



This Standard Operating Procedure (SOP) is applicable to all UniSQ Research Workers who care for and use Animals for Scientific Purposes. The procedure must only be performed by those persons who have been deemed competent, and who believe they remain competent to do so. Access to supervision by suitably qualified staff whilst undertaking this procedure is encouraged, where required.

Species

Example species that **may be** targeted for nest camera installations are:

- Wedge-tailed Eagle (*Aquila audax*)
- White-bellied Sea Eagle (*Haliaeetus leucogaster*)
- Little Eagle (*Hieraaetus morphnoides*)
- Spotted Harrier (*Circus assimilis*)
- Whistling Kite (*Haliastur sphenurus*)
- Brahminy Kite (*Haliastur indus*)
- Brown Goshawk (*Accipiter fasciatus*)
- Australian Hobby (*Falco longipennis*)
- Peregrine Falcon (*Falco peregrinus*)
- Black kite (*Milvus migrans*)

Purpose

This procedure was written as part of a suite of SOPs for the assessment of various raptor monitoring techniques. Population surveys and monitoring play a key component to many ecological research projects and are an important conservation tool. However, raptor monitoring is time consuming and expensive, resulting in a decline of monitoring raptor species in Australia. The project looks to optimise raptor monitoring by determining the efficacy of various monitoring technologies and techniques available to wildlife conservation. It is important to use traditional methods in concurrence with these novel methods to provide a baseline to compare against.

The purpose of this procedure is to monitor the breeding activities and diet of nesting raptors. It is important to monitor this data to determine:

- Breeding and fledgling success rate of various species. This provides conservation information to determine if the population in an area is likely to increase or decrease.
- Health status of individual eagles – adult, nestling and immature raptors
- Identify the diet of different raptor species in different areas. By identifying diet composition and preference, it is possible to identify the carrying capacity of a given area if the population of the prey items can be estimated.
- To compare this traditional, well-established method with other methods or recording breeding and diet information.

Definitions

Nil.	
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Linked SOPs

SOP ID number	SOP title
RMT010	In-person nest observations

Potential hazard to Research Workers

UniSQ Risk Management Plan ID number	UniSQ Management Plan title
RMP_2021_6165	Raptor monitoring techniques research – fieldwork – nest activities

Personal Protective equipment required

- Climbing equipment (anchors, harness, ropes, helmet, gloves, throw weights, foot ascender)
- Suitable footwear, clothing (forest-coloured browns, greens or greys) and sun protection

Animal wellbeing considerations	
Perceived stressors	Management strategy
Nest abandonment from disturbance of an active nest	In-person observations to be completed from a minimum of 50 metres from the nest. Cameras to be installed a minimum of 50 metres from an active nest. When possible, inactive nests should be used for camera installations. Observers and equipment to be camouflaged and/or strategically placed to minimise disturbance to nesting raptors. Should the raptor parents leave the nest in response to the presence of the observers, the nest should be observed from distance in a hidden location (minimum 200 m) until the parents return. Should the parents not return and there are young present in the nest, a local raptor rehabilitation expert (i.e. has Queensland Government permit to rehabilitate raptors) should be called to come and assess the situation. Further steps should be taken according to the rehabilitator's own procedures. <i>Transmitted footage should be reviewed daily by the researchers in the first two weeks to ensure abandonment has not occurred.</i>
Territorial response from nesting raptor	Should a nesting raptor display a territorial response towards the observers (e.g. swooping, screaming), camera installation must be halted and the area vacated. An alternative nest site and nesting pair of raptors must be selected as a replacement.
Negative interaction between raptors and installed equipment	It is possible that nesting raptors attack installed equipment such as the surveillance cameras, solar panels and camouflage nets. If this occurs, it will likely be captured on camera and transmitted to the observation team. In this case, the equipment must be removed from current location and if a new less obtrusive location cannot be secured, then an alternative nest site and nesting pair of raptors should be selected as a replacement.

The overall perceived level of risk to an animal undergoing this procedure is:

- High
 Medium
 Low

Substances to be administered			
Substance	Dose	Route	Purpose
Not applicable.			

Equipment/ materials required

- Camouflage equipment (e.g. nets, portable bird hide)
- Wireless surveillance camera (either CCTV type or trail camera)
- Batteries and memory card for camera
- Solar panel and cable
- WiFi antenna (when applicable)
- Gorilla camera tripod
- Digital rangefinder
- Water containers (3 L per person)
- Portable first aid kit including snake bandage
- Smart phone with project recording app installed

Site specification or location requirements

Southeast Queensland on properties where the landowner has granted permission and the activity falls within a current Queensland Department of Environment and Science (DES) research permit. Only species listed on a current Queensland DES permit can be monitored using this method.

Waste disposal

Not applicable.

Duration of the procedure

- 30 minutes to 2 hours.

Procedure

Camera setup selection

1. A setup using either bursts of still photographs or video recordings triggered via movement should be selected. This allows for the largest range of analysis of breeding (e.g. parental care, success rate, fledgling, siblicide), diet (items brought to the nest by parents), and insights into activity budgets (e.g. time on nest, hunting, inter and intra species interactions). Single still images can capture some of this information, however they are limited to what is captured at that specific moment.
2. To minimise the number of times a nest location is visited, the cameras should be set up with solar recharging and when possible, remote wireless transmission of data.
3. Video recordings should last for 20 seconds. The camera should be angled so that when, using a low sensitivity setting, will not be triggered by any nestlings, only movement of the adults. This movement will typically be entering or leaving the nest.
4. Locations for camera setup should be selected based on the activity status of the nest. Nests which are active should have overlooking cameras set up at a minimum of 50 metres distance from the nest. Whereas inactive nests can have cameras set up in the tree or structure above the nest. This precaution is to minimise the chance of a breeding pair of raptors abandoning the nest. In both situations, the camera should be camouflaged.
5. Trail cameras should be used for installations in the structure above the nest, whereas CCTV-type cameras with pan, tilt and zoom functions should be used for long-distance installations. Both camera types are available with the option to trigger from movement, programmable duration of recording and a selection of wireless, wired or memory card transmission and recording options.

Camera installation – active nests

1. The camera installation process should follow the same procedure as *RMT010 – In-person nest observations* up until the point of access to a vantage point and physical camera installation.
2. The camera should be installed using a gorilla mount tripod or similar to provide a stable base for recordings. These tripods can wrap around an object, fixing the camera in place. They can also be used as a traditional tripod for ground installations. With ground installations, guide ropes should be fitted to the tripod to secure it in place. For tree installations, a safety line should be attached to the tripod to ensure the camera installation cannot fall to the ground. Camouflage should be added in the form of a temporary bird hide for ground installations or a camouflage net for tree installations.
3. The recharging solar panel should be fitted above the vantage point for tree installations, with angle and direction carefully selected so as not to reflect sunlight and disturb the raptors. For ground installations, the solar panel should be installed behind the bird hide, out of view; care should be taken to ensure the angle of the panel does not reflect glare towards raptors that may be flying in the vicinity.

Camera installation – inactive nests

1. Cameras at inactive nest sites can be installed about the nest in the same tree. The climbing procedure covered in *RMT010 – In-person nest observations* is to be followed. A suitable branch above the nest should be selected to climb, and the camera, tripod, camouflage net and solar panel should be hoisted to this point by the climber using a rope.
2. The camera should be installed using the tripod and tested to ensure the correct field of view, sensitivity and file transmission. It should be disguised using a camouflage net fixed to the tree.

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3. The solar panel should be fitted to the opposite side of the tree. If this side of the tree faces south, an adjacent tree should be used for the solar panel to ensure adequate charging. Care should be taken to ensure the angle of the panel does not reflect glare toward raptors that may be flying in the vicinity.

WiFi antenna installation-permanent installation at university/ partner sites

1. Permanent WiFi antenna installation can be conducted at University or partner-owned locations. This should be set up with adequate antennas to provide coverage for each site. This can be achieved using several long-range antennas, deep charging batteries and solar panels. The number of antennas required will depend on the terrain and canopy cover of the site.
2. Where possible, existing internet connections should be used or upgraded at each site to transmit recordings to a central cloud-based database.
3. The camera should be set up to transmit recordings via this network.

WiFi antenna installation – temporary installation at other sites

1. Temporary installations can be made if the nest is near to a human dwelling, and permission is obtained to install a WiFi antenna at the dwelling and use the occupiers' existing internet connection and power supply. Compensation may need to be provided to the dwelling owner to achieve this.
2. If the camera is out of range of the dwelling antenna, one or more additional antenna installations with solar recharging can be made on the site to boost the range to reach the camera.
3. The cameras should be set up to transmit recordings to the central cloud-based database via the dwelling internet connection.

Video recording at sites without WiFi capability

1. At some sites it will not be possible to set up a WiFi network for video transmissions. At these sites the internal memory cards will need to be used to store the video recordings. The maximum storage capacity possible should be installed, and if required, a lower quality recording setting can be selected to reduce the storage required.
2. Extra careful camera installation and testing at these sites should be completed to minimise false triggers and to set the correct sensitivity. The number of false triggers can be reduced by targeting the camera at the outward edge of the nest and not at the eggs/chicks. This approach should be used at all sites to minimise cloud storage requirements and the quantity of videos that the observer subsequently has to review.
3. If the memory cards run out of space during an active breeding season, they can be replaced at the sites with cameras installed over 50 metres from the nest but will have to remain *in situ* until the end of the breeding season at the cameras installed above active nests.

Malfunctioning wireless camera installations

1. It is possible that issues will develop with the wireless camera installation. This could include issues like a camera pointing in the wrong direction, not transmitting videos or just a build-up of dirt or other material (e.g. cobwebs) on the lens. In cases where the cameras are installed at a vantage point away from an active nest, these issues should be fixed. For the installations above the nest, this will not be possible until the end of the breeding season, and the chicks have fledged the nest.

Video processing and data collation

1. The videos that are sent to the central cloud storage should be viewed weekly in batches, and a range of biological data recorded.
2. Data recorded will include frequency and species of diet items returned to the nest by the breeding pair, the quantity of eggs laid and hatched, quantity or nestlings/fledglings at the nest, inter/intra species conflict, and any re-clutching or siblicide events.
3. The data should be stored on the central cloud server.
4. Data analysis should be performed at the end of each breeding season to provide a summary of the findings and determine their statistical significance.

Training, qualifications or competencies required

Researchers with relevant experience or qualifications may undertake this SOP to complete the required procedures. Student researchers must receive appropriate training and supervision prior to undertaking procedures.

Tree climbing training must be completed with approved training provided prior to the installation of cameras at height in trees.

References

Nil.

Licences and permits

Ensure any required (if required) licences and permits are obtained prior to undertaking the activities covered within this Standard Operating Procedure.

SOP approval and review history			
Date	Version	Review Pathway	Notes
10 February 2022	0.0	02/12/2021 UniSQ AEC "Subject to Modifications." 10/02/2022 Reviewed and approved by the UniSQ AEC Executive	N/A