Weed Management Plan for The Nut State Reserve (2021-2026)





March 2020



Prepared for: Tasmania Parks & Wildlife Service

Prepared by: Matt Rose

Natural State PO Box 139, Ulverstone, TAS, 7315 www.naturalstate.com.au

Table of Contents

1. Introduction	2
2. Summary of weed management activities 2015-2020	3-9
2.1 Evaluation of progress	3
Figure 1 - Summary of Weed Management Activities 2015-2020	4
Figure 2 - Vegetation change in mature Gorse control areas 2015-2020	5
2.2 Before and after photos	6-9
2.3 Observations and lessons learned	10
3. The proposed strategy for the next 5 years	11-12
3.1 Follow up, follow up, follow up	11
3.2 Continue to improve the site aesthetics	12
3.3 Assisted natural regeneration	12
3.4 Opportunities, challenges and logistics	12
4. Recommended weed management areas	13-20
Figure 3 - Recommended Weed Management Areas 2021-2026	14
4.1 Management Area 1 – Chairlift, tracks, revegetation areas and straw daisy buffers	15
4.2 Management Area 2 - Lower slopes	16
4.3 Management Area 3 – Large Gorse patch	17
4.4 Management Area 4 – Hemlock in rookeries	18
4.5 Management Area 5 - Biological control area	19
4.6 Summary of estimated costs for weed management works 2021-2026	20
4.7 Budget explanation	20
5. Further recommendations	21-26
5.1 Poa seeding trials	21
5.2 Intervention to encourage endangered Straw Daisy recruitment	22
5.3 Shade and windbreak plantings around seating areas	23
5.4 Contractor record keeping and reporting standards	24
5.5 Monitoring requirements	25
Figure 4 - Summary of Revegetation & Proposed Poa Seeding / Windbreak Planting	26
6. References	27
Appendices	28-30
Appendix 1. Daily chemical record form example	28
Appendix 2. Monitoring form template	29-30

Cover photo: Chainsawing Gorse bushes near the zig-zag track. Facing north, M.Rose, 28/01/16.

To the extent permitted by law, Natural State excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using information or material (in part or in whole) contained in this plan.

1 NATURAL STATE - PO Box 139, Ulverstone TAS 7315. Mobile: 0437 971 144 www.naturalstate.com.au

1. Introduction

Natural State was engaged by Tasmania Parks and Wildlife Service (PWS) to prepare an updated 5 year weed management plan for The Nut State Reserve; located in Stanley, Tasmania.

This plan builds on the previous Weed Management Plan for The Nut State Reserve (Natural State, 2015). A more detailed assessment of the natural values onsite and a description of previous weed management works are included in the 2015 plan.

This plan documents the following information:

- An evaluation of the progress achieved during the previous plan period 2015-2020.
- Lessons learnt over the past 5 years.
- Recommendations and mapping of weed management areas for 2021-2026.
- An estimation of the resources (labour and money) required to achieve realistic outcomes over a 5 year period.

It is hoped that this plan will assist the Parks and Wildlife Service to gain further external funding to protect and restore the natural values whilst also enhancing the onsite experience for visitors and tourists, and to encourage support for the project within the local community.

The works recommended in this plan largely prioritise follow up weed management work to consolidate on previous hard work & investments.

Due to the degraded nature of the site, a long term commitment of resources will be required for conservation and land management works on The Nut.

The Nut State Reserve Management Plan (2003) states:

"The Nut State Reserve will be managed to protect and restore its natural and cultural values, and to provide for a range of tourism and recreational opportunities, including scenic viewing, walking, picnicking and nature study".



Photo 1: Clearing the dense Gorse along the zig-zag track. Facing NE, M.Rose, 23/05/15.

2. Summary of weed management activities 2015-2020

2.1 Evaluation of progress

A total budget of \$163,755 was allocated over 5 years to implement the 2015 plan.

During this time the management area priorities were changed slightly based on a greater appreciation of the actual extent and resilience of the weed infestation onsite, while trying to get the best possible outcome with the available budget.

The approach has focussed primarily on managing the weeds around the main entry points to the site and improving the site aesthetics and visual impact for visitors. The management areas have targeted around the PWS depot, car park, chairlift stations, tracks, lookouts, seating areas, native shrubland & sedgeland vegetation communities on the cliff edge, and buffering the endangered Straw Daisy populations.

The 2015 plan sought to treat a total area of 25.5 hectares for the estimated budget. The actual area treated for this period was 31.6 hectares. An additional area of 6.1 hectares was covered with the project budget.

New primary treatment areas have not commenced until the density of weed infestations on previously treated areas is significantly reduced through ongoing annual follow up work. This did slow progress initially but was necessary to ensure successful results within all treatment areas. The labour required for follow up work has decreased year on year.

A Green Army team was based in Stanley back in 2016-2017. Their main outputs on The Nut for this period were track maintenance and revegetation. Approximately 1.8 hectares was revegetated with local tree & shrub species through tubestock planting. The current survival rate is approximately 90%.

The weed management areas were prioritised as follows:

- 1. **Chairlift, tracks, lookouts**, revegetation areas & native vegetation on the summit. This work has been achieved by 2 people using 15L knapsacks, chainsaws, brushcutters and occasionally a 50L spray tank with a 20m hose attached to the power carrier. This area incorporates Management Areas 1,2,3,4,5,7 & part of 8.
- 2. **The lower slope** between the Stanley wharf and the penguin viewing area has been managed annually using a vehicle mounted spray unit. This area incorporates Management Area 6: approximately 5.6 hectares.
- 3. The large patch of Gorse in the middle of the summit had some mulching conducted initially during 2015-2016 by PWS staff with the regrowth sprayed by a contractor using an ATV with spray unit. Unfortunately since the ATV ban on Crown land a larger capacity spray unit has not been used on the summit. Most of this area and a few sections of the rookeries were aerial sprayed by helicopter in October 2019. This area incorporates Management Area 8: approximately 7 hectares.

The only Management Area from the 2015 plan that was not treated was Management Area 9 -Three Cornered Garlic. This work may be incorporated into the future management areas.

There has been a significant reduction in Gorse surrounding the tourism infrastructure onsite between 2015-2020.

The Nut State Reserve - Summary of Weed Management Activities 2015-2020



Figure 1: Summary of Weed Management Activities 2015-2020.

25/02/2020

4 NATURAL STATE – PO Box 139, Ulverstone TAS 7315. Mobile: 0437 971 144 www.naturalstate.com.au

www.naturalstate.com.au

On parts of the summit, within a year of primary control of large Gorse bushes, a mass germination of Gorse and Thistle seed occured, colonising the bare ground. Ongoing follow up control is vitally important and required until an adequate cover of *Poa* spp. - Tussock Grass can establish to provide competition.

In combination with annual follow up control, the Poa labillardieri – Common Tussock Grass & Poa poiformis – Coastal Tussock Grass, will naturally regenerate from seed and colonise the bare ground in treatment areas, with adequate ground cover density achieved after 4 years.

The *Poa* spp. competition does not eliminate the risk of re-colonisation of Gorse, Thistle & Hemlock, but the weed density is significantly reduced, which results in reduced follow up control labour, herbicide & cost.



Vegetation change at the monitoring sites is displayed below.

Figure 2: Observed vegetation cover assessed at the time of annual treatment in Spring.

We have recorded the efficiency and productivity gains within the area marked in yellow on the previous map, to quantify the benefits of using this assisted natural regeneration technique.

- During the 2018/19 financial year (Year 4) approximately 19 hectares was treated over 23 days by 2 people using 15L knapsacks applying a total of 4,000L of chemical mix at a total cost of \$23,000.
- During the 2019/20 financial year (Year 5) the same area was treated over 11 days by the same 2 people using 15L knapsacks applying 2,400L of chemical mix at a total cost of \$13,000.

2.2 Before and after photos



 Photos 2-4: Before Gorse control June 2014 on the left and the current state as of February 2020 on the right.
 6

 NATURAL STATE – PO Box 139, Ulverstone TAS 7315. Mobile: 0437 971 144 www.naturalstate.com.au



Photos 5-8: Before Gorse control June 2014 on the left and the current state as of February 2020 on the right.



Photos 9-12: Before Gorse control June 2014 on the left and the current state as of February 2020 on the right.



Photos 13-16: Before Gorse control June 2014 on the left and the current state as of February 2020 on the right.

2.3 Observations and lessons learnt 2015-2020

- The Straw Daisy populations are rapidly declining. Only one population of <50 plants has persisted over the past 5 years, restricted to the inaccessible cliff edge near the Stanley wharf lookout.
- Hemlock is spreading further from the established Shearwater / Muttonbird rookeries encroaching areas of the walking track. The rookeries may actually be spreading too.
- To keep the tracks and public access areas tidy the Thistles and Hemlock require control between October December before the peak tourism season.
- Cape Ivy is slowly spreading further up the slope near the chairlift station and around the car park.
- The treated Gorse bushes often reshoot, either at the base, along the branch, or both after 12 months and require follow up control.
- It can take 3-4 years for treated Gorse bushes to rot down to ground level.
- Gorse is very fast growing on The Nut and can grow between 0.5-1m within 12 months.
- Treating the dense Gorse regrowth in the Green Army revegetation areas was very time consuming over the first two years after planting. The seedlings were planted in patches of very high density Gorse with no site preparation, apart from mulching the mature Gorse bushes. The success of these revegetation sites is a result of the summer watering over the first few years and the follow up Gorse control.
- Regular community consultation is very important to inform the local community of the project objectives, site challenges, and to familiarise them with the progress achieved to date e.g. Stanley Chamber of Commerce, local politicians and external funders.
- When working onsite, visitors often provide positive comments regarding the land management work undertaken on the summit. This was not the case in 2015 where visitors would vocalise their unhappiness with the prevalence & state of the weeds.
- The weed management work on The Nut is physically & mentally demanding and requires 2 people to work together to adhere to workplace safety requirements and for ongoing moral support. Engaging contractors with strong mental discipline is essential.
- A combination of broadleaf selective spraying, mulching, chainsawing, natural regeneration, and possibly burning, are part of the recommended future management regime.
- There are opportunities to standardise the record keeping and reporting requirements for all contractors to assist with data collection and long term monitoring.
- Although some monitoring has been conducted on the summit (mapping, photopoints, observational data and assessment), there are opportunities to further develop and improve the current monitoring program to cover all management areas. Simple monitoring methodology should be followed for the next 5 years.

3. The proposed strategy for the next 5 years

3.1 Follow up, follow up, follow up!!!

It takes ongoing follow up control to adequately manage large areas of high density mature Gorse. A mature Gorse infestation can produce up to 6 million seeds per hectare per year (PIRSA, 2010). Gorse seed can remain viable in the soil for 75 years.

The before and after photos (pp.6-9) provide some insight into how bad the infestation really was, and show the great results achieved so far.

The major concern moving forward, is that great results have been achieved several times throughout the past 20 years, and then, for whatever reason ongoing funding for the vital follow up maintenance work has ceased. Given the favourable site conditions for many invasive weeds it would only take 5 years for the site to return to a very degraded weed infested state, wasting all the energy and previous investments. Not to mention the goodwill of contractors and the perception amongst the local community. If this was to occur again the local community would be pretty disappointed, which may lead to distrust and a reluctance to collaborate with PWS in future.

Ongoing funding for follow up control is crucially required to improve the site condition further, to capitalise on the hard work and determination of everyone involved to date, to adhere to statutory obligations regarding threatened species and declared weeds, and to help the site reach its full potential for eco-tourism in the Circular Head community and North West region.



Photo 17: A revegetation fail, highlighting the impact of inadequate follow up Gorse control. The tree guard is smothered by approximately 5 years of regrowth since the initial planting. The seedling did not survive. M.Rose, 20/01/16.

3.2 Continue to improve the site aesthetics

The infrastructure at The Nut State Reserve has received significant upgrades in recent years with a new toilet block, major track work on the summit, new penguin viewing area, and the PWS depot improvements. The Nut is one of the most important tourism assets in the North West region providing significant benefit to the Circular Head economy.

The weed management strategy implemented between 2015-2020, and proposed for the next 5 years, compliments these infrastructure upgrades by reducing the significant weed burden immediately surrounding the public access areas, adding value to the tourism experience for visitors, whilst encouraging project support within the local community.

The woody weeds growing along the lower slopes are highly visible from the entrance to Stanley and also from within the township. This area will be given a higher priority for control over the next 5 years, potentially improving the scenic beauty of the town.

3.3 Assisted natural regeneration

One of the longer term conservation objectives for The Nut is to encourage natural regeneration where possible. We can actually use the natural ecological processes to our advantage to assist with our weed management goals as well.

For example, on the summit we are encouraging the *Poa labillardieri* grassland ecological community to provide a dense groundcover on bare ground, to compete with and prevent further weed incursions, reducing the density of the existing weeds. See Figure 4, p.26.

Other examples are around the cliff edges where the remnant native shrublands and sedgelands still persist. By providing a weed buffer in and around these natural areas, the vegetation communities have the ability to slowly expand over time.

This reduces the follow up control labour which in turn reduces the overall cost of the project. This is a cost effective method for ongoing weed management which will continue to be utilised.

3.4 Opportunities, challenges and logistics

Some of the day-to-day logistical challenges are outlined in the 2015 plan. Below are some additional issues which warrant further consideration for the next period 2021-2026.

- Contractors and PWS staff will need to be able to utilise a motorised spray unit up on the summit to enable greater productivity. The PWS tractor mounted spray unit will be essential for future weed management on the summit of The Nut. Workload flexibility will be required to be able to set aside time when the weather is suitable to undertake this work during a busy season. The weed management work alone on The Nut could easily equate to 1FTE for a PWS staff member.
- Engaging a contractor with a UTV mounted spray unit would be a good backup plan. The legal requirements to enable contractors & PWS staff to use a UTV mounted spray unit onsite should be investigated further.
- Opportunities to involve the Tasmanian Aboriginal community in land management and cultural activities through the PWS Working on Country Program should be explored. External funding could be sourced for these activities e.g. rookery management.
- Perhaps the PWS Working on Country Program Coordinator could investigate the logistics and planning required to use controlled burning to manage the large Gorse patch and the rookeries in future. This land management technique could provide valuable experience for Indigenous Rangers and reduce the ongoing budget considerably compared to outsourcing contractor labour for mulching and helicopter or spray unit spraying.

4. Recommended weed management areas 2021-2026

The following recommendations are for weed control works within the newly defined management areas. The recommended approach is to manage the weed infestations using a combination of chemical, mechanical & biological control, integrated with natural regeneration techniques. Figure 3, p.14, highlights the proposed management areas for the 2021-26 period.

Annual costs associated with the works have been estimated for each management area over a 5 year period. The actual budgets required will depend on the density of weed regrowth and seasonal conditions which vary from year to year.

The contractor labour and herbicide costs are estimated at the current market rates as of February 2020. Contractor rates have been calculated at:

- \$90 per hour x 1 person for an 8 hour day using a spray unit.*
- \$70 per hour x 1 person for an 8 hour day using a chainsaw / knapsack.*
- \$3,500 per hour for helicopter aerial spraying
- \$150 per hour for mulching with a Positrack.*

* These rates do not factor in contractor travel or living away from home expenses.

Costs shown exclude Goods and Services Tax (GST). The costs in this plan provide a guide only to assist with allocating budgets for engaging contractor labour, or for the herbicide expenses required. Quotes for works should be sought by several service providers before confirming annual works budgets.

For comparison, in the case where a PWS budget is not available, the PWS staff time required to do the same activity has also been estimated in consultation with local PWS staff.

Please note: The registered herbicides available to control specific weeds in Tasmania is referenced from the Department of Primary Industries, Parks, Water and Environment (DPIPWE), Invasive Species, Weeds website. The mention of a specific product brand name is not, and should not be construed as an endorsement of that particular product, rather as an example for product names with specific active ingredients. Generic herbicide brands are now much cheaper.



Photo 18: Controlled Gorse around the Pinmatik / Rocky Cape lookout. Facing north, M.Rose, 17/02/20.

The Nut State Reserve - Recommended Weed Management Areas 2021-2026



Figure 3: Recommended weed management areas 2021-2026.

4.1 Management Area 1 – Chairlift, tracks, lookouts, revegetation areas and straw daisy buffers

Total area : Approximately 20 hectares. <u>Weed density / cover:</u> Sparse 6-25% cover. Individual plants are well separated. Other plant species dominate and typically occur between the target species. Small clumps may occur.

Objective : Follow up control to manage ongoing weed regrowth and improve the aesthetics for visitors to the Nut, improve the native vegetation condition, and create a weed buffer zone around each of the endangered Straw Daisy populations.

Method: Spot spraying with knapsacks & chainsawing. Timing: The best results have been achieved when actively growing between Spring-Autumn.

<u>Herbicides</u>: Broadleaf selective for woody weeds (Grazon Extra) active ingredient *Triclopyr* and *Picloram*, or (Garlon) active ingredient *Triclopyr* or (Brushoff) active ingredient *Metsulfuron methyl*, with a surfactant and marker dye. For Thistes and Hemlock (MCPA 500) active ingredient *MCPA*, or (Lontrel Advance) active ingredient *Clopyralid*, with a surfactant and marker dye.

Table 1: Recommendations for Management Area 1 over the next 5 years:

		Contrac	tor costs	PWS staff labour required	
Year	Description of activities	Knapsack / chainsaw	Herbicide		
1	<u>Target Species</u> : African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Horehound, Gorse, Three Cornered Garlic, and Thistles.	180 Hrs. x \$70/hr. = \$12,600	\$600	23 days x 1 person	
2	<u>Target Species</u> : African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Horehound, Gorse, Three Cornered Garlic, and Thistles.	180 Hrs. x \$70/hr. = \$12,600	\$600	23 days x 1 person	
3	Target Species: African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Horehound, Gorse, Three Cornered Garlic, and Thistles.	180 Hrs. x \$70/hr. = \$12,600	\$600	23 days x 1 person	
4	Target Species: African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Horehound, Gorse, Three Cornered Garlic, and Thistles.	128 Hrs. x \$70/hr. = \$8,960	\$400	16 days x 1 person	
5	Target Species: African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Horehound, Gorse, Three Cornered Garlic, and Thistles.	128 Hrs. x \$70/hr. = \$8,960	\$400	16 days x 1 person	
	TOTAL	\$55,720	\$2,600	115 days	

4.2 Management Area 2 – Lower slopes

Total area : Approximately 10 hectares. <u>Weed density / cover:</u> Sparse 26-50% cover. Individual plants are clearly separated or rarely touching. Individuals may be moderately clumped. Other plants present or bare ground.

Objective : Follow up control to manage ongoing weed regrowth and improve the aesthetics for visitors to the Nut and the adjoining properties, improve the native vegetation condition, gradually working further up the slope.

Method : Broadacre spraying with a spray unit & where necessary chainsawing & knapsack spot spraying. Timing : Spring-Autumn.

<u>Herbicides</u>: Broadleaf selective for woody weeds (Grazon Extra) active ingredient *Triclopyr* and *Picloram*, or (Garlon) active ingredient *Triclopyr* or (Brushoff) active ingredient *Metsulfuron methyl*, with a surfactant and marker dye. For Thistes and Hemlock (MCPA 500) active ingredient *MCPA*, or (Lontrel Advance) active ingredient *Clopyralid*, with a surfactant and marker dye.

Table 2: Recommendations for Management Area 2 over the next 5 years:

		Contractor costs			PWS staff labour	
Year	Description of activities	Spray unit	Knapack / chainsaw	Herbicide	required	
1	Target Species: African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Holly, Horehound, Gorse, Periwinkle and Thistles	80 Hrs. x \$90/hr. = \$7,200	40 Hrs. x \$70/hr. = \$2,800	\$1,000	15 days x 1 person	
2	Target Species: African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Holly, Horehound, Gorse, Periwinkle and Thistles	80 Hrs. x \$90/hr. = \$7,200	40 Hrs. x \$70/hr. = \$2,800	\$1,000	15 days x 1 person	
3	Target Species: African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Holly, Horehound, Gorse, Periwinkle and Thistles	80 Hrs. x \$90/hr. = \$7,200	40 Hrs. x \$70/hr. = \$2,800	\$1,000	15 days x 1 person	
4	Target Species: African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Holly, Horehound, Gorse, Periwinkle and Thistles	40 Hrs. x \$90/hr. = \$3,600		\$500	8 days x 1 person	
5	Target Species: African Boxthorn, Broom, Cape Ivy, Elderberry, Hemlock, Holly, Horehound, Gorse, Periwinkle and Thistles	40 Hrs. x \$90/hr. = \$3,600		\$500	8 days x 1 person	
	TOTAL	\$28,800	\$8,400	\$4,000	61 days	

4.3 Management Area 3 – Large Gorse patch

Total area : Approximately 10 hectares. Weed density / cover: Very dense >75% cover. Individual plants are touching or overlapping – forming a monoculture with few other species present. Individuals may be very densely clumped.

Objective : follow up control to manage the largest area of mature Gorse on the summit. Reduce the cover & density of this patch and encourage the Common Tussock Grass - Poa labillardieri & Coastal Tussock Grass - Poa poiformis to colonise the disturbed ground.

Method: Broadacre spraying using a combination of aerial spraying with helicopter & spray unit + mulching. Timing for control: All year round.

Herbicides : Broadleaf selective for woody weeds (Grazon Extra) active ingredient Triclopyr and Picloram, or (Garlon) active ingredient Triclopyr or (Brushoff) active ingredient Metsulfuron methyl, with a surfactant and marker dye. For Thistes and Hemlock (MCPA 500) active ingredient MCPA, or (Lontrel Advance) active ingredient Clopyralid, with a surfactant and marker dye.

Table 3: Recommendations for Management Area 3 over the next 5 years:

			C	Contractor costs	;		PWS staff
Year	Description of activities	Mulching	Helicopter	Helicopter Herbicide	Spray unit	Spray unit Herbicide	labour required
1	<u>Target species :</u> Gorse Hemlock & Thistles. Utilise the PWS tractor mulcher & spray unit. Outsource contractor assistance for mulching where required.	\$6,000					20 days x 1 person
2	<u>Target species :</u> Gorse Hemlock & Thistles. Utilise the PWS tractor mulcher & spray unit. Outsource contractor assistance for aerial spraying.		\$7,000	\$2,000			40 days x 1 person
3	Target species : Gorse Hemlock & Thistles. Utilise the PWS tractor mulcher & spray unit. Outsource contractor assistance for spraying outlier Gorse areas.				80 Hrs. x \$90/hr. = \$7,200	\$2,000	40 days x 1 person
4	<u>Target species :</u> Gorse Hemlock & Thistles. Utilise the PWS tractor mulcher & spray unit. Outsource contractor assistance for aerial spraying.	\$6,000					30 days x 1 person
5	<u>Target species :</u> Gorse Hemlock & Thistles. Utilise the PWS tractor mulcher & spray unit. Outsource contractor assistance for spraying outlier Gorse areas.		\$7,000	\$2,000			30 days x 1 person
TOTAL		\$12,000	\$14,000	\$4,000	\$7,200	\$2,000	200 days

Please note: This area was aerial sprayed during October 2019 by a helicopter using a Controlled Droplet Applicator. Mulching will be required during Spring 2020 with ongoing follow up spraying scheduled to prevent the Gorse from re-establishing. It will be critical to ensure this area is managed throughout this period with mulching and spraying.

4.4 Management Area 4 – Hemlock in rookeries

Total area: Approximately 5 hectares. Weed density / cover: Very dense >75% cover. Individual plants are touching or overlapping – forming a monoculture with few other species present. Individuals may be very densely clumped.

Objective : To prevent further Hemlock spread on The Nut summit, improve the integrity of nearby native vegetation. Encourage the Common Tussock Grass - Poa labillardieri & Coastal Tussock Grass - Poa poiformis to colonise the disturbed ground in rookeries.

<u>Method</u>: Broadacre spraying using a combination of aerial spraying with helicopter, drone & spray unit. <u>Timing for control</u>: May – October, when Shearwater's are absent. When handline spraying it will be necessary to use wooden boards placed out as 'stepping stones' for operator safety and to prevent damage to burrows.

Herbicides : (MCPA 500) active ingredient MCPA, or (Lontrel Advance) active ingredient Clopyralid, with a surfactant and marker dye.

Table 4: Recommendations for Management Area 4 over the next 5 years:

Year Description of activities		Contractor costs					PWS staff
		Helicopter	Helicopter Herbicide	Spray unit	Spray unit Herbicide	Revegetation	labour required
1	Target species : Hemlock & Thistles. Outsource contractor handline spraying to prepare for Poa seeding trials.			24 Hrs. x \$90/hr. = \$2,160	\$600	8 Hrs. x \$65/hr. = \$520	6 days x 1 person
2	<u>Target species</u> : Hemlock & Thistles. Outsource contractor assistance for aerial spraying.	\$3,500	\$800				5 days x 1 person
3	Target species : Hemlock & Thistles. Outsource contractor handline spraying to prepare for Poa seeding trials.			24 Hrs. x \$90/hr. = \$2,160	\$600	16 Hrs. x \$65/hr. = \$1,040	7 days x 1 person
4	Target species : Hemlock & Thistles. Outsource contractor handline spraying to prepare for Poa seeding trials.			24 Hrs. x \$90/hr. = \$2,160	\$600	16 Hrs. x \$65/hr. = \$1,040	7 days x 1 person
5	Target species : Hemlock & Thistles. Outsource contractor assistance for aerial spraying.	\$3,500	\$800				5 days x 1 person
	TOTAL	\$7,000	\$1,600	\$6,480	\$1,800	\$2,600	30 days

<u>Please note</u>: Part of the rookeries were aerial sprayed during October 2019 by a helicopter using a Controlled Droplet Applicator. The Hemlock will germinate again in the bare ground until adequate competition can be established over time.

4.5 Management Area 5 – Biological control area, upper slopes

Total area: Approximately 2.5 hectares. **Weed density / cover:** Very dense >75% cover. Individual plants are touching or overlapping – forming a monoculture with few other species present. Individuals may be very densely clumped.

Objective : To build up a local source population of Gorse biological control agents. With further intervention it is hoped that this biological control agent breeding area will expand and reduce the Gorse biomass on the upper slopes of The Nut.

<u>Method</u>: Source and release more infected Gorse material with Gorse Spider Mite – Tetranychus lintearius. Research options to source and release samples of Gorse Seed Weevil – Exapion ulicis, Gorse Soft-shoot Moth - Agonopterix umbellana and Cape Broom Psyllid - Artinnis hakani also.

Timing for release : Spring and Summer.

Year	Description of activities	PWS staff labour required
1	Target species : Gorse. Release biological control agent infected material amongst the Gorse on the upper slopes annually.	1 day x 1 person
2	Target species : Gorse. Release biological control agent infected material amongst the Gorse on the upper slopes annually.	0.5 day x 1 person
3	Target species : Gorse. Release biological control agent infected material amongst the Gorse on the upper slopes annually.	0.5 day x 1 person
4	Target species : Gorse. Release biological control agent infected material amongst the Gorse on the upper slopes annually.	0.5 day x 1 person
5	Target species : Gorse. Release biological control agent infected material amongst the Gorse on the upper slopes annually.	0.5 day x 1 person
	TOTAL	3 days

Table 5: Recommendations for Management Area 5 over the next 5 years:

<u>Please note</u>: No herbicides are to be used in this area. There are small isolated patches of Gorse Spider Mite infected Gorse bushes already located in this area. Realistically it is unlikely that this area will be able to be treated over the next 5 years using chemical or mechanical means.

4.6 Summary of estimated costs for weed management works 2021-2026

Description	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Management Area 1	\$13,200	\$13,200	\$13,200	\$9,360	\$9,360	\$58,320
Management Area 2	\$11,000	\$11,000	\$11,000	\$4,100	\$4,100	\$41,200
Management Area 3	\$6,000	\$9,000	\$9,200	\$6,000	\$9,000	\$39,200
Management Area 4	\$3,280	\$4,300	\$3,780	\$3,780	\$4,300	\$19,440
Management Area 5	\$0	\$0	\$0	\$0	\$0	\$ 0
Updated 5 Year Weed Management Plan	\$0	\$0	\$0	\$0	\$5,000	\$5,000
TOTAL	\$33,480	\$37,500	\$37,180	\$23,240	\$31,760	\$163,160

Table 6: Summary of estimated costs for weed management works 2021-2026

4.7 Budget explanation

Obviously the more that the PWS staff can implement during the 2021-2026 period, the lower the required budget for engaging contractor labour. The estimated costs assume that no PWS labour will be available for weed control. Contractor labour will be required to reach the best possible outcome over the next 5 years.

Some of the contractor labour requires specialised machinery, such as the Positrak with mulcher attachment, and the Helicopter with controlled droplet applicator. This equipment adds substantial value to the project through efficiency and productivity gains which can not be matched with the existing PWS equipment. The bush regeneration work on the summit is also a specialised field of ecological restoration with limited practitioners available in NW Tasmania.

This project utilises experienced and skilled contractors in their chosen professional disciplines who have, over previous years, given discounted rates to assist PWS to achieve successful results. This commitment and added value, although difficult to quantify, should not be underestimated.



Photo 19: Hectares of treated Gorse sprayed with a helicopter in October 2019. M.Rose, 17/02/20.

5. Further recommendations

An updated weed management plan should be developed during 2026. The costs associated with preparing an updated weed management plan have been factored into the final year of this 5 year period, please refer to Table 6, p20.

5.1 Poa seeding trials

The future management of the dense Hemlock cover in the Shearwater rookeries needs an integrated pest management approach. Broadleaf selective spraying alone will not exhaust the weed seed bank which has accumulated for many years now. Obviously the spraying will need to occur when the Shearwaters are absent.

It is worth trying to establish a groundcover of *Poa labillardieri* - Common Tussock Grass & *Poa poiformis* - Coastal Tussock Grass in the bare ground after spraying the Hemlock, based on the success of this technique elsewhere on the summit. Over time if the smaller trial areas are proven to be successful, then further *Poa* seeding can be scaled up throughout the rookeries. The process, observations and lessons learnt should be documented.

The most cost effective method of *Poa* grassland establishment in this context is through direct seeding. It is highly probable that we can speed up the *Poa* grassland natural regeneration process through collecting *Poa* seed in January and February, and then hand seeding or broadcasting seed into the barer ground throughout May – July. The risk of wind erosion will also need to be considered.

Opportunistic seed collection could be incorporated into the weed monitoring activities during Summer. Several other indigenous tree and shrub species also set seed at this time of year and could easily be collected as well.



Photo 20: Poa labillardieri - Common Tussock Grass seed covering the bare ground. M.Rose, 09/02/18.

5.2 Intervention to encourage endangered Straw Daisy recruitment

Over the past 5 years whilst implementing the weed management work, we have monitored the condition of the Straw Daisy populations. We have observed a significant decline in seedling numbers. Extra care has been taken to avoid any impacts to this species whilst managing the nearby weeds. The most likely current threats to the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) listed endangered species are dryer seasons and browsing pressure (Collier, 2016) possibly from wallabies & rabbits.

Some practical solutions to test the browsing pressure theory would be to provide protection from browsing through brush matting, or constructing basic wire netting cages near known populations during winter before the growing season. Rabbit baiting may also be required.

Photopoint monitoring locations should be established in specific areas to monitor the recovery response.



Photo 21: Hand pulled Gorse seedlings surrounding a single Straw Daisy plant. M.Rose, 10/12/16.



 Photo 22: Flowering Straw Daisies on the cliff edge overlooking the wharf. M.Rose, 25/11/17.

 22
 NATURAL STATE – PO Box 139, Ulverstone TAS 7315. Mobile: 0437 971 144 www.naturalstate.com.au

5.3 Shade and windbreak plantings around seating areas

The summit of The Nut is generally a very windy site. Four of the seats on the summit are very exposed and provide very little or no protection from the wind or sun. It would be quite easy to plant a small number of seedlings behind the seats, taking account of the appropriate aspect and avoiding the loss of coastal views. The wind will prevent the seedlings from growing too tall.

Some potential species could include:

- Acacia melanoxylon Banksia marginata Eucalyptus nitida Eucalyptus obliqua Eucalyptus viminalis Melaleuca ericifolia Myoporum insulare Pomaderris apetala Rhagodia candolleana
- Blackwood
- Silver Banksia
- Smithton Peppermint Gum
- Messmate Stringybark
- White Gum
- Swamp Paperbark
- Coastal Boobialla
- Common Dogwood
- Sea-berry Saltbush



Photo 23: An example of the seats which are quite exposed to the elements. M.Rose, 17/02/20.

5.4 Contractor reporting standards

In previous years there have been gaps in the information gathered and reported back from some weed control contractors. A consistent reporting framework for all contractors engaged in weed management activities should be established from now on.

The reporting standards aim to improve the quality of data collected including:

- Target species
- Herbicides used, mix rate and total volume / treatment area
- Area (ha) treated / day
- Cost per treatment area over time

Standardised weed control data collected by all of the contractors can be incorporated into the monitoring program and used to evaluate the contractor performance and success of treatments.

Several procedural changes are suggested below:

1. <u>All contractors should be required to fill in a daily chemical record form</u>. This is a Workplace Health & Safety (WHS) requirement.

A simplified chemical record form template has been developed, tailored to this program (Appendix 1). If required, the form can be further refined by PWS staff before the 2021 control season commences.

2. <u>All contractors should be required to wear a GPS unit for each day of work, to track the area</u> <u>covered</u>.

Before starting the GPS units need to be set to use the map datum, either GDA94 or WGS84, and the position format UTM UPS.

The GPS tracklog data is required to show the boundary of treatment areas.

Tracklog data (and waypoints if required) should be saved in either of the following formats:

- .kml file format. Keyhole Markup Language used to display in Google Earth.
- .gpx file format. GPS Exchange Format commonly used in Garmin GPS units.
- .shp file format. Shapefile Format used in geographic information system software.

If required, all waypoint coordinates should be recorded with Eastings and Northings, As an example, the middle of The Nut summit is recorded as: E356818 N5486094.

If the contractor has the capabilities to collate, analyse and present the data using GIS mapping, maps should be produced using the GDA 1994 MGA Zone 55 projection.

3. <u>All contractors should be required to submit daily chemical record forms and GPS data with</u> invoices.

Invoices processed when reporting requirements are met.

Extra time for PWS staff will need to be allocated to coordinate the reporting requirements and collate contractor data each year.

Contractors who have not provided this information previously should be contacted prior to the treatment season and informed of the new expectations for reporting.

5.5 Monitoring

A standard monitoring program should be developed to sample specific sites within all of the recommended management areas. The objective of the monitoring is to evaluate the success of weed control works, and to assess changes in vegetation composition within treatment areas over time.

The four components of the standard monitoring technique include:

- Mapping
- Photopoints
- Observational data
- Assessment of control and monitoring activities

This approach will capture qualitative data and general trends over time which should be sufficient to achieve the program objectives above. The monitoring frequency will be determined by the PWS staff.

Specific monitoring sites will need to be established within each of the 5 proposed management areas. Star pickets could be used for camera posts, and sighter posts, if used.

The proposed *Poa* seeding trial and the Straw Daisy intervention will need to be monitored using a similar format also.

A simplified draft monitoring template form has been developed, tailored to this program (Appendix 2). The form can be further refined by PWS staff before the 2021 control season commences. Further guidance can be referenced (pp.1-73) in the 'Monitoring manual for bitou bush control and native plant recovery' (Hughes et al., 2009).

Annual aerial drone photography would assist the monitoring program by allowing finer scale map production, compared to the limitations with the current aerial imagery of the site (Google Earth, Bing Maps, LISTmap; State Aerial Photo & ESRI Imagery) which is between 5-10 years old. High resolution aerial imagery would be beneficial to this program as it will allow further analysis of the weed management and natural vegetation / regeneration boundaries, and it will help determine the extent of the area to be replicated over time.

Extra time for PWS staff will need to be allocated to coordinate the monitoring program each year. If PWS staff time can not be allocated when required this may need to be outsourced. Once established the time burden should not be significant. If required, some monitoring could be conducted by contractors whilst treating the weeds, with the cost absorbed from the contractor labour estimated in the budget provided.

The Nut State Reserve - Summary of Revegetation Activities + Proposed Poa Seeding / Windbreak Planting



Figure 4: Summary of Revegetation Activities & Proposed Poa Seeding / Windbreak Planting map.

26 NATURAL STATE - PO Box 139, Ulverstone TAS 7315. Mobile: 0437 971 144 www.naturalstate.com.au

6. References

Clarke, I. Stokes, Z. and Wallace, R., (2010). *Habitat Restoration Planning Guide for Natural Resource Managers*, Government of South Australia, Department of Environment and Natural Resources, Adelaide.

Collier, P. (2016). *Leucochrysum albicans* at The Nut State Reserve: Status update February 2016. Threatened Plants Tasmania.

Department of Primary Industries, Parks, Water and Environment website. Conservation, Threatened Species List - Vascular Plants H-L, *Leucochrysum albicans var. tricolor* Notesheet <u>http://dpipwe.tas.gov.au/Documents/Leucochrysum-albicans-var-tricolor.pdf</u>

Department of Primary Industries, Parks, Water and Environment website. Invasive Species, Weeds (2014) <u>http://dpipwe.tas.gov.au/invasive-species/weeds</u>

DPIPWE (2014). AGVET Chemicals - Code of Practice for Spraying in Public Places.

DPIPWE (2014). AGVET Chemicals - Code of Practice for Ground Spraying.

DPIPWE (2016). AGVET Chemicals - Code of Practice for the Supply and Use of Veterinary Chemical Products.

Gouldthorpe, J. (2006). Gorse National Best Practice Manual: Managing gorse (Ulex europaeus L.) in Australia. Department of Primary Industries and Water.

Hughes, NK., Burley, AL., King, SA., and Downey, PO (2009) Monitoring manual for bitou bush control and native plant recovery, Department of Environment, Climate Change and Water, Sydney. <u>https://www.environment.nsw.gov.au/-/media/OEH/Corporate-</u> <u>Site/Documents/Animals-and-plants/Pests-and-weeds/monitoring-manual-for-bitou-bushcontrol-native-plant-recovery-090352.pdf</u>

Keenleyside, K.A., N. Dudley, S. Cairns, C.M. Hall, and S. Stolton (2012). Ecological Restoration for Protected Areas: Principles, Guidelines and Best Practices. Gland, Switzerland: IUCN.

McNaught, I., Thackway, R., Brown, L. and Parsons, M. (2008). A field manual surveying and mapping nationally significant weeds. 2nd Edition. Bureau of Rural Sciences, Canberra.

Parks and Wildlife Service (2009). Guiding Document for the Management of Weeds in the Nut State Reserve. Parks and Wildlife Service, Department of Environment, Parks, Heritage and the Arts, Ulverstone.

Parks and Wildlife Service (2003). The Nut State Reserve Management Plan 2003. Parks and Wildlife Service, Department of Tourism, Parks, Heritage and the Arts, Hobart.

PIRSA (2010). Biocontrol factsheet July 2010. Biological control of Gorse.

Schahinger, R. (2009). Leucochrysum albicans in The Nut State Reserve: Status and management recommendations. A report to the Tasmanian Parks and Wildlife Service. Threatened Species Section, Department of Primary Industries and Water, Hobart.

Sinclair, SJ. (2011) National Recovery Plan for the Hoary Sunray Leucochrysum albicans var. tricolor. Victorian Government Department of Sustainability and Environment (DSE) Melbourne http://www.environment.gov.au/system/files/resources/9d3c877f-78e6-4ca0-906b-6567e205251e/files/leucochrysum-albicans.pdf

Threatened Species Section (2014). Leucochrysum albicans var. tricolor (grassland paperdaisy): Species Management Profile for Tasmania's Threatened Species Link. http://www.threatenedspecieslink.tas.gov.au/leucochrysum-albicans-var-tricolor

7. Appendices

APPENDIX 1. Daily chemical record form example

Contractor name:		
Date:	Operator names:	
Client:	Location:	
Temperature:	Weather Conditions: \Box	Overcast 🗆 Sunny 🗆 Wet 🗆 Dry
Wind Direction:	Wind Speed in Km: \Box (0-10 □ 10-20 □ >20
Weed cover: □ < 25 % □ 25-50 %	5 □ > 50 %	
Target Weed Species:		
PPE Gear: Elbow length glove:	s 🗆 Safety glasses 🗆 Enclos	sed footwear 🗆 Respirator
\Box Long sleeve shirt	□ Long pants □ Overc	alls 🛛 Wide brimmed hat
Chemicals used:	Mix rate:	Quantity used:
Total volume applied in Litres:	Area tree	ated (ha):
Equipment used: □ 1 - 2L bottles	🗆 Knapsack 🗆 Spray unit 🗆	Boom 🗆 Chainsaw 🗆 Brushcutter
Control method: Foliar spray] Cut & paint 🗆 Hand pull 🗆	Fire 🗆 Mulching
Description of works: Knockdo	wn / site preparation 🗆 Prim	nary control 🗆 Follow-up control
Commonles		

APPENDIX 2.	Monitoring template form		
Date:	Observer name: _		
Management o	area:	Time:	
Photopoint loco	ation coordinates: E	N	
	INSERT PHOTOPOINT	DATUM IMAGE HERE	

Photopoint #	Photo direction	Photo description e.g. image no. & grid reference		

Vegetation composition: e.g. dominant species, species mix, TASVEG community_____

Weed species present: _____

Weed density, % cover:□ Absent 0%□ Isolated plants 1-5%□ Very sparse 6-25%□ Sparse 26-50%□ Dense 51-75%□ Very dense <75%.</td>

Treatment notes:				
Observation notes:				