



# Annual Report

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## Five Rivers Reserve 2017-18



[www.tasland.org.au](http://www.tasland.org.au)

## INTRODUCTION

The Tasmanian Land Conservancy (TLC) protects important natural areas as permanent reserves and aims to demonstrate excellence in reserve management for biodiversity conservation. The TLC has adopted an adaptive management framework – the Open Standards for the Practice of Conservation which comprises 5 key steps – planning, implementing, monitoring, reporting, review/adaptation and communication.

Five Rivers Reserve was acquired by the TLC in 2010 and protects over 11,113 ha of highland forests and marshlands on Tasmania's Central Plateau. The management of the Reserve is guided by the Five Rivers Reserve Management Plan, implemented by TLC staff through an annual Reserve Work Plan and Monitoring Plan. Details of ecological monitoring methods can be found in TLC's Ecological Monitoring Procedures Manual on [www.tasland.org.au](http://www.tasland.org.au).

This report describes progress made towards delivery of the management plan in 2017-18, and is divided into three sections:

1. Reserve Scorecard – a table summarising the results of management effectiveness and ecological monitoring to date;
2. Ecological Monitoring Summary – providing details of the status of conservation targets and trends of key ecological indicators;
3. Management Effectiveness Summary – providing details of the implementation of key management strategies and making recommendations for plan improvement.

The recommendations made in this report are used to adapt and improve management of the Reserve, update the management plan, and revise work and monitoring plans for the coming year. Key findings of this report are communicated to TLC Board, supporters and other stakeholders.

## KEY ACHIEVEMENTS 2017-18

- Repeat monitoring completed for vegetation, terrestrial mammals for 5<sup>th</sup> consecutive year and acoustic monitoring for the first time.
- Mammal data featured in the highly successful TMAG's Remarkable Devil Exhibition;
- Discovery Weekend in February 2018 hugely successful with over 100 supporters attending;
- Construction, installation and on-site launch of 'Loo with a View';
- Fallow deer reduced by 12 animals through recreational shooting and partnership formed with UTAS on an ARC Linkage grant investigating deer in the WHA;
- Eighth consecutive year of Central Highlands Weed control completed with decreasing quantity of priority weeds - ragwort, mignonette and mullein

Cover image: 2018 TLCs Loo at Skullbone Plains: Image Matt Newton

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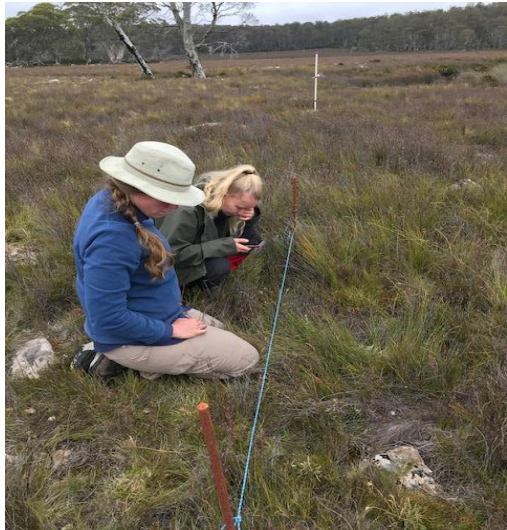
ECOLOGICAL MONITORING							
<i>Target</i>	<i>Indicator</i>	<i>Status 2013-2014</i>	<i>Status 2014-2015</i>	<i>Status 2015-2016</i>	<i>Status 2016-17</i>	<i>Status 2017-2018</i>	<i>Trend</i>
<b>Highland Marshes</b>	Floristic diversity	12.7 species/site	Not monitored	10.1 species/site	Not monitored	12.7 species/site	Decrease 2016 (drought), recovered 2018
	Structural complexity	5.2 lifeforms/site	Not monitored	5.3 lifeforms/site	Not monitored	5.3 lifeforms/site	Stable
	Miena cider gum recruitment	Stands mapped	Not monitored	Not monitored	Not monitored	Not monitored	Unknown
	Sphagnum peatland extent	Unknown	Unknown	100.8 hectares	Unknown	+0.5 ha restoration	Unknown
<b>Streams and Wetlands</b>	Macroinvertebrate diversity (Simpsons Index)	Not measured	Not measured	Not measured	0.68	Not measured	Unknown
	Floristic diversity	11.6 species/site	Not monitored	9.6 species/site	Not monitored	11.5 species/site	Decrease 2016 (drought), increasing since
	Structural complexity	5.6 lifeforms/site	Not monitored	5.6 lifeforms/site	Not monitored	5.6 lifeforms/site	Stable
	Droping pine pop'n size	Riparian stands identified	Not monitored	Not monitored	Not monitored	Not monitored	Unknown
<b>Highland Forest and Woodland</b>	Floristic diversity	12.3 species/site	Not monitored	10.6 species/site	Not monitored	12.6 species/site	Decrease 2016 (drought), recovered 2018
	Structural complexity	7.5 lifeforms/site	Not monitored	7.6 lifeforms/site	Not monitored	7.6 lifeforms/site	No change
	Canopy recruitment	2.3 cohorts/site	Not monitored	2.3 cohorts/site	Not monitored	2.3 cohorts/site	No change
	Eagle nest productivity	3 of 5 nests active	4 of 5 nests active	1 nest active	2 of 5 nests active	Not checked	Stable
	Forest cover change in reserve	Not monitored	Not monitored	Not monitored	9463	Not monitored	No change 2000 - 2010
	Forest cover change - 20km	Not monitored	Not monitored	Not monitored	1721 ha (2011-2015)	Not monitored	Sign decline 2000 - 2010
<b>Terrestrial mammals</b>	Species richness	10 native species 5 introduced species	12 native species 4 introduced species	12 native species 3 introduced species	11 native species 4 introduced species	12 native species 3 introduced species	Stable – natural fluctuation
	Proportion native species	0.67	0.75	0.80	0.73	0.80	
	Native species diversity indices	Simpson 0.75 Shannon-Wiener 1.59	Simpson 0.77 Shannon-Wiener 1.64	Simpson 0.78 Shannon-Wiener 1.70	Simpson 0.76 Shannon-Wiener 1.63	Simpson 0.75 Shannon-Wiener 1.57	
<b>Strategy</b>	<b>Indicator</b>	<b>Status 2013-2014</b>	<b>Status 2014-2015</b>	<b>Status 2015-2016</b>	<b>Status 2016-17</b>	<b>Status 2017-2018</b>	<b>Trend</b>
<b>Access Management</b>	Reportings / evidence of illegal entry	Declining	Low level	Low level	Low level	Low level	Illegal access continuing at low level
<b>Fire Management</b>	Number of unplanned fires	1 – Jan 2014	0 unplanned fire	0 unplanned fire	0 unplanned fire	1 fire - Nov 2017	Stable
<b>Threatened Species Protection</b>	Number of projects	1 - climate change monitoring	2 – Bushblitz, spagnum fire age	2 – PAPL and TAFE course	2 - jewel beetle, ptunnara	3 - UTAS carnivores, jewel beetle, peat core	Stable and steady
<b>Clarence Galaxias Protection</b>	Presence of Clarence galaxias	Present at 4 sites	Not monitored	Not monitored	Present at 4 sites	Not monitored	Unknown
<b>Carnivorous Marsupial Conservation</b>	Spotted-tailed quoll occupancy	0.02 (detected at 1 of 42 sites)	0.13 (detected at 4 of 32 sites)	0.11 (detected at 4 of 37 sites)	0.09 (detected at 3 of 34 sites)	0.13 (detected at 5 of 39 sites)	Increasing/ stable – natural fluctuation
	activity	0.001 (1 detection, 1202 trap nights)	0.006 (7 detections, 1120 trap nights)	0.004 (5 detections, 1217 trap nights)	0.003 (3 detections, 1175 trap nights)	0.008 (9 detections, 1143 trap nights)	
	Eastern quoll occupancy	0.29 (detected at 12 of 42 sites)	0.47 (detected at 15 of 32 sites)	0.41 (detected at 15 of 37 sites)	0.38 (detected at 13 of 34 sites)	0.15 (detected at 6 of 39 sites)	Generally stable – natural fluctuation. Decline in 2018





	activity	0.03 (32 detections, 1202 trap nights)	0.06 (66 detections, 1120 trap nights)	0.03 (37 detections, 1217 trap nights)	0.07 (81 detections, 1143 trap nights)	0.015 (17 detections, 1143 trap nights)	
	Tasmanian devil occupancy	0.67 (detected at 28 of 42 sites)	0.97 (detected at 31 of 32 sites)	0.78 (detected at 29 of 37 sites)	0.76 (detected at 26 of 34 sites)	0.92 (detected at 36 of 39 sites)	Increasing/ stable – natural fluctuation
	activity	0.11 (128 detections, 1202 trap nights)	0.21 (234 detections, 1120 trap nights)	0.14 (173 detections, 1217 trap nights)	0.16 (193 detections, 1143 trap nights)	0.32 (360 detections, 1143 trap nights)	
	DFTD status	Unknown	Disease detected 13% of sites	Disease detected 3% of sites	Disease detected 19% of sites	Disease detected 10% of sites	Disease persisting on Reserve
<b>Pest Animal Management</b>	Feral cat occupancy	0.33 (detected at 14 of 42 sites)	0.50 (detected at 16 of 32 sites)	0.32 (detected at 12 of 37 sites)	0.38 (detected at 13 of 34 sites)	0.51 (detected at 20 of 39 sites)	Stable
	activity	0.02 (30 detections, 1202 trap nights)	0.03 (29 detections, 1120 trap nights)	0.02 (27 detections, 1217 trap nights)	0.02 (23 detections, 1175 trap nights)	0.04 (47 detections, 1143 trap nights)	
	Rabbit	0.33 (detected at 14 of 42 sites) 0.001 (1 detections, 1202 trap nights)	0.50 (detected at 16 of 32 sites) 0.007 (8 detections, 1120 trap nights)	0.32 (detected at 12 of 37 sites) 0.002 (2 detections, 1217 trap nights)	0.38 (detected at 13 of 34 sites) 0.009 (11 detections, 1175 trap nights)	0.13 (detected at 5 of 39 sites) 0.005 (6 detections, 1143 trap nights)	Increasing/ stable
	Fallow deer occupancy	0.07 (detected at 3 of 42 sites)	0.28 (detected at 9 of 32 sites)	0.14 (detected at 5 of 37 sites)	0.21 (detected at 7 of 34 sites)	0.31 (detected at 12 of 39 sites)	Steady activity and detection
	activity	0.01 (11 detections, 1202 trap nights)	0.02 (22 detections, 1120 trap nights)	0.02 (27 detections, 1217 trap nights)	0.01 (15 detections, 1175 trap nights)	0.02 (21 detections, 1143 trap nights)	
	Deer shot	Unknown	9 deer shot	9 deer shot	16 deer shot	12 deer shot	
	Stock access	Some stock incursions	Some stock incursions	Some stock incursions	Some stock incursions	No incursions detected	Stable
<b>Weed Management</b>	Weed extent	Weeds on roads and disturbed areas	Weeds on roads and disturbed areas	Weeds on roads and disturbed areas	Weeds some roads and disturbed areas	Weeds some roads and disturbed areas	Improving
	Weed density	Very low	Very low	Very low	Very low	Very low	Improving
	Treatment extent	100% of weeds (other than thistles)	100% of weeds (other than thistles)	100% of weeds (other than thistles)	100% of weeds (some thistles)	100% of weeds (some thistles)	Stable
<b>Protecting Cultural Heritage</b>	Cultural heritage sites are documented and mapped	Not commenced	Not commenced	Not commenced	European heritage sites are being documented.	European heritage sites being documented.	European improving
	Understanding and interpretation of indigenous knowledge	Not documented	Not documented	Not documented	Not documented	Not documented	Unknown
<b>Enhance Ecosystem Services</b>	Income generated from Reserve	Unknown	Unknown	Unknown	\$80,870	\$81,000 (>10%)	Stable
	TLC expenditure in local community	Unknown	Unknown	Unknown	No data collected	Data not assessed	Unknown

Note The Strategy 'Community connection to landscape' has been removed and is now reported across all TLC reserves annually

## ECOLOGICAL MONITORING SUMMARY


<b>Highland Marshes</b>					<b>Status: Very Good</b>
<b>Key Objectives</b> <ul style="list-style-type: none"> <li>• Maintain or improve the floristic diversity of Highland Marshes</li> <li>• Maintain or improve the structural complexity of Highland Marshes</li> <li>• Maintain recruitment of Miena cider gum</li> <li>• Maintain the extent of Sphagnum Peatland</li> <li>• Maintain or improve the vertebrate fauna diversity</li> </ul>					<b>Outcome: On Track</b>
<b>Description</b> Highland marshes typically occur in valleys where impeded drainage and severe frosts restrict the growth of most tree species. Highland marshes include all forms of poorly drained vegetation communities, including peatland, heathland, <i>Eucalyptus rodwayi</i> and <i>E. gunnii</i> woodland, and <i>Poa</i> grassland. Highland marshes are floristically diverse, and perform important ecological functions, including filtering water runoff, and reducing erosion from, and the severity of, flooding events. The diverse shrubs flower for an extended period over summer and provide an important food resource for native insectivorous bird species in particular.			2018 Vegetation monitoring. Photo: TLC 		
<b>Indicator</b>	<b>2013-2014</b>	<b>2014-2015</b>	<b>2015-2016</b>	<b>2016-17</b>	<b>2017-2018</b>
Floristic diversity	12.7 species/site	Not monitored	10.1 species/site	Not monitored	12.7 species/site
Structural complexity	5.2 lifeforms/site	Not monitored	5.3 lifeforms/site	Not monitored	5.3 lifeforms/site
Miena cider gum recruitment	Stands mapped	Not monitored	Not monitored	Not monitored	Not monitored
Sphagnum peatland extent	Unknown	Unknown	100.8 hectares	Unknown	+0.5 ha restoration
<b>Key Findings 2017-18</b> <ul style="list-style-type: none"> <li>• Vegetation monitored this season</li> <li>• No major impacts reported or detected on site this season.</li> <li>• Sphagnum restoration program of 0.5ha is near finalisation and monitoring installed.</li> <li>• Data shows the condition of vegetation remains very good and unchanged.</li> <li>• Dieback of mature cider gums (<i>E. gunnii</i> subsp. <i>gunnii</i>) was not assessed.</li> <li>• No changes detected in terrestrial mammals through monitoring.</li> <li>• Acoustic monitoring was installed this year</li> </ul>					
<b>Recommendations</b> <ul style="list-style-type: none"> <li>• Continue to implement Fire Management Strategy, including the development of an operational fire management plan for the Reserve that identifies sensitive vegetation.</li> <li>• Complete rehabilitation of Roscarborough Sphagnum bog and undertake monitoring.</li> <li>• Make assessment of Miena Cider Gums a priority.</li> <li>• Continue extension surveys for ptunarra brown butterfly in <i>Poa</i> grasslands.</li> <li>• Analyse 2017-18 wombat images for potential prevalence of mange.</li> <li>• Repeat long-term ecological monitoring in 2020.</li> </ul>					

<b>Streams and Wetlands</b>		<b>Status: Moderate</b>			
<b>Key Objectives</b> <ul style="list-style-type: none"> <li>• Maintain the diversity of aquatic biota</li> <li>• Maintain or improve floristic diversity of streams and wetlands</li> <li>• Maintain or improve structural complexity of streams and wetlands</li> <li>• Maintain or improve vertebrate diversity in streams and wetlands</li> <li>• Maintain populations of drooping pine <i>Pherosphaera hookeriana</i></li> </ul>		<b>Outcome: Data required</b>			
<b>Description</b> The Five Rivers Reserve is nestled between the Nive, Serpentine, Pine, Little and Little Pine Rivers and surrounded by Lake Ina, Clarence Lagoon, Kenneth Lagoon and Pine Tier Lagoon and their associated tributaries and creek systems. These water systems are invaluable ecosystems and corridors for a range of aquatic dependent and associated plants and animal species. The riparian vegetation is intact and is dominated by diverse native vegetation with no or few weeds occurring in this area.		 <p>2018 Photographers on the edge of Kenneth Lagoon. Photo: Chris Crerar</p>			
<b>Indicator</b>	<b>2013-2014</b>	<b>2014-2015</b>	<b>2015-2016</b>	<b>2016-2017</b>	<b>2017-2018</b>
Aquatic macro-invertebrate diversity (Simsons Index)	Not measured	Not measured	Not measured	0.68	Not measured
Floristic diversity (species/site)	11.6 species/site	Not monitored	9.6 species/site	Not monitored	11.5 species/site
Structural complexity (strata/site)	5.6 lifeforms/site	Not monitored	5.6 lifeforms/site	Not monitored	5.6 lifeforms/site
Drooping pine population size	Riparian stands identified	Not monitored	Not monitored	Not monitored	Not monitored
<b>Key Findings 2017-18</b> <ul style="list-style-type: none"> <li>• The condition of riparian vegetation is excellent</li> <li>• Clarence galaxias targets are discussed separately</li> <li>• Aquatic biota was assessed for the first time in 2016-17 and needs regular survey</li> </ul>					
<b>Recommendations</b> <ul style="list-style-type: none"> <li>• Undertaking extension surveys for drooping pine along the Nive River is a priority.</li> <li>• Repeat long-term ecological monitoring in 2020.</li> <li>• Improving knowledge on aquatic biota diversity is a priority</li> </ul>					

<b>Highland Forest and Woodland</b>		<b>Status: Good</b>			
<b>Key Objectives</b> <ul style="list-style-type: none"> <li>• Maintain or improve overall floristic diversity and structural complexity, and recruitment of canopy species</li> <li>• Maintain Highland Forests and Woodlands forest cover within 2% of 2010 baseline</li> <li>• Maintain or improve breeding success of the wedge-tailed eagle</li> </ul>		<b>Outcome: Review data in 2018-19</b>			
<b>Description</b> The highland forests and woodlands of the Five Rivers Reserve are a significant conservation feature of the landscape. Diverse eucalypt species occur as a mosaic, where dominance is determined by minor changes in topography, aspect, drainage and geology. The forests are floristically diverse and are structurally complex despite decades of forestry activities.		 <p style="text-align: center;">Sensitive forest and woodland. Photo: Chris Crerar</p>			
<b>Indicator</b>	<b>2013-2014</b>	<b>2014-2015</b>	<b>2015-2016</b>	<b>2016-2017</b>	<b>2017-2018</b>
Floristic diversity	12.3 species/site	Not monitored	10.6 species/site	Not monitored	12.6 species/site
Structural complexity	7.5 lifeforms/site	Not monitored	7.6 lifeforms/site	Not monitored	7.6 lifeforms/site
Canopy recruitment	2.3 cohorts/site	Not monitored	2.3 cohorts/site	Not monitored	2.3 cohorts/site
Eagle nest productivity	3 of 5 nests active	4 of 5 nests active	1 nest active	2 of 5 nests active	Not checked
Forest cover change in reserve	Not monitored	Not monitored	Not monitored	9463	Not monitored
Forest cover change - 20km	Not monitored	Not monitored	Not monitored	1721 ha (2011-2015)	Not monitored
<b>Terrestrial Mammals (across entire reserve)</b>					
Species richness	10 native sp 5 introduced sp	12 native sp 4 introduced sp	12 native sp 3 introduced sp	11 native sp 4 introduced sp	12 native sp 3 introduced sp
Proportion native species	0.67	0.75	0.80	0.73	0.80
Native species diversity indices	Simpson 0.75 Shannon-Wiener 1.59	Simpson 0.77 Shannon-Wiener 1.64	Simpson 0.78 Shannon-Wiener 1.70	Simpson 0.76 Shannon-Wiener 1.63	Simpson 0.75 Shannon-Wiener 1.57
<b>Key Findings 2017-18</b> <ul style="list-style-type: none"> <li>• TLCs 5 wedge-tailed eagle nests were not checked during the 'Where Where Wedgie' project</li> <li>• Sustainable Timber Tasmania has been harvesting on state-owned land adjacent to Viormy.</li> <li>• A wildfire started by a lightning strike occurred on Viormy in November 2017. Mild weather conditions resulted in a moderate intensity fire, and a quick response from fire agencies and TLC kept this fire small (~3 ha).</li> <li>• Boundary fencing was maintained at Pine Tier and Roscarborough, and trenches installed along the Marlborough Hwy to prevent illegal firewood collection and 4WD access.</li> </ul>					
<b>Recommendations</b> <ul style="list-style-type: none"> <li>• Repeat vegetation monitoring in 2020.</li> <li>• Continue to implement and improve the Access Management Strategy, including monitoring for illegal timber harvesting and taking action to prevent illegal access when detected.</li> <li>• Annual eagle nest checks must be undertaken 2018-19.</li> </ul>					



## MANAGEMENT EFFECTIVENESS SUMMARY

Access Management		
<b>Key Objective</b> <ul style="list-style-type: none"> <li>Unauthorised access is reduced by 80% by 2020</li> </ul>		<b>Status 2017-18</b> <b>Illegal access is continuing</b>
<b>Strategy Description</b> Management of access points across the Reserve is required so that visitation causes minimal impact to Reserve natural values. Unauthorised and illegal access can negatively impact on values, through activities e.g. hunting, wood-hooking, campfires, dumping rubbish and off-road driving. A variety of mechanisms are used to regulate access including infrastructure e.g. fences and gates, signs, and direct communication with the local community and potential visitors. Infrastructure needs to be maintained to ensure it is safe to use, effective and does not impact on the Reserve values (e.g. erosion).		 <p>Illegal firewood collection on Roscarborough</p>
<b>Indicator</b>	<b>Status 2017-18</b>	<b>Trend</b>
Reportings / evidence of illegal entry	Difficult to measure – see recommendations below	Declining but continuing to occur
<b>Key Findings 2017-18</b> <ul style="list-style-type: none"> <li>In 2017-18 illegal access was observed and reported numerous times, mostly in late summer and autumn primarily linked to STT logging operations adjacent to Viormy, circle work on sensitive vegetation, gates vandalised, and felling of trees and theft of firewood in Pine Tier and Roscarborough, where public access roads traverse through TLC land. Illegal access was gained from the Marlborough Rd and Pine Tier Rd, with tree felling in areas that were not visible from the main road. Trenches were dug and fences installed to block access at these areas.</li> <li>Maps classifying all roads and tracks on Five Rivers Reserve were completed, with standards for maintenance developed for each road classification. There has been ongoing road maintenance, including management of road drainage to prevent erosion of roads, and rehabilitation of the surface of primary roads that were becoming degraded. Tree falls were cleared from roads as necessary. The Nive River Bridge at Viormy was assessed as unsuitable for heavy vehicles and may require maintenance work in the future. Vegetation was removed from priority roads, including slashing and spraying as necessary.</li> <li>Several locks on gates went missing or were broken, and were replaced as necessary.</li> <li>Signage was developed and installed to support visitor access to Skullbone Plains, including directional signage for vehicles and walking track signage.</li> </ul>		
<b>Recommendations</b> <ul style="list-style-type: none"> <li>Continue the program of road, gate and trench maintenance and installation. Further work is scheduled for Viormy main road to maintain 2WD access to Skullbone Plains.</li> <li>Ensure that the right-of-ways for Sustainable Timber Tasmania are finalised prior to any further use by logging trucks and that usage/maintenance requirements are adhered to.</li> <li>Develop relationships with individual hunters to ensure that access breaches and other illegal activity is passed onto TLC.</li> <li>Revise objective – individual instances of illegal access are difficult to detect and measure. Qualitative measurements as reported by reserve management staff would be more indicative, as would the efficacy of barriers, gates and other access control methods.</li> </ul>		



## Fire Management

### Key Objectives

- No unauthorised fires start on the reserve by 2020.
- All reasonable measures are taken to prevent the spread of any fires originating on the reserve (ongoing)

### Status 2017-18

**On-track**

### Strategy Description

The aim of this strategy is to reduce the impact of unplanned fire, on the people and values of the Five Rivers region. Bronte Park is the largest community in the region and wildfire poses a significant risk to the community. While most of the natural values of the Reserve are relatively resilient to the impacts of fire, there are some significant natural values, such as sphagnum peatlands and populations of drooping pine that should be protected from fire as a priority and wherever possible.

Fire management on Five Rivers: Photo TLC



Indicator	2013-2014	2014-2015	2015-2016	2016-2017	2017-18
Number of unplanned fires	1 – Jan 2014	0 unplanned fire	0 unplanned fire	0 unplanned fire	1 fire - Nov 2017

### Key Findings 2017-18

- Water points were maintained for use during fire-fighting.
- A wildfire started by a lightning strike occurred on Viormy in November 2017. Mild weather conditions resulted in a moderate intensity fire, and a quick response from fire agencies and TLC kept this fire small (~3 ha).
- TLCs fire management policy including fuel stove only is being implemented.
- A whole-of-TLC fire management strategy is being developed to ensure all TLC properties are effectively managed from threats relating to fire, and that fire is used appropriately as a tool to manage the values of TLC properties.

### Recommendation

- Continue to implement a fuel stove only policy for the Reserve and TLC's fire policy and procedures, including conducting an annual fire risk assessment across all TLC properties.
- Continue to maintain key roads and firefighting infrastructure such as water points.
- Consider revising first objective – the current objective is easy to measure but doesn't reflect the effectiveness of TLC's management.
- Continue to develop the whole-of-TLC fire management strategy, including plans to protect values from fire.

**Threatened Species Protection**

**Key Objective**

- Improved conservation outcomes for threatened species from 2016 onwards

**Status 2017-18**  
**On-track**

**Strategy Description**

There are a number of threatened species on the Five Rivers Reserve that are either poorly known or for which more information is required. Extension surveys are required to better understand the distribution and status of fauna species such as the Ptunarra brown butterfly, Miena jewel beetle, Masked owl and Grey goshawk, etc and threatened plant species such as the grassland cupflower, claspleaf heath and small alpine leek orchid. Knowledge of the ecological requirements of other threatened species should be investigated. Ongoing survey and assessment of eagles will ensure this shy nesting species is not disturbed during the breeding season and that breeding success and productivity is being maintained.

Peat core from Sphagnum beds on Skullbone Plains. Photo: S Bryant



**Indicator**

Knowledge is improved on threatened species

**Status 2017-2018**

Three new reports received

**Trend**

Improving

**Key Findings 2017-18**

- Report received from Geoffrey Hope, Mark Burrows, Patricia Gadd, Feli Hopf, Jane Keble-Williams and Jennie Whinam (Nov 2017) The History of Skullbone Plains Peatland, Central Plateau, Tasmania.
- Updated information on devils and quolls from UTAS Hons project (Liam Thompson)
- Threatened Species Section (2018). Castiarina insculpta (*Miena Jewel Beetle*): *Species Management Profile for Tasmania's Threatened Species Link*. <https://www.threatenedspecieslink.tas.gov.au/Pages/Miena-Jewel-Beetle.aspx>. Department of Primary Industries, Parks, Water and Environment, Tasmania. Accessed on 2/10/2018. <https://www.threatenedspecieslink.tas.gov.au/Pages/Miena-Jewel-Beetle.aspx>

**Recommendations**

- Progress extension surveys on poorly known or recorded threatened species.
- Expand Miena jewel beetle surveys during peak *O. hookeri* flowering periods in Jan/Feb.
- Improve knowledge on swift parrot distribution on the reserve.
- Continue extension surveys for ptunarra brown butterflies in Poa grasslands.
- Promote extension surveys for drooping pine in riparian vegetation along the Nive River on the Viormy section of the Reserve.
- Update threatened species mapping to incorporate jewel beetle data collected in 2017

## Clarence Galaxias Protection

### Key Objective

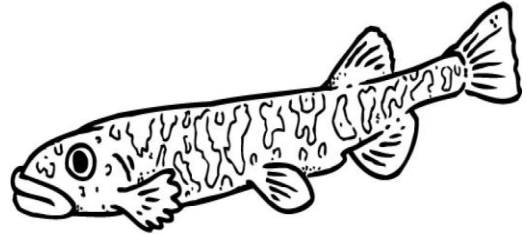
- No introductions or expansion of brown trout on the reserve

**Status 2017-18**  
**To be addressed**

### Strategy Description

The strategy aims to prevent the expansion and establishment of Brown Trout in areas where Clarence galaxias occurs. Brown trout have the potential to cause extinction of this species. Access control and the encouragement of responsible fishing practices are some of the ways this risk can be reduced.

A secondary aim is to work with partners particularly the Inland Fisheries Service to investigate the potential to eradicate trout from other small water bodies to expand area of occupancy of Clarence galaxias as specified in the species recovery plan.



**CLARENCE GALAXIAS**

TLC sticker Clarence galaxias. Image J Pringle


<i>Indicator</i>	<i>2013-2014</i>	<i>2014-2015</i>	<i>2015-2016</i>	<i>2016-2017</i>	<i>2017-18</i>
Presence of Clarence galaxias	Present at 4 sites	Not monitored	Not monitored	Present at 4 sites	Not monitored

### Key Findings 2017-18

- Feasibility plan to build a Skullbone weir for the Clarence galaxias placed on hold.
- Potential relocation site to fire dam on Serpentine remains as a possibility.
- Contacted IFS for 2017-18 survey results. They reported no monitoring during this period and a likelihood of now monitoring every two years for this species.
- Access maintained to improve likelihood that trout do not spread into galaxias habitat.

### Recommendations

- Maintain contact with IFS to ensure monitoring work undertaken in 2018-19. If none proposed for 2018-19 then contract this survey work immediately.
- Determine water quality and food availability in the Serpentine fire dam.

<b>Carnivorous Marsupial Conservation</b>		<b>Status 2017-18 : Some Declines</b>			
<b>Key Objective</b>		<b>Outcome: Population fluctuations, continue monitoring</b>			
<p><b>Strategy Description</b></p> <p>The Bronte region is one of the few areas in Tasmania that retains an intact guild of large carnivorous marsupials, the Tasmanian devil, spotted-tail quoll and eastern quoll. All three species are threatened under state and federal environmental legislation. The mosaic of open areas, woodland and forest supports high population densities of prey species such as wallabies and possum and large fallen trees and rocky areas provide abundant den sites.</p>		 <p>Tasmanian devil on remote camera in 2018. Photo: TLC</p>			
<b>Indicator</b>	<b>2013-2014</b>	<b>2014-2015</b>	<b>2015-2016</b>	<b>2016-2017</b>	<b>2017-18</b>
Spotted-tailed quoll occupancy	0.02 (detected at 1 of 42 sites)	0.13 (detected at 4 of 32 sites)	0.11 (detected at 4 of 37 sites)	0.09 (detected at 3 of 34 sites)	0.13 (detected at 5 of 39 sites)
	0.001 (1 detection, 1202 trap nights)	0.006 (7 detections, 1120 trap nights)	0.004 (5 detections, 1217 trap nights)	0.003 (3 detections, 1175 trap nights)	0.008 (9 detections, 1143 trap nights)
Eastern quoll occupancy	0.29 (detected at 12 of 42 sites)	0.47 (detected at 15 of 32 sites)	0.41 (detected at 15 of 37 sites)	0.38 (detected at 13 of 34 sites)	0.15 (detected at 6 of 39 sites)
	0.03 (32 detections, 1202 trap nights)	0.06 (66 detections, 1120 trap nights)	0.03 (37 detections, 1217 trap nights)	0.07 (81 detections, 1143 trap nights)	0.015 (17 detections, 1143 trap nights)
Tasmanian devil occupancy	0.67 (detected at 28 of 42 sites)	0.97 (detected at 31 of 32 sites)	0.78 (detected at 29 of 37 sites)	0.76 (detected at 26 of 34 sites)	0.92 (detected at 36 of 39 sites)
	0.11 (128 detections, 1202 trap nights)	0.21 (234 detections, 1120 trap nights)	0.14 (173 detections, 1217 trap nights)	0.16 (193 detections, 1143 trap nights)	0.32 (360 detections, 1143 trap nights)
DFTD status	Unknown	Disease detected 13% of sites	Disease detected 3% of sites	Disease detected 19% of sites	Disease detected 10% of sites
<p><b>Key Findings 2017-18</b></p> <ul style="list-style-type: none"> <li>• Eastern quoll decline noted and may be reflective of decline concerns statewide</li> <li>• Three carnivorous marsupials and feral cats routinely detected</li> <li>• The Tasmanian devil remains the most commonly detected carnivorous species</li> <li>• Devil facial tumour disease persists in animals on the Reserve</li> <li>• Small fluctuations in some species population considered relatively normal</li> </ul>					
<p><b>Recommendations</b></p> <ul style="list-style-type: none"> <li>• Continue monitoring in 2018-19 to determine if small downward trajectory continues</li> <li>• Standardise camera placement, settings and duration of trap nights</li> <li>• Ensure eastern quoll data is assessed in more detail if downward trajectory continues</li> </ul>					



## Pest Animal Management

### Key Objective

- By 2016 distributions of key feral species have been mapped and management strategies identified.

**Status 2017-18**  
**On-track**

### Strategy Description

The aim of this strategy is to better understand and minimise the impact of pest animals on the natural values of the Reserve. Five Rivers Reserve is bordered by pastoral properties where stock can have negative impacts on wetlands and other sensitive vegetation if unmanaged. Targeted monitoring using camera traps and other methods will identify a baseline measure of population trends and need for control measures. A Feral Animal Management Plan will be prepared to reduce populations of cats, deer and rabbits and also European wasps. This will require input from key organisations including DPIWPE and others.



Fallow deer on monitoring cameras in 2018. Photo TLC

Indicator	2013-2014	2014-2015	2015-2016	2016-2017	2017-18
Feral cat occupancy activity	0.33 (detected at 14 of 42 sites)	0.50 (detected at 16 of 32 sites)	0.32 (detected at 12 of 37 sites)	0.38 (detected at 13 of 34 sites)	0.51 (detected at 20 of 39 sites)
	0.02 (30 detections, 1202 trap nights)	0.03 (29 detections, 1120 trap nights)	0.02 (27 detections, 1217 trap nights)	0.02 (23 detections, 1175 trap nights)	0.04 (47 detections, 1143 trap nights)
Rabbit occupancy activity	0.33 (detected at 14 of 42 sites)	0.50 (detected at 16 of 32 sites)	0.32 (detected at 12 of 37 sites)	0.38 (detected at 13 of 34 sites)	0.13 (detected at 5 of 39 sites)
	0.001 (1 detections, 1202 trap nights)	0.007 (8 detections, 1120 trap nights)	0.002 (2 detections, 1217 trap nights)	0.009 (11 detections, 1175 trap nights)	0.005 (6 detections, 1143 trap nights)
Fallow deer occupancy activity	0.07 (detected at 3 of 42 sites)	0.28 (detected at 9 of 32 sites)	0.14 (detected at 5 of 37 sites)	0.21 (detected at 7 of 34 sites)	0.31 (detected at 12 of 39 sites)
	0.01 (11 detections, 1202 trap nights)	0.02 (22 detections, 1120 trap nights)	0.02 (27 detections, 1217 trap nights)	0.01 (15 detections, 1175 trap nights)	0.02 (21 detections, 1143 trap nights)
deer shot	Unknown	9 deer shot	9 deer shot	16 deer shot	12 deer shot
Stock access	Some stock incursions	Some stock incursions	Some stock incursions	Some stock incursions	No incursions detected

### Key Findings 2017-18

- Deer control continues in partnership with the Bronte Deer Stalkers. Hunters reported slightly fewer deer during 2017-18 with less deer shot than in the previous season. TLC were issued with culling tags but these were not used this season.
- Feral cat monitoring has continued, and stable trends with small changes observed. The Bronte Deer Stalkers reported 5 feral cats and successfully shot one.
- TLC has partnered with UTAS on an ARC linkage grant for a deer management research project on Five Rivers Reserve.
- James Hattam has been invited to join the DPIWPE Game Species Management Advisory Group

### Recommendations

- Continue to obtain deer tags for Five Rivers Reserve for the 2018-19 season.
- Continue monitoring pest species for the 2018-19 season

## Weed Management

### Key Objective

- Existing infestations of weeds are eradicated from the Reserve by 2017

**Status 2017-18**  
**On-track**

### Strategy Description

The aim of this strategy is to control existing infestations of priority weeds on the Five Rivers Reserve. Weed mapping and control has been ongoing since 2010 and is continuing. A weed management strategy has been prepared for TLC's Central Highland properties to ensure that weed management is effective. Monitoring and follow-up control are a key part of the weed management strategy, along with co-operating with neighbours to encourage management of weeds at a regional scale. Hygiene procedures are also critical so no new weed species are introduced to the Reserve.

Central Highlands weeding team. Photo: TLC



Indicator	Status 2017-18	Trend
Weed extent	Weeds present in most areas of reserve	Improving
Weed density	Very low	Improving
Treatment extent	100% of weeds (other than thistles)	Stable

### Key Findings 2017-18

- The TLC's Central Highlands weed management strategy has been implemented annually since 2010. This plan encompasses all of the TLC's properties in the Central Highlands, including the Five Rivers Reserve. Annual weed maps and a report of the weed control project were updated in 2018, and shared with key stakeholders (Derwent Catchment NRM and neighbours).
- Weed control was conducted at Five Rivers, Skullbone Plains and London Marsh from 5-7 and 21-22 February 2018. Target weeds were ragwort, gorse and great mullein, with spear and Californian thistle also targeted at properties within or buffering the TWWHA. A total of 5 work days (54 person/days) were put towards this work. 100% of the tracks on the TLC's Bronte properties were covered in this time, for the seventh consecutive year. One day was lost to poor weather. Overall decrease in quantity of priority weeds (ragwort/mignonette/mullein) found, using numbers of individual observed/treated as the indicator. A detailed report was produced.
- Thistles (Californian and spear) were treated at Skullbone Plains for the fourth consecutive year, and at Viormy West for the second consecutive year, with thistle numbers markedly decreased from previous years.
- Machinery used for road maintenance was cleaned prior to bringing on to the Reserve, ensuring no new weeds were brought into the Reserve.

### Recommendations

- Annually update weed mapping and reporting to include the previous season of weed control.
- Revise goal - current goal is overly ambitious and does not prioritise weed species – some weed species do not pose a particular threat to conservation targets or are so established in the region that eradication is not viable or feasible. The TLC's Central Highlands Weed Management Strategy prioritises weed species and sets out goals for management.
- Revise objective and indicators – they are hard to measure at present. Update and revise according to the weeding plan.

**Protecting Cultural Heritage**

**Key Objective**

- By 2016, cultural and indigenous heritage sites are documented and a protection strategy planned.

**Status 2017-18**  
**Some**  
**Improvement**

**Strategy Description**

Cultural heritage values are an important feature of the landscape, and TLC’s management objectives for cultural heritage values are consistent with the Burra Charter.

Sites of indigenous cultural significance, and sites and structures from early European settlement are widespread on the Five Rivers Reserve. Features of cultural significance include Aboriginal stone tool scatters, the remnants of trapper’s and shepherd’s huts, and the remains of old fences. Landscape surveys by cultural heritage officers will increase our knowledge of these values on the Reserve. The remoteness of most sites means that they remain in a relatively undisturbed condition. A range of shepherd huts, boundary fences, cairns and oral histories of the early pioneering days are in various stages of being documented.

Bruce Hay with Five River’s original boundary marker. Photo: S Bryant



Indicator	Status 2017-18	Trend
Cultural heritage sites are documented and mapped	European heritage sites have been documented. Indigenous heritage sites have yet to be documented.	Improving
Understanding and interpretation of indigenous knowledge	Not documented	Unknown

**Key Findings 2017-18**

- UTAS student project in 2017 recorded an oral history of the changes to the area from key people, including Bruce Hay and David Hean. Mapping of sites is still in progress.
- TLC maintains a good working relationship with the Aboriginal Land Council of Tasmania, the Tasmanian Aboriginal Centre and other Aboriginal groups and seeks to improve our understanding and protection of aboriginal sites.

**Recommendations**

- Continue to systematically map and document European heritage sites, including finalising mapping of European heritage values, as per Bruce Hay's documents.
- Work with indigenous groups to document and/or protect indigenous heritage values.
- Establish a process to preserve knowledge of the landscape.
- Support the collection of more oral histories in relation to past use and changes in the landscape.
- Support the use of the reserve as a cultural landscape by the Aboriginal community.

## Enhance Ecosystem Services

### Key Objective

- Ecosystem service derived income supplements reserve costs by 10% annually and our activities are contributing to the local Bronte community

**Status: 2017-18**  
**On-Track**

### Strategy Description

Through its activities TLC generates economic benefits to the local Bronte community to enhance its long term vision to support healthy communities underpin healthy landscapes. An ecosystem services framework has been used by TLC as a way to structure thinking around income generation from reserves. By annually recording expenditure related to on-reserve activities (e.g. purchase of food, fuel, accommodation and hire of local contractors) and revenue generated in the local area, we can measure our financial contribution from conservation activities to the local community.

### How does carbon offsetting work?

As planes fly they burn fuel which releases emissions. We've calculated & offset our domestic flight emissions through Qantas Future Planet. Our contribution is passed directly to verified carbon offset projects that mitigate climate change, protect wildlife and nourish communities.



Virgin Airlines purchased all TLC carbon credits in 2018.

### Indicator

### Status 2017-18

### Trend

Income generated from Reserve

\$81,000 (>10%)

Stable

TLC expenditure in local community

Data not assessed

Unknown

### Key Findings 2017-18

- Income derived for Five Rivers Reserve includes the sale of carbon credits, provision of hunting licenses, and commercial use licenses including a small firewood royalty (total \$81,000).
- TLC activities such as sponsoring TAFE courses, supporter trips, discovery days and reserve management trips generated economic activity in the Bronte community.
- Work still underway on measuring TLCs financial value to local communities.
- TLC activities secure 10% of all of TLC's reserve management costs for this reserve.

### Recommendations

- Maintain carbon stocks and reporting requirements for carbon credits.
- Continue to seek ecosystem service programs to support conservation of the reserve and assist the local community.