

# Kororā Monitoring Protocols

## National Kororā/ Little penguin monitoring programme

NZ Penguin Initiative

*These protocols provide a best practice guideline for community groups undertaking kororā monitoring, while ensuring consistent data collection methods are being used across the national monitoring programme. There are three tiers of monitoring to cater for the different capabilities and capacity of each group.*

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## 1 Introduction

Despite extensive research in Australia, little penguins/ kororā (*Eudyptula minor*) remain largely understudied in New Zealand. We understand their general distribution, but we have little robust population data for most of the country. In much of their range populations appear to have declined but evidence is anecdotal or based on sporadic surveys conducted by individuals, providing insufficient data to implement conservation management actions. In locations where long-term monitoring has occurred, it mostly relies on isolated efforts of community groups. A comprehensive, investigative approach is essential to understand factors driving declines and identify and enact the management actions required to reverse declines of kororā in different parts of New Zealand.

NZPI's national monitoring programme aims to coordinate the efforts of kororā conservation groups around New Zealand with a consistent methodology, centralised database and scientific guidance. Importantly the data will be available through the creative commons for conservation management and collaborative research.

We are using three tiers of monitoring, allowing groups of varying capacity and experience to undertake monitoring work.

## 2 Permissions and requirements for kororā monitoring

You need permission from the Department of Conservation (DOC) and local iwi to interact with wildlife or use public conservation land for reasons other than personal recreation. It is the responsibility of both the community group and NZPI to ensure that the necessary Wildlife Act Authority is arranged prior to undertaking kororā monitoring. More information on permitting is available on the DOC website: <https://www.doc.govt.nz/get-involved/apply-for-permits/>

Currently all kororā monitoring activities being undertaken by community groups as part of the national monitoring programme fall under their own permit (if a permit is required). Longer-term, NZPI are pursuing a nationwide permit that will give community groups the option to work under the NZPI umbrella permit.

## 3 Tier 1

### Overview

Birds will be marked using passive integrated transponders (PIT tags). Nest contents and bird IDs will be recorded during fortnightly monitoring rounds. Observations, either direct or using a burrowscope, will determine the number of adults, eggs, or chicks at the nest. Birds will be identified using a handheld transponder reader or a transponder hoop set at the nest opening.

Monitoring marked populations allows us to determine breeding success, adult survival, and recruitment; the three key demographic parameters that allow robust determination of population trends. Tier 1 is the gold standard of kororā monitoring for community groups and is in line with methods used at established monitoring sites including Oamaru Blue Penguin Colony. This method is for groups with a long-term commitment, ample experience, and suitable infrastructure.

### 3.1 Tier 1 Monitoring Protocols

#### 3.1.1 Equipment

- PIT tags (Trovan 11mm)
- Insertion gun (Trovan reusable plastic syringe)
- Transponder reader (Gallagher HR5)
- A sharps container for used injection needles
- Alcohol wipes/ alcohol & pipette/ cotton pad
- Restraining bag ('weigh bag')
- Vernier callipers
- Pesola spring balances (1000g & 2500g)
- Hand sanitiser
- Burrowscope
- Torch/ headtorch
- Field notebook/ Recording sheet/ app
- Gloves
- First aid kit
- Map, GPS unit or smartphone with nest locations

#### 3.1.2 Establishing the nest sites

At the time of first monitoring, an initial survey should be undertaken to identify nest sites and mark birds in the colony. Nests are to be numbered for identification and reference. As new nests are

identified during the breeding season, number them accordingly and include them in subsequent monitoring rounds.

Nest locations should be marked with numbered cattle tags. Unless nests are outside of public access, ensure that nest marking is placed inconspicuously to not attract attention to the nest. Data to be recorded when marking new nests are:

1. Unique Nest ID (make sure not to create duplicates)
2. Date and time
3. Region (e.g. Otago Peninsula)
4. Location (e.g. Pilot's beach)
5. GPS coordinates
6. Nest type (i.e. natural burrow, nest box, open)
7. Habitat (e.g. forest, shrub, grass, rock walls)
8. Notes

**Nest numbers should be retained indefinitely, i.e. do not reassign new numbers to the same nests in the following season (hence, permanent marking of nests).**

**Do not reuse a number if a previously numbered nest is lost or destroyed.**

### 3.1.3 Marking the population

*For specific handling and transpondering protocols see sections [3.3](#) and [3.4](#).*

A concerted effort should be made to transponder all adult birds found at the time of the first monitoring round. The remaining unmarked birds will be transpondered through the season. Marking adult birds as they are discovered on the nest is most efficient but lifting birds off eggs or young chicks should be reserved for confident, experienced penguin handlers to minimise the risk of harm to nest contents. If adults require marking during this incubation/ early chick stage and no highly experienced handlers are present, then targeted 'marking nights' can be undertaken. This entails waiting in the colony or on the foreshore for birds to return from sea and intercepting them for marking before they reach the nest.

### 3.1.4 Timing and frequency

Monitoring begins 2 weeks prior to the earliest known egg laying date at the colony. Monitoring rounds occur either weekly or fortnightly. For larger monitoring programmes, nest checks at different sites or zones can occur on different days, providing the routine remains consistent throughout the breeding season. E.g. Zone A is done on Saturday, Zone B is done on Sunday.

(Consistency should be kept where possible, but adjustments *can* be made to avoid adverse weather and unforeseen circumstances).

If recourses allow it, monitoring should continue until completion of the moult to establish nest site fidelity of breeders beyond the breeding season.

### 3.1.5 Personnel

Nest checks *can* be conducted by one person providing the necessary safety precautions are in place, but the process is most efficient with two or three people. Two people are always required for transpondering.

Try to ensure that one person from the previous monitoring round is present. Where there are multiple teams conducting the monitoring rounds, allow individuals to rotate between teams; this prevents divergent habits from forming and limits observer bias.

### 3.1.6 Nest checks

Nest monitoring represent the backbone of the monitoring effort of tier 1 and tier 2 programmes. Data to be recorded for each nest are as follows:

1. Nest ID
2. Date and time
3. Number of adults present
4. (Tier 1 only): Identities of adult birds (transponder numbers); any unmarked adults should be inserted with transponder
5. Nest contents (i.e. empty, 2 eggs, 1 egg, 1 egg / 1 chick, 1 chick, 2 chicks).
6. Observation type (i.e. direct observation, burrowscope)
7. (Optional when using app) Photo
8. Notes (e.g. add a note if adult or chicks were interacted with for transponder insertion, sampling, device deployments).

Systematically move through the study colony, stopping at each nest to inspect and record nest contents. Prior to inspecting nests, look externally for signs of activity including faecal matter in and around the nest entrance and a strong odour; 'gates' can be used as an indicator by placing upright sticks in the nest entrance, if the gates are down on the following visit then it indicates burrow/ nest use. Record if the nest appears active.

Inspect each nest with minimum disturbance. Record the number of adults, eggs and/or chicks present. If a bird appears to be incubating but you cannot see eggs, then the bird can be gently lifted with the transponder reader to see underneath. Record the ID of each adult bird by scanning with

the transponder reader (see section [3.4.6](#) for scanning procedure). **If breeding is confirmed it is vital to identify both adults in the pair. If the same bird is encountered on subsequent monitoring rounds, extra effort should be made to identify its partner before the end of the season.** Record chick data as per section 3.4.5.

Nests in deep burrows, beyond direct observation will require inspection with a burrowscope. Take great care when using the burrowscope so as not to damage nest contents. Note that when using a burrows-scope it will not always be possible to confirm nest contents. Birds in these burrows may be beyond the reach of handheld transponder readers; in this case an in-situ transponder hoop placed around the nest entrance for a few nights may be required. NZPI will attempt to provide hoop readers where required (they are currently being developed).

### 3.1.7 Marking chicks

Chicks should be marked ca. 6 weeks after hatching. All chicks that are accessible should be marked and transponder data recorded as outlined under 3.4.5. **When marking chicks it is vital that Nest ID is recorded** otherwise family lineage cannot be determined.

### 3.1.8 Re-sighting of marked birds (not associated with nest)

Any birds encountered while doing monitoring rounds not associated with any nest (e.g. loafing, wandering through colony, roosting) should still be identified if possible and recorded as a re-sighting. Re-sighting data consists of the following:

1. Bird ID
2. Date and time
3. Region (e.g. Otago Peninsula)
4. Location (e.g. Pilot's beach)
5. GPS coordinates
6. Bird status (i.e. dead, loafing, commuting, picked-up for rehab)
7. (Optional when using app) Photo
8. (if dead) Collected for post-mortem? Yes/No
9. (if dead) suspected cause of death
10. Notes

### 3.1.9 Other

Wash penguin bags and soiled clothing in a solution of Sterigene (previously known as Trigene) between sites and at the end of each day. Other equipment should be wiped down using alcohol wipes.



Remove any hazardous items from the nest (litter, sharps or any item that poses a risk of entanglement) if you can do so without causing harm or undue stress.

Report any sick or injured wildlife to the Department of Conservation hotline (0800 362 468), or your local DOC contact if prior agreed. **Make a re-sighting record for every injured penguin that is marked (see [3.1.8](#)).**

Dead chicks are to be left in the nest unless instructed by DOC to collect for post-mortem.

Establish with your local DOC contact what protocols to follow if dead penguins are found. At any rate, check dead birds for transponders and if marked record as a recovery entry following the same procedure as re-sightings (see [3.1.8](#)).

## 3.2 Recording data

### Digital data recording

NZPI is in the process of creating a database app that runs on smart phones/tablets that will allow digital recording of monitoring data. The advantage of digital data entry is that database interfaces prevent or at least allow the instantaneous identification of data entry errors (e.g. typos when recorded nest or bird ids). Date, time GPS positions are recorded automatically, and photos can be directly associated with the recorded entry. Recorded data can be synced with and backed-up to the cloud once in cell phone range.

### Analog data recording

If digital data recording is not an option, NZPI can supply data entry sheets and pre-printed notebooks. Recorded data then needs to be transcribed to a computer spreadsheet and uploaded to the NZ penguin database currently still under development. Copies of the spreadsheet should furthermore be uploaded to a designated Dropbox folder using a naming convention that incorporates date of spreadsheet creation, name of spreadsheet creator, species and location. Filename format is as follows:

YYYYMMDD-USERNAME-SPECIES-LOCATION.xlsx e.g.

20201102-RICHARDSEED-LITTLEPENGUIN-PILOTSBEACH.xlsx

Spreadsheet templates for data upload are available for download at <http://www.penguin-conservation/download/>.

### 3.3 Handling little penguins/ kororā

#### 3.3.1 From nest boxes

When removing penguins from a nest box, open the lid and remove the bird carefully but confidently through the top of the nest box. Control of the bird is gained by gently yet firmly placing a gloved hand or weigh bag on the back of the bird, with a thumb near the base of the bird's skull and fingers splayed down the front. Once there is control of the head, another hand must be placed under the bottom of the bird to fully support it before it is lifted.



*How to hold a little penguin/ kororā, ensuring the head is under control.  
Photo supplied by Phillip Island Nature Parks.*

A bird must never be lifted by the neck alone. The nest box lid should be placed back immediately after the bird has been removed. Removal of kororā from nest boxes must be done quickly (under 10 seconds) to reduce the stress. This is critical if the bird is incubating eggs or on very young chicks. Return birds back into the nest box through the nest-box entrance.

#### 3.3.2 From natural burrows

Removing birds from natural burrows or nest boxes that do not open will require more practice and guidance from an experienced handler. Birds are removed by sliding a gloved hand along the bottom of the burrow until a bird is found. A foot should then be felt for, grabbed onto and the bird carefully pulled out of the burrow. If eggs or small chicks are felt to be in a vulnerable position, then removal

of the bird shall be ceased. Once the back legs are out of the burrow, gloves should be removed (to improve dexterity) and the other foot caught. Often, this is the time where the penguins splay their flippers making it difficult to pull them out. Penguins should not be forcibly pulled out of the burrow if this happens. Instead, while both legs are being held, the penguin should gently be ‘rocked’ or ‘wiggled’ from side to side while still being pulled backwards. The penguin should soon let go. If you have observed or felt nest contents shift during the removal, then put them back into position. Never handle penguins by the flippers.

For greater extension into the burrow a ‘wire’ can be used. This device is simply a length of number 8 wire with one end bent round to form a handle and the other end bent back to form a crook; sharp ends are then taped over with cloth tape [photo pending]. A wire should only be used if birds are out of reach but nest contents can be seen or felt; never blindly poke the wire into a burrow.

### 3.4 Transpondering protocols

The term ‘Transponder’ refers to a passive integrated transponder (PIT tag), commonly called a microchip. This method of marking negates the need for impactful external attachments and reduces handling in the long run. It is recognised as the gold standard for penguin monitoring.

#### 3.4.1 Training and Certification

Before you can insert transponders, compulsory training is required. There are 3 levels of certification, as per the DOC Banding Office requirements.

**Level 1** trainees may only operate under the direct supervision of a Level 3 operator certified for the species group or marking method. Level 1 operators are required to log their capture, marking and handling experience using the NZNBBS training log, to be signed by the Level 3 trainer.

**Level 2** operators are considered competent to capture/mark birds independently, but still need to operate under the general supervision of a Level 3 operator. The Level 3 operator retains responsibility for all capturing and marking conducted by the Level 2 operator. Level 2 operators are required to log their capture, marking and handling experience using the NZNBBS training log.

**Level 3** operators have extensive experience for the species and marking methods listed on their certificate. Responsibilities include supervising Level 2 and training Level 1 operators, signing training logs, overseeing projects, and ensuring that the necessary Wildlife Act Authorisation / permits are in place.

Note that flipper banding certification does not translate to transponder certification.

Each community group will have a nominated **principal operator** for transponder insertion. This person shall be trained to Level 2 or 3 and will generally be the project leader. This person is

responsible for ensuring that all transponder data is recorded into the NZPI Database which is to be linked with the DOC Banding database. A **nominated level-3-certified trainer** would be desirable for each community group; NZ Penguin Initiative will act as the nominated trainer where community groups lack a Level 3 certified member.

More information about transponder certification can be found on the DOC Banding Office website:

<https://www.doc.govt.nz/our-work/bird-banding/how-to-become-a-certified-bander/>

### 3.4.2 Minimum age and condition for transponder insertion

Birds in poor condition will not be transpondered. No minimum threshold has been set due to variation between sexes, general sizes, and clades; assessment of under conditioned birds will be part of the transponder training. Chicks are to transpondered from 6 weeks of age, providing there is an adequate longitudinal pinch of skin and subcutaneous fat at the insertion site. Birds will not be transpondered through the peak of the moult, but may be transpondered in the early stages, i.e. prior to feathers dropping or in the very latter stages of moulting.

### 3.4.3 For transponder insertion process see appendix ([section 8.1](#))

### 3.4.4 If the first transponder insertion fails

If the first transponder insertion fails do not attempt to insert another straight away. You must wait a minimum of 5 days before inserting a second transponder to minimise trauma and risk of infection. You must record the 15-digit number of the failed transponder as a 'Lost Band' and keep record of why this injection failed.

If the transponder is inserted into the bird but does not scan, firstly ensure that the transponder reader is on and working; if it was not simply a transponder reader error then double check if tag has popped out of the wound. If transponder pop-out can be ruled out scan four times. If this is still not successful, record transponder number and report to NZPI. Then follow process as described in the previous paragraph.

### 3.4.5 Recording transponder insertion data

Main data to record when inserting a new transponder are as follows:

1. Transponder number
2. Date and time
3. Region (e.g. Otago Peninsula)
4. Location (e.g. Pilot's beach)

5. Site (Nest ID, 'in colony', 'on track', 'on beach')
6. GPS coordinates
7. Weight
8. Measurements of bill depth & length (culmen) for sexing
9. Age (i.e. chick/juvenile/adult)
10. Life-stage (i.e. breeding, non-breeding, pre-moult, pre-breeding)
11. Side portrait of head ('mug shot')
12. If marking chicks: Nest ID (see [3.1.7](#))
13. Notes

Ideally data will be recorded digitally using the NZPI database app. As back-up and/or alternative NZPI will supply transponder insertion spreadsheet templates to print out.

#### 3.4.6 Reading Transponders

*The Gallagher HR5 reader is recommended for its universal transponder reading capacity (for cases where other researchers or rehabilitators have used non-Trovan transponders), it also has a large LCD display, it is robust, and it allows for auxiliary data (sex, date of first capture etc.) to be displayed.*

Turn the transponder reader on before approaching any penguins or nests. Ensure the reader is configured to scan for 10 seconds from a single push of the trigger and set the reader to vibrate and flash when a transponder is read.

To read transponders, pull the trigger and scan 1-5cm above the bird's neck. Change the alignment of the reader as you pass it over the neck. Four complete scans, of 10 seconds, are required to confirm the absence of a transponder.

Birds need not be handled or touched when reading transponders.

## 4 Tier 2

### Overview

Nest contents (number of eggs, chicks, and adults) will be recorded during fortnightly monitoring rounds at the designated colony, or colonies. Inaccessible burrow contents will be observed through a burrowscope. No handling or marking will occur.

Tier 2 represents a building block towards tier 1 monitoring, or where long-term commitment to monitoring is uncertain. The data acquired through this method is not as robust as with tier 1 monitoring but allows us to assess trends of local populations with a lower impact of disturbance.

### 4.1 Tier 2 Monitoring Protocols

#### 4.1.1 Equipment

- Burrowscope (optional extra)
- Torch/ headtorch
- Field notebook/ NZPDB app
- Hand sanitiser
- First Aid kit
- Map/ GPS unit/ smartphone showing nest locations

#### 4.1.2 Determining active nests

At the time of first monitoring, an initial survey should be undertaken to identify nest sites. Nests are to be numbered for identification and reference. As new nests are identified during the breeding season, number them accordingly and include them in subsequent monitoring rounds.

Record the GPS position of each nest using a handheld GPS unit or GPS capable smart phone. Nest locations can be marked by flagging tape if they are beyond public access. Remove all flagging tapes at the end of the season, i.e. when penguins are entering the moult.

#### 4.1.3 Timing and frequency

Monitoring begins 2 weeks prior to the earliest known egg laying date in the colony. Monitoring rounds occur either weekly or fortnightly. For larger monitoring programmes, nest checks at different sites or zones can occur on different days, providing the routine remains consistent throughout the breeding season. (While consistency should be kept where possible, adjustments can be made to avoid adverse weather and unforeseen circumstances).

#### 4.1.4 Personnel

Nest checks can be conducted by one person providing the necessary safety precautions are in place, but the process is most efficient with two or three people. Where there are multiple teams conducting the monitoring rounds, allow individuals to rotate between teams; this prevents divergent habits from forming and limits observer bias. Try to ensure that one person from the previous monitoring round is present during monitoring.

#### 4.1.5 Nest Checks

**No handling will occur under tier 2 monitoring.**

Systematically move through the study colony, stopping at each nest to inspect and record nest contents. Firstly, look externally for signs of activity including faecal matter in and around the nest entrance and a strong odour; 'gates' can be used as an indicator by placing upright sticks in the nest entrance, if the gates are down on the following visit then it indicates burrow/ nest use. Record if the nest appears active.

Inspect nest contents with minimal disturbance; speak quietly, avoid shining bright lights directly at penguins, keep the time at nests to a minimum. Record the number of adults, eggs and/or chicks present on the nest.

Nests in deep burrows, beyond direct observation may require inspection with a burrowscope. Take great care when using the burrowscope so as not to damage nest contents. Note that when using a burrows-scope it will not always be possible to confirm nest contents. Do not 'guess' nest status if nest contents cannot be assessed.

#### 4.1.6 Other

If required, remove any hazardous items from the nest if you can do so without causing undue stress. Hazardous items include litter, sharps or any item that poses a risk of entanglement. Cabbage tree leaves have resulted in Little penguin chicks losing limbs; remove any cabbage tree material from nests.

Report any sick or injured wildlife to the Department of Conservation hotline (0800 362 468), or your local DOC contact if prior agreed.

Dead chicks are to be left in the nest. Establish with your local DOC contact what protocols to follow if dead penguins are found.

## 4.2 Recording data

See [3.2](#).

## 5 Tier 3 Monitoring Protocols

### Overview

Trail cameras will be used as a minimal impact method to gauge the size and trends of local populations. This method will be used by community groups that are establishing new kororā monitoring projects or when school groups are leading the project. Footprint surveys are another monitoring option at sandy beach sites; this method is considered the least reliable and should be reserved for projects where education and advocacy is the primary objective.

### 5.1 Trail Camera Monitoring Protocols

#### 5.1.1 Equipment

- Trail cameras
- SD cards (min. 32GB; 2 per camera)
- Rechargeable Eneloop AA batteries (16 per camera)
- AA battery charger
- Stakes (optional, for trail camera placement)
- First aid kit

#### 5.1.2 Operating

Cameras should be set up to record access paths, where penguins travel between the sea and the colony. Multiple cameras can be used to cover multiple access paths. Strap the cameras securely to existing material (branch, trunk, rock) or fix to a stake in the ground. Number the cameras and record their GPS position. Ensure cameras are not easily visible from public access paths to prevent theft; alternatively, cameras can be secured with steel cable and padlocks.

Set cameras to record 20 seconds of video each time they are triggered.

Batteries and memory cards need to be replaced every 7-14 days; do so in the middle part of the day to avoid the most active penguin times. The cameras run on 8x AA batteries; an allocation of 16 batteries per camera will be enough to allow for rotation of charged batteries and keep the cameras running.

When replacing memory cards, clearly note which camera the memory card came out of.

#### 5.1.3 Data recording

For each penguin observed on playback record the time, date, direction of travel (seaward or nestward). Record observations of chicks separately.



## 5.2 Footprint Surveys

*This method is considered the least reliable and should be reserved for projects where education and advocacy is the primary objective.*

### 5.2.1 Equipment

- Ruler/ tape measure
- Field notebook or recording sheet
- Footprint guide
- First aid kit

### 5.2.2 Surveys

Sandy beach footprint surveys are best undertaken in the early morning before footprints weather and become less visible. On shallower beaches survey times must coincide with low tides, before footprints are washed away.

Repeat sandy beach surveys monthly from the beginning of June until the end of February.

Kororā footprints are identified as follows:



Source: <http://nztracker.org/> | Photos by Emily Roberts (Taranaki Regional Council)

- 5.5cm in length
- Chunky toes/claws
- Visible heel
- Angle of all toes less than 75°
- Usually tracking straight up and down the beach

Record the number and direction of tracks.

## 6 Review

These protocols will be reviewed throughout each breeding season and updated in March each year by NZPI with input from community groups, iwi and the Department of Conservation.

## 7 Acknowledgments & Contribution

We would like to thank the Department of Conservation for providing us with their best practice guidelines for transponder use in Yellow-eyed penguins, particular thanks to the authors Bruce McKinlay and Marcus Simons from DOC, and Mel Young from the University of Otago.

We must acknowledge Philip Island Nature Parks for sharing their fantastic penguin monitoring protocols. We are very grateful for their contribution of handling instructions as well as photos, illustrations and descriptions of moult and chick stages.

Thanks to Wellington Forest & Bird branch's 'Places for Penguins' project for sharing their monitoring protocols, this allowed us to align our protocols to the community groups'. Further thanks to Emily Roberts of Taranaki Regional Council for sharing their wonderful footprint identification resources.

NZPI's [Advisory Group](#) provided guidance and gave valuable feedback on the first draft of this document. Finally, we thank the community groups for providing feedback on how these protocols translate to their operations on the ground. Specifically, John Stewart (Supporters of Tiritiri Matangi & Motuora Restoration Society), Melissa McLuskie (Western Bay Wildlife Trust) Elise Smith and Michelle Bird (Ngā Motu Marine Reserve Society), Kerry Shaw (Places for Penguins), Matt Charteris (West Coast Penguin Trust) and Shona Sangster (Stewart Island Rakiura Community & Environment Trust).

## 8 Appendix

### 8.1 Transponder Insertion Process

*(Adapted from DOC's best practice guideline for transpondering yellow-eyed penguins)*

#### 8.1.1 Equipment

- PIT tags (Trovan 11mm)

- Insertion gun (Trovan reusable plastic syringe)
- Transponder reader (Gallagher HR5)
- A sharps container for used injection needles
- Alcohol wipes/ alcohol, pipette/ cotton pad
- Restraining bag ('weigh bag')
- Pesola spring balances (1000g & 2500g)
- Vernier callipers for morphometric measurements
- Hand sanitiser
- Band aid/First aid kit
- Field notebook/ app

### 8.1.2 Insertion process

1. Two competent people are required, one to hold the bird, the other to do the insertion.
2. Clean and cover any bites or scratches on your hands.
3. Set a suitable work area before handling the bird. Ensure that equipment will be within arms-reach.
4. Birds should be held in a restraining bag. Set up so the head of the bird is facing the dominant hand of the person doing the insertion.
5. Ensure that all measurements and samples are taken before transponder injection.
6. Before inserting a transponder, use a transponder reader to check that one is not already present in the bird. Scan the bird with four complete passes of the transponder reader (i.e. four 9-10 second sweeps) to maximise the chances of detection.
7. Using the supplied barcode stickers, stick the barcode in your field notebook or scan the barcode into the NZPI database app, and save the remaining stickers for data submission.
8. The transponder will be inserted under the skin in the fold of tissue on the back of the neck, so undertake a pinch of the skin to ensure that there is an adequate fold of tissue to insert into.
9. Pinch the skin longitudinally (i.e. with fold running along length of bird).
10. If the pinch of skin remains taut after release, the bird is too dehydrated for a transponder. You will not attempt to insert a transponder into a bird that is dehydrated.
11. Attach the needle to the insertion gun and using your hands gently pre-loosen the sheath from the needle so that it can be easily accessed. Place the needle with loosened sheath on a clean, stable surface to your dominant side.
12. Expose a patch of skin, clean the area with an alcohol wipe (which will also clear the feathers), and remain holding the pinched fold of skin with your weaker hand. Loosen the needle sheath completely from the needle using your dominant hand, and then insert the needle, bevelled side upwards, from the head end of the neck towards the rear of the bird, along the length of the pinched fold. If the bird has loose down at the injection site, a small amount may be plucked beforehand to expose the site.

13. Make sure that the needle is inserted between the bases of adjacent feathers. Avoid pushing parts of feathers or feather shafts into the skin with the needle, as this is likely to increase the chance of infection and complicates the needle insertion.
14. Make sure that the needle does not come out through the skin on the other side of the pinched skin. Check after insertion by ruffling the feathers or down adjacent to the insertion site after injection.
15. Close the trigger gently but steadily, hold the tag in place with thumb and finger while retracting the needle. Secure the needle by re-sheathing or sticking into the ground as a temporary measure. Apply pressure with a sterile cotton pad or alcohol wipe to the injection site if bleeding. If the transponder pops out of the injection hole see [Section 3.4.4](#).
16. Dispose of the sheathed used needle into a sharps receptacle.
17. Check that the transponder can be read. Check the full 15-digit number against the barcode number recorded in the notebook and record that this number is correct. If the transponder will not scan, see [Section 3.4.4](#).
18. Check the notebook or app to ensure all information has been recorded. Release the bird.
19. Clean your hands and all equipment that has come into contact with penguin blood and/or faeces with sanitiser so as to prevent transmission of bloodborne diseases between penguins.






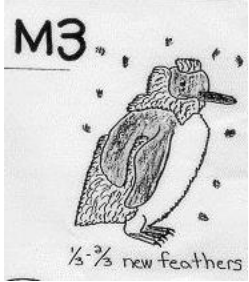




## 8.2 Potential Impacts and Mitigation measures

Tier	Impact type	Impact effect	Mitigation measure
1,2 and 3	Stress	Presence of humans in the penguin colony can induce a stress response	Keep noise to a minimum when in the colony. Avoid groups of more than 4 people at nest sites. Do not shine bright light at penguins-dim torch light or use red light when penguins are present.
1	Stress	Handling birds in high temperatures causes heat stress	Birds will not be handled if the outside temperature is above 30°C.
1,2 and 3	Trampling sensitive habitat	Walking through penguin colony could damage	Those working in sensitive ecosystems must have an awareness and appreciation for other species present in the colony. Repeated

		seabird burrows and other sensitive flora and fauna	monitoring rounds in sensitive habitats should follow the same safe route.
1 and 2	Damage to nest contents	Interactions with penguins at the nest could cause eggs to be damaged or chicks to be injured.	All persons interacting with birds are to be experienced with working with penguins or be working under direct supervision of an experienced researcher. Interactions will be carried out in a manner that minimises the risk of beaks, flippers or feet striking eggs or chicks. If birds appear unduly agitated or aggressive when approached, do not handle them.
1	Permanent nest abandonment	Interactions with adult penguins could cause them to abandon their nest permanently.	Keep handling time to the absolute minimum. The risk for nest abandonment as a result of handling is likely low. Once eggs have been laid, penguins show a strong attachment to nest contents making permanent abandonment an unlikely outcome. However, if a bird shows exceedingly stressed behaviour, handling will be terminated.
1	Injury or infections because of transponder injection	Poor transponder injection skills can cause injuries or infection of the needle puncture wound.	Follow the DOC best-practice guide when inserting transponders. Only personnel with L2 or L3 NZBBS certification to perform transponder injections. Injection points will be disinfected.
1	Disease transfer	Penguin-borne diseases could be transferred between individuals and colonies	Wash hands and all equipment thoroughly after each monitoring round and in between sites. Catch bags to be washed in steregine.

### 8.3 Adult Moulting Stages

Imagery and descriptions supplied by Phillip Island Nature Parks.

<p><b>M1</b> The flippers are swollen, and old feathers are beginning to stand up, but none are actively falling out yet.</p>		
<p><b>M2</b> Old feathers are beginning to fall out</p>		
<p><b>M3</b> 1/3 to 2/3 of the new feathers are visible.</p>		
<p><b>M4</b> More than 2/3's of the new feathers are visible</p>		
<p><b>M5</b> All new feathers but the bird has not been out to sea yet. Feathers may feel powdery and have a deep blue colour.</p>		

## 8.4 Chick Stages

Imagery and descriptions supplied by Phillip Island Nature Parks.

<p><b>A stage chick.</b> 1 - 7 days old and eyes are closed or only eye slits visible. They are sparsely covered in first down which is dark grey, and the bill is black</p>		
<p><b>B stage chick.</b> 2 – 3 weeks of age, have a second down that is thicker and chocolate coloured. iris is dark grey in colour; the region between the nostrils and eyes (the lore) and around eye bare until 3rd week.</p>		
<p><b>C stage chick.</b> 4 – 5 weeks old. Sheathed feathers appear at 4 weeks, down is shed from underneath flippers and iris changes to pale grey similar to adults at 5 weeks</p>		
<p><b>P1 Chick.</b> Blue feathers are predominately seen only on the flippers and bottom.</p>		 <p><b>P1</b> -blue flippers only -ready to band (6 wks old)</p>
<p><b>P2 chick.</b> More adult feathers are visible on the body but at least 2/3's of the body is still covered in down.</p>		 <p><b>P2</b> - 1/3 blue or adult plumage</p>

**P3 chick.** Only 1/3 of the body is still covered in down.



**P3**

- 2/3 blue
- generally have 'ruff' around neck



**P4 chick.** All the down has been lost. Chicks can be distinguished from M5 adults due to their thin beaks and high pitched, 'squeaky' voices.



**P4**

- all blue
- bills smaller, blue brighter and voice squeakier than adults

