

Technical appendices

Wildlife (Animals)

Technical appendices – Flying-fox heat stress guideline

These technical appendices support and should be read in conjunction with the Department of Environment and Science's (department) document 'Flying-fox heat stress guideline'.

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Technical appendices – Flying-fox heat stress guideline

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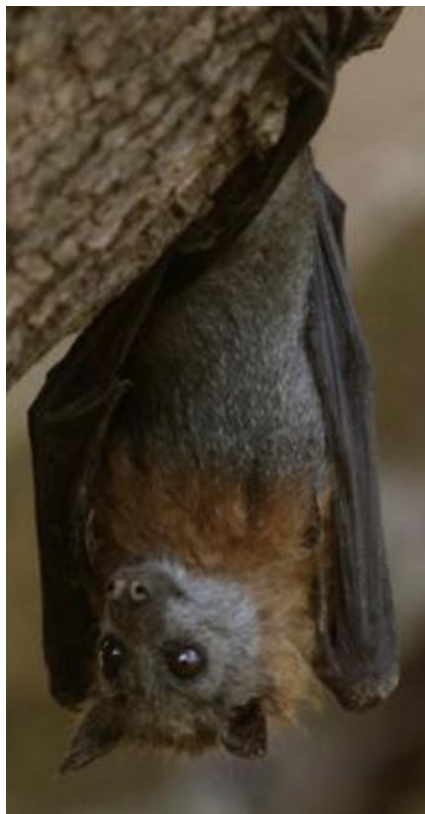
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1 Behavioral monitoring

1.1. Category 1 – Normal behaviour



- A sound understanding of 'normal' behaviour (classified as category 1) will aid in the detection of abnormal behaviour and in assessing when a heat stress event (HSE) response is going to be required.
- The time of year, ambient temperature and relative humidity should always be considered as an essential part of information when interpreting any behaviour related to heat stress events.
- The proportion and demographics of animals carrying out heat stress response behaviours are also important (i.e. only pregnant/lactating females fanning, versus the entire colony fanning). Pregnant and lactating females may start fanning at temperatures as low as 23°C due to the higher metabolic demands of their physiological state at those times.
- Whilst observing this fanning behaviour is important and can act as an early warning sign of arising issues, it is also important to note that these behaviours can be quite normal in animals not under stress.
- Behavioural progression from animals showing signs of heat stress through to heat stroke will always follow a predictable consistent progression. (Snoyman et al. 2012). This progression is described in sections 1.1 to 1.5 of this document.

Figure 1 Normal behaviour – Photograph – Mandi Griffith

1.2. Category 2 – Wing fanning



- Wing fanning is a normal cooling behaviour in response to the first signs of heat stress.
- It is conducted to increase the flow of cooler air over the wing membranes where the dilated blood vessels full of warmed blood can cool from radiant cooling.
- This can start at temperatures as low as 23°C-30°C, depending on the physiological status of the individuals within the camp and the relative humidity within the camp environment.
- Monitoring the proportion of flying-foxes carrying out this behaviour in the camp and any progression needs to be noted at this point.

Figure 2 Wing fanning – Photograph Mandi Griffith

1.3. Category 3a – Clustering

- Flying-foxes start to move down the trees into the middle-storey of vegetation at the camp. Thermal imaging has revealed that by doing this flying-foxes are seeking to move to cooler microclimates within the vegetation at the camp (Welbergen et al. 2012).
- Flying-foxes will continue to fan during this time and if temperatures continue to rise, they will begin panting and wrist-licking.
- The proportion of flying-foxes at the camp carrying out this stage of behaviour should be monitored.
- It must be stressed that whilst the monitoring of flying-foxes at and from this stage is warranted, the flying-foxes should **not** be disturbed.
- These flying-foxes are moving to cooler microclimates where they will have a better chance of surviving the heat stress event, while continuing to use body reserves of water by fanning and licking extremities and utilising evaporative cooling. Imposing additional stress by human intervention during this stage could compromise these efforts, potentially causing flying-foxes to succumb to heat-stroke and possibly death.



Figure 3 Clustering – Photograph by Sonya Stanvic

- It must be emphasised that consideration of the proportion of flying-foxes carrying out heat-stress response behaviours is most important when monitoring camps during a heat-stress event. There may be some individuals in extreme stress or even dying at the base of trees while the rest of the animals in the camp are still in stage 3a (clustering) and continuing to cope within their physiological limits.
- Moving in and removing or tending to a relatively small number of flying-foxes in distress may cause the rest of the colony to lift or experience increased heat-stress, potentially leading to 100s if not 1000s of unnecessary deaths.

1.4. Category 3b – Clumping (roosting on top of each other – looking for cooler microclimates within the camp)

This can occur:

- on the shaded side of trees
- under logs
- in the understorey
- in tree hollows
- at the base of trees
- on the ground.

These clumps may consist of over 50 individual flying-foxes (Stanvic et al. 2013¹).

At this stage flying-foxes should not be approached for spraying with water, as many would not be able to tolerate spraying at this point.

Once most of the animals at the camp have reached this stage of heat-stress (i.e. >70%, apparently requiring a heat-stress event response) this should be communicated to members of the response team and a base camp set up for a response if the sensitivity of the roost, its location and available resources allow.

1.5. Category 4 – Panting/wrist licking at the bottom of trees



Figure 4 Clumping – Photograph by Mandi Griffith

- At this stage a heat-stress response should have been triggered and a response site should already be set up ready to go if conditions for intervention are suitable for the site.
- Flying-foxes start to pant and lick their wrists en masse. The ambient temperature has continued to rise and clumping in cooler microclimates and wing fanning appears to have failed to lower their core body temperatures.
- Wrist licking and panting is utilised as a means of using evaporative cooling to lower core body temperatures:
 - in high humidity heat events, this is hampered by the high humidity affecting the ability of bodily fluids to evaporate and cool the body
 - in low humidity heat events, this will be very effective at cooling the body, however it will be extremely taxing on the animals, as flying-foxes will start to dehydrate quickly
 - this is why high and low humidity events require a different approach to the use of water spraying.
- Flying-foxes will become highly dehydrated, hypoglycaemic and disorientated due to the effort of fanning and heat stroke starting to affect internal organs and body functioning.

- Flying-foxes will move to the bottom of the trees and those with no mid-storey may fall from the upper canopy with severe heat stroke.
- At this stage, monitoring needs to be undertaken very carefully.
- Rescuers need to very cautiously approach flying-foxes at the base of trees to monitor for any signs of distress and flying-foxes trying to lift off. Rescuers then must move away as quietly as possible to avoid flying-foxes lifting at this critical stage

¹ Stanvic, S., McDonald, V., Collins, L. (2013) Managing Heat Stress in Flying-Fox Colonies ([Managing Heat Stress in Flying-foxes Colonies \(fourthcrossingwildlife.com\)](http://fourthcrossingwildlife.com))

- Any seizing animals should be taken for euthanasia **only** if a person, licenced by the Queensland Department of Health in wildlife euthanasia and sedation practices, is available **and** other nearby flying-foxes are not stressed or show signs of lifting on the approach of humans.



Figure 5 Wrist licking – Photograph Mandi Griffith



Figure 6 Collapse – photograph Mandi Griffith

2 Heat stress event – Response logistics

Each camp is unique, however, the overall approach to HSE responses should be the same. What on-site features need to be identified at a HSE site? What resources and equipment needs to be on standby? How do we enact their availability?

Feature	Details	Enaction
Site access permission & Landholder support	Access approval (best arranged pre-event), identification of any existing planning and response documentation.	Obtain maps/mud maps of all camps to identify approval needs.
Access logistics	Locked gates, parking, footpaths or tracks, no-go zones, maps/ fences.	Obtain maps/mud maps of all camps to identify the following site features: <ul style="list-style-type: none"> • local amenities • each group to take mud map and using triage logistics, prepare a plan, including site controller position and sign on, any barriers to protect members of the public, information signage, evacuation points and triage setup.
Health and safety	<ul style="list-style-type: none"> • Needs to be identified in roles – under induction/site controller and first aid officer. • Headquarters/operative tent, inductions, sign in-out sheets, first aid, drinking water, shade, wash station, PPE. • Sanitary amenities. Part of any pre-plan for a rescue site is to identify amenities close by (e.g. shopping centres, service stations, private residences). • Evacuation points. 	HSE Roles (See Section 3 of this document).
Infrastructure	Water, power, shade structures, toilets.	
Resources	<ul style="list-style-type: none"> • Backpack sprayers, water trucks. • Marquee, shade structure, trestle tables. 	<p>If available to site, assess in advance and enact use as soon as possible after the response is initiated.</p> <p>Care should be taken with the use of generators, and the associated noise, to avoid stressing flying-foxes.</p>
Rescue and care	<ul style="list-style-type: none"> • Triage area, rescue / transport access and process. • Rescue Equipment – cages, poles/nets, wraps. 	Refer to section 3 of this document.
Drivers	<ul style="list-style-type: none"> • Transportation of animals to veterinarians, wildlife hospitals and carers. • Can also deliver supplies needed for wildlife rescue as well as items needed to support responders (e.g. additional water, food). 	Have on standby when HSE are predicted and inform when responses are initiated.

Receiving sites/Treatment facilities	Veterinarians and/or wildlife hospitals on standby.	Have on standby when HSE are predicted and inform when responses are initiated.
Rehabilitators	Carers to receive animals after veterinary assessment and treatment.	Tracking of animals post heat stress treatment – refer to the ‘flying-foxes rehabilitated post care’ section of the template within section 5 of this document.
Body disposal	Landholder and/or local government involvement.	Request.
Existing documentation	Create a template based on information included adapted to your camp and group.	Prepare in advance.

3 Roles

Successful HSE responses require many and varied roles requiring differing skill and fitness levels.

Note:

- The roles listed in section 3.1 of this document which are underlined and marked with an asterisk (e.g. triage personnel*) delineate roles which require a person to be vaccinated against the Australian bat lyssavirus (ABLV).
- The roles listed in section 3.1 of this document which are **not** underlined and marked with an asterisk delineate roles which do **not** require a person to be vaccinated against ABLV.
- Ensure that, where possible, the camp has been divided in quadrants, and thumb tags supplied with colours corresponding to quadrants that flying-foxes are taken from. The identification (ID) numbers on the tags are then included in the records kept for the HSE response, and the tags must stay with the flying-fox throughout any care/veterinary treatment.
- Ensure that the site inductor and/or coordinator assigns rescuers and sprayers to designated quadrants so that any flying-foxes can be identified if any human/flying-fox contact incident occurs.

3.1 Detailed role delineation

3.1.1 Site inductor/Incident controller/Scribe–

- Where possible, there should be one incident controller, one scribe and one site inductor. Non-vaccinated volunteers can be used to inform members of the public about what is happening and to keep them out of the working site.
- Set up clearly visible barriers to the working site with standardised signage indicating that a heat event is taking place and that only trained and vaccinated personnel are to pass the barriers. If the HSE is on public land (e.g. a park), a small fenced off through-way, away from the camp, may need to be established to keep members of the public away from HSE response activities.
- Where possible, divide the colony into quadrants and assign rescuers and sprayers to designated quadrants.
- Standardised leaflet drops should be made to neighbouring properties.
- Each person on-site must sign in with the site inductor, and provide their current contact details, details of an emergency contact person (e.g. next of kin), vaccination status and role at the site.
- Ensure (and mark off) that everyone has the correct PPE for their role on site (e.g. hat, gauntlets, nitrile gloves, long sleeves and pants, gators and sturdy shoes).
- Collate the numbers of animals brought in for triage, including the sex, age and species.
- Record the approximate number of:
 - flying-fox deaths at the site and deaths during triage, recovery or transport.
 - flying-foxes taken into triage and ID numbers

- flying-foxes that go to veterinary care and where they were taken.
- Get tag colours and ID numbers of flying-foxes, prior to being taken into care and where in the colony that flying-fox was taken from.
- Record the temperatures and interventions of the rescuers, as well as the timing and duration of sprays and responses of the flying-foxes.
- Record the number of flying-foxes going to veterinary care and the relevant ID.
- Record responses to sprays (e.g. positive or negative) for future response tailoring.
- Recruit volunteers to record details of flying-foxes coming into triage, vital signs and treatment given prior to going to veterinary care. Ensure that all flying-foxes coming into triage have some form of ID tag.
- Record any human first aid incidences and follow-up to ensure that appropriate action has been taken.
- Ensure that when volunteers/carers leave the site they sign-off.

3.1.2 Coordination and communication

- This may be done by non-vaccinated people.
- Monitor the flying-fox heat stress forecaster and communication channels.
- Coordinating teams of people to respond to those camps with the greatest need.
- Support personnel.
- Local government liaison.

3.1.3 Triage area set up and pack up

- This may be done by non-vaccinated people.
- Support personnel.

3.1.4 Food and water provision

- This role may be done by non-vaccinated people.
- Ensure that adequate water and food is at each site. Each person responding will need a minimum of 3-4 litres of water available depending on time spent at the site.

3.1.5 Carers on standby*

- Ability to triage and rescue flying-foxes will be limited by how many vaccinated carers are available to take on heat-affected flying-foxes post veterinary assessment.
- Need to have an idea of the capacity and availability of carers able to take on adults as well as juveniles affected in a HSE response.

3.1.6 Safety officer/Human first aid officer

- This person should hold a first aid certificate.
- Must have access to a well-equipped first aid kit(s).
- Must have water for all HSE response participants on-site (e.g. large water containers for refilling backpack water containers and other drinking water containers).
- Include ice vests if available.
- Ensure that HSE response participants are rotating out of the heat into shaded areas.
- Pull out anyone not coping or becoming faint and unwell, etc.
- Record the time that each rescuer started working and when they finished.
- Ensure that each rescuer is wearing appropriate PPE for their task.
- Record any injuries sustained.
- Record any scratches or bites and identify the quadrant that the flying-fox came from, in addition to the ID number of the specific flying-fox involved.
- Record each person entering the response site, including their contact details, emergency contact person (next of kin), vaccination status and allocated role(s).

- Mark off that they have been given the appropriate level of PPE for their role.
- Record any human health incidents using the appropriate safety forms, and sign personnel out when they leave.

3.1.7 Colony monitors

- Preferably, people who know the colonies and flying-fox behaviours well or have been trained in HSE event site monitoring.
- Monitor the colony leading up to and during the heat event.
- Advise rescuers and sprayers of the need to intervene and timing of any spraying interventions.
- Monitoring each group of flying-foxes that has been sprayed, and their response to spraying, to determine the need for removing flying-foxes for triage or euthanasia or noting positive responses to spraying.
- Monitoring post event for orphaned juveniles.

3.1.8 Rescuers and sprayers*

- If numbers permit, send rescuers and sprayers to identified specific quadrant areas within the camp, so that all flying-foxes that are returned from those volunteers can be identified with a thumb tag ID to determine which quadrant they came from.
- When advised by colony monitors, rescuers and sprayers will need to remove those animals in need of euthanasia or immediate triage.
- When advised by the colony monitors, rescuers will ascertain if flying-foxes will tolerate spraying. This needs to be carefully monitored as any additional stress at this time could cause lifting and additional stress on the animals, leading to possible death. If tolerated, lightly increase the intensity of water and ensure that flying-foxes are sprayed directly to effectively saturate them. Once achieved, give an interval of 15-minutes, observe and reattempt spraying again up to 3 times, if tolerated. Success is measured by flying-foxes moving back up into the mid-storey.
- Advise monitors and site induction personnel which flying-foxes, from which quadrants of the camp, have been sprayed, when, for how long and how many times they have been sprayed.
- Cease spraying if flying-foxes are showing **any** signs of stress and/or are trying to move away.
- Ideally place thumb tag indicating the quadrant of which colony the flying-fox is from. The thumb tag information identifies the flying-fox for further treatment and to ease tracking if any human exposure issues or flying-fox related quarantine issues arise. This also allows tracking of treatment and responses of flying-foxes, assisting to improve feedback and data on responses.

3.1.9 Triage personnel*

- Ideally need at least one person licenced in wildlife euthanasia and sedation practice by QLD Health.
- Triage and initial stabilisation of flying-foxes delivered from camp by rescuers.
- Triage and stabilisation of orphans.
- Preparation of flying-foxes for transport to veterinary care.

3.1.10 Body removal*

- Any animals euthanised via Lethabarb will need to be separately placed in body bags, and not left on-site.
- Liaise with roost site land management (e.g. relevant local government) for all other deceased flying-foxes.

3.2 Response, Equipment and Setup

3.2.1 Operation set up

Separate the site into zones required for response operations on-site, namely:

- site controller, site induction point, scribe

- triage area
- flying-fox stabilisation and recovery
- rescue supplies and rest areas, including sprayer refill sites
- first Aid areas
- transport preparation area

Set up clear barriers to demarcate zones, including:

- cool zones where non-vaccinated people can be present
- clear hot zones where strictly only vaccinated people can be present.

Ensure that:

- clear signage and barriers are erected to keep members of the public safe
- clear evacuation and exit points are defined in the case of bushfire
- tasks such as water collection, food provision etc. are available for concerned members of the public to assist with, should they choose to.

3.2.2 Site setup equipment

The following list of equipment is recommended for response operations:

- Laminated list of all equipment in relevant containers with checklist for lost/broken/used items
- Community information flyers
- Standardised protocols and role outlines
- AM/FM Radio for emergency updates
- Map of camps and mud map of triage and rescue site locations including possible evacuation points
- Traffic / barricading material to prevent access by unvaccinated persons and members of the public
- Waterless antiseptic hand wash
- Backpack sprayers with extension nozzles
- Saws
- Multi-tools
- Human first aid kits, including snake bite bandages
- ID tags
- Hats or wrist bands to indicate roles in camp
- Cameras/phones for recording flying-fox behaviour
- Water containers (human drinking)
- Backpack water carriers (human drinking)
- Water (spraying flying-foxes)
- Ice vests
- Shade structures
- Foldable chairs
- Trestle tables (induction site, rest sites, first aid)
- Clip boards / iPad (if available) for data recording
- Head lamps
- Flying-fox thumb tags
- Pens, pencils and masking tape for labels
- Suitable PPE (e.g. nitrile gloves, gauntlets, gators, sturdy shoes, face masks)
- Personal care pack, including items such as personal medication and snacks
- Checklist to record equipment needing replacing for further responses
- List of local amenities, service stations, relevant local government contact information.

3.2.3 Triage zone setup

General items

- Standardised protocols and role outlines
- Esky and ice
- Battery operated fans – at least 9 per site
- 3 x Trestle tables– initial triage, fluid table and third for post fluids monitoring.
- Good lighting – halogen lamps
- Spray bottles and tepid water
- Cages – open wire for increased circulation
- Towels – large and small
- Thermometers
- Body bags
- Water – camel backs for people or adequate cool water
- Ice vests
- PPE – gauntlets; nitrile gloves, hats, gators- sturdy shoes and long-sleeved shirts and pants
- Shade structures
- Hand washing stations (tubs)
- Cages – transport and holding
- Head lamps
- Checklist to record equipment needing replacing for further responses.

Consumables

- Syringes of various sizes – 1ml (50 minimum), 3ml (50 minimum) 10ml (50 minimum), 20ml (50 minimum) and 60ml (50 minimum)
- Needles – 25G; 23G; 18 G- 1 inch (100 each minimum)
- 2.5% glucose saline fluid bags (500ml) – 2 minimum (need to be refrigerated after first use)
- Hartmann's fluid bags 1L – 4 minimum
- F10 hand wash
- Vet wrap – 2 x 5cm diameter rolls per response
- Tubigrib – medium 1 x roll
- Fixomul tape – 1 roll
- Self-warming hot packs – pack 50
- Gauze swabs – pack 50-100
- Alcohol swabs (not for cooling) – 1 tub per table (alcohol in cotton balls).

Medical equipment

- Stethoscope
- Pulse oximeter (if funding allows).

Medications

- Only if personnel with valid and current permit are present, trauma carer drug permits (must be stored as prescribed in the *Medicines and Poisons Act 2019*) – Pamlin; Lethabarb; Alfaxan; fluids
- Lockable portable safe
- Betadine
- Flamazine ointment
- False tears / Lacri-lube
- Glucodin powder.

Note:

Where possible, avoid using Hi-Vis vests for identification of people dealing with flying-foxes to avoid distressing flying-foxes. Investigate alternate options such as coloured hats, wrist bands or arm bands. However, this may not be optional as some sites and land managers require Hi-Vis vests when undertaking work on reserves or other locations as part of their WH&S policies. Check with the relevant local government.

4 Risk Assessment and Management Process (RAMP)

This section can be modified to suit the purposes of your particular group, using WorkSafe Queensland risk management resources, available at: <https://www.worksafe.qld.gov.au/> - search: managing risks.

Project risk assessment

This includes a summary of the risk assessment and management process (RAMP), modified from the WorkSafe Queensland website; however, the risk rating will be able to modify activities using the controls that are in place at the activity.

This will include all steps and will show the risk rating before and after controls are added. It is important to ensure the listed controls are in place at the project site and to review the RAMP.

When you encourage other people to participate in an activity, you owe a duty of care to those people. The expectation is that you will take **reasonably practicable** steps to protect them against **reasonably foreseeable** accident or injury (i.e. plan ahead, foresee how people could be harmed, then put measures in place to prevent that from happening).

An example of a simple risk assessment, modified from WorkSafe Queensland, is provided below:

Step 1: Identify hazards

When conducting the RAMP, hazards must be considered from the ability of all responders (e.g. differing levels of experience). This will provide a range of the perceived hazards and risks.

Hazard – *an object, situation or activity that has the potential to cause harm. It is a situation or condition which, if unchecked, could lead to a negative outcome.*

Listed below are some considerations for hazard identification; however, please note that this is not intended to be an exhaustive list and each site needs to be assessed separately:

Consider the site: Is it rough, steep, rocky, slippery, dusty, exposed to sun or wind? Is it thickly vegetated? Are there overhanging dead branches? Are there likely to be snakes, bees, wasps, bull ants or spiders? How far are you from emergency assistance if required? Will members of the public interfere?

Consider the tasks: Do people have to carry heavy or awkward objects? How will they be carried? Will they be exposed to additional hazards entering camps such as snakes, heat stroke? Will they be working near machinery or cliffs or roads or dangerous water? Will unvaccinated people be able to be contained away from the worksite?

Consider the people: Are they skilled and experienced in the work to be done? Are there children who require close supervision? Are there people who are less agile? Do any of the people have pre-existing injuries or medical conditions that could be aggravated by doing the planned tasks?

How could a person be injured? Think about 'these people doing these jobs at this site'. Consider heat-stroke, trips and falls, bites and stings, sunburn and dehydration, back or shoulder strains arising from heavy lifting or from overuse or misuse of tools, or eye injuries caused by twigs or spikes.

Step 2: Assess the risks (analyse and evaluate the risks)

Assess the level of risk each hazard identified poses.

Risk – *The possible harmful effects from interacting with the hazard.*

It is the assessed likelihood and severity (consequence) of the hazard resulting in adverse consequences/harm (e.g. injury, accident).

You need to determine if the risks are acceptable and if the activity can proceed. The assessment of level of risk can also be used to prioritise those risks that require closer management than others. This is done using a standard risk matrix to provide a 'risk rating'.

The risk matrix uses two measures to determine the level of risk:

- Consequence – If an injury occurs what would the likely consequences be?
- Likelihood – how likely is it that a person will be injured, i.e. how likely is the consequence?

Consequence

	Worst probable (realistic) injury/illness
I Insignificant	No injuries
II Minor	On-site First aid needed
III Moderate	Medical treatment needed & loss of time
IV Major	Serious injury, hospitalisation
V Catastrophic	Death or permanent disability

Likelihood

	How likely could the consequence happen?
Rare	Remote (less than once every 5+ years)
Unlikely	Not expected to occur (1-5 years)
Possible	Occurs occasionally (monthly-yearly)
Likely	Occurs regularly (weekly –monthly)
Almost Certain	Expected to occur (daily – weekly)

The level of risk is then obtained by using the 'Risk Matrix' table, located below. Cross reference the likelihood and consequence that has been determined for each risk. For example, a hazard with a Moderate Consequence and Rare Likelihood would be L (Low Risk).

Risk Matrix

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Rare	L	L	L	M	M
	Unlikely	L	L	M	M	H
	Possible	L	M	M	H	H
	Likely	M	M	H	H	E
	Almost Certain	M	H	H	E	E

From the risk matrix, work out the level of risk to determine the level of response as shown below:

Assessed risk		Level of response
E	Extreme	Do not proceed – further controls required to reduce risk
H	High	Requires consultation with the Safety Officer, or if unavailable, a member of the Executive
M	Medium	Team leaders/activity co-ordinator to brief all new volunteers involved in activity about the hazard and safe procedures/risk controls used
L	Low	Standard onsite risk management

Step 3: Treat/mitigate risks

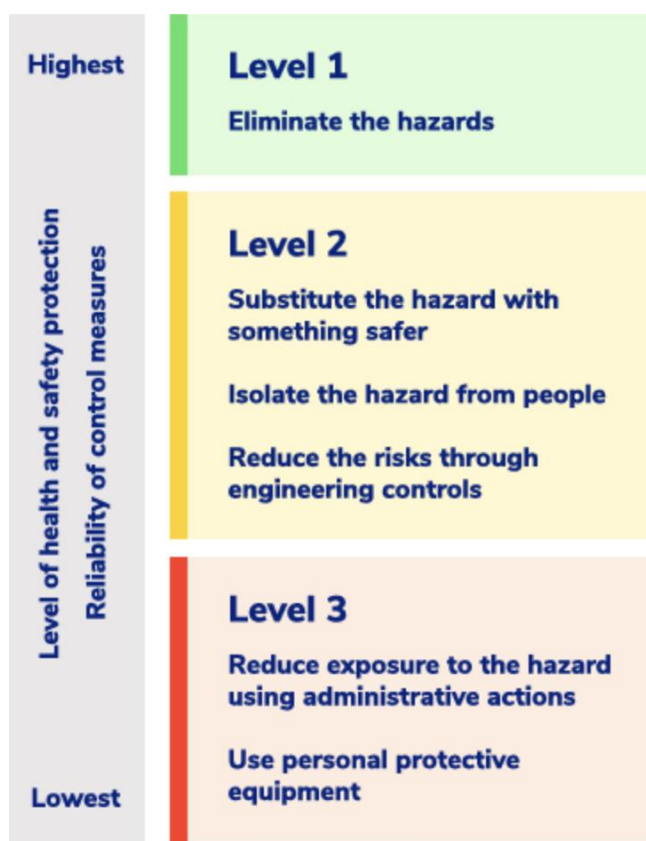
Identify risk control strategies: What will people do, or not do, in order to minimise the chance of harm? Involve everyone in the process; utilise all the eyes and experience the group can offer. Record the agreed strategies on the Risk Assessment Form. Make sure everyone understands what is expected of them.

As low as reasonably practicable (ALARP) principal of risk management is the best approach that most groups should aim to achieve when evaluating risks of attending at heat events (i.e. risk must be balanced against the time, cost and difficulty of taking measures to reduce or eliminate the risk). It is important to ensure that for each risk control, the residual or substitute risk needs to be analysed before implementation (e.g. adding a larger mirror to improve vehicle reversing visibility, but may have the residual risk of reduced forward visibility).

The level of risk can generally be lowered by:

- Reducing the severity of the potential consequences
- Reducing the likelihood of occurrence
- Reducing exposure to that risk.

The 'hierarchy of control', shown below, can be utilised to reduce risks.



Control measures to lower risk are listed below in order of more effective to less effective:

1. **Eliminate** - the hazard altogether (e.g. get rid of the dangerous machine).
2. **Substitute** - the hazard with a safer alternative (e.g. replace the machine with a safer one).
3. **Isolate** the hazard - from anyone who could be harmed (e.g. keep the machine in a closed room and operate it remotely).
4. Use **engineering** - controls to reduce the risk (e.g. attach guards to the machine to protect users).
5. Use **administrative** - controls to reduce the risk (e.g. train workers on how to use the machine safely).

6. Use **personal protective equipment** (PPE) (e.g. wear gloves and goggles).

Step 4: Monitor and review

Supervise and monitor to make sure everyone is sticking to the ‘rules’. Some tasks or people might require closer supervision than others. Be prepared to change any strategies that don’t seem to be working.

5 Heat stress data recording

If the number of personnel available allow, data recording of triage measures taken and responses will give invaluable data to assist in future responses. It is recommended that as much data is filled in as possible.

If you have been involved in a heat event, data collection greatly assists in the refining of protocols and monitoring population effects. Add as much information as you feel you can. If you feel you cannot confidently separate the species by age and/or by sex, the total number (or the number for each species) still provides very important information.

Please send a copy of completed data sheets to:	<ul style="list-style-type: none"> • Dr. Tania Bishop, email: tania8303@gmail.com
	<ul style="list-style-type: none"> • Dr Justin A. Welbergen, email: j.welbergen@uws.edu.au Hawkesbury Institute for the Environment, UWS Hawkesbury Campus, Locked Bag 1797, Penrith, NSW 2751
	<ul style="list-style-type: none"> • Wildlife Health Australia - kmagee@wildlifehealthaustralia.com.au
	<ul style="list-style-type: none"> • Department of Environment and Science – wildlife.management@des.qld.gov.au

Centralised data collection and shared behaviour observations amongst personnel experienced in the assessment of flying-fox behaviours in heat events within a region can also aid the accuracy of a decision to continue to monitor or mount a response.

COLONY:	
<i>Date:</i>	
<i>Time:</i>	
<i>Recorder (Name and Ph Number)</i>	
<i>Temperature and relative humidity</i>	
<i>Location (include map on separate sheet if possible):</i>	
<i>Characteristics of site:</i> <i>(Including vegetation structure (complete / incomplete), recent disturbances access to water and any other relevant information)</i>	
<i>Details of heat stress event:</i> <i>(Including any recorded temperatures, relative humidity and behavioural observations)</i> <i>Please note if you have related video footage / photographs</i>	
<i>Details of methods or management approaches used during the heat stress event. (i.e., monitoring and collecting only; active spraying etc)</i> <i>Also note any responses – positive or negative</i> <i>This will help to modify future responses.</i> <i>NB (note if Video or photographic footage available)</i>	
<i>Observer's name:</i>	
<i>Phone:</i>	
<i>Email:</i>	

ALIVE			
<i>Estimated total number of flying-foxes present:</i>			
<i>Estimated number of flying-foxes present by species:</i>	<i>Grey-headed</i>	<i>Black</i>	<i>Little Red</i>
DEAD			
<i>Estimated total number of flying-foxes that died/ found dead:</i>			
<i>Estimated number of flying-foxes that died /found dead / were euthanised by species, age and sex:</i>	<i>Grey-headed</i>	<i>Black</i>	<i>Little Red</i>
<i>Adult females</i>			
<i>Adult males</i>			
<i>Juveniles</i>			
<i>Unknown</i>			
<i>Comments:</i>			

FLYING-FOXES TAKEN INTO TRIAGE						
<i>Estimated total number of flying-foxes triaged:</i>						
<i>Estimated number of flying-foxes by species:</i>	<i>Grey-headed</i>		<i>Black</i>		<i>Little Red</i>	
<i>Number taken into care:</i>						
FLYING-FOXES REHABILITATED POST CARE:						
<i>Estimated total number of flying-foxes successfully released:</i> (Male / female)	<i>Grey-headed</i>		<i>Black</i>		<i>Little Red</i>	
	<i>Juvenile</i>	<i>Adult</i>	<i>Juvenile</i>	<i>Adult</i>	<i>Juvenile</i>	<i>Adult</i>

POST-MORTEM MEASUREMENTS				
<i>Date:</i>				
<i>Time:</i>				
<i>Location:</i>				
<i>Observer name:</i>				
<i>Phone:</i>				
<i>Email:</i>				
<i>Species (B-GH- LR)²</i>	<i>Sex (M-F)</i>	<i>Forearm (mm)</i>	<i>Body mass (grams)</i>	<i>Comments</i>

² B: Black Flying-fox, GH: Grey-headed Flying-fox, LR: Little Red Flying-fox

Human Rights Act 2019 compatibility

The department is committed to respecting, protecting and promoting human rights. Under the [Human Rights Act 2019](#), the department has an obligation to act and make decisions in a way that is compatible with human rights and, when making a decision, to give proper consideration to human rights. When acting or making a decision under these technical appendices, officers must comply with that obligation (refer to [Comply with Human Rights Act](#)).

Disclaimer

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Science should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Approved By

Ben Klaassen

Signature

30/11/2023

Date

Deputy Director-General
Queensland Parks and Wildlife Service &
Partnerships

Enquiries:
Wildlife and Threatened Species –
Governance and Operational Policy Unit
Email. wildlife.management@des.qld.gov.au