Appendix K

Fire Management Plan

Vista Gold Australia Pty Ltd

Mount Todd Project Area

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Attachment K1 – Fire History Report (2010-2019)

Attachment K2 – Fire Scars by Year Report (2011-2020)

Abbreviations

AWS	Automatic Weather Station
BOM	Bureau of Meteorology
EMS	Environmental Management System
ERP	Emergency Response Plan
FMP	Fire Management Plan
Km	Kilometres
MMP	Mining Management Plan
MODIS	Moderate Resolution Imaging Spectroradiometer
MTPA	Mt Todd Project Area
NT	Northern Territory

1. Introduction

The Mt Todd Project Area (MTPA) site is located approximately 55 km northwest of Katherine and 250 km south of Darwin in the Northern Territory and has a sub-tropical climate with distinct wet and dry seasons. The area surrounding the MTPA is rural and sparsely populated. The Werenbun community is the closest residential area located approximately 6.5 km from the site. The Stuart Highway, the main arterial road in the region, is located west of the mine site.

1.1 Purpose

This Plan forms part of the Environmental Management System (EMS) for the MTPA and is considered a working document. It has been be updated following formal consultation and assessment by Department of Primary Industry and Resources (DPIR) as part of the mining authorisation process.

The Fire Management Plan (FMP) has been developed to provide a framework for the management of fires across and adjacent to the mine site. Fire has the potential to impact on the environment and/or on MTPA assets.

This document will be reviewed and updated regularly, in consultation with pastoralists, traditional owners and other relevant stakeholders.

1.2 Objectives

The FMP has been created to minimise potential impact in relation to fires. The main objectives are to:

- Protect cultural heritage sites, assets, biodiversity and people from controlled and uncontrolled fires;
- Detail procedures to be implemented to reduce potential for fires;
- Establish consultation procedures for controlled burns; and
- Provide bushfire control procedures and responses.

Fire Management Objectives and Targets set by Vista Gold for MTPA are outlined in ***Table 1-1 Fire Management Objective***.

Table 1-1 Fire Management Objective

Objective	Targets	Indicator
Improve land quality via improved fire management	• Increase the ecological value of 1,900ha of land surrounding MTPA as part of the offsets strategy	Field surveys of land quality
Reduction of bushfire risk prior to bushfire season.	• Maintain clear, continuous firebreaks around infrastructure prior to the commencement of the Dry Season. • Undertake controlled burns when required. • Ensure compliance with NT Bushfires permitting requirements and appropriate notification and liaison with relevant parties, including local pastoralists.	Number of fire related incidents reported.

1.3 Associated Management Plans

The FMP specifically applies to fire, however consideration of the management of fire is also addressed in several other sub-management plans including:

- Flora and Fauna Management Plan;
- Waste Management Plan;
- Weed Management Plan; and
- Emergency Response Management Plan.

1.4 Legislation and Guidelines

The NT *Bushfires Management Act 2009* establishes the legal framework and responsibilities for bushfire management in the Northern Territory. The fundamental principle established by the *Bushfires Management Act 2009* is that the responsibility for bushfire management rests with the landholder. A key consideration when clearing native vegetation is that there are minimum standards for firebreaks along boundary and internal fence lines.

Additional Northern Territory legislation applicable to fire management at the mine site includes:

- *Bushfires Management Regulation 2005;*
- *Fire and Emergency Act 1996;* and
- *Fire and* Emergency Regulations *2011*.

2. Existing Environment

2.1 Ecological Context

Changing fire regimes is a major threatening process in Australian ecosystems. The changes vary with location, and some areas have very infrequent fires whilst others have very frequent or very large and intense fires. Many areas now have less spatial heterogeneity in burning pattern than is desirable. The aerial extent of altered fire regimes has been identified as one of the key indicators for biodiversity in the State of the Environment report.

2.2 Fire Danger Ratings

Fire danger ratings are a standardised scale used by the Bureau of Meteorology (BOM) to indicate the danger of a fire should it occur or the difficulty in putting out any fires. The level is based on wind, temperature, humidity and rainfall. A summary of the fire danger ratings is provided in ***Table 2-1 Fire Danger Ratings***.

Table 2-1 Fire Danger Ratings

Key	Fire Rating	Fire Behaviour and Risks	BOM Recommendations
	Catastrophic	• Fire will threaten without warning. It will be very hard to see, hear and breathe. • Fire may be uncontrollable and fast moving. Embers will start spot fires, often kilometres ahead of the main fire. • Highly likely that unprepared people will suffer serious or life-threatening injury. • Property in the fire's path is likely to be destroyed (even well-prepared homes). • Wide-scale power, telephone and water supply failure likely. • Do not expect a fire truck or firefighters to attend.	• Leave your property early in the day. It is not safe to stay and defend even with the best-prepared property in catastrophic conditions. • Listen to a battery-powered radio tuned to ABC local radio to keep updated with the situation throughout the day.

Key	Fire Rating	Fire Behaviour and Risks	BOM Recommendations
	Extreme	• Fire will threaten suddenly and it will be hot, windy and difficult to see, hear and breathe. • Fires will be fast moving and very difficult to control. Burning embers will start spot fires. • There is potential for property in the fire's path or homes under ember attack to be lost. • People may suffer serious or life-threatening injury. • Only very well-prepared homes that are solidly constructed will be likely to offer any safety. • Expect power, telephone and water supply failure. • Do not expect a fire truck or firefighters to attend.	• If you are leaving your property, do so early in the day. • If your bushfire survival plan permits the decision to stay and defend your home, only do so if it is prepared to the highest level and constructed to withstand bushfire, and you are physically able to do so. • Listen to a battery-powered radio tuned to ABC local radio to keep updated with the situation throughout the day.
	Severe	• Fires will burn unpredictably and may be difficult to control. Embers will be blown around. • It will be dangerous and uncomfortable to be outside. • There is potential for property in the fire's path or homes under ember attack to be lost. • People may suffer serious or life-threatening injury. • Only very well-prepared homes that are solidly constructed will be likely to offer any safety. • Expect localised power, telephone and water supply failure. • Do not expect a fire truck or firefighters to attend.	• If you are leaving your property, do so early in the day. • If your bushfire survival plan permits the decision to stay and defend your home, only do so if it is prepared to the highest level and constructed to withstand bushfire, and you are physically able to do so. • Listen to a battery-powered radio tuned to ABC local radio to keep updated with the situation throughout the day.
	Very High	• Fires can be difficult to control. Embers may be blown around. • Loss of property and injury is less likely, but significant damage could occur. • Well-prepared homes and substantial buildings can offer safe shelter. • Some local infrastructure may be temporarily unavailable.	• If you are leaving your property, do so early in the day. • If your bushfire survival plan permits the decision to stay and defend your home, only do so if it is prepared to the highest level and constructed to withstand bushfire, and you are physically able to do so. • Listen to ABC local radio to keep updated throughout the day.

Key	Fire Rating	Fire Behaviour and Risks	BOM Recommendations
	High	• Fire can be controlled. • Loss of property is unlikely but damage may occur. • Well-prepared homes and substantial buildings can offer safe shelter.	• Listen to ABC local radio to keep updated throughout the day. • Know how and where to get further information if required.
	Low-Moderate	• Fire can be easily controlled. • Little risk to life and property.	• Listen to ABC local radio to keep updated throughout the day. • Know how and where to get further information if required.

2.3 Fire Tracking

Fire tracking is an important tool in determining seasonal fire threat at the MTPA. Several internet based systems provide details on the fire forecast, watch and act notices, official emergencies and tracking maps. The websites will be reviewed and information assessed to determine threat to site personnel. A summary of the fire tracking details is provided in ***Table 2-2 Fire Tracking and Alert Systems***.

Table 2-2 Fire Tracking and Alert Systems

System	Website	Information	Monitoring Frequency
Bureau of Meteorology – Fire Forecast Katherine area.	http://www.bom.gov.au/nt/forecasts/fire-forecast-summary.shtml	Fire forecast for the region on a daily basis.	As required
Bushfires NT	https://securent.nt.gov.au/alerts	Department of Land Resource Management summary of fire locations and issues 'Watch and Act' procedures.	
ABC Website – Summary of Alerts and Warnings	ttp://www.abc.net.au/news/emergency/state/nt/ /	Official warnings will be issued through the ABC as and when released.	
North Australia Fire Information – Bushfire Map	http://www.firenorth.org.au/nafi3/	Mapping of hotspots and fire scars in the area.	
Secure NT – Bushfire Map:	http://www.securent.nt.gov.au/	Bushfire tracking map.	

2.4 Climatic Conditions

Climatic conditions in northern Australia have a significant effect on the ability of bushfires to spread. Frequent and extensive fires are a consequence of the region's monsoonal climate, with marked summer wet season and a long and warm dry season. The wet season generates heavy growth of grasses and other vegetation, and the dry season creates the tinder-dry, fine fuels for fires.

Detailed descriptions of climatic factors are provided in the Mine Management Plan (MMP). Following is a short summary of climatic factors relating to fire risk at the site.

The MTPA experiences a sub-tropical savannah climate with hot, humid wet season lasting from November to April followed by a hot dry season lasting from May to October. The average annual mean minimum and maximum temperature range from 13.3 to 23.2°C and 32.7 to 39.5°C, respectively. The higher temperatures are generally experienced from October to March (corresponding with higher rainfall in the region).

Rainfall events display a distinct wet season/dry season pattern with the majority of rainfall experienced between the wet season months of November to March and no to minimal rainfall during the remaining months.

Wind direction and speed has been monitored on-site from 2011 when an Automatic Weather Station (AWS) was installed. Wind illustrates distinct seasonality, with the dry season dominated by south-easterly trade winds and the wet season dominated by north-westerlies as an effect of the Australian Monsoon. Stronger wind is experienced during the dry season within wind speed between 0 – 8m/s recorded whilst during the dry season wind speed between 0 – 5.5m/s.

In conclusion, high temperatures that coincide with low humidity and high fuel load increase the potential of ignition and therefore fire risk.

2.5 Fire Regime

A 'fire regime' is defined as the history of fire events at a point in the landscape. The current fire regime in the Yinberrie Hills is dominated by large-scale late-dry-season fires. At the MTPA, the majority of fires occur in April and May each year. Late season burns (as late as October) have however occurred on occasions over the last 10 years.

In April and May of 2019, the majority of the MTPA (approximately 95%) was last burnt. Over the last 10 years an average of approximately 70% of the site is burnt each year, with some areas being each year.

Attachment K1 - Fire History Report (2010-2019) and ***Attachment K2 Fire Scars by Year Report (2011-2020)*** provide additional data and detail on the distribution and frequency of fires at the MTPA over the last 10 years.

It should be noted that the fire scar data in these reports are derived from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor on the NASA Terra and Aqua satellites.

3. Fire Management

Fire management refers to bushfires, building fires and machinery/plant fires. These events have potential to impact site personnel, adjacent land users and biodiversity.

The Emergency Response Coordinator in accordance with the Emergency Response Plan (ERP) will be responsible for managing fires with the MTPA and assist outside the mine site if required.

3.1 Bushfire Influences

Bushfires are significantly influenced by climate conditions. In addition, the following can impact on fire spread on the day:

- Wind: increased wind speeds are experience around ridge lines/slopes with the downwind slopes experiencing lower wind speeds.
- Aspect: Northern and western facing slopes will burn quicker due to the slopes generally being drier from increased solar radiation.
- Slope: every 10º increase in angle doubles the rate of spread due to the fire travelling a shorter distance to reach unburnt fuel.

3.2 Bushfire Management Methodologies

If bushfires are deemed likely to impact on the construction or operation of the mine, bushfire management methods will be implemented. Personnel will have sufficient training to manage bushfire management methods prior to implementing. Bushfire management methods include direct or indirect attacks as detailed in ***Table 3-1 Bushfire Attack Methodologies (Source: ACT Fire & Rescue, 2011)***.

Table 3-1 Bushfire Attack Methodologies (Source: ACT Fire & Rescue, 2011)

Attack Method	**Details**	
Direct Attack		
Head Attack	Attacking the bushfire from the head of the fire (front and progressing direction). Only recommended for low intensity fires.	
Flank Attack	Attack the fire from its side flanks and attempt to extinguish and progress to the head of the fire.	
Parallel Attack	Establishing a control line in front of the fire using tools to reduce potential fuel load. The line is to restrict advancement of the fire across the control line.	
Equipment	**Advantages**	**Disadvantages**
• Water contained in knapsacks or tankers, or in hose lines from a static water source. • Bull dozers and other earth moving equipment.	• Less area is burnt • Fuel is removed from the immediate path of the fire, allowing the earliest possible control	• Firefighters working at the fire's edge can be exposed to heat and smoke • An irregular control line has to be constructed in a short

Attack Method	Details	
• Hand tools such as axes, rake hoes and chainsaws.	• Parts of the fire edge that may have gone out may be quickly incorporated into the fire line.	time (if the fire's perimeter is irregular) • Fences and natural barriers may present obstacles • Patrol of the constructed control line can be difficult
Indirect Attack		
Indirect Attack	Back burning from a safe distance to the bushfire to eliminate fuel sources. This method is recommended for high intensity fires.	
Equipment	**Advantages**	**Disadvantages**
• Water contained in knapsacks or tankers, or in hose lines from a static water source.	• Ability to control intense bushfire • Reduces exposure of firefighters to the effects of bushfire • Allows choice of better locations for control lines. • Allows more time for control line construction.	• Size of the fire is increased • Increased size gives a greater area to be controlled and patrolled leading to a greater chance of the fire breaking through the control lines. • Fuel between the fire and the control line may have to be backburned. The two fires joining may result in intense fire activity at the junction zone (where the fires meet). • Increased chance of spotting

3.3 Firefighting Equipment

A mobile firefighting unit will be located on site for fighting fires. A number of fire hydrants will also be located around the MTPA to manage fire around infrastructure. Water storage facilities on site can be a source of water and small pumps and hoses can be utilised for fire fighting fires within the site. If required, water trucks on site will also be a resource for firefighting.

3.4 Key Activities, Risks and Impacts

The MTPA key activities and potential environmental impacts for fire have been listed in ***Table 3-2 Activities, Risks and Impacts for the Site***.

Table 3-2 Activities, Risks and Impacts for the Site

Activity	Potential Environmental Impact	Residual Risk Level		
Bushfire, caused by either onsite fire event or external events	Fragmentation or loss of habitat or food resources over a wide area, rendering habitats for listed	Minor	Unlikely	Very Low

Activity	Potential Environmental Impact	Residual Risk Level		
	threatened species unsuitable for periods of time.			
	Disturbance or loss of vegetation with potential for change in vegetation composition, including simplification in structure and diversity.	Minor	Unlikely	Very Low
	Impacts to Gouldian Finch	Major	Unlikely	Medium
	Personnel fatality or injury.	Critical	Unlikely	High
Personnel impacted by fire or explosion. This includes equipment and substance fire and explosions. This may occur during construction or operations. Mining operations fires would typically involve mobile equipment fires. Processing plant fires would typically involve fixed plant fires. This also includes the gas fired power generation plant and high-pressure gas pipeline.	Personnel fatality or injury.	Critical	Unlikely	High
	Asset Damage	Critical	Unlikely	High

3.5 Fire Management Objective

Fire Management Objective and Target set by Vista Gold for MTPA are outlined in ***Table 3-3 Fire Management Objective***.

Table 3-3 Fire Management Objective

Objective	Target	Indicator
Reduction of bushfire risk prior to bushfire season.	• Maintain clear, continuous firebreaks around infrastructure prior to the commencement of the Dry Season. • Undertake controlled burns when required. • Ensure compliance with NT Bushfires permitting requirements and appropriate notification and liaison with relevant parties, including local pastoralists.	Number of fire related incidents reported.

3.6 Mitigation Measures

Mitigation measures have been developed to minimise potential impacts associated to fire management. The mitigation measures, timing and responsibilities are provided in ***Table 3-4 Mitigation Measures***.

Table 3-4 Mitigation Measures

ID	Mitigation Measure	Timing	Responsibility
Site Induction			
FR1	Site induction includes the following components for fire management: • Awareness of potential bushfire risks across the MTPA; • Requirements for reporting bushfires or incidental fires in close proximity to the mine site; • Responsibilities in fire management; • Environmental emergency preparedness and response; • Hot works permitting system (restricted to hot work areas); • Management procedures/stop work requirements; and • Location of permitted smoking areas.	Site Induction	All personnel
General Management			
FR2	Permanent site personnel to undertake fire control training, including the correct use of extinguishers.	At all times	All personnel
FR3	All vehicles to carry fire extinguishers and UHF radios.	At all times	All personnel
FR4	Installation of signage to identify fire hazards and permitted smoking areas.	At all times	Area Managers
FR5	Annually collaborate controlled burns activities with stakeholders including: • Parks and Wildlife Commission; • Traditional Owners (Jawoyn); • Local Pastoralists; and • Northern Territory Emergency Service – Local Volunteer Unit.	Prior to April (end of wet season)	Environmental Manager
FR6	Storage of flammable and combustible materials will be in accordance with the Hazardous Substances Management Plan and legislation. Open flame or other ignition sources are prohibited within 20m of bulk flammable storage areas, fuel dispensing vehicles or refuelling operations and activities in hazardous atmospheres.	At all times	Area Managers

ID	Mitigation Measure	Timing	Responsibility
FR7	If “hot work” is to be undertaken in any area where a potential fire hazard exists or in areas designated as a potential fire risk by contractor in the risk assessment, a ‘Hot Works’ permit is required. In addition, a fire watcher or fire warden shall remain on watch for a minimum of 30 minutes after completion of the hot works. The “hot work” risk assessment will use Australian Standard AS 1674.1 Safety in welding and allied processes – Fire precautions to determine the required controls will be implemented.	At all times	Area Managers
FR8	Firefighting equipment will be inspected, maintained and tested routinely.	As required	Emergency Response Coordinator
FR9	Inspections of landfill and waste management practices to identify potential accumulation of combustible materials and associated risks prior to April.	Prior to April	Emergency Response Coordinator
FR10	Fire detection and suppression systems, fire extinguishers and firefighting training.	At all times	Area Managers
FR11	Dedicated firefighting equipment and trained personnel for fire management.	At all times	Emergency Response Coordinator
Bushfire			
FR12	Monitor the fire Danger Rating for the Katherine Region (http://www.bom.gov.au/nt/forecasts/fire.shtml).	At all times	Emergency Response Coordinator
FR13	Bushfires will be managed in accordance with the Emergency Response Plan.	At all times	All personnel
Building Structure Fire			
FR14	Building structure fires will be managed in accordance with the Emergency Response Plan and the FMP (this document).	At all times	All personnel

ID	Mitigation Measure	Timing	Responsibility
Machinery/Plant Fire			
FR15	Machinery or plant fire will be managed in accordance with the Emergency Response Plan and the FMP (this document).	At all times	All personnel
FR16	Vehicles maintained and serviced at regular intervals to reduce potential of fire related to engines or exhausts.	At all times	Area Managers
FR17	No machinery left running unattended.	At all times.	All personnel
Firebreaks			
FR18	Maintain a clear and continuous firebreak of 10m minimum around infrastructure including: • Processing Plant; • Gatehouse; • Explosives Magazine; and • Camps.	Prior to April (end of wet season)	Environmental Manager
FR19	Maintain fire breaks (4m wide minimum) around the perimeter of the mining lease and other fire prone areas are maintained prior to commencement of the dry season	Prior to April (end of wet season)	
FR20	Vegetation growth around assets is controlled during the wet season through the application of herbicides and then removal		
Landfill Burning			
FR21	Controlled burns are held at the landfill site as necessary to control amount of putrescible and windblown waste. The burn will be undertaken in accordance with the Waste Management Plan.	At all times	Environmental Manager
Controlled Burns			
FR22	Identify areas with high fuel loads requiring controlled burns. Liaise with Traditional Owners, local pastoralists and Bushfires NT prior to burning.	Prior to May	Emergency Response Team Environmental Manager

ID	Mitigation Measure	Timing	Responsibility
FR23	Controlled burns are undertaken in accordance with the recommendations of the Conservation Commission of the Northern Territory (CCNT), Mt Todd Gold Mine Environmental Management Plan, Nitmiluk Park Rangers, Werenbun Community and Jawoyn Association (Envirotech Monitoring, 2016)	At all times	Environmental Manager
FR24	Permits are acquired to burn prior to conducting controlled burns	At all times	Environmental Manager
FR25	Implement patchy burns of low scorch height wherever practicable.	At all times	Emergency Response Coordinator
FR26	No fire to be lit during designated fire bans. Fire ban status can be checked at: http://www.bom.gov.au/nt/warnings/index.shtml.	At all times	All personnel
Monitoring and Inspections			
FR27	Incident report to be completed following any fire related incident.	At all times	All personnel
FR28	Firefighting equipment and infrastructure will be maintained, inspected and serviced.	Monthly	Emergency Response Coordinator Safety Officer
FR29	Active working areas and fuel storage locations will be regularly inspected to determine if there are any developing fire risks.	As required	Emergency Response Coordinator
FR30	Annual FMP performance review.	Annual	Environmental Manager
FR31	Firebreaks will be included into an environmental workplace inspection program. They will be regularly inspected to determine if there are any developing fire risks.	Monthly	Environmental Manager
FR32	Continuous monitoring of fire danger ratings	At all times	

3.7 Trigger, Action and Response Plan

The Trigger, Action and Response Plan (TARP) outlines remedial actions and responses to the situation. The levels of incidents are outlined in ***Table 3-5 Trigger, Action and Response Plan***.

Table 3-5 Trigger, Action and Response Plan

Responsibility	Situation			
	Standard	**Level 1**	**Level 2**	**Level 3**
	Firebreaks maintained. Equipment sufficiently maintained. No bushfires or planned fires within the vicinity of the Project.	**Trigger:** Inspection identifies elevated risk due to activities or firebreaks not maintained.	**Trigger:** Bushfire within the vicinity of the mine.	**Trigger:** Unplanned fire at the mine.
Site Personnel	• Maintain awareness of potential bushfire risks across the MTPA. • Maintain vigilance against potential outbreaks of fire in work areas.	Onsite personnel should: • If a work specific risk, personnel should mitigate the situation to reduce/eliminate the risk. • Notify the respective Supervisor and/or Area Manager of the elevated fire risk.	Onsite personnel should: • Maintain safe distance from bushfire. • Report bushfire to Emergency Response Coordinator.	Contact the Site Emergency Response Coordinator and attempt to extinguish the fire if safe to do so.
Area Managers	• Maintain a clear and continuous firebreak of 10m minimum around infrastructure. • Vehicles maintained and serviced at regular intervals. • Continue controlled burns of landfill. • Firefighting equipment will be inspected, maintained and tested frequently. • Inspections of landfill and waste management practices to identify potential accumulation of combustible materials. • Active working areas and fuel storage locations regularly inspected to determine if they are increasing fire risk.	• Maintain a clear and continuous firebreak of 10m minimum around infrastructure. • Firefighting equipment will be inspected, maintained and tested. • Log incident.	• Monitor bushfires through the procedures outlined in section 2.4 and on ground inspection to determine risk to site personnel. • Provide updates to personnel within vicinity of the bushfire and inform of requirements (i.e. stop work). • Log incident.	• Utilise firefighting equipment at incident. • Undertake incident investigation and support the implementation of corrective and preventative actions. • Comply with reporting requirements

4. Reporting, Auditing and Review

- As part of the onsite environmental workplace inspection program Vista Gold will continue to conduct environmental workplace inspections on its own and subcontractor work areas to assess environment performance and fire management will be part of the assessment;
- Records and related documents will be audited periodically to ensure that work that has been laid out in the FMP has been undertaken and captured.
- Management documentation, for example plans and procedures, will be reviewed periodically to ensure that they remain applicable to current operations and compliant with Vista Gold's requirements and that of the regulatory authorities;
- Updates in relation to fire management on site will be provided in Vista Gold's monthly report as required.

5. Document Management

It is important that accurate records be kept for planning but also for audit purposes. The FMP will be in place for the duration of the MTPA. It will also be relevant for the cleanup and rehabilitation of areas no longer required once the gas plant has been completed. The FMP will be reviewed yearly or as required if changes are identified.

Fire related documents and procedures will be kept up to date and available for review and audit when required.

6. Environmental Training and Education

Selected personnel will be trained in firefighting methods to ensure that MTPA assets and the environment are protected to the best extent possible. Vista Gold will also ensure that employees, contractors and visitors receive appropriate environmental awareness training. This will be achieved through induction training and site-wide training. Records of training content and attendance will be maintained. Employees and contractors required to undertake work at the site must undergo an environment, health and safety induction.

Attachments

Attachment K1- Fire History Report (2010-2019)

Territory Natural Resource Management

Northern Territory Government

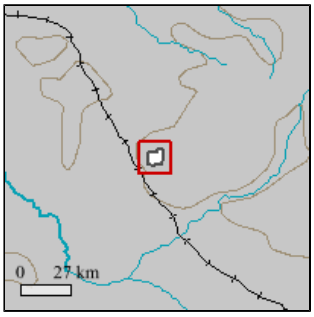
CHARLES DARWIN UNIVERSITY

Mt Todd Project Area

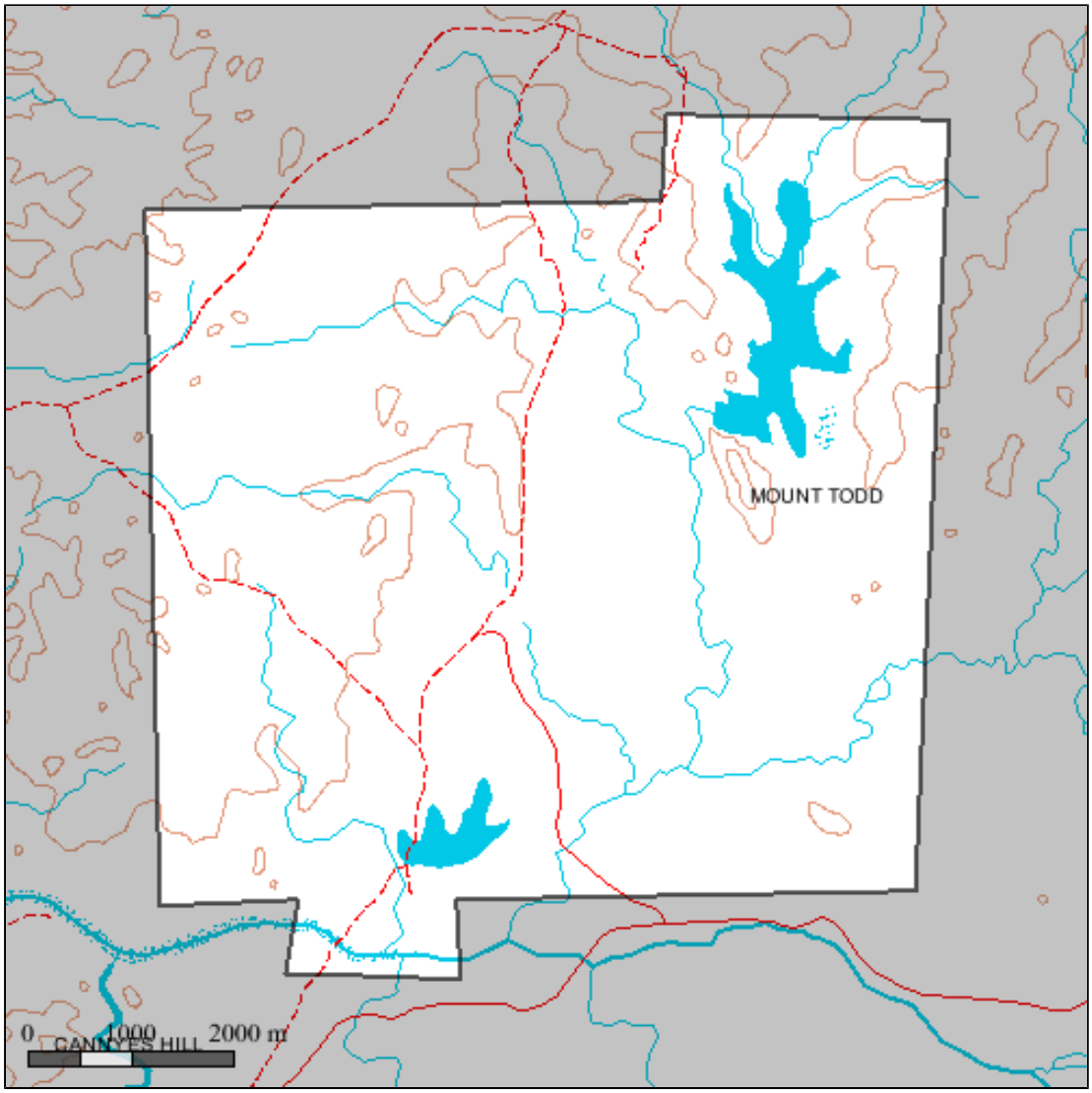
Fire History Report

Mt Todd Project Area

Mt Todd Project Area encompasses an area of 52.13 sq km extending from 14 deg 5.0 min to 14 deg 10.0 min S and 132 deg 4.0 min to 132 deg 9.0 min E.
Mt Todd Project Area is located in the Pine Creek, bioregion(s)



Location of Mt Todd Project Area

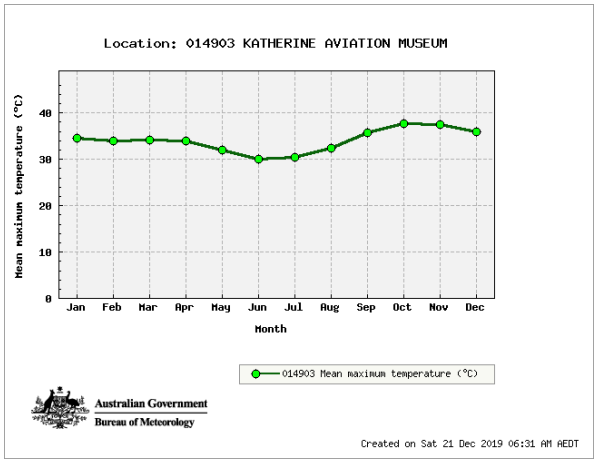


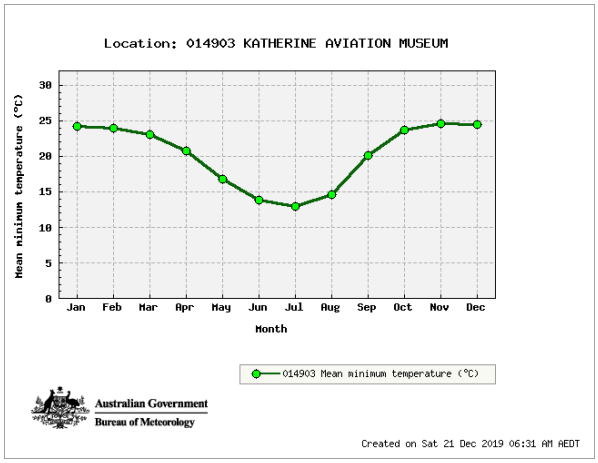
Mt Todd Project Area Climate

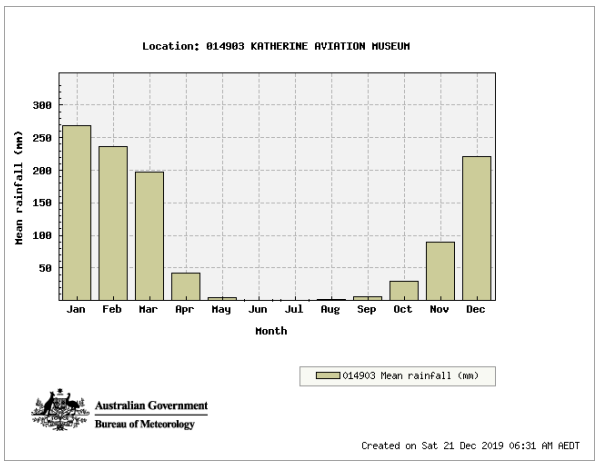
The closest long-term weather station is KATHERINE AVIATION MUSEUM (14 deg 26.0 min S, 132.2737E) 38 km SE of the center of selected area

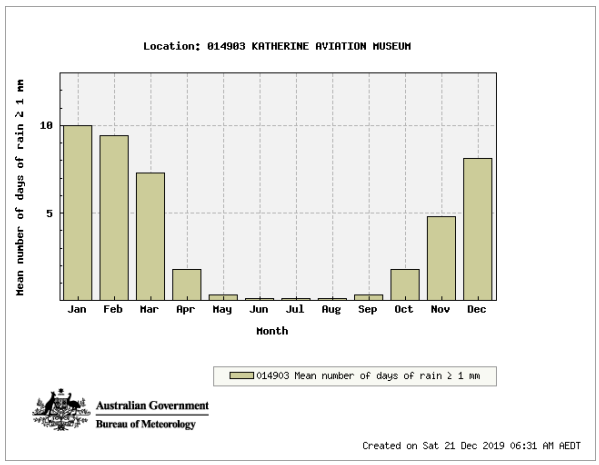
Statistics	Annual Values	Years of record
Mean max temp (deg C)	34.0	27
Mean min temp (deg C)	20.3	27
Average rainfall (mm)	1134.8	37
Average days of rain	44.1	44

Climate summaries from Bureau of Meteorology (www.bom.gov.au)



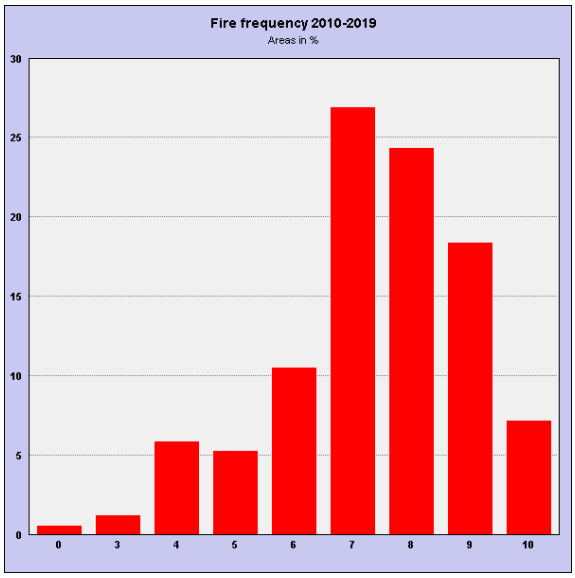






Mt Todd Project Area Fire History

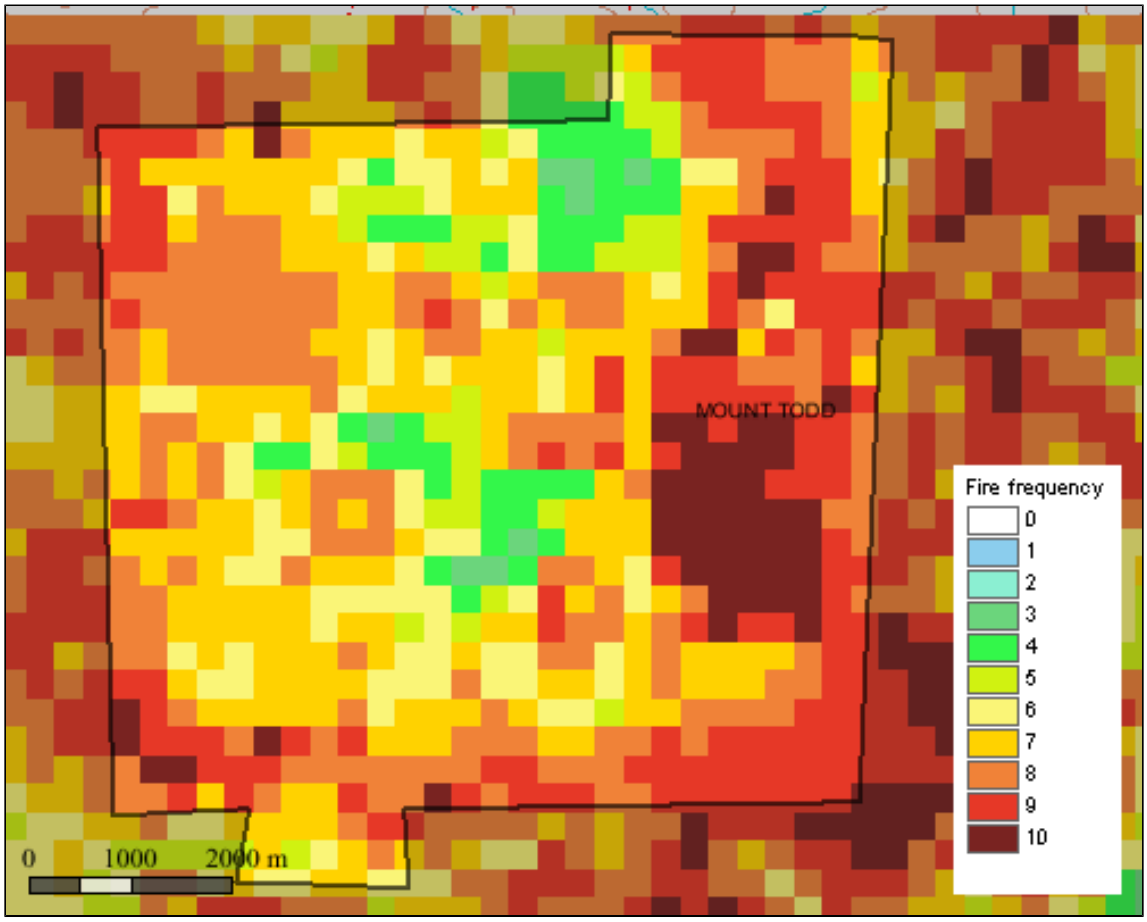
Fire frequency 2010-2019



area burnt in each fire frequency category 2010-2019

Category	Area sq km	Area%
0	.28	.53
3	.62	1.20
4	3.04	5.82
5	2.75	5.28
6	5.46	10.47
7	14.01	26.88
8	12.68	24.32
9	9.58	18.37
10	3.72	7.13

Fire frequency 2010-2019

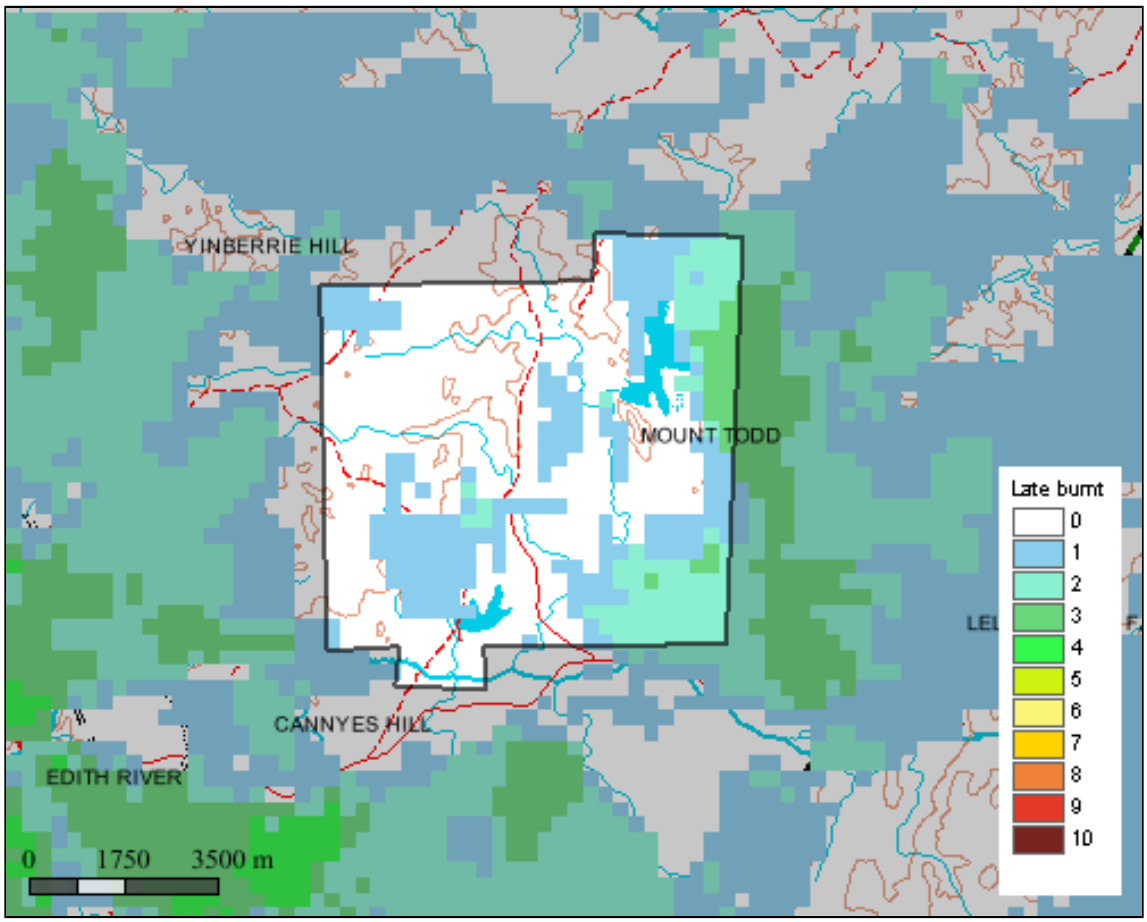


The fire frequency(250m) Layer is derived from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the NASA Terra satellite
Spatial Resolution: 250m x 250m pixels (at Nadir).

Late fire frequency(after July 31) 2010-2019

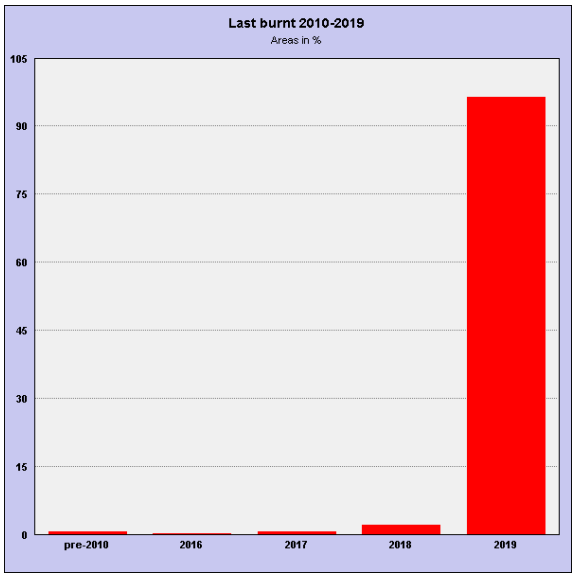
area burnt in each late fire frequency category 2010-2019

Late fire frequency 2010-2019



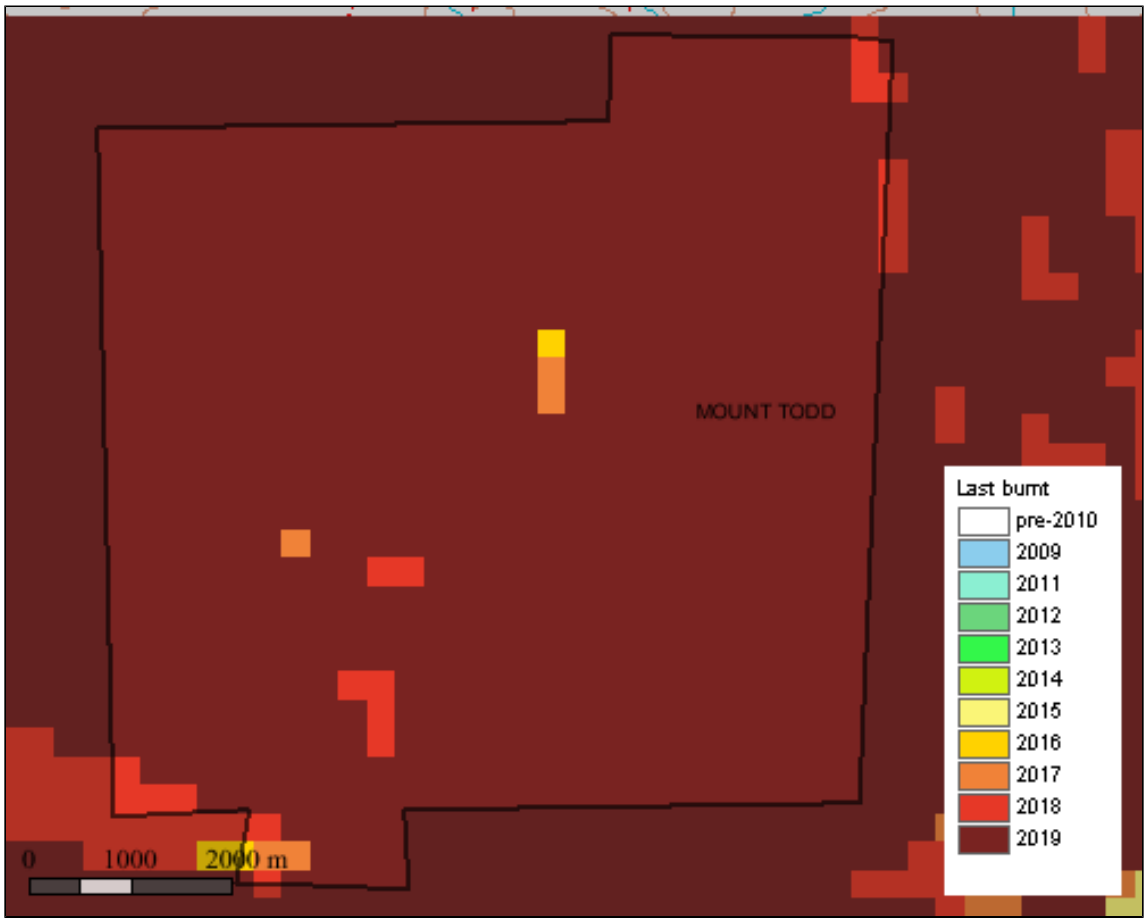
The fire frequency(250m) Layer is derived from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the NASA Terra satellite
Spatial Resolution: 250m x 250m pixels (at Nadir).

Year last burnt 2010-2019 and area of each year category



Category	Area sq km	Area%
pre-2010	.28	.53
2016	.10	.19
2017	.37	.70
2018	1.08	2.07
2019	50.31	96.50

Year last burnt 2010-2019



The fire frequency(250m) Layer is derived from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the NASA Terra satellite
Spatial Resolution: 250m x 250m pixels (at Nadir).

Soils and vegetation graphs and tables refer to area of soils and vegetation only. Fire graphs and tables refer to entire selected area including sea if present. Calculations are derived from map images or vector data, and should be taken as a guide only. Accuracy cannot be guaranteed. For small areas, figures should be rounded to the nearest whole number.

Fire map layers used in these reports have been updated in 2018 so their pixels are aligned to the same grid.

Attachment K2- Fire Scars by Year Report (2011-2020)

Mt Todd Project Area

Fire Scars by Year Report

Report generated from Infonet website (www.ntinfonet.org.au) on 5 June, 2020.

About the fire scar data used in these reports

The fire scar data in this report are derived from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor on the NASA *Terra* and *Aqua* satellites. Spatial Resolution: 250m x 250m pixels (at Nadir).

Areas where suitable fire scar mapping exists for reporting:

- northern WA and Qld down to 20 degrees S
- the entire NT

Full metadata descriptions are available by downloading the fire history and fire scar data from NAFI. Go to the "Download Data" area in the menu.

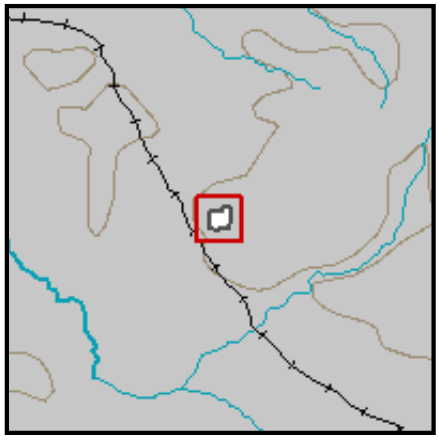
About the sources of uncertainty in this report

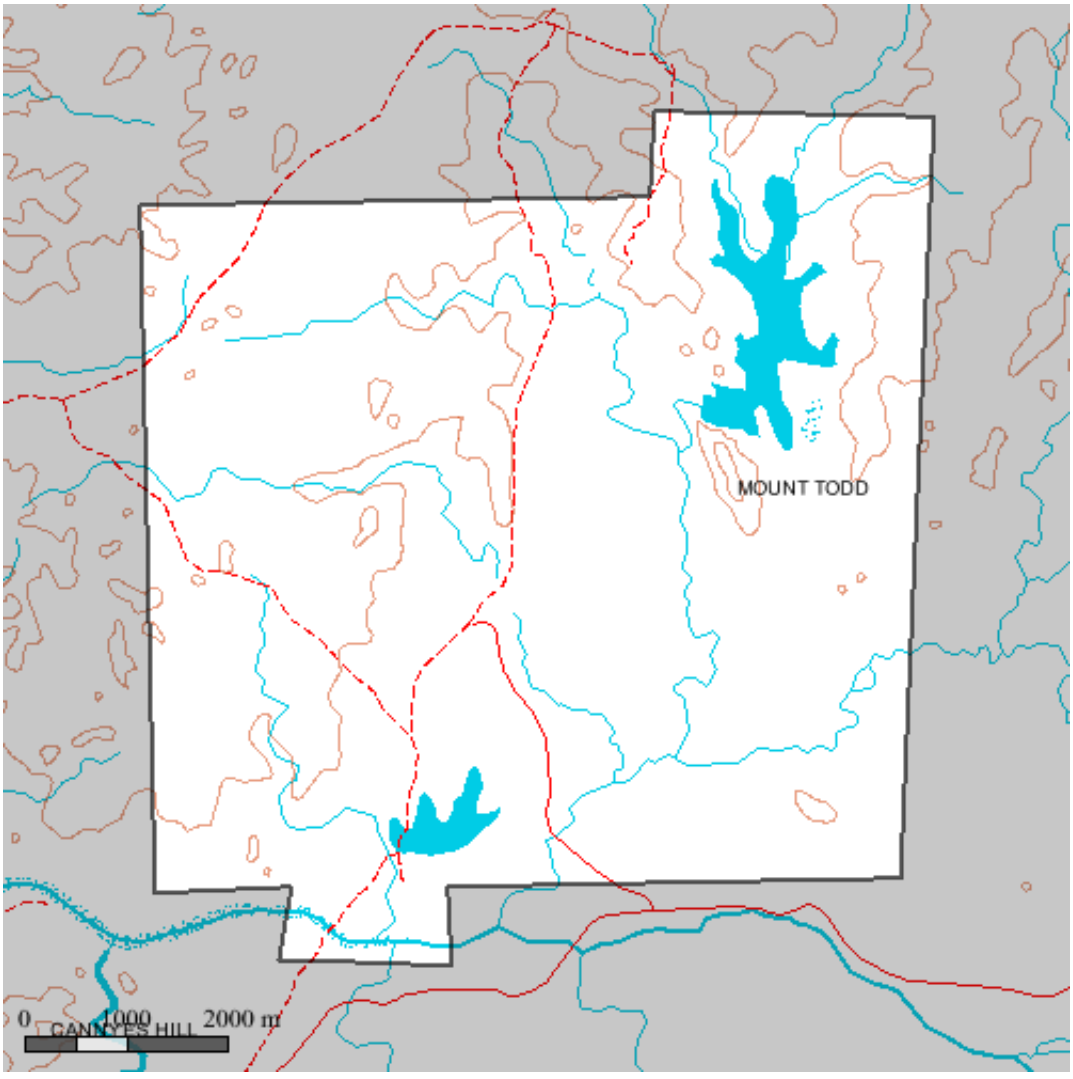
The most recent fire scar mapping in the open savanna country north of 20 degrees S has been validated using waypoints collected along aerial transects in various locations throughout the 2012 fire season. Surveys involving over 6,000 waypoints showed the fire scars were 88% accurate.

The area estimates for selected areas and the consequent estimates of areas burnt as a % of the selected areas are dependent on algorithms that use pixel-based area measurements and, for hand-drawn selected areas, may in error by up to 2% depending on the shape drawn.

Location Map for Mt Todd Project Area

Mt Todd Project Area encompasses an area of 52.13 sq km extending from 14 deg 5.0 min to 14 deg 10.0 min S and 132 deg 4.0 min to 132 deg 9.0 min E.
Reports are based on data recorded from the highlighted area.





Note

Fire scar areas by year

Current Year	Area sq km	Area %
Jan	.0	.0
Feb	.0	.0
Mar	.0	.0
Apr	13.9	26.7
May	6.7	12.9
Jun	.0	.0
Jul	.0	.0
Aug	.0	.0
Sep	.0	.0
Oct	.0	.0
Nov	.0	.0
Dec	.0	.0
Unburnt	31.5	60.4
Total area: 52.1	**Total area burnt: 20.6**	**Total area burnt % : 39.6**
2019	**Area sq km**	**Area %**
Jan	.0	.0
Feb	.0	.0
Mar	.0	.0
Apr	15.6	29.9
May	34.7	66.6
Jun	.0	.0
Jul	.0	.0
Aug	.0	.0
Sep	.0	.0
Oct	.0	.0
Nov	.0	.0
Dec	.0	.0
Unburnt	1.8	3.5
Total area: 52.1	**Total area burnt: 50.3**	**Total area burnt % : 96.5**
2018	**Area sq km**	**Area %**
Jan	.0	.0
Feb	.0	.0
Mar	.0	.0
Apr	34.5	66.3
May	.1	.2
Jun	1.9	3.6
Jul	.0	.0
Aug	.0	.0
Sep	.0	.0
Oct	.0	.0
Nov	.0	.0
Dec	.0	.0
Unburnt	15.6	29.9
Total area: 52.1	**Total area burnt: 36.5**	**Total area burnt % : 70.1**

2017	Area sq km	Area %
Jan	.0	.0
Feb	.0	.0
Mar	.0	.0
Apr	7.8	15.0
May	20.7	39.6
Jun	2.2	4.2
Jul	3.2	6.1
Aug	.1	.1
Sep	.0	.0
Oct	.0	.0
Nov	.0	.0
Dec	.0	.0
Unburnt	18.2	34.9
Total area: 52.1	Total area burnt: 33.9	Total area burnt % : 65.1

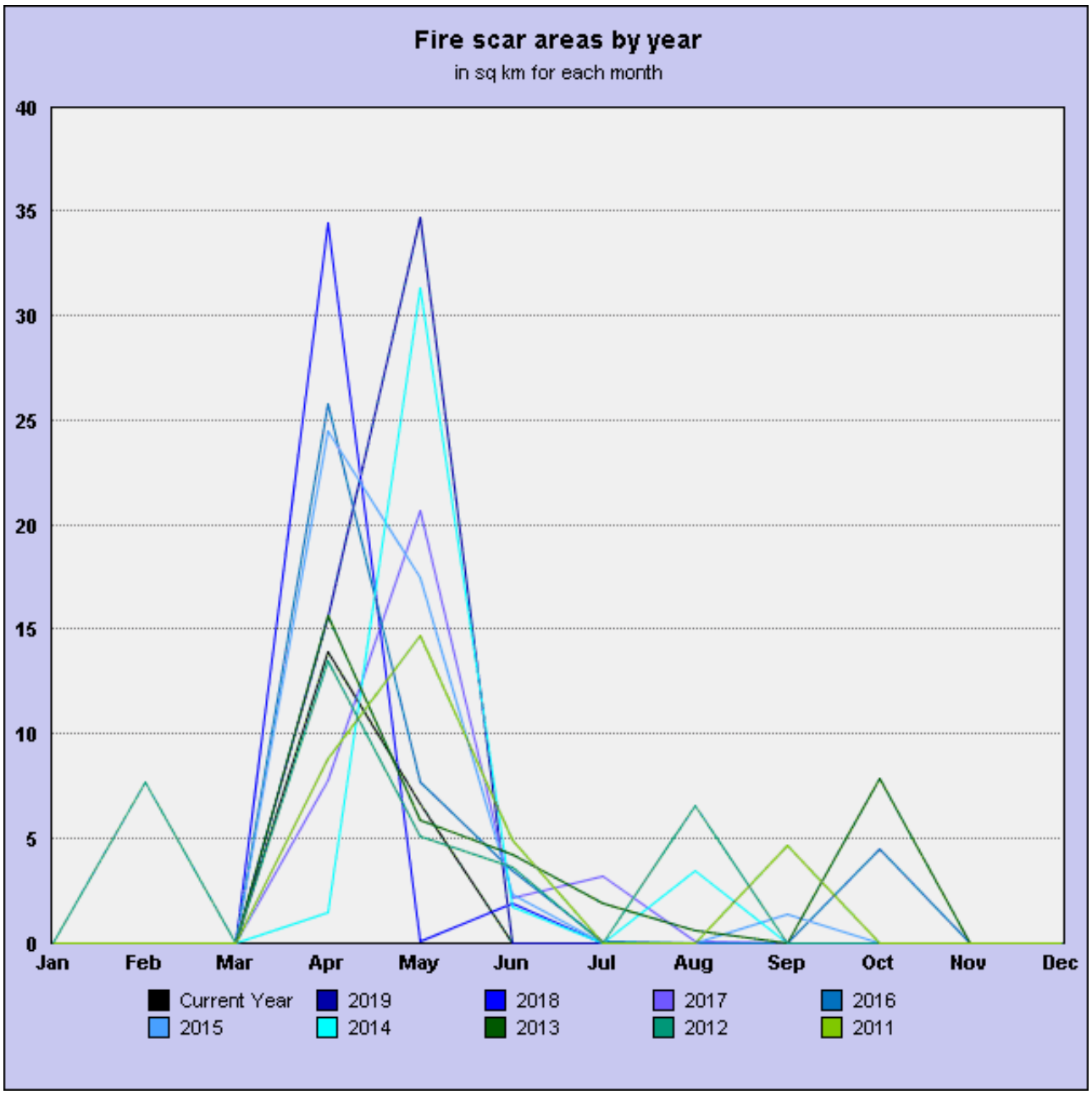
2016	Area sq km	Area %
Jan	.0	.0
Feb	.0	.0
Mar	.0	.0
Apr	25.8	49.6
May	7.7	14.8
Jun	3.5	6.6
Jul	.1	.1
Aug	.0	.0
Sep	.0	.0
Oct	4.5	8.7
Nov	.0	.0
Dec	.0	.0
Unburnt	10.5	20.1
Total area: 52.1	Total area burnt: 41.6	Total area burnt % : 79.9

2015	Area sq km	Area %
Jan	.0	.0
Feb	.0	.0
Mar	.0	.0
Apr	24.5	47.0
May	17.5	33.6
Jun	2.3	4.4
Jul	.0	.0
Aug	.0	.0
Sep	1.4	2.7
Oct	.0	.0
Nov	.0	.0
Dec	.0	.0
Unburnt	6.4	12.3
Total area: 52.1	Total area burnt: 45.7	Total area burnt % : 87.7

2014	Area sq km	Area %
Jan	.0	.0
Feb	.0	.0
Mar	.0	.0
Apr	1.5	2.9
May	31.3	60.1
Jun	1.7	3.2
Jul	.0	.0
Aug	3.5	6.7
Sep	.0	.0
Oct	.0	.0
Nov	.0	.0
Dec	.0	.0
Unburnt	14.1	27.0
Total area: 52.1	Total area burnt: 38.1	Total area burnt % : 73.0

2013	Area sq km	Area %
Jan	.0	.0
Feb	.0	.0
Mar	.0	.0
Apr	15.7	30.1
May	5.9	11.4
Jun	4.2	8.1
Jul	1.9	3.6
Aug	.6	1.2
Sep	.0	.0
Oct	7.9	15.2
Nov	.0	.0
Dec	.0	.0
Unburnt	15.9	30.4
Total area: 52.1	Total area burnt: 36.3	Total area burnt % : 69.6
2012	Area sq km	Area %
Jan	.0	.0
Feb	7.7	14.7
Mar	.0	.0
Apr	13.5	25.9
May	5.1	9.8
Jun	3.6	6.9
Jul	.0	.0
Aug	6.6	12.7
Sep	.0	.0
Oct	.0	.0
Nov	.0	.0
Dec	.0	.0
Unburnt	15.6	29.9
Total area: 52.1	Total area burnt: 36.5	Total area burnt % : 70.1
2011	Area sq km	Area %
Jan	.0	.0
Feb	.0	.0
Mar	.0	.0
Apr	8.8	16.8
May	14.7	28.2
Jun	4.9	9.4
Jul	.0	.1
Aug	.0	.0
Sep	4.7	9.1
Oct	.0	.0
Nov	.0	.0
Dec	.0	.0
Unburnt	19.0	36.4
Total area: 52.1	Total area burnt: 33.2	Total area burnt % : 63.6

Period	Monthly Averages sq km	Monthly Averages %
Jan	.0	.0
Feb	.8	1.5
Mar	.0	.0
Apr	16.2	31.0
May	14.4	27.7
Jun	2.4	4.6
Jul	.5	1.0
Aug	1.1	2.1
Sep	.6	1.2
Oct	1.2	2.4
Nov	.0	.0
Dec	.0	.0
Unburnt	14.9	28.5
Yearly Average Burnt	**37.2**	**71.5**



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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
REV0	John Ross	James Hill		Nicole Conroy		08/09/2017
Rev 1	James Hill	Jill Woodworth		Jill Woodworth		16/11/2017
Rev 2	Brent Murdoch	John Rozelle		Brent Murdoch		31/11/2018
Rev 3	Julia Curran	Jill Woodworth		Brent Murdoch		June 2020

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