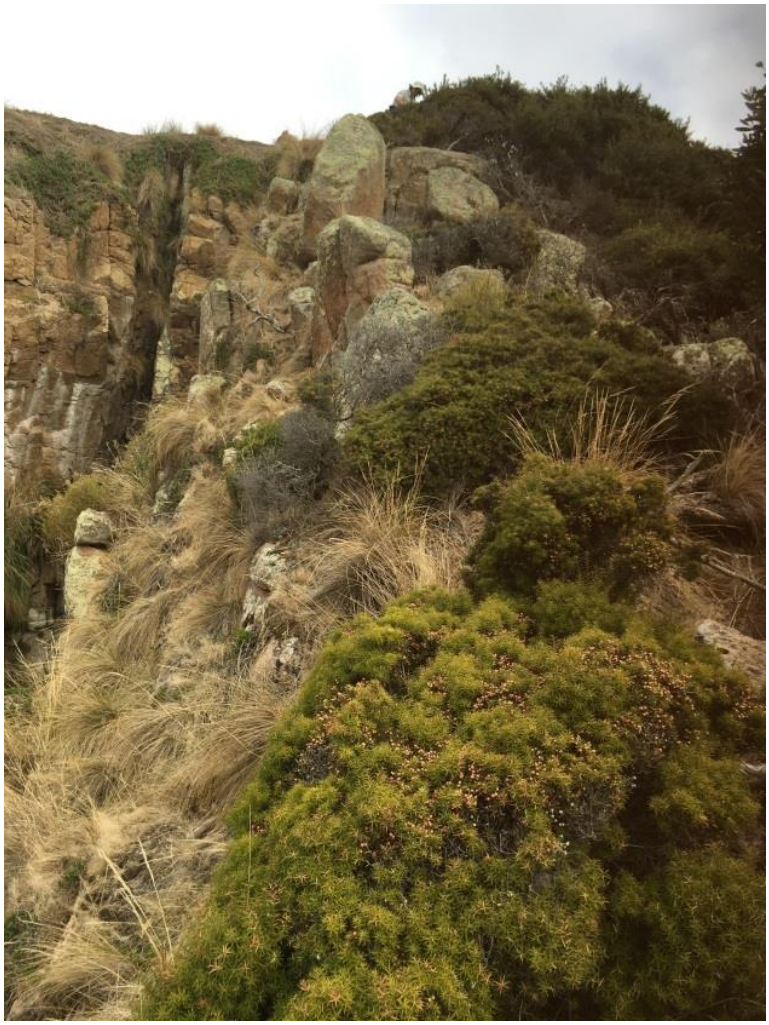

Figure 6: The berries on this Crimson berry plant are old and faded (image: Jon Fallaw).

2.2 Pest plant invasion

At Cape Woolamai the dominant pest plant of threat is African boxthorn (*Lycium ferocissimum*). Other pest plants present include Mirror bush (*Coprosma repens*) and Apple of sodom (*Solanum linnaeanum*).

Above the cliffs at Cape Woolamai the Short-tailed shearwater (*Ardenna tenuirostris*) habitat is highly degraded in parts with large infestations of Cape weed (*Arctotheca calendula*) and Prairie grass (*Bromus catharticus*).

Figure 7: Crimson berry growing alongside Gorse (image: Jon Fallaw).

2.3 Competition

Some of the Crimson berry plants in The Gap – YCW population are being impacted by indigenous climbing groundcovers such as Bower spinach (*Tetragonia implexicoma*), Small-leaved clematis (*Clematis microphylla*) and Sea-berry saltbush.

Figure 8: Bower spinach smothering Crimson berry (image:Susan Spicer

2.4 Erosion

The Gap - YCW population is particularly under threat of erosion with the majority of plants straddling a large gully. There is also potential for increased erosion due to changes in drainage because of weed control.

Figure 9: Severe erosion at The Gap – YCW (Image: Susan Spicer).

2.5 Browsing by herbivores

The population of Swamp wallabies (*Wallabia bicolor*) at both locations is high. Wallaby tracks criss-cross the cliffs and there appears to be heavy pruning of surrounding shrubs in the vicinities. Wildlife monitoring cameras have captured evidence of wallabies browsing on the plants at The Gap - YCW and there has also been evidence of bark stripping. Until its removal, the Gorse had been acting as a protective barrier from wallabies to abutting Crimson berry bushes, but removing the Gorse has created space that has proven to be good shelter for wallabies. It appears they are gnawing on the branches whilst sheltering beneath them. There is also evidence of rabbit activity at both Cape Woolamai and The Gap –YCW sites. If there is any natural recruitment occurring, rabbit browsing would likely prevent the plants from reaching maturity.

Figure 10: Swamp wallaby detected by a Reconyx motion sensor wildlife monitoring camera browsing on Crimson berry (image: Phillip Island Nature Parks).

2.6 Exposure and climate change

Some of the plants at The Gap - YCW show evidence of severe salt and wind pruning. Whilst this pruning is natural on coastal headlands, and it is this that gives them their dense, compact shape, there has been some severe foliage die off in recent years. It is occurring on the windward sides of the plants and in some cases up to 80% of the plant is affected. It is possible that there have been more severe wind events in recent times but it is also likely due to the lack of protection from surrounding vegetation as the Gorse has been reduced. Groundcovers such as Coast tussock grass have been regenerating and filling the gaps left by the Gorse, however they only grow up to 80 cm tall and there has been no recruitment of other coastal shrubs that may help to slow down the wind or create a wind barrier. The removal of the Gorse has affected the whole profile of the cliff so that the salt laden winds can penetrate further in and at greater speeds.

Figure 11: Wind and salt pruned Crimson berry at The Gap-YCW (image: Susan Spicer).

3.0 Existing Conservation Measures

The 2004 survey of Rare or Threatened Plants of Phillip Island by Simon Cropper formed the basis for current conservation measures. Cropper identified threats to the populations and listed suggested management activities. At Cape Woolamai he recommended weed control of African boxthorn, the installation of a drainage barrier to prevent weed infestations from the Short – tailed shearwater habitat above the cliffs and the establishment of a bird hide to monitor pollination and fruiting of Crimson berry. Of these recommendations, weed control of African boxthorn has been acted upon. For The Gap – YCW site, Cropper recommended weed control of Gorse and revegetation of the eroded gully with native grasses. Both recommendations were acted upon.

A brief plan of action was written in 2010. This incorporated recommendations from the Rare Plant Survey and primarily addressed the threats of weeds, erosion and lack of recruitment.

3.1 Lack of recruitment

Over the last 10 years there have been numerous attempts to propagate Crimson berry plants from cuttings and by seed under nursery conditions. Several methods have been tried such as fermentation, feeding the berries to captive birds and chickens and soaking in HCL acid prior to sowing the seed. There has been no success to date. Currently Nature Parks staff are trialling the fermentation method as recommended by the Conservation Volunteers Understorey Network Nursery (CVUNN 2020), soaking in vinegar, applying cold stratification and germinating in granitic gravel/sand collected from Cape Woolamai. Crimson berry seeds are known to have chemical inhibitors so it can take up to 3 years for the seeds to germinate (CVUNN 2020). Wildlife monitoring cameras have been deployed at The Gap –YCW to establish an understanding of how the flowers are being pollinated and whether any frugivorous bird species are visiting the plants assisting with seed dispersal.

3.2 Pest plant control

The removal of African boxthorn from the Nature Parks has been a major project during the last 20 years and at Cape Woolamai in particular since 2006. Great results were obtained by removal of the large bushes on the top of the Cape with a tractor mounted winch and tine grab in partnership with local contractor Ian McFee. Broad scale regrowth was then treated by contractor John Baulsch with herbicide using a skidsteer mounted 'Ecoblade' (Phillip Island Nature Parks Weed Management Strategy 2018-2023). Annual monitoring, cutting and painting with hand tools and herbicide has continued by Nature Park staff since, however the large African boxthorn bushes on the cliff face remain. Other species targeted at Cape Woolamai include Apple of Sodom, Kikuyu (*Pennisetum clandestinum*), Cape weed and Inkweed (*Phytolacca octandra*).

The Nature Parks have been controlling the large Gorse infestation around The Gap – YCW population since 2003, when in partnership with Landcare and the Gorse Taskforce a biological control method was trialled. The Gorse spider mite was released at this site (Phillip Island Nature Parks Weed Management Strategy 2018-2023) and although it had some impact in damaging foliage it did not kill whole plants, so in tackling such a huge infestation, spraying with a selective herbicide for woody weeds and cut and painting with herbicide were found to be the most effective methods. Contractors and Nature Park staff have been addressing this as an ongoing project as new plants are continually emerging. Pampas grass (*Cortaderia selloana*) along the cliff below the Phillip Island Racetrack has been sprayed with herbicide by Nature Park staff and contractors on several occasions

over the past 15 years, but as with the Gorse, safe access is an issue and the infestation is not currently in control.

3.3 Competition
Bower spinach, Small-leaf clematis and Seaberry saltbush are annually removed from easily accessible Crimson berry plants at The Gap – YCW.

3.4 Erosion
The seed of Coast tussock-grass was collected from The Gap – YCW in 2010 and 2015 and propagated to tubestock in the Nature Parks nursery. These were planted into the eroded gully in 2011 and 2015. There has been less than 50% survival, but those that have established are trapping the soil and slowing the erosion. With the removal of Gorse there has also been a substantial amount of natural recruitment of Coast tussock-grass on the slope above the eroded section helping to stabilise it.

3.5 Protection against herbivores
Evidence of damage to Crimson berry plants at The Gap – YCW from wallaby browsing led to the construction of a fenced coop around some of the plants in 2019.

Figure 12: Wallaby exclusion fence surrounding some of the Crimson berry plants at The Gap-YCW (image: Susan Spicer).

4.0 Recovery Objectives and Actions
The overall objective of recovery is to minimise the probability of extinction of Crimson berry on Phillip Island and to increase the probability of populations becoming self-sustaining in the long term.

This RAP guides recovery actions for Crimson berry and will be implemented and managed by the Phillip Island Nature Parks and community groups as appropriate. Technical, scientific, habitat management or education components of the RAP will be referred to specialist groups on research, in situ management, community education and cultivation as required. The RAP will run for a maximum of five years from the date of its adoption and will be reviewed and revised within five years of the date of its adoption. Within the duration of this RAP, the specific objectives for the recovery are to:

Table 2: Summary table of the recovery objectives, applicable actions and locations, and the indicators of success.

Objective **(Action)**	Description	Population Location	Indicators of Success
Objective 1 **(1)**	**Determine distribution, abundance and population structure**		
1.1	Undertake surveys to determine the area and extent of populations, the number, size and structure of populations and inference or estimation of population change	All Phillip Is locations	Sites mapped for population size, condition and habitat
1.2	Contribute to the Victorian Biodiversity Atlas by lodging records with VBA		Records lodged with VBA
Objective 2 **(1)**	**Determine habitat requirements**		
2.1	Survey known habitat and collect floristic and environmental information relevant to community ecology and condition	All Phillip Is locations	Species /habitat specific survey design prepared and implemented
Objective 3 **(1)**	**Ensure that all populations and their habitats are protected and managed appropriately**		
3.1	Ensure staff and contractors are aware of the locations of the populations and protect against off-target herbicide impacts, trampling or disturbance	All Phillip Is locations	Management activities have no negative impact on populations
Objective 4 **(1, 2, 3, 4, 5)**	**Manage threats to populations**		
4.1	**Investigate and address lack of recruitment**		
4.1.1	An examination of the seed viability by a specialist botanist undertaken (5.1)	All Phillip Is locations	Seed viability is determined
4.1.2	Expand and improve habitat with species enrichment planting of suitable frugivore attracting shrubs	Cape Woolamai #1,2,3	
4.1.3	Undertake population genetics analyses and phylogenetic analysis examining the genetic variations of the species (5.1)	All Vic or Aus locations	Genetic relationships are established
4.2	**Investigate and control threat from native herbivores and pest animals**		
4.2.1	Exclude herbivores from the population with fences	The Gap - YCW	Herbivores excluded from 80% of the population
4.2.2	Monitor for the impact of rabbits and include the locations in the Nature Parks rabbit control program if required	All Phillip Is locations	Impact of rabbits is determined
4.3	**Control threat from pest plants**		
4.3.1	Remove Gorse with herbicide by spraying & cut and painting, using rope access techniques where required	The Gap - YCW	Reduction of Gorse by 80%
4.3.2	Remove Pampas grass with herbicide by spraying & cut and painting, using rope access techniques where required	The Gap - YCW	Reduction of pampas grass south of Phillip Island Racetrack by 80%
4.3.3	Remove African boxthorn from cliffs by cut & painting with herbicide using rope access techniques	Cape Woolamai #1,2,3	Reduction of boxthorn by 50%

4.3.4	Monitor for new and emerging weeds	All Phillip Is locations	New weed threats are identified and addressed if they occur
4.4	**Control competition**		
4.4.1	Remove native climbing groundcovers from Crimson berry plants	The Gap - YCW	Reduction of native climbing groundcovers on Crimson berry plants by 80%
4.5	**Address threat from erosion**		
4.5.1	Erosion control planting with tussock groundcovers	The Gap - YCW, Cape Woolamai #3	At least 50% increase in native vegetation coverage in eroded areas
4.6	**Address threat of exposure and climate change**		
4.6.1	Species enrichment planting with shrubs	The Gap - YCW	Photographic evidence of reduced salt pruning
4.6.2	Construct wind breaks	The Gap - YCW	Photographic evidence of reduced salt pruning
Objective 5 **(1, 2, 6)**	**Identify key biological functions**		
5.1	Evaluate current reproductive status, longevity, fecundity (4.1.1) and recruitment levels		Reproductive ecology and regenerative potential quantified
5.2	Identify key stimuli for seed germination requirements		stimuli for recruitment identified
Objective 6 **(1, 2, 6)**	**Determine the growth rates and viability of populations**		
6.1	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data.	All Phillip Is locations	Techniques for monitoring developed and implemented.
Objective 7 **(1)**	**Establish a population in cultivation**		
7.1	Establish a seed bank	All Phillip Is locations, Wilson's Prom, Barb Martin Bushbank	seed in storage at Barb Martin Bushbank
7.2	Establish plants in cultivation to safeguard against destruction of wild populations, provide a research population and potentially for reintroductions	Barb Martin Bushbank	Development of effective propagation and cultivation techniques. At least 100 healthy, genetically diverse, mature plants in cultivation
Objective 8 **(1, 6)**	**Establish new wild populations**		
8.1	Select and evaluate potential reintroduction sites that are ecologically suitable	Cape Woolamai	Criteria for site suitability identified and 2 sites selected
8.2	Prepare introduction sites to achieve maximum survival of plants	Cape Woolamai	Selected sites prepared and potential threats addressed
8.3	Introduce plants from cultivation	Cape Woolamai	At least 50 cultivated plants introduced to each new site
8.4	Nurture and maintain protection of young plants to maturity	Cape Woolamai	at least 50% survival of plants after the first year
Objective 9 **(6)**	**Build community support for conservation**		

9.1	Raise awareness of rare plants within the community through the Nature Parks Threatened Species Communication Plan and Educational and Interpretaion programs		Increased community awareness and support of the species
9.2	Establish rare plants in the Barb Martin Bushbank botanical garden	Barb Martin Bushbank	Samples of cultivated plants established in the Bushbank garden

4.1 Recovery Actions

Table 3: Summary table of the recovery actions, a brief description and the applicable objectives to be achieved.

Recovery Action	Action Description	Recovery Objectives Achieved
1	Survey and monitor	1, 2, 3, 4, 5, 6, 7, 8
2	Investigate lack of recruitment and identify key biological functions	4, 5, 6
3	Manage threat from herbivores	4
4	Manage threat from pest plants	4
5	Species enrichment planting	4
6	Cultivation and translocation	5, 6, 8, 9

4.1.1 Survey and monitor

A detailed assessment of all Crimson berry populations should be undertaken. Given the cliff location and access difficulties, a preliminary survey using an UAV was carried out at Cape Woolamai population #1 and #2 in early 2019. This technique was found to be suitable for collecting photographic data of the populations. Because the flight paths can be programed and it is also repeatable, it will be useful for future monitoring and for the measurement of changes in the population and habitat with time.

A sample of the more easily accessible plants can be closely monitored with wildlife monitoring cameras to observe life history stages, pollination, predation, growth rates, rate of salt pruning and responses to recovery actions.

4.1.2 Investigate lack of recruitment and identify key biological functions

The fecundity of the Phillip Island Crimson berry populations and the viability of the seed need to be established. There is fruit developing but the seed needs examining to see if mature embryos are developing. It is possible that there is fertility depression occurring. An examination by a botanist is required.

The flowers of the Crimson berry are unisexual, that is there are male flowers and female flowers so an examination of the flowers is also required to determine the sexual ratios of the flowers within the plant populations and infer reproductive potential.

Population genetics analyses in conjunction with a phylogenetic analysis can provide us with an understanding of genetic variations within the species. This would be a potential Honours student project in conjunction with one of the Universities and Royal Botanic Gardens Victoria.

A population genetic analysis of each Phillip Island population may indicate the extent of sexual reproduction occurring within the population, whether there is any cross-fertilization between local populations or whether they are clonal populations.

A phylogenetic analysis can compare the Phillip Island populations to other Victorian and Tasmanian populations to determine the genetic relationships. This may indicate which populations we should endeavour to obtain genetic material for out-crossing in order to reinstate a genetically diverse population of Crimson berry on Phillip Island and potentially one that is most resilient to the threat of climate change.

4.1.3 Manage threat from herbivores

The impact Swamp wallabies are having on the Crimson berry plants in the gully at The Gap –YCW needs to be further addressed by expanding the fenced off area to encompass more plants. It is difficult terrain with some steep slopes, so more thought into fencing design, exact location and logistics of how to carry out the construction is required.

4.1.4 Manage threat from pest plants

4.1.4.1 Cape Woolamai

The preliminary UAV survey identified several large African boxthorn plants that need to be removed. Conservation Department staff members qualified in rope access techniques will be required to cut and paint those and any smaller plants that have not been detected in the photography. There is a very large population of African boxthorn along the stretch of cliff between population #2 and #3 that should also be removed. Care must be taken not to cause destabilisation of the cliffs. The boxthorn plants have also been providing habitat for small birds such as the New Holland Honeyeater and Grey fan tail (*Rhipidura albiscapa*), so adopting a gradual removal method over several years, followed by ongoing monitoring and removal of emergent plants is preferable. There are potentially other species of woody weeds such as Mirror bush that should be removed.

4.1.4.2 The Gap – YCW

While a great impact has been made on reducing the Gorse, there is still a very large seedbank and the infestation covers many hectares across the neighbouring farm property. New Gorse plants are continually emerging so continued control is required and the Gorse on the steeper sections of cliff have not previously been targeted. For treatment of Gorse plants within 2m of a Crimson berry bush and where there is a high risk of spray drift, cutting and painting with herbicide is the safest method.

Where spraying herbicide may be suitable, great care must be taken to monitor the weather conditions so as to avoid spray drift. The steep cliffs can also create swirling updrafts regardless of the prevailing wind direction so constant monitoring of conditions during application is required. Individual Crimson berry plants should be temporarily covered with a non-absorbent covering whilst spraying Gorse within 2-50m of them.

The Pampas grass infestation along the cliffs below the Phillip Island Racetrack needs to be sprayed or cut and painted with herbicide to prevent further spread towards the Crimson berry population.

4.1.5 Species enrichment planting: aid recruitment, reduce erosion, reduce exposure

4.1.5.1 Cape Woolamai

Species enrichment planting and linking the habitat to more wooded sections of Cape Woolamai should be undertaken to encourage frugivorous bird species and provide more habitat support for the Crimson berry populations. The Crimson berry habitat is a narrow strip of Coastal Headland Scrub separated from other shrub/woodland communities by a large area of groundcover communities: Sandhill Sedgeland/ Coastal Tussock Grassland/ Bird Colony Succulent Herbland. Much of this area however is degraded and in fact dominated by Cape Weed and exotic annual grasses such as Prairie grass and Cocksfoot (*Dactylis glomerata*).

In an 1842 survey by George Smythe, Survey of the Eastern Coast of Westernport, the centre of the Cape is denoted 'Open Forest' and 'Timbered with She-oak and Gum trees'. Oates and Frood (2010), considered that prior to European settlement in the mid 1800's 'Damp Sands Herb-rich Woodland would have extended from the central area of the Cape to the more sheltered areas immediately inland from the cliffs, especially in the lower-lying, more protected areas.'

It is assumed that the shearwater colony has expanded since prior to European settlement and the cessation of stock grazing. Consideration must be given not to compromise the shearwater habitat, however planting islands of EVC 3 Damp Sands Herb-rich Woodland species into the degraded areas will help link Crimson berry population #3 with the central woodland area.

Species considered suitable for revegetation for EVC3 are Drooping she-oak (Allocasuarina verticillata), Black wattle (*Acacia mearnsii*), Sweet bursaria (*Bursaria spinosa* subsp. *spinosa*), Coastal bearded heath and Currant wood (*Monotoca glauca*). Currant wood is also a rare plant with local populations in Oswin Roberts Reserve and Rhyll Wetland. It grows within the Crimson berry communities at Wilson's Promontory and the currant-like berries may help to attract more frugivores. A population of Current wood at Cape Woolamai will also reduce the risk of extinction for this species. Further planting of EVC 161 Coastal Headland Scrub species such as White correa and Coast everlasting along the track to the beacon would also help connect population #1 and #2 to the woodland.

There are four registered cultural heritage sites within several hundred metres of the Crimson berry populations so great care must be taken to avoid disturbing these sites and planting should be carried out beyond the 50m buffer zone. Cape Woolamai is under a culturally sensitive heritage overlay so gaining cultural heritage consent and working in association with the Bunurong Land Council is essential.

4.1.5.2 The Gap - YCW

The Gap – YCW area has been highly degraded due to the Gorse infestation. In recovery, Coastal tussock grass dominates to form EVC 163 Coastal Tussock Grassland however there are also elements of EVC 161 Coast Headland Scrub, EVC 162 Coastal Headland Scrub/ Coastal Tussock Grassland mosaic and EVC 53 Swamp Scrub. There is a remnant patch of Swamp Paperbark (*Melaleuca ericafolia*) at the top of the cliff and a few individuals in the gully, patches of Common boobialla on a lower saddle, a few remnant Sweet bursaria, Coast bearded heath and Sea box scattered about. It is likely that prior to agricultural clearing and the Gorse infestation, there would have been more of the Coast Headland Scrub and Swamp Scrub present. This would have provided more protection against the wind and salt spray, provided suitable habitat for nectar and fruit-eating birds and there would have been less erosion. Planting species from these EVC's will help to

restore the cliff profile, thus provide more protection against salt laden wind, provide more habitat for nectar and fruit eating birds and reduce erosion. Suitable species for planting include Sweet bursaria, Coast everlasting, White correa, Sea box, Coast bearded heath and Swamp paperbark.

Reinforcement planting of Coastal tussock grass in the eroded gully will help increase ground coverage and further reduce the effects of erosion.

4.1.6 Cultivation and translocation

Successfully propagating plant stock and establishing new wild populations at Cape Woolamai would help reduce the risk of extinction for the species on Phillip Island. Choice of location for new wild populations must consider ease of monitoring and management of the population along with suitable ecological characteristics. Given the varied EVC's that Crimson berry occurs elsewhere in Victoria, the choice of site will not be restricted to only the Aeolian Sand Coastal Headland Scrub / Coastal Tussock mosaic, EVC161/163 communities where they are currently found on Phillip Island. There are potential suitable locations all along the eastern side of Cape Woolamai and also Newhaven Swamp.

Although to date we have had no success in propagating new plants, the Friends of the Prom have had some success with striking cuttings in their volunteer-run nursery at Tidal River, Wilsons Promontory. The Barb Martin Bushbank should produce cuttings from Phillip Island plants but also seek to obtain cutting material from other populations. They should also continue with seed germination treatment trials using seed from Phillip Island and elsewhere. On a field trip to Foster Beach and Wilsons Promontory, evidence of recruitment of Crimson berry was observed (S. Spicer pers. obs. 2019) so obtaining seed from these locations for germination trials might provide more success.

If successful in cultivating plant stock, a small population retained at the Barb Martin Bushbank will safeguard against the loss of the wild populations and also provide material for further cultivation and future translocation. A sample plant should also be established in the Bushbank botanical garden for educational purpose and to raise community awareness of the species. Due to the Crimson berry's intolerance to root disturbance, translocation of whole mature plants would be deemed high risk and likely to fail. Though compact in size, the mature Crimson berry plants are very old and have well-established root systems. Their roots penetrate through cracks in the rocky substrate so it would be a very difficult operation to undertake successfully.

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