TASMANIAN
LAND
CONSERVANCY

Annual Reserve Report

Five Rivers Reserve 2016-17

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 hectares of highland forests and marshlands on Tasmania's Central Plateau. The management of the Reserve is guided by the Five Rivers Reserve Management Plan. The plan is 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.

This report describes progress made towards delivery of the management plan in 2016-17, and is divided into three sections:

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

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.

EXECUTIVE SUMMARY

- Mammal monitoring undertaken with 54,000 images collected, 2,500 fauna detections assessed and abundance and occupancy evaluated for 15 mammal species;
- Clarence galaxias protection strategy continued, 2 of 5 eagle nests active, one new threatened species identified and 965 wombat images assessed for prevalence of mange;
- Number of fallow deer reduced by 16 through recreational and crop protection shooting; feral cats recorded at 56% of monitoring sites;
- Rehabilitation of sphagnum on Roscarborough commenced and Central Highlands Weed control reduced density of 4 key weed species;
- Road and gate maintenance continued, boundary fencing improved to reduce illegal wood hooking and new road signs installed;
- Held 4 TLC events, 21 volunteer activities, 5 research projects, 81 visitors and 170 volunteer days;
- Successful 'Loo with a View' crowd funding project raised $25,000

Cover image: 2017 Loo with a View Campaign: drawing by Josh Pringle

FIVE RIVERS RESERVE SCORECARD 2016-17

Monitoring			
Target	***Indicator***	***Status 2016-17***	***Trend***
Highland Marshes	Floristic diversity	10 species/site	No change
	Structural complexity	2.8 strata/site	No change
	Miena cider gum recruitment	> 3 age cohorts present	No change
	Sphagnum peatland extent	100.8 hectares	No change
	Vertebrate fauna diversity	6.7 species per site	No change
Streams and wetlands	Macroinvertebrate diversity (Simpsons Index)	0.68	Baseline data
	Floristic diversity	9.4 species/site	No change
	Structural complexity	2.9 strata/site	No change
	Vertebrate fauna diversity	7 species/site	Increase (17%)
	Drooping pine population size	Present but not fully mapped	Not assessed
	Clarence galaxid populations	Present at 4 sites	No change
Highland forest and woodland	Floristic diversity	10.4 species/site	No change
	Structural complexity	10.3 strata/site	No change
	Canopy recruitment	2.9 cohorts/site	No change
	Vertebrate fauna diversity	6 species/site	Decrease (14%)
	Eagle nest productivity	2 active nests	Increase from 0
	Forest cover change in reserve	No data for report period	No change 2000-10
	Forest cover change - 20km	No data for report period	Significant decline 2000-10
Carnivorous marsupials	**Spotted-tailed quoll** Occupancy Relative abundance	 9.75% 0.002	 Decrease (10%) Decrease (15%)
	Eastern quoll Occupancy Relative abundance	 39% 0.056	 Decrease (13%) Increase (133%)
	Tasmanian devil Occupancy Relative abundance Disease status	 80% 0.158 19% of sites	 Decrease (7%) Increase (22%) Increase
Community connection with landscape	# volunteer days on the reserve	170 volunteer/days	Stable
	# visitors to the Reserve	81 visitors	Decrease
Cultural heritage	Intactness of indigeneous heritage sites	Not documented	
	Understanding and interpretation of indigenous knowledge	Not documented	
	Intactness of cultural heritage sites	Not documented	
	Preserve cultural history sites and knowledge	Being documented	
Regional capacity	Income generated from Reserve	$80,870	Stable
	TLC expenditure in local community	No data collected as yet	Unknown
Management Effectiveness			
Strategy	***Indicator***	***Status 2016-17***	***Trend***
Access management	Reportings / evidence of illegal entry	Ongoing	Increase
Fire management	Number of unplanned fires	0	Decrease
Clarence galaxias protection	Presence of brown trout	Present through most of the Nive Catchment including Kenneth Creek	No change
	Presence of Clarence galaxias	Present at 4 sites	No change
Threatened species protection	Number of projects	1 project completed (jewel beetle) 2projects ongoing (UTAS, ptunnara)	Stable
Feral and domestic animal management	Feral Cats	Occupancy 54% Abundance 0.022	Increase (10%) No change
	Rabbit abundance	Occupancy 15% Abundance 0.014	Increase (40%) Increase (50%)
	Fallow Deer abundance	29% of sites 0.018 observations 16 deer shot	Increase (16%) Decrease (10%)
	Stock access	Some stock incursions	No change
Weed management	Weed extent	Weeds in most areas of reserve	Flat
	Weed density	Very low	Improving
	Treatment extent	100% of weeds (other than thistles)	Improving
Visitor management	Visitors compling with TLC policies	Processes partially in place	Ongoing
Protecting cultural heritage sites	European heritage sites documented and mapped by B. Hay	European sites being documented	Flat
Community engagement	# events at the Reserve	4 events	Increase
	# of volunteer activities at the Reserve	21 vol activities	Increase
	# of research and education projects	5 projects	Increase

MONITORING SUMMARY

Highland Marshes	**Status: Very Good**
Goal Maintain or improve the floristic diversity of Highland Marshes Maintain or improve the structural complexity of Highland Marshes Maintain recruitment of Miena cider gum Maintain the extent of Sphagnum Peatland Maintain or improve the vertebrate fauna diversity	**Outcome: On Track**

Description

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, *Eucalyptus rodwayi* and *E. gunnii* woodland, and *Poa* 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.

2017 wombat mange assessment. Photo: TLC

Ecological indicator	**Status - 2016**	**Trend**
Floristic diversity	10 species/site	No change
Vertebrate fauna diversity	9.4 species per site	No change
Structural complexity	2.8 strata/site	No change
Miena cider gum recruitment	> 3 age cohorts present	No change
Sphagnum peatland extent	100.8 hectares	No change

Key findings

- The condition of vegetation remains very good.
- Dieback of mature cider gums (*E. gunnii subsp. gunnii*) was observed at some sites.
- Analysis of 965 wombat images found 2 mange detections in 2016 and 3 detections in 2017 indicating a significantly low prevalence of mange on the reserve.
- Rehabilitation of a degraded area of Sphagnum bog at Roscarborough is underway.
- Ptunarra brown butterfly surveys at Skullbone Plain's grasslands did not detect butterflies.
- Invertebrate sampling of sphagnum at Skullbone was undertaken at peat core sites

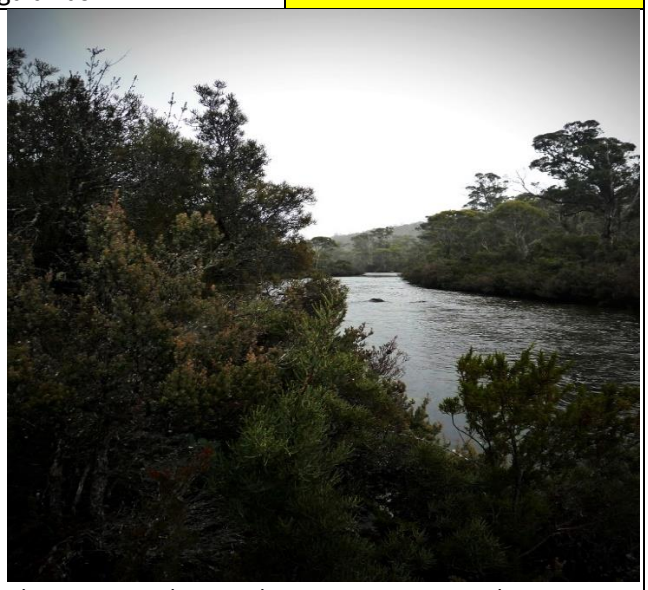
Recommendations

- Continue to implement Fire Management Strategy, including the development of an operational fire management plan for the Reserve that identifies sensitive vegetation.
- Complete the rehabilitation plan for Roscarborough Sphagnum bog and implement monitoring.
- Continue implementing Miena Cider Gum action plan by monitoring stands of E. gunnii).
- Continue ptunarra brown butterfly extension surveys in Poa grasslands.
- Analyse 2017-18 wombat images for prevalence of mange.
- Repeat long-term ecological monitoring in 2020.

Streams and Wetlands	**Status: Moderate**
Goals Maintain the diversity of aquatic biota Maintain or improve floristic diversity of streams and wetlands Maintain or improve structural complexity of streams and wetlands Maintain or improve vertebrate fauna diversity in streams and wetlands Maintain populations of drooping pine *Pherosphaera hookeriana* Maintain or increase populations of Clarence galaxias	**Outcome: Action required – the Clarence galaxias remains at high risk of extinction**

Description

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.



The Nive River bisects the 5 Rivers Reserve. Photo: TLC

Ecological indicator	**Current status**	**Trend**
Aquatic macro-invertebrate diversity (Simsons Index)	0.68	Baseline
Floristic diversity (species/site)	9.4	No change
Vertebrate fauna diversity	8.9 species per site	No change
Structural complexity (strata/site)	2.9	No change
Drooping pine population size	Present but not fully mapped	Not assessed
Clarence galaxid presence	4 sites	No change

Key findings

- The condition of riparian vegetation is excellent
- A project to increase the occupancy of Clarence galaxias is still in progress
- Aquatic biota was assessed for the first time

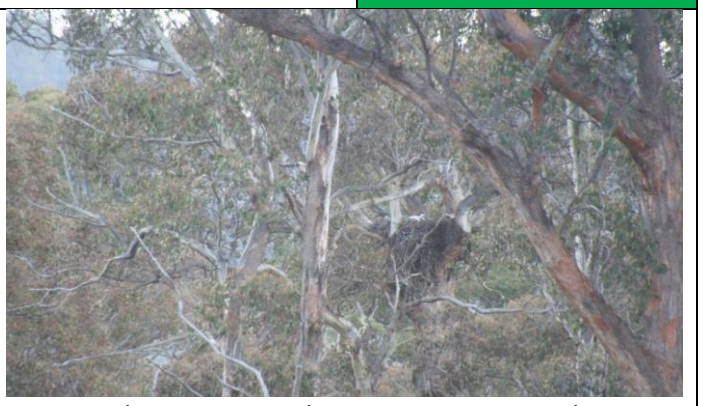
Recommendations

- Continue implementing the Threatened Species Protection Strategy, including: extension surveys for drooping pine along the Nive River in the Viormy section of the Reserve.
- Continue to progress the Clarence Galaxias Protection Strategy.
- Repeat long-term ecological monitoring in 2020.
- Consider adjusting target goals to better reflect TLCs capacity to measure changes:
- The condition of riparian vegetation is maintained or improved
- The area of the Reserve occupied by Clarence galaxias is increased by 50% by 2025
- The diversity of aquatic biota is better known

Highland Forest and Woodland	**Status: Good**
Goals • Maintain or improve overall floristic diversity and structural complexity, and recruitment of canopy species • Maintain Highland Forests and Woodlands forest cover within 2% of 2010 baseline • Maintain or improve reproductive success of the wedge-tailed eagle	**Outcome: On Track**

Description

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.



Active eagle nest 2016 on the Five Rivers Reserve. Photo: TLC

Ecological indicator	**Current status**	**Trend**
Floristic diversity (species/site)	9.4	Stable
Structural complexity (strata/site)	4.1	Stable
Canopy recruitment (cohorts /site)	2.9	Stable
Wedge-tailed eagle productivity - # successful nests - # fledged young	**2016-17** 2 of 5 nests 2	Increase
Forest cover change in reserve (hectares)	9463	Stable
Forest cover change - 20km	1721 ha (2011-2015)	Increase

Key findings

- TLCs 5 wedge-tailed eagle nests were checked in October 2016 and 2 nests were observed to be active with fresh leaves and signs of activity (Nest #245, #1687). Nest #673 was noted to be in poor condition. This information was passed to FPA for their annual records.
- Vegetation condition was not assessed during the reporting period, but was stable at the time of the last assessment in early 2016.
- April 2017 - Forestry Tasmania began harvesting native forest at land adjacent to Viormy.
- Boundary fencing was installed at Pine Tier and Roscarborough to prevent illegal firewood collection and monitoring cameras installed in an effort to capture.

Recommendations

- Repeat vegetation monitoring in 2020.
- Continue to implement and improve the Access Management Strategy, including monitoring for illegal timber harvesting and taking action to prevent illegal access when detected.
- Consider removing the indicator “Forest cover change – 20 km buffer” as it doesn’t reflect TLC management, and can’t be influenced by TLCs actions.
- Continue to implement the Threatened Species Protection Strategy, including annual eagle nest checks and review eagle breeding status in 2017-18.
- Consider amalgamating the first three goals to be “The condition of Highland Forests and Woodlands is improved”, maintaining the same indicators.

Carnivorous Marsupials	**Status: On Track**
Goals Maintain wild, free ranging populations of carnivorous marsupials	**Outcome: Normal population fluctuations, continue monitoring**

Description

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 listed as threatened under state and/or 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.

Eastern quoll captured by remote camera in 2017. Photo: TLC

Ecological indicator	**Current status 2016-17**	**Trend**
Spotted-tailed quoll	Occupancy 9% Abundance 0.002	Decrease (10%) Decrease (15%)
Eastern quoll	Occupancy 39% Abundance 0.056	Decrease (13%) Increase (133%)
Tasmanian devil	Occupancy 80.5% Abundance 0.158 DFTD suspected 21% of sites	Decrease (7%) Increase (22%) Increase

Key findings

- 15 species of mammal fauna routinely identified, including brown bandicoot and rodents
- Three carnivorous marsupials and feral cats routinely detected
- The Tasmanian devil continued as the most commonly detected carnivorous species
- Devil facial tumour disease was suspected at 7/33 sites though images were poor to score
- More detections of Eastern quoll but at fewer sites, spotted-tailed quoll relatively stable
- Small fluctuations in population considered relatively normal

Recommendations

- Continue monitoring in 2017-18 to determine if small downward trajectory continues
- Standardise camera placement, settings and duration of trap nights
- Investigate other options to improve detectability of spotted-tail quoll
- Consider using new brand of cameras to improve image quality and DFTD detection

Community Connection with the Landscape	**Status: Good**
Goal • Provide ways for people to achieve and enjoy the benefits of conservation • Harness knowledge of the Bronte landscape to enhance management and support healthy communities.	**Outcome: On Track**

Description

There is a high degree of public interest in the Five Rivers Reserve, and the TLC continues to encourage community connection with the landscape. People visit the reserve for a variety of cultural, artistic, recreational and educational reasons. Volunteers assist in a variety of reserve management activities. TLC staff support local businesses through purchase of food, fuel and accommodation and hire of local contractors.

Student volunteers surveying wombat dens in 2017. Photo TLC

Indicator	**Current status**	**Trend**
# volunteer days on the reserve	170 vol/days	Stable
# visitors to the Reserve	81 visitors	Decrease

Key findings

- 81 people visited Five Rivers in 2016/17 excluding hunters (19) and Daniel Hackett's clients
- TLC continued its lease with RiverFly 1864, which operates fly fishing trips from a standing camp at Skullbone Plains. (Visitor numbers from RiverFly 1864 were not included in the above visitation figure, as they have not been supplied to TLC.)
- Reserves = 7 volunteer activities, including activities such as track maintenance, weeding, threatened fauna surveys and sphagnum rehabilitation works, resulted in 75 volunteer/days working with reserves staff.
- Science & Planning – 24 volunteers – 10 activities including data entry, wombat surveys, peat core analysis, grant application, Clarence galaxias etc. = 722 hours or 91 volunteer/days
- Fundraising – Volunteers assisting with Bequest day 2 volunteers x 2 days each – 4 vol/days

Recommendations

- Continue to implement the Community Engagement Strategy, including: encouraging visitation to the Reserve by people in diverse and exciting ways; and improving opportunities for locals to engage in low-impact recreational uses such as fishing, camping and bushwalking.
- Consider removing this target from individual reserve management plans and reporting all relevant TLC activities across Tasmania in a separate report. This approach will be easier to report, more reflective of TLCs effort and change over time, and is a goal of TLC's Strategic Plan.

Cultural Heritage	**Status: Very Good**
Goal Protect, enhance and rediscover the cultural heritage values of the reserve	**Outcome: On Track**

Description

The Five Rivers Reserve in the wider central highland landscape contains a number of important cultural sites for Aboriginal people and also areas where there remains evidence of early European settlement, such as fences, chimneys and ruins. Although a detailed Aboriginal cultural survey has yet to be undertaken, many artefact scatters and traditional campsites are known to occur across 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.

Shepherd hut remains on Serpentine. Photo: Bruce Hay

Indicator	**Current status**	**Trend**
Intactness of indigeneous heritage sites	Not documented	Unknown
Understanding and interpretation of indigenous knowledge	Not documented	Unknown
Intactness of cultural heritage sites	State of decay	Unknown
Preservation of cultural history sites and knowledge	Documentation finalised	Unknown

Key findings

- Retired TLC staff member Bruce Hay has an excellent knowledge of the European cultural heritage sites. Bruce mapped and documented these sites in 2016.
- UTAS student project in 2017 now recording B Hay's oral history of changes to the reserve

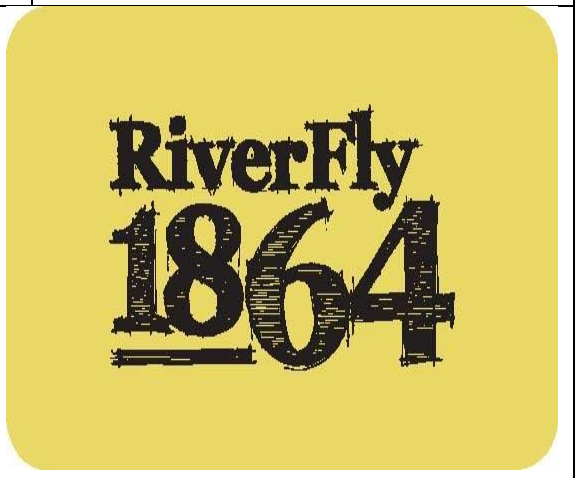
Recommendations

- Continue to systematically map and document European heritage sites.
- Support the collection of an oral history of the reserve especially in relation to past use and changes of the landscape.
- Support the use of the reserve as a cultural landscape by the Aboriginal community.

Enhanced Regional Capacity and Ecosystem Services	**Status: 2016-17** **On-Track**
Goal • Ecosystem service derived income supplements reserve costs by 10% annually and contributing to the local Bronte community	

Description

Through our conservation activities TLC generates economic benefits to the local community. A robust Bronte community will enhance the TLCs long term vision to support healthy communities to 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 and revenue generated in the local area, we can measure our financial contribution from conservation activities to the local community.



Lease agreements in place with RiverFly. Photo: TLC

Indicator	**Current status**	**Trend**
Income generated from Reserve	$80,870	Stable
TLC expenditure in local community	No data collected as yet	Unknown

Key findings

- Income continues to be derived for Five Rivers Reserve through the sale of carbon credits, provision of hunting licenses, and commercial use licenses (total $80,870).
- TLC activities such as monitoring, the PALRC course, supporter trips and reserve management trips generated a significant economic activity in the Central Highlands community.
- Work still underway on a generic method for measuring TLCs financial value to local communities.

Key recommendations for future management

- Maintain carbon stocks and reporting requirements to maintain carbon credits.
- Continue to seek ecosystem service programs to support conservation of the reserve.
- Replace this strategy. Separately report on all relevant TLC activities across its reserve estate, with the aim of securing 10% of all of TLC's reserve management costs from reserve income.

MANAGEMENT EFFECTIVENESS SUMMARY

Access Management

Key objective(s)

- Unauthorised access is reduced by 80% by 2020

Status 2016-17
Action required – illegal access has increased in the past 12 months

Strategy description
Management of access points across the Reserve is required so that visitation causes minimal impact to Reserve natural values. Unauthorised and illegal access can have a negative impacts on values, through activities such as hunting, wood-hooking, campfires, dumping of rubbish and off-road driving. A variety of mechanisms are used to regulate access including infrastructure e.g. fences and gates, information on signs, and direct communication with the local community and potential visitors. Infrastructure needs to be maintained to ensure it is safe to use, is effective and does not impact on the values of the Reserve (e.g. erosion).

Illegal vehicle stealing wood at Roscarborough captured on camera in 2016. Photo: TLC

Indicator	Current status	Trend
Reportings / evidence of illegal entry	Difficult to measure – see recommendations below	Declining

Progress in 2016-17

- In 2016-17 illegal access was observed and reported numerous times, mostly in late summer and autumn. Illegal access was primarily linked to felling of trees and theft of firewood in and around the area of the 2014 fire at Pine Tier / Roscarborough. Illegal access was gained from the Marlborough Rd and Pine Tier Road, with tree felling located in areas that were not visible from the road. Trenches were dug and fences installed to block access at these areas.
- All roads and tracks on Five Rivers Reserve were mapped and classified, including information about road condition and maintenance requirements. 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. Several bridges were repaired following flood damage. Vegetation was removed from priority roads, including slashing and spraying as necessary.
- Several locks on gates went missing or were broken, these were replaced as necessary.
- Forestry Tasmania used the main Serpentine Road for moving logging trucks between Lake Echo and the Marlborough Rd, with reparations required after use. Forestry Tasmania is working on formal rights-of-way over several TLC roads, as agreed when TLC purchased Five Rivers Reserve.
- A grant was obtained to develop signage to support visitor access to Skullbone Plains.

Key recommendations for future management

- Continue the program of road, gate and trench maintenance. Further work is required on main Viormy road to address drainage issues. Roadside spraying will be required in 2016-17 through

Viormy. Top dressing of roads across Pine Tier, Viormy and Skullbone Plains will be required in 2018-19.

- Ensure that the right-of-ways in favour of Forestry Tasmania are finalised prior to any further use by logging trucks and that usage/maintenance requirements are adhered to.
- Develop relationships with individual hunters to ensure that access breaches and other illegal activity is passed onto TLC.
- 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.

Fire management

Key objective(s)

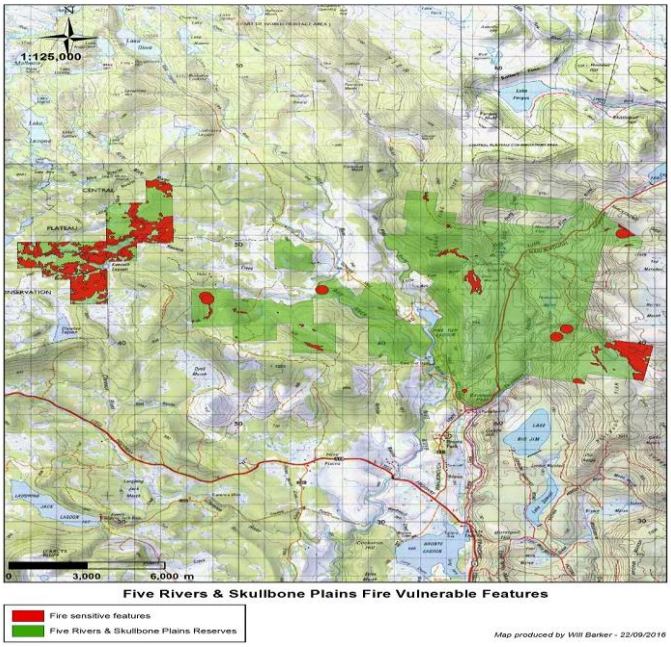
- No unauthorised fires start on the reserve by 2020.
- All reasonable measures are taken to prevent the spread of any fires originating on the reserve (ongoing)

Status 2016-17
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 features, such as sphagnum peatlands and populations of drooping pine that should be protected from fire wherever possible.

Fire sensitive vegetation on Five Rivers: Map TLC



Indicator	Current status	Trend
No. of unplanned fires	0 unplanned fires	Flat

Progress in 2016-17

- Water points were maintained for use during fire-fighting. All water points were mapped and suitability for use assessed. Two new water points were installed to improve accessibility to water during fires.
- A UTAS intern completed an assessment of fire-sensitive natural values at Five Rivers.
- There were no unauthorised fires on the Reserve in 2016-17.
- 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.

Key recommendations for future management

- 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(s)

- Improved conservation outcomes for threatened species by 2016

Status 2016-17
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.

Threatened Miena jewel beetle found on 5 Rivers in 2017. Photo: D Kingdom

Indicator	Current status	Trend
Knowledge is improved about distribution, status and ecology of threatened species	One new species discovered	Improving

Progress in 2016-17

- Miena jewel beetle were observed at Roscarborough in 15 Feb 2017 at GPS site 461727 / 5345457, the first time on this reserve.
- Extension surveys were conducted for ptunarra brown butterflies at Skullbone Plain's grasslands, but were not observed.

Key recommendations for future management

- Continue to progress extension surveys on poorly 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.
- Conduct extension surveys for drooping pine in riparian vegetation along the Nive River on the Viormy section of the Reserve
- Consider revising strategy to emphasise the improvement of knowledge about data deficient threatened species
- Update threatened species mapping to incorporate jewel beetle data collected in 2017

Clarence Galaxias Protection

Key objective(s)

- No introductions or expansion of brown trout on the reserve

Status 2016-17
On-track

Strategy description

The aim of this strategy is to prevent the establishment of Brown Trout in areas where Clarence galaxias occurs. Brown trout have the potential to cause extinction of native fish species. Anglers are the most likely vector for introduction. Access control and the encouragement of responsible fishing practices are some of the ways that the risk can be reduced.

A secondary aim is to work with partners 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 in Cider Gum Tarn. Photo: J Hattam

Indicator	Current 2016-17 status	Trend
Presence of brown trout	Present through most of the Nive Catchment including Kenneth Creek	Stable
Presence of Clarence galaxias	Present at 4 sites	Stable

Progress in 2016-17

- Feasibility plan for Clarence galaxias restoration independently costed.
- Application to purchase Kenneth Lagoon from the Crown was rejected.
- Site of Skullbone weir determined but construction phase larger than first envisaged.
- Consultant report received modelling high water flows.
- Potential relocation site to fire dam on Serpentine investigated.
- Potential change to species status if works undertaken to be determined by DPIPWE.

Key recommendations for future management

- Await species status assessment from DPIPWE if works proceed (? Endangered to Vulnerable)
- Continue investigation of fire dam translocation to Serpentine

Feral and Domestic Animal Management

Key objective(s)

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

Status 2016-17
On-track

Strategy description

The aim of this strategy is to better understand the impact of feral fauna on the natural values of the Reserve and to develop appropriate strategies to minimise their impact. Targeted monitoring using camera traps and other methods will identify a baseline measure of population that will be used to plan cat 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 DPIPWE and others.
Five Rivers Reserve is bordered by pastoral properties that run stock (predominantly cattle) which can have negative impacts on wetlands and other sensitive vegetation if unmanaged.

Feral cat on monitoring cameras in 2017. Photo TLC

Indicator	Current status in 2016-17	Trend
Feral Cat Abundance	Abundance 43 Occupancy 53.6 Recorded at 23 / 41 sites (56%) ID: 15 Known – 9 Unknown (24)	Relatively stable but upward
Rabbit abundance	Abundance 28 rabbits Occupancy 14.6 rabbits Recorded at 6 / 41 sites (14.6%)	Relatively stable but upward
Fallow Deer abundance	Abundance 34 deer Occupancy 29.2 deer Recorded at 12 / 41 sites (29.2%) No of deer shot = 16	Relatively stable but upward
Stock access	No stock incursions detected	Declined

Progress in 2016-17

- Deer control continues in partnership with the Bronte Deer Stalkers. Their hunters reported slightly greater number of deer during 2017 than the previous year, although many deer shot had a lower than usual body weight, possibly due to dry conditions over summer. TLC issued the Bronte Deer Stalkers with 3 additional deer culling tags to increase the number of deer shot. In total, 11 doe and 5 stags were shot.
- Feral cat monitoring has continued, and stable trends with small changes observed
- TLC participated in the Tasmanian Legislative Council inquiry into the wild fallow deer population and recommended reducing or eliminating the species from Tasmania. TLC has partnered with UTAS and Greening Australia on an ARC linkage grant for a deer management research project.
- TLC was successful in gaining approval to release a new strain of rabbit calicivirus at Skullbone Plains, however, rabbit numbers (determined by spotlight counts) were too low to warrant it

Key recommendations for future management

- Continue to increase deer tags obtained for Five Rivers Reserve for the 2018 season.
- Consider separating this strategy into “Feral Animal Management” and “Stock Exclusion”, as the two are very different points of focus for management.

Weed management

Key objective(s)

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

Status 2016-17
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 to ensuring that new weed species are not introduced to the Reserve.

Weeding Volunteers with TLC staff on Five Rivers 2016. Photo: TLC

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

Progress in 2016-17

- The TLC's Central Highlands weed management strategy was completed in 2010 and has been implemented annually since. This plan encompasses all of the TLC's properties in the Central Highlands, including the Five Rivers Reserve.
- TLC staff and volunteers have completed a seventh consecutive year of weed control across the Five Rivers Reserve. Work was supported by a grant from NRM South.
- Overall decrease in quantity of priority weeds (ragwort/mignonette/mullein) found, using numbers of individual observed/treated as the indicator.
- Thistles (Californian and spear) were treated at Skullbone Plains for the third 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.

Key recommendations for future management

- Annually update weed mapping to include the previous season of weed control.
- Continue with annual weed control.
- Consider revising 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.
- Consider revising indicators – they are hard to measure at present. Update and revise according to the weeding plan.

Visitor management

Key objective(s)

- People visit the reserve every year and are complying with TLC policies

Status 2016-17
On-track

Strategy description
The aim of this strategy is to ensure that visitation is undertaken safely with minimal impact on the values of the reserve. Five Rivers Reserve provides excellent opportunities for the community to engage with TLC and conservation through recreation, education and scientific research, where this has minimal impacts on values. Visitor infrastructure at Five Rivers includes roads, gates and camping platforms at Skullbone Plains. Activities that pose a threat to the natural values are controlled or prohibited.

Successful 'Loo with a View' campaign. Photo: TLC

Indicator	Current status	Trend
Procedures in place to ensure visitors are aware of and comply with policies	Processes partially in place	Ongoing

Progress in 2016-17

- A large number of people continue to visit the Five Rivers Reserve, with World Heritage listed Skullbone Plains a major drawcard.
- Visitation infrastructure, including roads, bridges, tent platforms, fire pit, water tank and firewood storage shed, was maintained and visitors were supported to visit the Reserve.
- A crowd-finding campaign successfully raise $25,000 to build a "Loo With A View" at the Skullbone Plains camping hub.
- A grant was obtained to develop signage to support visitation and finalise a visitor guide for Skullbone Plains.

Key recommendations for future management

- Consider the need for additional visitor infrastructure, seek funding and construct, e.g. composting toilet at camping platforms, hut, walking tracks.
- Maintain visitor infrastructure including tent platforms, rinse water tank, fire pit and supply firewood
- Finalise the reserve visitor guide, including information about values, management issues and a map.
- Consider changing the objective to "Visitation and visitor infrastructure is managed to protect the natural values of the Reserve," to reflect the work required to support visitation to the Reserve.

Protecting Cultural Heritage

Key objective(s)

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

Status 2016-17
On-track

Strategy description

Cultural heritage values are recognised by TLC as an important feature of the landscapes we manage, and TLC 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 cultural heritage values on the Reserve.

Cairn with inbuilt storing site circled. Photo: Bruce Hay

Indicator	Current status	Trend
Cultural heritage sites are documented and mapped	European cultural heritage sites have been documented. Indigenous heritage sites have not been documented yet.	Improving

Progress in 2016-17

- TLC Staff member Bruce Hay documented his extensive knowledge of European history and heritage sites at the Reserve. Mapping is still to be completed.
- 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

Key recommendations for future management

- 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.

Community engagement

Key objective(s)

- Increasing number of people accessing the Reserve are engaged in TLC activities.

Status 2016-17
On-track

Strategy description

The aim of this strategy is to engage with the Central Highlands community and the wider Tasmanian community.

Five Rivers Reserve provides excellent opportunities for the community to engage with TLC and conservation through recreation, education and scientific research, where this has minimal impacts on values. Visitor infrastructure at Five Rivers includes camping platforms at Skullbone Plains. Activities that pose a threat to the natural values are controlled or prohibited. All visitors to TLC Reserves are asked to take measures to ensure that weeds and diseases are not introduced to the Reserve.

Bequesters trip to Skullbone Plains in Nov 2016. Photo P Roach

Indicator	Current status	Trend
# events at the Reserve	4 events	Increase
# of volunteer activities at the Reserve	21 vol activities	Increase
# of research and education projects	5 projects	Increase

Progress in 2016-17

- A large number of people continue to visit the Five Rivers Reserve, with World Heritage listed Skullbone Plains a major drawcard.
- 4 events held were: TLC hosted bequester trip in November 2016 attended by 16 people, UTAS "Protected Areas Planning" field-based course Jan 2017 - 20 students, TAFE Tasmania orienteering course - 15 students. Plus a major Crowd Funding 'Loo with a View' Campaign attracting donations from 127 participants. Plus 17 additional events through Reserve Mgt and Science & Planning team programs
- 8 volunteer events included: 30 Wildland Students from the USA participated in wombat surveys in February 2017, ecological monitoring with 4 volunteers, 2 weeding trips, 2 roadwork trips, 1 ptunarra butterfly survey, 1 sphagnum rehab trip.
- Research projects were wombat mange study, UTAS Hons mammal project at Skullbone Plains, invertebrate sampling of sphagnum, Miena Cider Gum and Clarence Galaxias surveys
- Riverfly Tasmania continues to take clients to the Reserve to access trout fishing in the WHA

Key recommendations for future management

- Continue to identify opportunities for volunteers to assist with reserve management and monitoring activities and ensure this information is included in the volunteer policy.
- Continue to work with a diverse range of stakeholders to create opportunities for community access and engagement with Five Rivers Reserve.
- Continue to work with TAC on developing a guided walk through trawtha makuminya and Skullbone Plains.