Standard Operating Procedure

SC25-12 USING ARTIFICIAL NEST BOXES TO MONITOR LITTLE PENGUINS (*EUDYPTULA MINOR*) (FEBRUARY 2026)

Animal welfare is the responsibility of all personnel involved in the care and use of animals for scientific purposes.

Personnel involved in an Animal Ethics Committee approved project should read and understand their obligations under the *Australian code for the care and use of animals for scientific purposes*.

Version 1.2

February 2026

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**

Department of Biodiversity, Conservation and Attractions
Locked Bag 104
Bentley Delivery Centre WA 6983
Phone: (08) 9219 9000

www.dbca.wa.gov.au

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This report/document/publication was prepared by Species and Communities Program, Biodiversity and Conservation Science, Department of Biodiversity, Conservation and Attractions.

Questions regarding the use of this material should be directed to:
Species and Communities Program
Department of Biodiversity, Conservation and Attractions
Locked Bag 104
Bentley Delivery Centre WA 6983
Email: animalethics@dbca.wa.gov.au

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Approved by the DBCA Animal Ethics Committee:

Dr Jacqui Richards
Chairperson, Animal Ethics Committee
Department of Biodiversity, Conservation and Attractions

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1 Acknowledgements

This standard operating procedure was originally developed by Dr Erin Clitheroe and Dr Belinda Cannell, based on methods and techniques used by Dr Barbara Wienecke and Dr Belinda Cannell.

2 Purpose

Artificial nest boxes are a commonly used method for monitoring species that use cavities such as burrows or hollows for nesting and shelter. Little penguins (*Eudyptula minor*) on Penguin Island, Western Australia, have been monitored using artificial nesting structures since 1986 (Figure 1). Artificial nests allow researchers and the Department of Biodiversity, Conservation and Attractions (DBCA) to access nests and collect data without the risk of damaging natural burrows or nesting habitat.

This Standard Operating Procedure (SOP) provides advice on the use of nest boxes for monitoring little penguins (penguins) in Western Australia.

Figure 1 Typical nest box used by little penguins on Penguin Island.

3 Scope

This SOP has been written specifically for scientific and education purposes, and endorsed by the Department of Biodiversity, Conservation and Attractions' (DBCA) Animal Ethics Committee (AEC). However, this SOP may also be appropriate for other situations.

This SOP applies to all fauna survey and monitoring activities involving the use of nest boxes for monitoring little penguins undertaken across Western Australia by DBCA (hereafter

department) personnel. It may also be used to guide fauna related activities undertaken by Natural Resource Management groups, consultants, researchers and any other individuals or organisations. All department personnel involved in use of nest boxes for monitoring little penguins should be familiar with the content of this document.

This SOP complements the *Australian code of practice for the care and use of animals for scientific purposes* (The Code). The Code contains an introduction to the ethical use of animals in wildlife studies and should be referred to for all AEC approved projects. A copy of The Code may be viewed by visiting the National Health and Medical Research Council website (https://www.nhmrc.gov.au/about-us/publications/australian-code-care-and-use-animals-scientific-purposeshttp://www.nhmrc.gov.au/).

4 Animal Welfare Considerations

To reduce the level of impact of nest monitoring on the welfare of penguins, personnel must consider, address and plan for the range of welfare impacts that may be encountered. Strategies to reduce impacts should be identified both prior to, and during, the monitoring season to ensure that they can be readily implemented during field work. Ensure all personnel involved in the project are aware of the range of issues that they may encounter, the options that are available for reducing impacts and improving animal welfare, and the process for managing adverse events.

Department projects involving nest box monitoring will require approval from the department's Animal Ethics Committee. Key animal welfare considerations that should be considered when undertaking nest box monitoring of penguins are listed below and highlighted throughout the document.

4.1 Injury and unexpected deaths

If adverse events including injury, unexpected deaths, or an unplanned requirement for euthanasia occur then it is essential to consider the possible causes and take action to prevent further incidents. Adhering to the guidance in this SOP will assist in minimising the likelihood of adverse events. For projects approved by the department's AEC, adverse events must be reported in writing to the AEC Executive Officer as soon as possible after the event by completing an *Adverse Events Form*. Guidance on first aid for animals and field euthanasia procedures are described in the department SOP *First Aid for Animals* and *Euthanasia of Animals Under Field Conditions.* Where infectious disease is suspected, refer to the department SOP for *Managing Disease Risk and Biosecurity in Wildlife Management* for further guidance.

4.2 Level of impact

Potential animal welfare impacts of nest box monitoring of penguins include:

- Trauma and distress during hand capture and processing.
- Hyperthermia (clinical overheating).

- Complications of microchipping (e.g. pain, incorrect insertion, infection).
- Injury or death of chicks due to incorrect handling technique.
- Abandonment of eggs or chicks due to inappropriate monitoring technique, frequency or duration.

If correct monitoring procedures are followed, the processing and microchipping of penguins should have minimal negative impacts on nesting penguins.

Project planning must involve the identification and mitigation of all potential welfare risks to minimise their impacts as much as possible. Note that whilst these impacts are specifically associated with the procedure nest box monitoring, an animal may also experience other impacts from associated procedures such as capture and handling. Investigators must be aware that the effects of a series of stressors, such as capture, handling, transportation, sedation, anaesthesia and marking can be cumulative.

5 Ethical Considerations

To reduce the level of impact of monitoring nest boxes on the welfare of animals, there are a number of ethical considerations that should be addressed. DBCA projects involving nest boxes for monitoring will require approval from the department's AEC. Where appropriate the following ethical considerations must be adequately covered in any application being submitted for approval.

5.1 Monitoring frequency

Monitoring frequency should optimise data quality to ensure the research question can be answered while minimising disturbance to the penguins. The highest frequency of nest box monitoring should be no more than once per week (as per Wienecke 1993, Winecke 2000). If multiple projects are utilising the same nest boxes, communication between project leaders is essential to determine the appropriate timing of nest box checks. Investigators should also consider the impact frequent nest disturbance may have on the penguins and consider whether potential overlap between studies could lead to data sharing, to reduce monitoring frequency.

5.2 Handling time and technique

To minimise stress or injury, penguins should only be handled for as long as is necessary to identify them and collect necessary measurements. This should not exceed five minutes. Correct handling techniques should be followed at all times and under supervision of experienced handlers.

5.3 Eggs present in nest

It is acceptable to process birds that are incubating eggs, however, to avoid damaging the eggs, adults must be removed quickly and deliberately (within 10 seconds) and must always

be returned through the entryway. Delaying removal increases stress and may result in damaged eggs.

5.4 Young in nest box

When chicks are present in the nest then an assessment of age is required before handling. This is to reduce the risk of accidental injury to chicks as a result of removing the adult. If chicks are less than five days old (see Appendix 2 for aging guide) then penguins should not be disturbed (unless necessary for specific demographic measures), and only the contents of the nest recorded. If older than five days, then the adult/s and chicks can be removed for processing. As with eggs, adults must be removed quickly and deliberately (within 10 seconds) and must always be returned through the entryway.

5.5 Temperature

Little penguins are susceptible to hyperthermia and stress associated with disturbance can increase body temperature compounding environmental impacts. Prior consideration of the air temperature is essential before undertaking monitoring activities. Monitoring should not be done when the ambient air temperature exceeds 30°C. When processing penguins, ensure that birds are sufficiently shaded; either naturally or by positioning your body in a way that shades the animal. If a penguin appears heat stressed (rapid panting), immediately return penguin to the box and monitor.

5.6 Predation risk

Investigator activity at the nest boxes may alert predators (ravens, foxes etc.). Before entering a box or removing penguins, the immediate area should be checked for potential predators. If predators are nearby, then the box should not be monitored until after predators have left the vicinity.

6 Equipment

The following equipment forms the base kit required for this activity:

- Callipers (minimum length 100mm and minimum accuracy 0.01mm).
- 2 x large weigh bags (20cm x 30cm), preferably dark in colour and made of a lightweight material.
- 1 x small weigh bag (15cm x 20cm), preferably dark in colour and made of a lightweight material.
- 2500g hanging scales.
- 500g hanging scales.
- Toolbox or similar for transportation of equipment.
- PPE (gloves, glasses, long sleeve shirt and long pants, closed in shoes).
- Data sheet (Appendix 1), pencils and erasers.
- Passive integrated transponder (PIT or microchip) scanner.

- PIT tag applicators.
- Hand sanitiser.
- Basic first aid supplies (i.e. Band-Aids, wound cleansers).

7 Procedure Outline

7.1 Timing and frequency of nest box checks

Nest boxes should be checked once a fortnight (minimum seven days between trips) during daylight hours (never between sunset and sunrise) throughout the breeding season (April – December). As boxes are occupied by nesting penguins throughout the day there is no need to complete monitoring within a specific time. On days where temperatures are high (>30°C) monitoring should be either postponed to an alternate day when the weather may be cooler, or, completed before temperatures reach 30°C.

7.2 Preparation prior to fieldwork

a) Nest box locations should be numbered and marked using a GPS.

b) Any new nest boxes should be installed, and existing nest boxes inspected and maintained, before the breeding season commences.

c) Obtain sufficient number of PIT tag applicators and scanner. Ensure scanner is in good working order with a full battery and PIT tags are in date and sealed.

d) Collect remaining equipment and place everything in a carry bag or box.

e) Check other equipment is in good working order. e.g. if using digital callipers, ensure batteries are charged and ensure scales are calibrated.

f) Check sufficient number of data sheets and pencils.

g) Ensure all equipment, and the hands of penguin handlers, are clean and disinfected before, between nest boxes and after monitoring (refer to the department SOP *Managing Disease Risk and Biosecurity in Wildlife Management*).

7.3 Checking nest boxes

a) Proceed with nest box monitoring by checking nest boxes one by one. Ensure boxes are approached in silence, minimising noise of foot-tread.

b) Lift nest box lid just enough to see into the box. If nest box is empty, secure the lid, record, and continue to the next box.

c) If penguins are present, they should be scanned to verify ID and determine if further handling and measurements are required.

d) If further measurements are required, determine the appropriate equipment needed (e.g. two penguins need two bags), replace lid gently and prepare equipment for processing.

e) Ensure all necessary equipment is easily accessible.

7.4 Removing penguins from nest box and transferring to soft containment

To minimise stress and avoid damage to chicks or eggs, penguins must be removed and placed into soft containment swiftly. This must take less than 10 seconds. Delaying the process increases stress and risk of adults moving to defend the nest which could lead to injured chicks or broken eggs.

a) Have one person hold the lid up enough so that there is room to safely remove the penguin from the box without allowing the penguin to escape (if monitoring alone, remove lid to expose half the box).

b) Depending on the site and type of the nestbox, and where the penguin is located within the nestbox, two different methods for penguin extraction can be used.

   i) The first method is to place a grip around the back of the neck, then support the penguin with the other hand placed under the belly (Figure 2) OR

   ii) The second method is to place a grip around the back of the neck, then support the penguin with the other hand placed under the belly.

   iii) Once supported, the penguin can be removed from the box. See department SOP *Hand Capture of Wildlife* for further advice.

c) Once removed from the box the penguin can be transferred into soft containment (Figure 3) for restraint (See department SOP *Animal Handling and Restraint using Soft Containment* for further advice). Once restrained, the lid should gently be replaced.

Figure 2: Restraining and removing penguin from nest box using two handed method.

Figure 3: Transferring penguin to soft containment bag.

7.5 Scanning and weighing

Once the penguin is restrained in the weigh bag and the bag is secure then the bird can be scanned and weighed.

a) If an ID has not already been obtained, with the bag and bird on the ground, run the scanner initially over the dorsal side of the body, focussing primarily on the nape area (Figure 4). If no PIT tag is found, it is necessary to check the whole body, in case the PIT tag has migrated internally. The scanner will indicate if a PIT tag has been located or not and identification can be recorded on the datasheet (Appendix 1).

b) Weigh the penguin using the hanging scale, ensuring the bird is still secured in the bag (Figure 5). Remember to deduct the weight of the bag from the final weight.

c) Record animal weight on the datasheet. Weight is generally a fair indication of health. Scales should be calibrated at least every two months to ensure continued accuracy, by weighing an object of known weight.

Figure 4: Scanning penguin in bag using PIT tag reader.

Figure 5: Weighing penguin in bag using hanging scales.

7.6 Insertion of PIT tag and collection of morphometric data

If the penguin has no existing PIT tag, then proceed with insertion of PIT tag and the collection of bill morphometric data.

ANIMAL WELFARE: Implantation of a PIT tag is an invasive identification procedure and must only be performed, or closely supervised, by experienced, endorsed and competent personnel. See department SOP *Permanent Marking of Vertebrate Using Passive Integrated Transponder (PIT) Tags* for further guidance.

7.6.1 Collecting bill and other data

While keeping the penguin in the bag, restrain firmly between legs and expose the bill only (Figure 6).

Measurements that must be taken using callipers include:

a) Bill length – length of exposed section of the penguin bill (Figure 7 measurement A). Begin where the bill stops and feathers start on the top of the bill, measure to the point where the upper and lower bill meet.

b) Bill depth – depth of the upper and lower bill whilst closed at the forward end of the nares (nostril) (Figure 7 measurement B).

Figure 6: Restraining, exposing and measuring bill length (top) and depth (bottom).

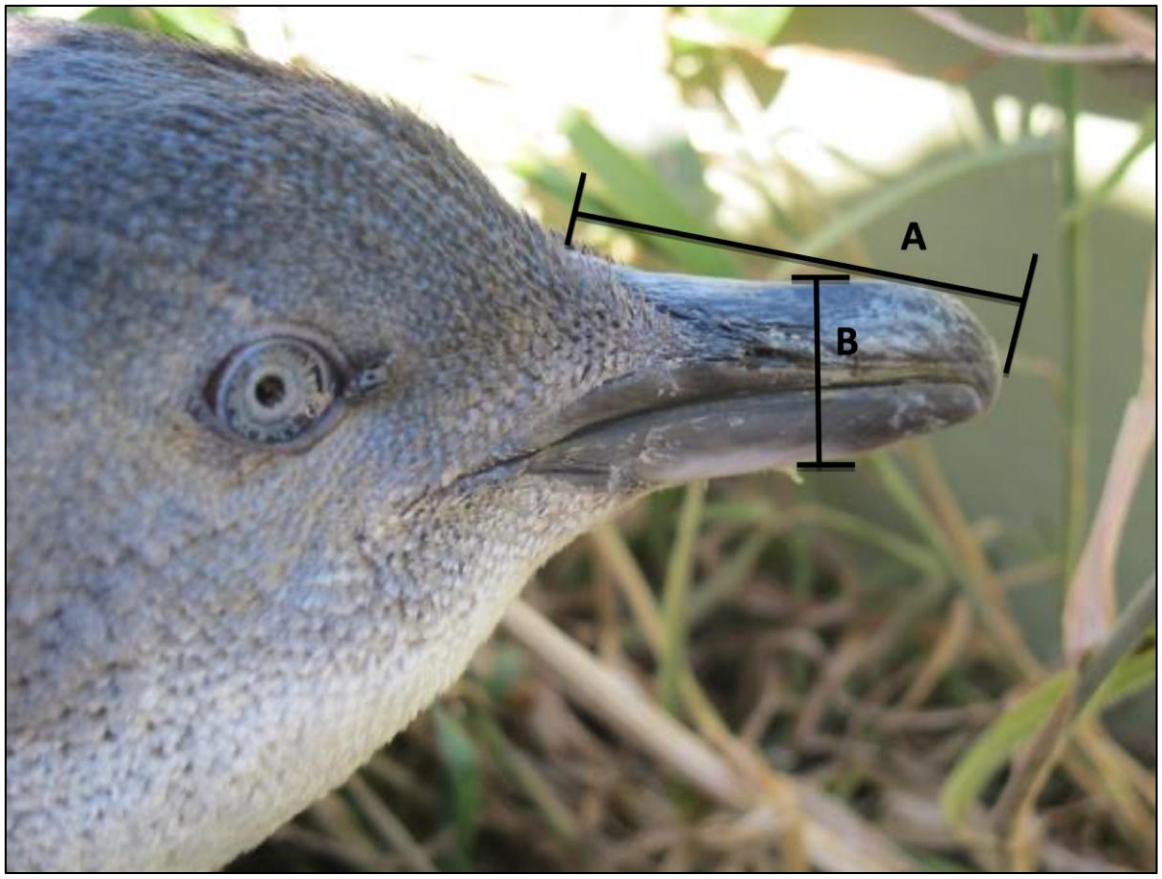


Figure 7: The bill measurements to be taken using calipers; A) bill length, B) bill depth.

7.6.2 Insertion of PIT tag

The best location for PIT tag insertion is subcutaneously in the loose skin at the nape of the neck (Figure 8).

a) Ensure the animal is secured in a way that allows the animal handler to confidently and safely insert the PIT tag. If possible, have as second person hold the penguin securely.

b) "Tent" the loose skin between the fingers and insert the needle at the base of the tented skin, horizontal to the penguin's body.

For further guidance see department SOP *Permanent Marking of Vertebrates Using Passive Integrated Transponder (PIT) Tags.* As per the SOP, anyone implanting PIUT tags is required to be endorsed as competent by a qualified and registered veterinarian or an AEC endorsed DBCA

staff member. For information on AEC endorsed staff members, contact the AEC Executive Officer (animalethics@dbca.wa.gov.au).

Figure 8: Inserting PIT tag.

7.7 Returning penguins to nest box

Methods for returning penguins to nest boxes will vary depending on the age of the penguins handled. Adult penguins and chicks more than five weeks old (see Appendix 2 for guide on aging penguin chicks) must be returned through the entryway after the lid has been secured. **Adult penguins should never be returned through the top of the box.** Chicks less than five weeks old should be returned to the nest bowl (depression that indicates nest) through the top of the box and then the lid secured. If adult/s and chicks are both present in the nest, then chicks should be returned to the nest first through the top of the box and then the lid secured. The adult can afterwards be returned to the nest through the entry way (Figure 9). It is important to direct the adult penguin's head inside the box entry. Otherwise, penguins are likely to escape into nearby bushes leaving eggs or chicks unattended and open to predation or exposure.

Figure 9: Returning adult penguin to nest through box entryway.

7.7.1 Eggs, chicks and multiple penguins in one box

Care must be taken when eggs or chicks are present and if there are multiple adult penguins in one box. To avoid damaging eggs or chicks, birds should be processed in the following way:

a) Assess adult temperament. Adults that back away off eggs and chicks and stand up in a defensive position are likely to be more aggressive and reactive. Birds that remain lying on their belly are generally less reactive and easy to handle.

b) Incubating adult penguins may be processed. Incubating adults should be removed quickly and gently so the eggs are not damaged. Highly aggressive or reactive adults should not be removed.

c) If there are two adults in one box, remove the first adult and process accordingly. After processing of the first adult is complete, remove the second adult then return the first adult to the box. Process the second adult and return to the box.

d) If there is more than one chick in a box remove and process one at a time. Return the first chick to the nest before moving onto the next. Ensure that the chick to be processed is distinguishable from any chick(s) already processed.

e) If there are both adult/s and chicks in the nest, then the adult/s should be removed first and processed. The adults should remain out of the box (contained in a separate holding bag out of the sun) while the chick/s are being processed. After returning the chicks to the nest, the adults can then be returned through the box entryway.

8 Moulting Adults

Moulting adults can be encountered in the nest boxes between November and February. Moulting adults can be removed and processed in the same way as nesting adults, however, only adults in the final stages of moult can microchipped (i.e. adult with more 2/3 new feathers). Birds should not be handled if the ambient temperature exceeds 30°C. Assess penguin for signs of heat stress before handling.

9 Competencies

A person who is competent has the knowledge, skills, and experiences that allow them to capture and handle animals successfully, and appropriately manage adverse events as required. Department personnel, and other external parties covered by the department's Animal Ethics Committee, undertaking fauna-related activities require approval from the committee and will need to satisfy the competency requirements (Table 1). Other groups, organisations or individuals using this SOP to guide their fauna monitoring activities are encouraged to also meet these competency requirements as well as their animal welfare legislative obligations.

It should be noted that, sampling design details such as intensity and scope of the study being undertaken will determine the level of competency required and Table 1 provides advice for standard monitoring only.

Table 1: *Competency requirements for Animal Handlers of projects using* artificial nesting boxes to monitor little penguins

Competency category	Competency requirement	Competency assessment
Knowledge	Broad understanding of the framework governing the use of animals in research and environmental studies in Western Australia	Training (e.g. DBCA Fauna Management Course or equivalent training). In applications, provide details on the course provider, course name and year.
	Understanding species biology and ecology	Personnel should be able to correctly identify the likely species to be encountered for the site(s) being studied, and have an understanding of the species' behaviour, biology and ecology. This knowledge may be gained through sufficient field experience and consultation of field guides and other literature.
	Understanding environmental conditions	Personnel should be aware of the environmental and seasonal conditions that may be expected on the project and understand location-specific animal welfare considerations. In applications, provide details of time spent undertaking similar work in similar locations.
Formal training *Note: Suitable levels of skill/experience can substitute for formal training requirements*	Department Fauna Management Course or equivalent training or experience	Provide course year
General Skills/experience	Relevant knowledge of species biology and ecology	Personnel should be confident in assessing penguin behaviour, sex, body condition and breeding status and be able to correctly determine the age of penguin chicks within 5 days. Familiarity with biology and ecology is essential and can be gained by sufficient field experience. Estimated minimum 1 year assisting with penguin monitoring or similar projects.

Animal handling and processing skills/experience	Experience handling terrestrial fauna	Personnel should be confident at assessing, capturing and handling penguins. This can be gained through field experience supervised by experienced personnel. Estimated minimum 1 year assisting with penguin monitoring projects. Provided there is adequate handling competency as per below.
	Experience inserting PIT tags	Personnel should be competent in inserting PIT tags and will have undergone necessary training and endorsement provided by a veterinary surgeon or AEC endorsed DBCA staff members. Experience should be gained through estimated minimum 1 year assisting with penguin monitoring or similar projects. Provided there is adequate handling competency as per below

In conjunction with possessing the required understanding and knowledge of the monitoring technique and animal welfare requirements, a guide to the experience and skill requirements for an animal handler to be considered competent to undertake nest box monitoring of little penguins unsupervised is as follows (noting that some personnel with experience may still require initial supervision in unfamiliar locations or with breeding habitat that they have not encountered previously):

- Recency of time in field: within the past 5 years.
- Minimum number of individuals penguins competently handled in the following categories:

Category	Number to be handled
Non-brooding adults	25
Moulting adults	5
Brooding adults – incubating eggs	25
Brooding adults – guarding chicks	25
Chicks – 0-21 days old	25
Chicks – 22-49 days old	25
Fledglings 50+ days old	25

10 Approvals

In Western Australia any person using animals for scientific purposes must also be covered by a licence issued under the *Animal Welfare Act 2002,* which is administered by the Department of Primary Industries and Regional Development.

Projects involving wildlife may require a licence/authorisation under the *Biodiversity Conservation Act 2016* (examples below). Personnel should consult the department's Wildlife Licensing Section for further guidance. It is your responsibility to ensure you comply with the requirements of all applicable legislation.

- Fauna taking (scientific or other purposes) licence (Reg 25)
- Fauna taking (biological assessment) licence (Reg 27)
- Fauna taking (relocation) licence (Reg 28)
- Section 40 Ministerial Authorisation to take or disturb threatened species.

11 Occupational Health and Safety

The following departmental SOPs for wildlife survey and monitoring activities are relevant to occupational health and safety:

- SOP *Managing Disease Risk and Biosecurity in Wildlife Management*
- SOP *Hand Restraint of Wildlife*

Departmental personnel, contractors and volunteers have duties and responsibilities under the *Occupational Safety and Health Act 1984* and Occupational Safety and Health Regulations 1996 to ensure the health and safety of all involved. Fieldwork is to be undertaken in line with the department's corporate guidelines, policies and standard operating procedures, including but not limited to, risk management and job safety analyses.

Further information can be found at
https://dbca.sharepoint.com/Divisions/corporate/people-services/HS/SitePages/SOPs.aspx

If department personnel or volunteers are injured, please refer to the departmental Health, Safety and Wellbeing Section's 'Reporting Hazards, Near-misses and Incidents' intranet page, which can be found at https://dbca.sharepoint.com/Divisions/corporate/people-services/HS/SitePages/Reporting-Hazards,-Near-Misses-and-Incidents.aspx

11.1 Animal bites, stings and scratches

Penguins are powerful birds and can deliver a painful bite and inflict scratches, often drawing blood. Open wounds are easily infected through contact with penguin faeces. Insects (particularly fleas), spiders and other invertebrates present on the penguin and in surrounding vegetation can inflict irritating stings or bites. All injuries should be appropriately treated as soon as possible to prevent infection and promote healing. Protective clothing including long pants, sleeves as well as leather gloves should be worn by handlers when undertaking monitoring. Correct handling technique will also minimise injuries.

If department personnel or volunteers are injured, please refer to the department's Health and Safety Section's 'Report a Hazard, near-miss or incident' intranet page, which can be found at http://intranet/csd/People_Services/rm/Pages/ReportingHazards,Near-MissesandIncidents.aspxZoonoses.

11.2 Tripping hazards

Penguin burrows and burrows of other animals pose a tripping hazard. Care must be taken when travelling through the environment to avoid injury and potential disturbance to burrowing animals.

11.3 Zoonoses

There are a number of infections caused by parasites, bacteria, or viruses that can be contracted through handling penguins and through contact with their nests (e.g. *Salmonella, E. coli*). Precautions should be taken to minimise the risk of transmitting zoonoses to personnel or wildlife populations. Staff should familiarise themselves with the department SOP for *Managing Disease Risk and Biosecurity in Wildlife Management.*

11.4 Needle stick injury and sharps disposal

There is a moderate risk of needle stick injuries to personnel. Care must be taken when working with PIT tag applicators. All injuries (even superficial ones) should be appropriately treated as soon as possible to prevent infection and promote healing. Adequate restraint needs to be used when working with an animal to avoid any sudden movements. All needles are to be disposed of in a sharps container.

12 Further Reading

The following SOPs have been mentioned in this advice, and it is recommended that they are consulted before undertaking nest box monitoring:

- Department SOP *Animal Handling and Restraint using Soft Containment*
- Department SOP *Hand Capture of Wildlife*
- Department SOP *Permanent Marking of Vertebrates Using Passive*

	Integrated Transponder Tags (PIT) Tags
• Department SOP	*Euthanasia of Animals Under Field Conditions*
• Department SOP	*Managing Disease Risk and Biosecurity in Wildlife Management*

For further advice refer also to:

National Health and Medical Research Council (2013) *Australian code for the care and use of animals for scientific purposes*, 8th edition. Canberra: National Health and Medical Research Council.

13 References

NHMRC (2004). *Australian code of practice for the care and use of animals for scientific purposes* (7th ed.). Canberra: National Health and Medical Research Council.

Stahel, C., & Gales, R. (1987). Little penguin: Fairy penguins in Australia: New South Wales University Press. Kensington, Australia.

Wienecke, B.C (1989). The breeding patterns of little penguins on Penguin Island, Western Australia, in relation to dietary and oceanographic factors. Honours Thesis, Murdoch University, Western Australia.

Wienecke, B.C. (1993). The size and breeding patterns of little penguins *Eudytptula minor* in Australia: A comparative study, PhD Thesis, Murdoch University, Western Australia.

Wienecke, B.C., Bradley, J.S. & Wooller, R.D. (2000). Annual and seasonal variation in the growth rates of young little penguins *Eudyptula minor* in Western Australia. Emu (100): 139-147.

14 Glossary of Terms

Animal handler: A person listed on an application to the department Animal Ethics Committee, who will be responsible for handling animals during the project.

Mesoptyle: One of the second set of down feathers in birds that have two successive down coats. Mesoptyle down (brown/grey in colour) appear after the natal down and represent an intermediate stage between initial hatchling down and growth of juvenile contour feathers.

Nest box: A human-made structure designed to meet the needs of cavity nesting species for shelter. They are often used as a means of observing and monitoring occupants.

PIT tag: An internally placed Passive Integrated Transponder (PIT) or microchip. The tags are inserted subcutaneously into the penguin using a pre-loaded needle applicator. The tags are pre-programmed with a PIT tag number that can be read using an appropriate scanner.

Appendix 1: Field Data Sheet

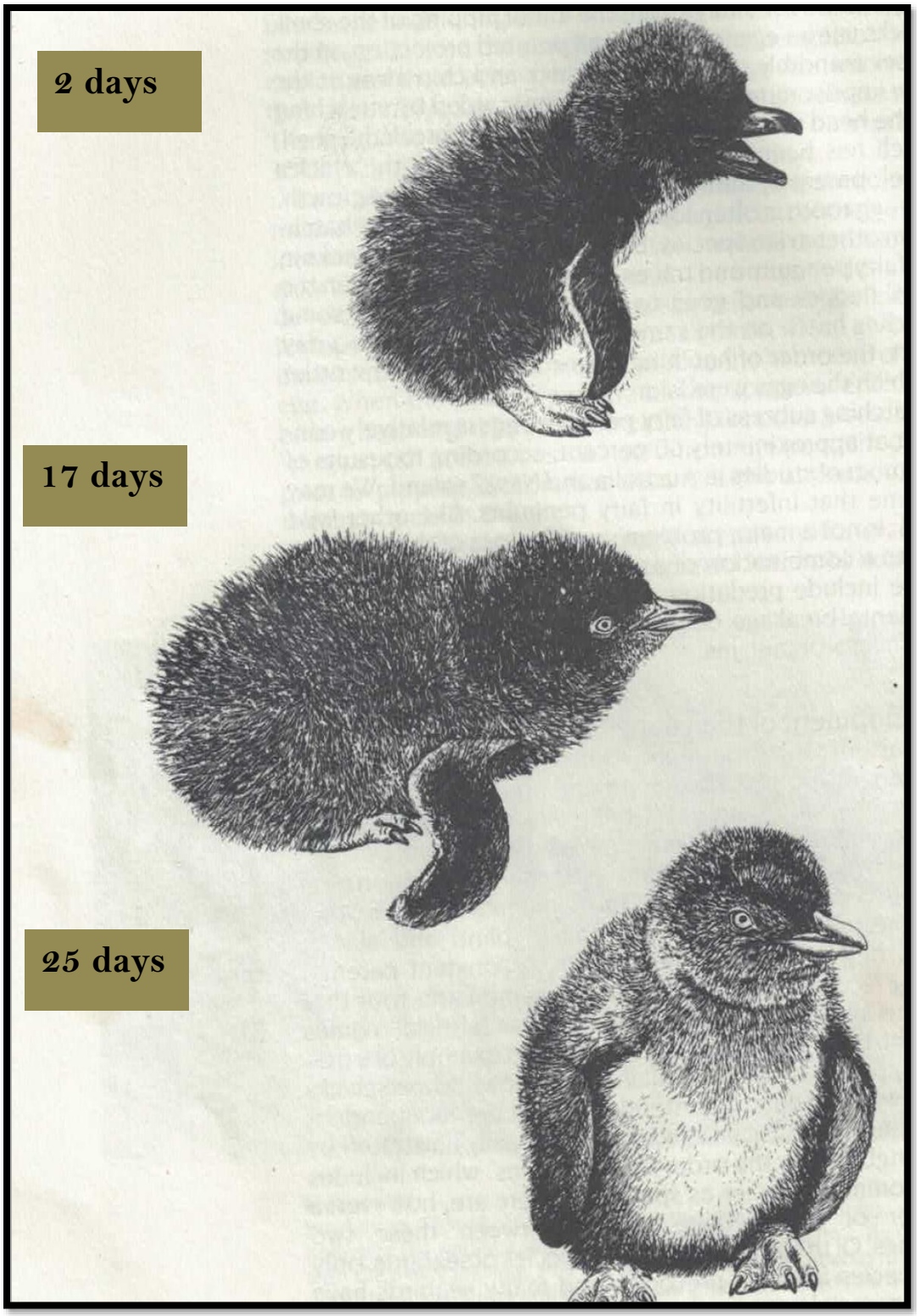
Penguin Nest Box Monitoring Data Sheet

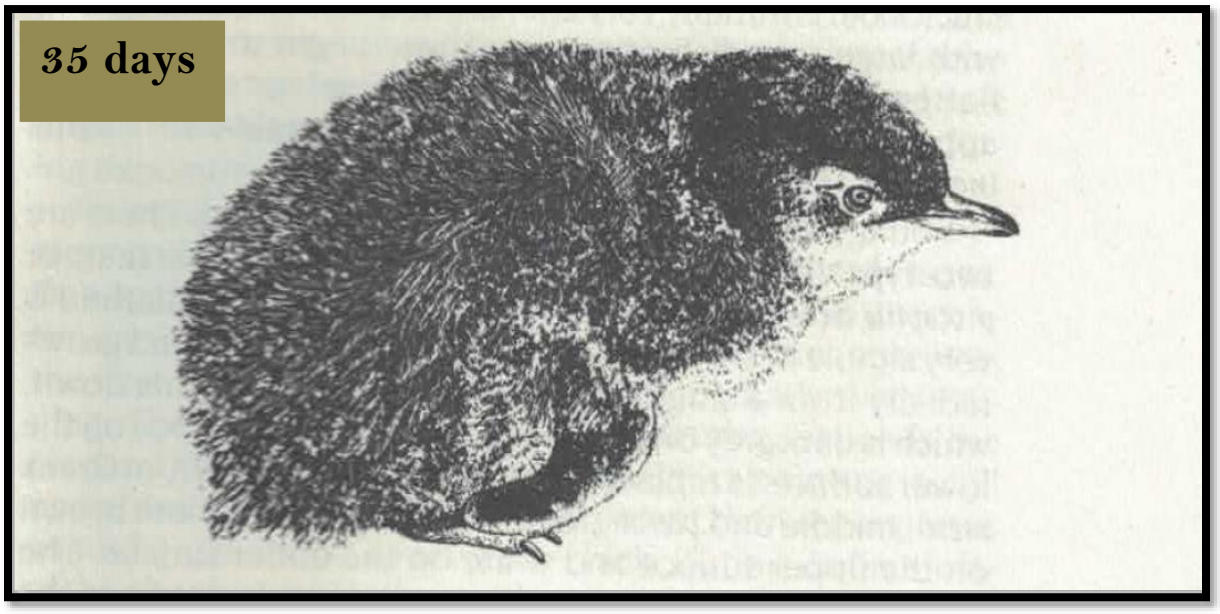
Date: **Weather:** **Page:**

Box #	ID	Weight	Bill Data		Eggs	Chick 1		Chick 2		Comments
			BL	BD		mass	age	mass	age	

[moult descriptor – pre-moult/ late pre-moult/ 1/4 moult/ 1/2 moult/ 3/4 moult/ post moult] [**Eggs** - pipping/ abandoned] [**Bill Data** - BL bill length/exposed bill, BD = Bill depth]

Appendix 2: Guide to Ageing Little Penguin chicks





Use the following key to assist in aging little penguin chicks. This can be used for ageing the chick on the first encounter. After this, they can be aged by adding the day since last seen (modified from Stahel and Gales, 1987).

1	**Ability to support head**	**(a)**	**No**	**1 day**
		(b)	Yes	Go to 2.
2.	Eyes	(a)	Not fully open	2 – 7 days
		(b)	Fully open	Go to 3.
3.	Coverage by mesoptyle down	(a)	Incomplete	8 – 14 days
		(b)	Complete	Go to 4.
4.	Feet	(a)	Dark grey	15 – 21 days
		(b)	Top white, bottom black	Go to 5.
5.	Egg tooth	(a)	Present	22 – 28 days
		(b)	Absent (scar only)	Go to 6.
6.	Mesoptyle down	(a)	General	29 – 56 days
		(b)	Absent or restricted to head and neck	57 + days