

# Kōkako Standard Management Techniques

## About this document

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# Kōkako Standard Management Techniques

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# 1 Purpose

The purpose of this manual is to:

- Provide information and resources on the best practice techniques currently available for kōkako management and research
- Ensure consistent kōkako management practices throughout New Zealand so that individual population status and responses to management can be easily compared at a national level
- Provide a mechanism for advocating the continuous improvement of kōkako conservation management and research

This resource will ensure that kōkako populations are managed to maximise national recovery plan objectives (Innes et al. in prep). It will also ensure that appropriate welfare standards are applied during the management and research of kōkako, as is required under the Animal Welfare Act, 1999.

This manual does not include techniques for pest control. For this information please refer to <https://www.doc.govt.nz/nature/pests-and-threats/methods-of-control/>

This manual does not repeat material that is substantially addressed in other plans. In particular, the best practice techniques for the translocation of North Island kōkako (Collen et al, 2016) covers many aspects of translocations that are not repeated here.

This manual should be read in conjunction with the:

- [Kōkako \(\*Callaeas wilsoni\*\) Recovery Plan: 2018–2026](#) (Innes et al. in prep.)
- [Best practice techniques for the translocation of North Island kōkako \(\*Callaeas wilsoni\*\)](#) (Collen et al. 2016)

## 1.1 Background

The maintenance and growth of all North Island kōkako (kōkako) populations remains primarily dependant on sustained pest mammal management to increase reproductive productivity by limiting predation at the nest, maximise food supply and, in the case of offshore islands and the pest-fenced Sanctuary Mountain Maungatautari, prevent pest mammal invasion.

The draft Kōkako Recovery Plan (Innes et al. in prep.) aims to double the national population of kōkako from 1600 pairs in 2017 to 3000 by 2026 by a) increasing the scale and effectiveness of pest control at all kōkako sites, b) reconnecting adjacent subpopulations by providing new vegetated corridors, and c) maximising the genetic diversity and security of original and translocated populations. The draft plan also encourages sustainable management within iwi and community-led biodiversity conservation projects that support kōkako populations and advocates for kōkako re-introductions to appropriate high-quality sites where they are currently absent.

## 1.2 Review

The information contained is up to date at the time of publication. These are methods which have been widely used in kōkako projects; and are considered the current standard. Practice evolves as technology advances, and experience and innovation provide new methods over time. At some sites compromises may have to be reached if any conflicts arise between different management objectives. The Kōkako Specialist Group will endeavour to update sections of this document as it becomes necessary. Before planning any project based on this document, confirm with the Kōkako Specialist Group coordinator whether or not it remains current.

## 1.3 Definitions

There are methods that must be followed because of legal requirements or that, after many years of practice, they have been identified as the best and safest methods to use routinely. These procedures are indicated by the words ‘must’, ‘must not’, ‘ensure’, ‘are required’, ‘shall’, ‘use’, ‘do not’, ‘make sure’, ‘only’ or ‘never’. If an alternative and potentially better method is considered, then in some circumstances, and after discussing with DOC via the Kōkako Specialist Group, a trial of the alternative method may be approved, in which case its use must be carefully

documented and reported to the Kōkako Specialist Group, whether better or worse than the mandatory method.

Recommended procedures are those which are the best-known methods to use routinely. However, there may be good alternatives. These procedures are indicated by the word 'should' or indicated as being 'preferred'. If an alternative potentially better method is used, then this must be carefully documented and reported to the Kōkako Specialist Group, whether better or worse than the current recommended method.

## 2 Permit requirements

### 2.1 Permits

If you are not working for the Department of Conservation (DOC) on a DOC project, it is a legal requirement that you obtain a permit under the Wildlife Act 1953 for any work that intends catching, handling and/or disturbing kōkako, including (but not limited to) the following activities:

- Photographing or observing kōkako in nests
- Inspecting nests and collecting contents
- Attaching cameras or other monitoring devices close to nests
- Marking kōkako with bands, wing tags or transponders
- Attaching radio-transmitters to kōkako
- Taking blood, feather or other tissue samples from kōkako
- Transferring kōkako to a new site
- Holding dead kōkako, eggs or shell fragments, feathers or other biological material
- Holding kōkako in captivity

If the work is for research purposes, you may also need to obtain a Research and Collection Permit from DOC. Since kōkako are regarded as iconic species, the high level of public interest in research on wild kōkako will almost always trigger the need for a High Impact Permit rather than a Standard Permit.

Further information on permits is available at

[http:// www.doc.govt.nz/get-involved/apply-for-permits/research-and-collection/](http://www.doc.govt.nz/get-involved/apply-for-permits/research-and-collection/)

It should also be noted that adherence to these guidelines does not necessarily remove the need to obtain additional authorisation under the Animal Welfare Act 1999, particularly when undertaking research.

## 3 Survey and monitoring techniques

For information on **handling, measuring, banding or disease screening** please refer to:

- [Best practice techniques for the translocation of North Island kōkako \(\*Callaeas wilsoni\*\)](#) (Collen et al. 2016)

### 3.1 Adult census

The adult census is a count of territorial adults done between the start of April and the end of October (outside of the breeding season). It is one of the key measures of a population and is likely to be used as a yardstick of success if the population is managed.

Survey is most effective from ridges, and people working together may be more effective than people working alone, particularly in dense populations. Surveys start at dawn and proceed along pre-planned routes that traverse the area of interest, until the afternoon. Surveying is only done in reasonable weather because wind and rain both cause observers to miss birds.

#### 3.1.2 The basic technique

**What you need:** experienced people with off-track field skills, notebook, good quality



binoculars with good light-gathering (ie an “x8” or a “x10”), GPS and computer with mapping software, digital recorder and microphone, amplifying speaker for playback, radios (where multiple observers).

Define the area over which counts are to be conducted – ensure that the area is easily defined, well described and (where previous counts have been conducted at the site) that you are surveying the same area as previous surveys. Walk ridges (or transect lines) trying to cover the entire location with your ears and your playback – spacing of lines may depend on topography – not much more than 200m between transects should be allowed in flat country, but ridges give better coverage so the distance between them may be up to 400m. Record these survey routes on GPS.

Listen for kōkako all the time. If none is heard, stop each 200 m, enter a GPS waypoint and listen for song. If there is no singing, play some *local dialect* tape, in the following sequence:

- a) 3 mew calls, followed by a 5-minute listening period
- b) 3 mew calls, followed by a 5-minute listening period
- c) 30 seconds of local song, followed by a 5-minute listening period

No good research supports this particular sequence being better than others but using it may enable better comparisons between surveys. Mew calls are perceived to be less dialectical than song and are more likely to elicit responses from any non-territorial birds which may be present. Good recording equipment is required to record local dialect for playback.

All birds heard or seen are followed and mapped. The purpose of the 20-30-minute follow is to:

- Identify bands *or any other unique identifying features*. Even *temporary features* (such as ‘missing 2 outer tail feathers on right’) may be useful to separate this bird from an adjacent territory holder.
- Listen and watch for activity of neighbouring kōkako while you are with this/these territory holders.

- Observe their behaviour – what identifies them as “territorial” (battling neighbours, singing from high song-post, wing-flap displays...)
- Observe their behaviour for what identifies them as a pair/single (do they mutual-preen, mutual-feed, duet closely together, archangel display, copulate, roost side-by-side)
- If the bird(s) do not sing then “challenge” them with territorial song-playback and observe their response. You may need to attempt this in different parts of the territory to get a response.
- We need to distinguish between “territorial and “non-territorial” birds very carefully – and this takes experience. A non-territorial bird will:
  - Often investigate you then disappear.
  - Will rarely sing, and if it does usually briefly.
  - Often move quickly, furtively and be cryptic to follow.
  - May move with other bird(s) and show much excited interaction within a group.
  - May interact briefly with territorial birds – but will usually avoid them.
  - Will often respond to “mews” (or other non-territorial calls) but will usually not respond if “challenged” with song.

Use a compass to record direction and approximate distance to “heard” birds. Any “heard” bird records should be cross referenced with other observers and/or previous field-days and revisited to confirm their status. All follows of kōkako are tracked using a GPS which is downloaded at the end of each day. As well as maintaining this information on mapping software, it is useful to keep a printed copy of a topo map and record follows, annotating with Pr = pair seen, S = single seen, H = bird(s) heard. An additional map should be kept showing all survey routes taken and all playback station waypoints, even if no birds are located.

Verify how many birds are actually present and where they are, which may be helped by using two (or more) observers, each observer following a different, neighbouring pair at the same time. Another technique is to ‘drag’ the birds by moving away from the birds and playing kōkako calls in an attempt to get the kōkako to follow to the edge of their territory, at

which time they will either stop following, or kōkako from a neighbouring territory will arrive. If working alone in areas of high kōkako density, “dragging”, observing territorial encounters between pairs at boundaries, seeing/hearing singing simultaneously from 2 adjacent pairs, or observing identifying physical differences (missing tail/wing feathers, scarred or unusual wattles, etc) may be the only ways to confirm closely adjacent pairs. In large continuous areas of high-density kōkako using two or more people is preferable. Tracking the birds on a GPS is the best way to map encounters and helps to avoid ‘double-counting’. Always map all *territories* in an area, even if the actual number of kōkako occupying them couldn’t be confirmed.

Most kōkako counts are in populations in which not all birds are banded. The main concerns are to ensure that counts in different areas (or in the same area at different times) are comparable and to have some awareness of the likely magnitude of error between the estimated and actual populations.

Perceived causes of error in kōkako adult counts:

- i. In any count some birds may be missed (they may have been outside their usual territory when you passed by, or may have been temporarily non-territorial – eg between partners, or may just not have responded to play-back)) but such errors are usually corrected by subsequent survey effort.
- ii. Double-mapping. Recording a territorial single or pair in separate localities as separate birds (belonging to more than one territory), when in fact they are the same individuals (in one territory). This is;
  - likely to be the biggest error source in past counts
  - resolved in the field by repeated, long follows, by “dragging” and especially by stake-outs (where one person maintains visual contact with one individual bird/pair and another observer moves around to identify additional birds)
  - reduced by using a GPS to record follows to look for overlapping follow routes, and accurately recording the time and details of follows on standard follow sheets. Past surveys can also be roughly assessed for this error if good follow sheets and times are available.

- iii. Clumping (reverse of (i) above). Mapping one or two birds in one territory when in fact there were more individuals from separate territories. This is resolved in the field with the same methods as (i).
- iv. Mobile subadults and non-territorial adults. Danger here is multiple mapping (as for (i)). Observing territoriality criteria is critical. Subadults and non-territorial adults can move many kilometers each day and can be encountered multiple times at different sites. However, they could be followed in the same place on two separate days and *may* (rarely) sing full song. Errors will clearly be minimised by having robust criteria for indicating territoriality, and by reducing the duration of the survey so that the mobile birds have less chance of being found in different places.
- v. Change of search area. Comparable counts in any forest involve searching the same area each time. This means including all corners of the block, and areas between known territories. Searching must not be confined to previously known territories (though may start by confirming existing territories and moving out from them to cover the entire area). If an area is too big to cope with, do a thorough count in a subsection of the area—don't do a skimpy effort over the bigger area. *Nevertheless*, as populations grow, we may need to expand search effort to new areas – *but then we need to acknowledge and report this change*.

### 3.1.3 Guidance for counts of all territorial adults

- i. Count to be undertaken outside of the breeding season (start of April until the end of October – though in some areas kōkako will start nesting during October); maximum duration should be 6 weeks. Therefore surveys should ideally be completed by the first week of October if practicable. Where surveys continue through October (or indeed surveys conducted in March/April), apparent singles should be followed for at least one hour (and ideally two one hour follows on different days).

#### *Comment*

The 6-week duration is as short as we can practicably make the count period, given that bad weather could rule out 2 weeks of this easily. If the survey can be done in less time, then do so, since this will reduce the chance of errors due to birds moving between

territories.

ii. A minimum of 2 people (for all or part of the time) may be required for stake-outs to verify whether birds are the same or different. As many skilled observers as possible should be used for each count. Having several observers (up to five can work well) operating in parallel on any day helps to delineate observations of unbanded singles/pairs, since these can be followed concurrently, reducing the need for follow-ups on different days. It can be difficult for a single surveyor to accurately delineate multiple proximate unbanded pairs and double-counting becomes a greater risk.

### *Comment*

Observers must be reasonably skilled and suitably cautious, or their dubious observations will cost the survey time. **Perhaps the biggest issue is the ability of the observer to understand and correctly recognize territorial vs. non-territorial (and pair vs. 2 non-territorials) behaviours.** The use of low-quality optics is widespread – due to cost – and can cause considerable difficulty with observer ability to observe and record distinguishing features of birds and/or bands. In our experience, to correctly identify bands methodically on kōkako takes at least a month of full-time practise. Observers with less than this experience are commonly and unavoidably used in surveys, and their contribution is valuable, but the survey organiser should be aware of possible errors and check them.

iii. The following will be noted (and/or recorded on GPS) by each observer:

- Daily survey routes, on appropriate maps are collated in one place.
- Times and location of each playback stations (with *and without* kōkako) are recorded on GPS. If no response record no response.
- Whether kōkako were heard or seen. Heard birds are best recorded as a direction/estimated distance rather than a location, unless the observer is very sure about how far away the bird was. Song and calls can be very deceptive to place accurately. Note the time—someone else may have been playing callback or been with the birds at the time. This can be confirmed using radios. Heard birds should be cross-referenced with other observers and revisited to confirm status.

- Plumage condition, wattle appearance, calls and song of each located kōkako. It is just as important to record these if they are “normal”. Missing feathers; big, small or lilac wattles; curious calls, song or behaviour (bird easy or difficult to follow) are all important clues to identify individuals, especially if unbanded. Simple features (missing tail feathers; chunk out of a wattle) can readily tease apart two sightings or suggest that two sightings were in fact of the same bird. This can be verified if necessary, by stake- outs.
- Behaviours. What do the birds do? Do they move closely as a pair, mutual feed, roost closely, bill-tap, mutual preen, archangel, carry moss or sticks (pre breeding behaviour)? Do they sing full-song (together) and flap their wings from a high perch or do they skulk about without sound and sneak away? Behaviours are the key to identifying a pair from 2 non-territorial adults or a territorial single from a non-territorial bird.
- Presence or absence of bands, radio transmitters, radio transmitter harnesses etc. If banded, note colours of bands on both legs (remember the LEFT leg is the BIRD’S LEFT, which is on the right side if it’s facing you).

iv. The following are field criteria for acceptance of birds into the count total:

a. For banded or distinctive kōkako which are known to be territorial in this place in the previous year...

- confirmed ID of bands or the distinctive character within the known territory
- *and* a follow of at least 15 minutes.

b. For newly banded individuals (e.g. last year’s young); unbanded, indistinctive kōkako (including pairs with an unbanded, indistinctive member); previously-known, banded or distinctive birds in a new location...

- follows on at least two separate days of at least 10 minutes duration each at the same location (so that follow routes cross each other);
- *or* one follow of at least 20 minutes in which one member of the pair expresses full song (challenge the bird(s) with song and observe the response)
- *or* one follow of at least 20 minutes by an experienced observer in which >1 typical pairing behavior is exhibited (mutual preen, mutual feed, bill tap, roosting side by side, moving closely)

### *Comment*

Follow times given are easily achieved at, e.g. Rotoehu and Mapara, but much less so at Kaharoa or Little Barrier Island. We could increase them, but the criteria may become impracticable at Kaharoa and other habitats with widespread impassable terrain features.

v. The following are field criteria for *possible* records:

- Any follow of an unbanded, indistinctive, kōkako, which doesn't reach criteria in 4b
- Any bird, which is heard giving any call or song, in a place where there is *no doubt* that it is not an already known individual.

Possible records must be followed up by more survey effort. Resolution of the true number of kōkako present is best achieved by dragging, revisiting poorly understood locations, using playback from new locations, stake-outs, or simultaneous searching in the doubt areas by multiple observers.

Where surveyors cannot determine whether a pair being followed is different to a previously located pair, the birds can be 'dragged' using playback across the previous follow. If the pair being followed sings full song in an area where another follow had previously been recorded, and no other pairs are heard or seen in the vicinity, these two follows can be assumed to be the same pair. Conversely, where pairs are not able to be 'dragged' over a previous follow, an effort should be made by the survey team to re-sight the previously identified pair within their territory to delineate the two observations. These methods help to avoid possible inaccuracies from double counting or clumping of sightings. This illustrates why it is useful to have several survey team members running, so that one can 'hold' a pair whilst observations are being delineated by others.

vi. Coverage of the survey area

All parts of the survey area must be searched by listening (from dawn onwards) and, wherever no song is heard, by play-back stations every 200m. Play-back should use good quality recordings of mews (from any site) and song of local dialect; each play sequence must be followed by at least 5 minutes of listening and watching at each station; stations should be within at most 200m (with some allowance for topography and sound propagation – but closer

is preferable to more distant) of all parts of the block, less if line-of-sight ridge-top listening stations can't be found.

### 3.2 Juvenile surveys

A second key parameter, which measures kōkako population health, is juvenile output. Young kōkako remain in their parents' territory for days-weeks-months after fledging and will regularly come and go. Juvenile surveys are carried out by visiting known pairs, in the latter part of the breeding season, to see whether or not they have juveniles with them. We use the parameter *proportion of pairs which fledge chicks* because it can be difficult to accurately determine the actual number of young which fledged from a clutch. Remember that this parameter includes data from pairs which do not even attempt to breed, and yet other pairs may make up to four breeding attempts each season, so that it is *not* a measure of the proportion of breeding attempts that are successful.

Nest monitoring, concluding for each pair with fledgling surveys, gives a better measure of productivity (and other useful information) than fledgling surveys alone. For example, a pair may have a successful nest attempt and kick out their fledglings soon after, to begin a second attempt - should that attempt fail prior to a fledgling survey, there would be no indication that this pair had contributed. However, where there is not the capacity or funding to do intensive nest monitoring, fledgling surveys provide a crude measure of productivity that is better than not doing any productivity studies at all.

#### **Definitions of terms**

1. '*Chick*' or '*nestling*' to apply to the time in the nest (i.e. from hatching to fledging).
2. '*Juvenile*' to apply to the time from when the chick leaves the nest to when it leaves the parents' territory. This is when we survey for young.
3. '*Subadult*' to apply to the time when the young bird departs the parents' territory to when it establishes its own.

#### **Evidence for accepting kōkako juveniles**



1. **Definite evidence**, i.e. characteristic of juveniles only. Any one of these observations is acceptable evidence of a juvenile.

a. Very small (pea-sized) pink-lilac wattles, sometimes concave and brown/olive plumage.

b. Short tail (cf. adult length).

c. Emergent down on thighs, head or neck or “peaked” tips to feathers. Brown tinge to plumage (all observations to apply).

d. Third (or more) bird(s) travels with adults for at least 5 minutes or 100 m *and* is fed by them. ‘Travels with’ means all birds travelling within metres of each other without overt aggression such as chasing.

e. Third (or more) bird is stashed/cached by parents, *and* both parents are seen to return to feed it. Stashed bird must remain in sight while parents feed and then leave.

2. **Probable evidence**, i.e. none by itself is sufficient to accept a juvenile, but (a and b) *and* either of (c) or (d) together means that a juvenile record is accepted.

a. The bird is not a member of a pair.

b. Adult size and behaviour but wattles lilac.

c. Abnormal (variable pitch, squeaky, incomplete) mews or song (c.f. adults). Song attempts sound warbled and may degenerate into squeaks or mutters. *Or* ‘buzz’ call when being fed.

d. Previous observations in the territory which suggest that a full nesting cycle has been completed, namely:

i single bird encountered (other is incubating or brooding) where normally there were two, lasting ca 35 days.

ii then, repeated sightings of one or two birds (especially carrying food) in a particular vicinity (feeding chicks), for a further 15 days. NO carrying of nesting material at this stage.

3. **Indicative evidence**, which suggests that further observation is warranted:

a. Sustained hesitant or clumsy movement

b. Small (pea-sized) blue wattles

c. Brownish tinge to plumage

- d. Prior indication from previous visits of breeding in the territory, but inadequate to be confident that a full nesting cycle was completed
- e. Inappropriate feeding attempts (e.g. of dead twigs)
- f. Low ‘keening’ note given by adults when chicks are present

### **Recommended juvenile survey method**

1. Follows of each pair must in total reach 2 hours. Follows up to a 4 hours total are desirable but not essential. Follow effort beyond this time should only occur if evidence suggests that a juvenile is present.
2. Individual follows must be 15 minutes at least to contribute to the 2-hour total. A ‘follow’ begins when birds are seen and ends when their locality is unknown. It is accepted that visual contact with birds is intermittent during a follow.
3. Total contact time (by observer, date and time) with each pair is to be noted. Record the number of contact-minutes needed to locate the juvenile(s).
4. Survey timing must recognise that juveniles may fledge between late December and May. Two separate surveys may be necessary.
5. The criteria listed above are to be used to accept or reject observations as sufficient evidence to count a juvenile.

### **3.3 Roll calls**

Roll calls (Rasch *et al.* 1986) are used to monitor the survival of individual adult territorial kōkako during aerial poisoning operations. Kōkako are selected for roll calling after walk-through surveys in the poisoning area. The monitoring sequence is then:

1. Map territories of all kōkako. Usually four visits per territory are enough.
2. Relocate all territorial adult kōkako at least once per week (= roll call), for 3 weeks or longer until the poison drop occurs.
3. Within a week, recommence roll calls. Continue for at least 3 roll calls, or until most baits are non-toxic.

A minimum of three roll calls prior to the poison drop verifies that individuals can be

relocated. If a kōkako can be found regularly before the poison drop, then it should be able to be found afterwards also. Any disappearance after the poison drop which cannot otherwise be explained (e.g. by expected natural mortality) is assumed to be due to death by poisoning (see Section 6).

Roll calls were first tested using 13 kōkako in the Pikiariki Ecological Area, Pureora, in May 1985, in the absence of any poisoning. All adult kōkako were located each week for 4 weeks, but one juvenile could not be found after the first roll call, probably because it left its parents' territory then. It took 1-5 days to locate all 12 adults, each week.

### 3.4 Monitoring nests

Kōkako nest on average 16m (range 2–31) above the ground, in many different tree species, but usually with dense overhead cover. One to three eggs are laid in September to April, first clutches usually occur between November to January. Usually only the female builds the nest, incubates eggs and broods young, although the male feeds the female at or near the nest while she is incubating and brooding. Both parents feed the chicks. Incubation takes about 18 days, and time to fledging is 30–35 days (Innes & Hay 1995). In 'good years', some kōkako pairs fledge two or even three clutches, and pairs will reattempt nesting up to three times after initial failure, which is usually caused by predation (see Section 6).

#### 3.4.1 Finding kōkako nests

For the first five or so weeks of nesting, the female is mostly at the nest while the male isn't. *The main job, then, is to locate the female and follow her to the nest.*

- Get to know where PAIRS of kōkako occur. Otherwise the single birds you follow may be just that—singles.
- The onset of nesting is characterised by increased frequency of courtship feeding, and 'archangel' displays, especially by the male, in which wings and tail are fanned out and the bird bobs up and down on one spot, as if bowing. Twigs may be passed between male and female. Nest building takes about 5 days. The female carries twigs, then leaves, moss and rotten wood, and finally tree-fern scales as nest-building progresses.
- Follows in pairs' territories during the breeding season should be a minimum of 35 minutes long. If the female is incubating, she will rarely leave the nest for more than 25

minutes (usually 2–15 minutes). If you follow a pair together for 35 minutes, then they will not be nesting. *If your follow is of a single bird when you know there should be a pair, or if your follow is marked by unusual disappearances and appearances of birds, or if the pair seem furtive and business-like, then you are on to something.*

- The hard part is finding the actual nest-site. This can be tricky even once you've pinpointed the general area where two birds seem to separate or come together, or where you hear mysterious calls (a second bird which you are sure is present but you don't get to see) or where you have followed a bird carrying twigs. The best technique is to sit still in a good viewing spot early in the morning and wait for either the female to emerge from the nest (about once per hour) or the male to visit her (about every 35 minutes average at one nest, but this may be as long as 2 hours especially once it gets later than 10am). *Once a male is seen carrying food, it will generally move quickly and purposefully towards the nest.*
- When chicks first hatch, the female spends as long (70–90% of her daylight hours) at the nest brooding the chicks as she did incubating. This then steadily declines as the chicks grow. At one Pureora nest, the female stopped brooding completely when the chicks were 21 days old. The total number of feeding visits made by the parents increases steadily to >3 per hour as the chicks grow. At this stage of nesting, the pair will repeatedly be in the same general area; they will be seen carrying food rather than swallowing it, and they will be very business-like in their movements. Both birds may then be followed to the nest, and chicks may be heard begging when they are fed.

Note that the male's visits to the nest are always brief, usually 5 seconds when feeding the female and less than 10 seconds when feeding the chicks. Most nests are found by following the male to the female rather than to the nest itself.

Radio transmitters on female kōkako are the best way to find all nests quickly.

### 3.4.2 Monitoring kōkako nests

- Once located, visit each nest at least once per week. More frequent visits are desirable if you wish to examine failed nests quickly after their failure. This will enable more accurate description of the nest scene which may hold clues to the original failure event, before scavengers obscure the original picture.

- The nest can be considered to be active if you see adults entering or leaving the nest, or you see kōkako movements on the nest, or a tail protruding over the edge, or you hear chick calls.
- The nest can be considered to have failed if no activity is seen at the nest in a 2-hour observation period.
- If you can do so safely and legally, climb to the nest and carefully note any clues that may identify the cause of failure (see Section 6), also look for feathers around the ground under the nest tree.
- Record key findings on a nest record sheet. A standard nest record sheet is appended. Individual nests should be identified by SEASON and NUMBER (allocated in chronological order). Nest record sheets should be filed safely for later reference.

### 3.4.3 Determining stage of nesting and age of chicks

Usually estimation of nestling age will involve weekly monitoring of the nest. Parental involvement at the nest will vary but, as a general rule, the following guide will help select the correct time to band nestlings.

- Female sitting tightly. Leaves nest for periods up to 20 minutes every 90 to 120 minutes. Male visits every 30 to 90 minutes.  
Incubation or... Brooding, first 5 to 7 days after hatching
- Female leaves nest for longer periods, often with every second visit of the male. Male visits every 20 to 40 minutes  
Chicks aged 7 to 10 days
- Female rarely brooding. Both parents visiting nest every 15 to 30 minutes  
Chicks aged between 10 and 20 days (*recommended age for banding*)
- Both parents frequently (every 20 minutes) feeding young, female sometimes making more visits than the male.  
Chicks 20 to 30 days
- Chicks seen flapping and moving about in and around nest. Chicks  
30 to 35 days... near to fledging

In some circumstance's kōkako parenting WILL differ; it may be necessary to approach the nest and assess the chick size. If the black face-mask is well developed

or the tail is greater than 75mm the chicks may be too big, approach with great caution! Chicks reach ideal banding size between 10 and 20 days (90 to 150 grams). At this age primary feathers will be between 10 and 80mm long and the tail will be 8 to 65mm long.

#### 3.4.4 Banding chicks

This is certainly the easiest time to band kōkako if you're trained at climbing. Refer to DOC tree climbing guidelines ([DOCCM- 1544989](#)) and obtain training before attempting any kōkako nest work.

You should aim to do your banding when chicks are between 10 and 20 days of age.

Make sure your climbing position allows you free access to all parts of the nest. If chicks are “jumpy”, (moving a lot, standing upright, looking agitated) abandon your attempt or, where possible, cover with a black bag to subdue them. Remove gently from the nest to a black cloth bag. Move chicks one by one, remembering to disentangle their feet from the nest/other chicks. Lower to ground on a rope if the route is obstacle free or abseil to the ground with the chicks. In some situations (i.e. where the climbing route was difficult) it may be preferable to band the chicks in the tree. Check your watch and be sure to have the chicks back home within 60 minutes.

On returning chicks to the nest settle them back one by one. A warm hand or black cloth placed gently on top will help them settle. Leave as quickly as possible. Where particularly boisterous chicks are concerned, we have left a simple dummy bird to “mind” them (made from a black bag, bound up, with moss inside it). If you do this ensure that there is nothing which could entangle the chicks and that it is light enough to be easily removed by the parents.

### 3.5 Using video surveillance

Monitoring kōkako nesting attempts using video surveillance cameras was a widely used technique during the 1990's and early 2000's but has only rarely been used during recent years. Such recording can provide us with unequivocal evidence of the causes of nest failure, identification of predators, timing of attacks and the nature of any sign that those agents leave. Operators must be careful that the cameras, lighting or process of fitting the

equipment does not in any way endanger the kōkako or nest. To get the most from the exercise, cameras are best fitted as early in incubation as possible.

### 3.5.1 Fitting cameras

In the past much nest filming was carried out using telephoto lenses and focused infra-red/infra-red laser illumination. This meant that cameras could be situated in separate trees, distant from nests. In some locations such systems will be preferred but many nests of kōkako are so well concealed that this is not an option. Compact cameras situated about 1.5m – 2m from nests have been used with good results. Such proximity allows for much cheaper, less power-hungry, lighting systems, and better image resolution. Interchangeable lens (or zoom lens) cameras allow greater flexibility in the positioning of the camera.

The electronics laboratory at DOC Head Office, Wellington can provide advice on the set up (contact Stu Cockburn) as this changes constantly as new technologies become available. Cameras and lighting should be connected by cables of at least 30 m in length to allow batteries and SD-cards/data storage to be changed/downloaded without disrupting the birds. Wireless cameras may be used in some situations but always check that the built-in battery is sufficient to power the camera, lighting and data transmission for the entire nesting period. It is important to consider image resolution, rate of recording (frames per second) and performance in poor light and or challenging environmental conditions when choosing equipment. Ensure that the light source used does not emit visible light (which might attract predators) and try to conceal the camera with a dull, camouflaged, cover, to avoid it from attracting unwanted attention. The lens will focus slightly differently under infra-red than it will with visible light, adjust for this where night-time image resolution is important. Tilt the camera downward and/or fit a rain-hood to prevent water from hitting the lens cover. When fitting the camera try to fit the cable so as not to provide a direct access-way to the nest – for example the cable may be suspended or strung between several trees away from the nest.

The camera should be securely attached to a branch as far as practicable from the nest using either a “G-clamp” or bracket fitted with long “Velcro” straps. This bracket connects to the camera by an adjustable ball clamp. The field of view can then be adjusted – with some camera systems this may involve communication with a second person who

operates the monitor at ground-level. Try to get a picture that includes some of the nest surrounds. The nest should occupy 1/3 to 1/2 of the frame. If possible, position it so that the eggs are visible.

Zip ties or loops of string should be used to quickly secure the cable.

### 3.5.2 Climbing to nests

Before you attempt (or ask anyone else) to climb to a kōkako nest over 3m high you will need official training in tree-climbing. See DOC tree-climbing code of practice ([DOCCM-1544989](#)).

Plan the entire operation *before* you leave the ground. Ensure that all the equipment is laid out, tested and ready to operate and that everyone is clear as to their tasks. It is critical, at the egg stage, that birds are not kept off the nest for greater than 20 minutes. Do not disturb birds in cold or rainy weather.

Watch the nest for some time to determine activity; try to time your climb for when the (female) has been sitting for some time so that the eggs are well warmed. Allow her to sit for as long as possible during the climb (some birds may sit tight throughout the proceedings) but don't give her a sudden fright by sneaking up! As the climber approaches the nest it's good practice to talk or whistle softly to the bird so that they are fully aware of your approach.

Assess the climb, think both of your safety *and* that of the nest. Kōkako nests at the ends of branches or amongst vines are particularly vulnerable as your movements, though distant from the nest, may dislodge or damage it. Long vines that pass through, or near, a nest, can make things very difficult!

If the climb is time consuming and the bird has left the nest, consider setting up the climb (fixing taps slings/carabiners/hardware) then returning after a couple of hours to re-climb and fit the camera.

Actual climbing techniques are many and varied... limited only by a requirement for safety and your imagination. Direct rope climbs (SRT) are usually the quickest and most secure. Sub-canopy trees with very supple branches may be approached from above using belay or abseil techniques. Lash or stay smaller branches to increase their stability if required. With low growing, supple, trees a ladder may be the only option- make yourself



aware of, and comply with any safety regulations/precautions in the use of ladders.

### 3.5.3 Servicing recorders

Most recorders, in current usage, will require periodic changes of batteries and tapes. For safety and simplicity go for sealed “gel” batteries. Use a recommended charger and keep a log of battery usage and recharged voltages so that you are aware when capacity begins to drop with age.

The recording unit and batteries will have been placed as far from the nest as possible, nevertheless, minimize possible impacts by keeping duration of visits and noise to a minimum. Don't stop to eat or drink near nests! Always take a monitor and check that the camera position is correct and that the date/time functions are still correctly set. Label data clearly and ensure they're properly saved and backed-up. In wet weather carry a towel, keep equipment as clean and dry as possible.

## 3.6 Data Handling

It is very important that information on kōkako is collected systematically.

See appendix 2 & 3 for field sheet example

### 3.6.1 Field recording

For tasks such as survey work, nest monitoring and causal visits you should enter field data in a pocket notebook made of waterproof paper (e.g. “Write –in-the-Rain” notebooks available from the DOC Banding Office (Biodiversity Group, National Office, Wellington). Field data should be transferred to an electronic file as soon as possible, photographed, or photocopied with the copy stored in a safe place away from where the field notebook is usually held. Ideally data should be transcribed daily in case the notebook is lost in the field.

For catching and banding birds, take copies of the appropriate field data sheets with you to ensure all relevant data is collected. In addition, make sure you have a list of unused band

combinations with you (usually kept in the banding box). Retain the paper copy after transferring the data to electronic database in case there are subsequent queries or transcription errors.

### 3.6.2 Electronic database

National data is collected via the Annual Reports, (see appendix 4). The data is then collated into one excel workbook ([DOCCM-3144275](#)) and held in the Department of Conservation's online filing system.

## 4 Planning a new kōkako site

Before starting, make sure that your project is closely integrated with ongoing projects being carried out in the same area by DOC and other agencies, will not interfere with existing project designs, and ties in with, or optimises, the timing of planned pest control programmes in the study area.

### 4.1 Minimum requirements of a site to establish a new kōkako population

Using knowledge gained from many previous translocations, coupled with more recent understanding of the genetic requirements for establishing and maintaining kōkako populations, the KSG has developed a set of minimum requirements that prospective kōkako sites need to attain. These standards, based on current science and knowledge, are intended to ensure that all translocations have a high chance of long-term success.

As more knowledge and insights are gained through additional translocations and their associated monitoring, standards may change to reflect advancements in our knowledge of kōkako

### ***1. A minimum of 40 founder kōkako are translocated***

To establish a new kōkako population that is sufficiently genetically diverse to support a large, long-term kōkako population, a minimum of 36 founders (i.e. unrelated kōkako that successfully produce progeny that survive to adulthood) is required **and** a sustained high population growth rate to a large size (sites with poor growth rates might require many more founders to reach genetic targets). Because not all released birds survive, stay at the new site or form productive pairs, a minimum of 40 kōkako is required to be translocated, but more kōkako may be required over time to achieve 36 unrelated founders. Appropriate source populations should be discussed with the KSG. There are currently only a few kōkako populations that are considered large and genetically diverse enough to overcome the loss of kōkako through translocations to other sites, and there is a high demand for these birds. This is currently one of the largest limitations of doing more translocations, as these original sites must be protected from erosion of genetic diversity. Genetic modelling has established annual thresholds for the number of kōkako that can be safely removed from these sites, and once these are reached, new projects must wait their turn. Therefore, planning well in advance of any proposed translocation date is highly recommended.

### ***2. Habitat quality is assessed for kōkako suitability***

High growth rate in newly established populations minimises loss of the genetic diversity necessary for long-term genetic health. High growth rate is dependent on both effective pest control and sufficient good quality habitat. The KSG is now in a position to provide an assessment of kōkako habitat quality after many years of research on kōkako productivity, behavior, habitat use, diet records and kōkako habitat preferences when released at new sites, e.g. see Powlesland 1987, Best & Bellingham 1991, Hay 1981, Collen et al 2016; Flux et al 2013; Innes et al. 2013. All sites proposed for the translocation of kōkako require a habitat assessment to be completed early in the feasibility stage of the approval process, to demonstrate that a suitably diverse and abundant understory with suitable canopy containing plant species important to kōkako diet is present.

If new populations are established at sites that are considered to be suboptimal habitat, kōkako population growth rates are likely to be low. Being small makes a population more vulnerable

for a variety of reasons i.e. to a predator incursion/irruption, pathogen outbreak, stochastic events such as fire or a big storm, or Allee effects. At worst, this could lead to small populations lacking sufficient genetic diversity, meaning they will have a lower probability of persisting in the long term and will be less suitable as future source sites. At best they may require ongoing translocations to the site in perpetuity, which is not only expensive and inefficient, but may reduce the availability of kōkako from the limited source populations for establishing kōkako populations at additional sites.

### ***3. The release site is required to contain at least 2000ha of suitable habitat.***

Genetic modelling using kōkako population dynamics has provided an objective criterion for establishing the minimum size an isolated kōkako population should be in order to have a high chance of maintaining high genetic diversity over reasonable periods of time (10 generations). The minimum population size for a kōkako population is now considered to be 500 adults. In a healthy population, there are few non-paired birds, so a minimum of 250 pairs is the target.

In high quality kōkako habitat, where kōkako may be approaching K (carrying capacity), the mean territory size is approximately 8 ha. Therefore, the minimum area that is considered sufficient to support a self-sustaining kōkako population is considered to be 2000ha of suitable habitat.

### ***4. Pest control targets must be met both before and after a kōkako translocation***

Kōkako are most vulnerable to introduced predators (ship rats, possums and stoats) when they are nesting, a period that can span from early November to late March. Therefore, predators need to be managed to low levels over this time to provide kōkako with the best chance of successfully breeding.

There are two approaches to predator control: one-off or continuous. Each requires slightly different considerations.

If a one-off control approach is used, the site is subject to intensive management over a short period of time, using methods that can abruptly reduce pest populations to very low levels. The most common method shown to consistently achieve this approach for kōkako is using aerially applied 1080, or 1080 in bait stations. 1080 is particularly effective as it can reduce all three

main predators of kōkako in one operation. When performed over a large enough area, it will take introduced predators several months to re-colonise the site from surrounding non-treated areas and rebuild their populations through breeding. During this period of low but rebuilding pest numbers, kōkako can successfully breed. The key is to reduce pests to such low densities that even by the end of the kōkako breeding season, pest numbers are still low enough over the site to allow kōkako to successfully breed. Studies have indicated that this target should be 1% RTC (possums) and 1% tracking tunnel rates for ship rats and needs to be achieved by 1 November each year. If this is achieved over a sufficiently large area, then in most seasons it appears that no extra pest management needs to occur for kōkako to have a high breeding success rate. Unfortunately, there is currently no robust method to measure the required maximum target stoat density that is known to allow kōkako recovery.

If continuous management is used, then management is applied either continuously throughout the breeding season (e.g. trapping), or through several pulses of pest control (e.g. two or more bait station operations using anti-coagulants). These methods are generally not considered to be able to suppress pest populations to the very low levels that one-off control methods can achieve but may be able to keep them to sufficiently low levels throughout the breeding period so that kōkako can still successfully breed. For these operations, monitoring needs to occur every 6-8 weeks throughout the breeding season to measure the effectiveness of management. The target for this is <5% RTC for possums and <5% rat tracking tunnel index at all times throughout the breeding season. [Note: as possum RTC's are expensive, and possum numbers do not increase as quickly as the other predators, annual RTC monitoring is deemed sufficient at proposed new sites].

These management results should be demonstrated for a minimum of two consecutive years prior to receiving kōkako, partly to demonstrate that site managers have good pest control systems in place, and partly to increase fruit, leaf and invertebrate food that will benefit kōkako.

Stoats should also be controlled at new sites using DOC best practice techniques ([Best Practice Stoat and Cat Control](#)) Note that where rats and possums are controlled with appropriate toxic baits, secondary kill of mustelids may be sufficient.

If pest control over 2000ha is not present at the start of the reintroduction programme, pest control should expand in advance of the expanding kōkako population, out to at least 2000ha of suitable habitat. A minimum of 1000ha of pest control is required at the start of the programme.

***5. An annual kōkako census is required, until 25 adult territorial pairs are confirmed, followed by a quadrennial census until 50 pairs are achieved.***

Monitoring new kōkako populations is essential for several reasons including determining the number of population founders, the effectiveness of pest control, population growth rates and detecting unforeseen events. As monitoring to establish whether at least 36 kōkako establish as true founders (i.e. breed and their offspring survive to then contribute genetic material to future generations) is time consuming and expensive, it can be assumed that if 40 unrelated kōkako establish territories, then at least 36 of these will be true founders.

If the population growth rate is not high, or there are not at least 40 unrelated kōkako that establish territories, then reconsideration of site suitability and identification of any issues will be required. Pest control may need to be improved or expanded to improve growth rates, along with further supplementary translocations to obtain the required number of founders.

Consultation with the KSG will be necessary to determine appropriate management responses in such cases.

## 4.2 Consultation with local communities and iwi

During the project planning process, there should be adequate consultation with local communities and tangata whenua, so that affected locals and neighbours know what you hope to do and are given every opportunity to contribute to the planning of your project. When you are ready to begin the consultation process, DOC staff can help to point you in the right direction.

Consultation does not require agreement between parties, but you should aim for this whenever it is possible. To do this, you should allow for an effective lead-in time and provide

other parties with plenty of time to consider their position, which may require them to have internal discussions. In some instances, this may take a lot of energy. However, if you can reach agreement with your local stakeholders, the effort and time spent will be well worthwhile.

If possible, involve your stakeholders in physical help with the project – the resultant sense of ownership will pay dividends in the long run. Also, ensure that you keep stakeholders informed about the progress of your project through informal and/or formal communication channels, as appropriate.

When planning a translocation, recognise the spiritual significance of such events to tangata whenua at both ends of the transfer process. Often the different iwi involved will want to talk to one another and establish protocols for the transfer and will almost certainly want to be involved in the first such transfer and be consulted about their wishes to be involved in subsequent identical transfers.

Note that iwi consultation is just one of many necessary actions you will be reminded of to complete a translocation plan (see Best practice techniques for the translocation of North Island kōkako (*Callaeas wilsoni*) (Collen et al. 2016).

### 4.3 Reporting

DOC staff and any individual or group who receives funding or in-kind support from DOC must supply an annual report to the Kōkako Specialist Group by 31 August each year. All projects should use the same template, and an electronic copy will be sent out to all groups by the KSG leader by 1 July each year.

## 5 Kōkako research

Most research and management that has been undertaken as part of the Kōkako Recovery Programme was carried out within a ‘research-by-management’ or ‘adaptive management’ framework during the 1980s and 1990s. This ensured that the research was closely aligned with management needs, the management actions were recorded and carried out using a suitably robust design, and the effects were quantified. The main results that describe key causes of kōkako decline and what can be done to address these were described in Innes et al. 1999.

The only substantial research undertaken since has been on kōkako song – its dialects, changes during translocations and effects on mate-choice (two PhDs), and on genetics of Hauturu kōkako (a MSc). The Kōkako SG has made several unsuccessful attempts in the last 20 years to initiate new research on kōkako demography, habitat needs and habitat quality at selected relict and translocation sites. Research goals are listed in Section 4.3.3 of the draft Recovery Plan.

Before starting, make sure that your proposed project is closely integrated with current projects being carried out in the same area by DOC and other agencies or community groups. This is to ensure new projects will not interfere with existing project designs, and ties in with, or optimises, the timing of planned pest control programmes in the area.

It is important that you have a clear idea of the expected outcomes of the project (e.g. twice as many kōkako in a given area), and the outputs (e.g. technical reports, scientific papers, university thesis, media articles). It is obviously impossible to know in advance precisely what results will occur but remember that negative results are still results if they are reported accurately. It is always tempting to only report the results of studies with robust sample sizes and which yielded significant results, rather than those where sample sizes were very small or no clear patterns emerged, and these also tend to be the main types of studies published by scientific journals. However, as long as the study was undertaken rigorously, the results will be useful if merged with other similar datasets. Long-term routine monitoring can have a very valuable teaching role in due course, and with good design can be seen as ‘research’. Therefore, ensure that you seek advice on project design from the Kōkako Specialist Group, kōkako researchers in DOC or universities, or kōkako research consultants during the project planning



stage.

Theoretical studies on wild kōkako that could be attempted on less threatened taxa should generally be avoided, as they have the potential to seriously disturb or affect the behaviour of the birds (e.g. through very close-order monitoring, or repeated handling or blood sampling). Therefore, be aware that it will be much more difficult to obtain permits for such research.

Before you complete your field programme, you should contact the Kōkako Specialist Group, because they may be aware of another project that could usefully build on your project. At the end of your study, allow ample time to restore your study area and study animals back to pre-study conditions (e.g. remove nest markers and radio-transmitters).

Every study should aim to make the results and interpretation available to the public in the form of a paper in a peer-reviewed scientific journal or DOC science series. Much valuable data languishes in unpublished reports, on temporary websites or, worse still, in notebooks. Contact the Kōkako Specialist Group for assistance if you would like to publish the results of your study but do not have the experience to analyse the data and/or write a scientific report.

## 6 Management of kōkako health

### 6.1 Sick kōkako

#### 6.1.1 Decision process

It is rare to find sick kōkako in the wild. If you do encounter a sick bird, you should attempt to get it to veterinary care as quickly as possible or, if the bird is unduly distressed and clearly beyond recovery (e.g. severely broken wing or leg, large open wound), it should be humanely euthanised by a blunt force stunning blow to the head followed by cervical (neck) dislocation or a further blow to destroy the brain.

### 6.1.2 Information collection

You should note down the symptoms of the illness compared with your experience of normal healthy birds – remember that the nearest veterinarian may not have encountered kōkako before and so may not know what is normal, e.g. a common minor stress response.

After an initial assessment by your local veterinarian, the kōkako will have the best chances of recovery if handled at a veterinary hospital that is familiar with managing kōkako if it needs a more specialist opinion and/or treatment. [Wildbase at Massey University \(wildbase@massey.ac.nz\)](mailto:wildbase@massey.ac.nz); Ph (06) 350 4525), the New Zealand Centre for Conservation Medicine at Auckland Zoo (Ph (09) 353 0753) and The Nest Te Kōhanga at Wellington Zoo ([wellingtonzoo@wellingtonzoo.com](mailto:wellingtonzoo@wellingtonzoo.com); Ph (04) 381 6755) have plenty of experience in dealing with kōkako and should be contacted in the first instance. Department of Conservation staff should also contact the DOC veterinarian for advice: [kmcinnes@doc.govt.nz](mailto:kmcinnes@doc.govt.nz) ; Ph 027 480 3365.

Ask the veterinarian to keep detailed records of their diagnoses and treatment schedules, as this may help with the treatment of similar cases in the future. Records of successful and unsuccessful treatments should be sent to the Kōkako Specialist Group Leader and DOC's veterinarian, and preferably be published in a veterinary journal such as Kōkako so that other vets can easily access the material.

Measure, weigh, sex and band the bird, collect 6–8 pin feathers for DNA analysis (when recovered), and complete the form shown in Appendix 3. This form should then be sent to the Kōkako Specialist Group Leader.

### 6.1.3 Release and monitoring

Once a bird is suitable for release, it should be banded. After being given an overall health clearance, the bird should be returned as close as possible to the site where it was found. In some cases, there is an advantage in having a transmitter on the bird to see if it copes with the transition back to the wild following serious illness, because this will assist the decision-making process in future. Where a bird is released away from its original location, it should be radio-tagged to see whether it tries to return home. This is only acceptable if adequate resources are available and allocated to undertake the radio-tracking, if the question being explored is strong, and if the transmitter can be cleanly shed from the bird after the question is answered. It is a good idea to invite the person who handed in the sick or poisoned bird to attend its release.

## 6.2 Dead kōkako

### 6.2.1 Decision process

It is important that all kōkako deaths are documented and, where possible, specimens are collected for scientific, pathological and cultural use.

If the specimen is simply skin and bones, or a suppurating mess, there will often be little value in collecting it because it will be impossible to detect toxins or disease and difficult to obtain useful material for cultural uses. However, it may still be possible to detect signs of predation such as puncture marks and broken bones, or to grow bacteria from inside the bones. Put on a pair of latex gloves and check the specimen (particularly the back of the head and neck, or remnant bones) for tooth marks and broken bones and measure the space between any paired canine punctures. [Note that some of the most significant evidence identifying predators comes from examination of the scene rather than the specimen – see 6.2.4].

If the kōkako has been killed only recently, get advice about how to take a DNA sample effectively. Swab the area around the wound with a cotton bud and store the cotton bud in a clean plastic bag because the DNA in the saliva of the killer may identify the culprit down to species level, and maybe even down to the individual level (e.g. to determine if one stoat is decimating a population). These saliva swabs can be analysed by Ecogene ([ecogene@landcareresearch.co.nz](mailto:ecogene@landcareresearch.co.nz) ; (09) 574 4225).

If the specimen is still fresh or moderately so, place it into a plastic bag and seal it, label the bag clearly with your name and date and phone number, the exact location where it was found, the species name and any permanent identification such as band number or transponder number, and chill it in a refrigerator at 4°C as soon as possible. To prevent a ‘helpful’ colleague from freezing it, mark the bag with a ‘DO NOT FREEZE’ label, because freezing will damage cells and tissues and make the diagnosis of cause of death more difficult, even if it does improve the smell!

The Department of Conservation has a contract with Wildbase, Massey University, which covers the costs of gross necropsies and histopathology of all threatened species.

All dead kōkako can be sent to Wildbase, Massey University, for necropsy. Where poison is suspected, Wildbase vets will collect and forward the appropriate samples to Landcare Research if you have indicated this on the submission form. If predators are suspected, take DNA swabs before sending the body away and request that the Wildbase vets look for

predator sign on the body during the necropsy, without telling them what predator you think killed it, so that their diagnosis is independent of yours. If disease or misadventure is suspected, or the cause of death is unknown, request a necropsy and provide as much background information as possible. Even where the cause of death is obvious, there may be something to learn from performing a necropsy, including the detection of other health issues that were affecting the bird at the time of death.

### 6.2.2 Information recording

A leg label should be attached to all dead kōkako that are found by field workers, or handed in dead to DOC, providing details of the date of death, location of death, apparent cause of death, person who found the bird, person who reported the death (if different) and person who filled in the tag.

### 6.2.3 What to do if poisoning is possible

Where poisoning is possible (e.g. after a pest control operation in the area), you should:

1. Immediately place the specimen in a refrigerator, NOT in a freezer. Maggots can be killed with fly spray or be picked off.
2. Contact Wildbase, Massey University, Palmerston North ([wildbase@massey.ac.nz](mailto:wildbase@massey.ac.nz) ; Ph (06) 350 4525) to arrange for a necropsy, and alert them that they will be requested to collect samples for toxin analysis.
3. Send the chilled specimen to Wildbase as quickly as possible in a chilly bin with an icepack to keep the specimen cool while in transit. Mark the chilly bin with 'Perishable' stickers. Do not send specimens on a Friday or Saturday, else they will decay over the weekend.
4. Contact the Kōkako Specialist Group Leader to check whether the specimen is needed for any particular priority research purpose and arrange transportation of the specimen with a request, where applicable, for it to be returned for local disposal
5. Results of toxin assays from Manaaki Whenua Landcare Research NZ Ltd will be sent to Wildbase, Department of Conservation, and to the original sender.

#### 6.2.4 What to do if disease is suspected

Where disease is suspected as the cause of death (e.g. the bird is in poor body condition, has superficial lesions or lumps, other symptoms were recorded before death, or is a radio-tagged bird that has died for no obvious reason), you should:

1. Follow the steps 1–4 outlined in the section above
2. Request that the results of the necropsy be sent to you and the DOC veterinarian, including a non-technical summary.

#### 6.2.5 What to do if predation is suspected

Where a kōkako is believed to have been killed by a predator, and where poisoning or disease is not suspected, the specimen may still be suitable for a variety of purposes, e.g. research, cultural materials, museum specimens or advocacy specimens. You should:

1. Carry out a scene examination, particularly looking for and collecting faeces or hairs of the likely predator. Photograph the kōkako body and any nearby feathers or other sign, as you find it. Mustelids are likely to stash carcasses under cover, while harriers and falcons will pluck feather from the carcass before feeding.
2. Examine the body of the kōkako for puncture wounds, especially on the back of the neck (characteristic of stoats; see Lyver et al. 2000).
3. If the kōkako is found freshly dead, swab the area around the wound to try to gather DNA in the saliva of the predator. With good-quality DNA, this test can identify not only the species involved, but also the individual animal, and so can determine that one individual predator killed e.g. two kōkako 5 km apart. Seal the swab in its container, refrigerate and contact Ecogene ([ecogene@landcareresearch.co.nz](mailto:ecogene@landcareresearch.co.nz); (09) 574 4225) to arrange examination.
4. You can either send the specimen to Wildbase for a necropsy and request that they collect samples for predator testing or carry out the analysis yourself. If you cannot necropsy the specimen in the laboratory immediately then freeze it.
5. Contact the Kōkako Specialist Group Leader to check whether the specimen is needed

for any particular priority research or advocacy purposes (e.g. as a mounted specimen) and arrange transportation of the specimen with a request, where applicable, for it to be returned.

6. If the specimen is not required for a priority research purpose, contact the local DOC district/region in which the specimen was found to arrange for the transfer of the specimen.
7. Forward frozen specimen in a clearly labelled chilly bin marked 'Perishable'

## 6.3 Failed nest

Most kōkako nesting attempts on the mainland fail because of predation, usually by introduced mammals (especially ship rats, possums or stoats) but also native birds (especially harriers). Accurate identification of predators is important for continually re-focusing pest control programmes.

### 6.3.1 Detecting a failed nest

See Section 3.4 for a description of the basic breeding cycle. The nest has probably failed if:

- At any stage of nesting, both pair members are followed together for more than one hour and their activities are not focused on the nest area. During incubation, the nest has almost certainly failed if the pair are together for half an hour.
- No activity is seen at the nest for 2 hours. Normally, the female gets off for a few minutes every 60–90 minutes, and the male visits every hour or two, although the latter varies a lot.
- Eggshell fragments, feathers or dead chicks are found under the nest. Kōkako remove hatched eggshell from the nest and drop it nearby. Hatched shells are distinctive because the shell break margin is smooth, and the break is transverse around the middle of the egg.

### 6.3.2 Examining a failed nest

The search for clues starts *before* climbing to the nest. Look on the ground under the nest, and

within a 20m. radius, for eggshell, chicks, feathers and any sign of a dragged carcass. The latter may be characteristic of a mustelid predation. Especially, check out snag surfaces such as tree-fern trunks and rata vines or bark. Also check under logs and other possible caching sites (usually sign of a stoat kill).

Then climb to the nest with a notebook, a large plastic bag to put the entire nest in, small pottles for eggshell and chick pieces, and a camera. Look for snagged/fallen feathers as you climb up the tree. At the nest, take a photo if possible. Wide-angle shots are best because the scale of sign on the nest is then clearer. Photos should be stapled to/digitally saved with nest record sheets to enable re-examination of diagnostic sign, and they are powerful advocacy tools. Don't move/touch anything until you've recorded what you see. Everything is significant. Look for faeces and feathers on upper surfaces of the nest and adjacent vegetation. Is the nest lining 'snuffled' so that egg-shell pieces are worked down into the soft lining? Note how many eggs or chicks are present, and what damage has been done to them. Put eggshell pieces into small pottles for safe transport. Then take the whole nest (including any remains adhering to it) for later examination by putting it all into a plastic bag. Write a few notes while still up the tree if you are comfortable and safe while doing so

Later, carefully examine the top surfaces of the nest for sign, especially ship rat faeces that are small, dark and inconspicuous (get someone else to check them if you are unsure, weta faeces may look quite similar!). Then tease the nest remains apart on a smooth table. Look especially for eggshell fragments snuffled into the lining and keep looking for rat droppings.

- *Keep all eggshell remains in pottles labelled with the date, location, pair name and nest number. Store rat faeces with the eggshell or in another small, labelled, pottle attached by a rubber band. Ensure samples are quite dry before storing.*
- *Keep chick remains in glass jars in 70% alcohol.*
- *Record all data about each nest onto a standard form (see attached example).*

The idea behind keeping these specimens is that others may learn from what you found. Let the specialist group leader know what you have collected so that this can be centrally recorded.

### 6.3.3 Diagnostic predator sign

Despite 10 years of research, many predations still cannot be credited to a particular predator species, because some predators leave the same or similar sign, and because sign left after a predation may be, subsequently, disturbed by scavengers of the same or a different species. However, most predators occasionally leave diagnostic sign. The following accounts are based on Redhead (1969), King & Moody (1982), King (1989, 1990), Major (1991), Brown *et al.* (1993), Marchant & Higgins (1993), Laurance & Grant (1994), James & Clout (1996), Innes *et al.* (1996), Brown (1997), and Brown *et al.* (1998). Key aspects of each species' predation sign are italicised in the following accounts.

#### 1. Ship-rat

Frequent predator of eggs, after harassing the sitting female off the clutch at night, usually in the first 10 days of incubation. Will also take chicks to at least 10 days old. Frequent scavenger at nests after predation by other species.

##### *Characteristic sign on eggs*

Ship rats make a hole in the egg sufficient to get at the contents, resulting in *one or two large shell pieces with many smaller fragments*. The *large pieces have jagged edges* but few, if any, clear incisor marks. The nest bowl is usually 'snuffled', meaning that the rat pursues some egg contents down into the nest lining, resulting in a disturbed lining and shell fragments up to 4 cm under its surface. Rats are also known to cleanly remove eggs or chicks from nests, although this has been verified only with species smaller than kōkako.

##### *Characteristic sign on chicks*

Ship rats partially eat chicks, leaving *gnawed (in contrast to cleanly broken) bone and/or flesh*. *Rat faeces often left on or around the nest*.

#### 2. Possum

Frequent predator of eggs, chicks and probably adults, although latter has not yet been filmed. Sitting females usually vacate nest as possum approaches. Possums videoed at kōkako nests



always eat eggs but may ignore chicks, or even bite them without feeding on them.

#### *Characteristic sign on eggs*

Possums eat eggs roughly, leaving *no large shell pieces*. Shell that does remain has *crushed rather than jagged margins*. Some *grossly infolded shell 'pellets'* may be formed in the possum's mouth and then spat out. Like rats, may 'snuffle' the nest lining to root out spilled egg contents.

#### *Characteristic sign on chicks*

Possums leave a partially eaten carcass with torn flesh and cleanly broken (not chewed) bones. Exposed upper surfaces of the chick are roughly bitten or eaten. Carcass may be partially skinned and there may be *one or several feather 'pellets'* (ca 15 x 5 mm,) produced by the possum in its upper palate, then spat out. Chicks may be found injured or dead in the nest or some distance from it, either up the tree or on the ground.

### **3. Kahu**

Kahu (harriers) are frequent predators of chicks and occasionally eggs especially in exposed nests with poor overhead cover. Adult kōkako always urgently flee harriers, so presumably are vulnerable to attack themselves. Kahu are NOT confined to open country or forest-margins but are widespread in remote forest interiors where they are less conspicuous.

#### *Characteristic sign on eggs*

Leave *large shell fragments with clean shell break margins*. Lift head frequently to look around while feeding, leaving strings of albumen pulled out from the broken egg.

#### *Characteristic sign on chicks*

Have been filmed cleanly removing kōkako chicks in about 4 seconds, and also taking more than 1 hour to pluck and eat a chick in the nest. Plucking or 'pluming' occurs by harrier ripping beak-fulls of feathers off the chick and disposing of them with a sideways flick of the head. *Many torn feathers* are thus deposited on the nest and surrounding vegetation in a

semicircle around the feeding bird, and many are blown or fall around the nest and down the tree. This continues until an area of muscle is exposed for eating, when the flesh is torn off in the same fashion as the feathers. Bones may be broken and eaten.

#### **4. Ruru**

Ruru (morepork) have never been filmed at a kōkako nest. They were filmed (by Kerry Brown) removing chicks, cleanly, from robin nests. Kōkako have been seen driving ruru away from the vicinity of a nest, suggesting that ruru (unlike kahu) do not threaten adult kōkako.

#### **5. Stoat**

So far, only one mustelid predation has been filmed at a kōkako nest (at Mapara, 1996–97), from the ca 25 nests filmed, and a stoat was seen carrying a dead kōkako chick near a Hunua nest (1997/98).

##### *Characteristic sign on eggs*

Badly needs clarification. Generally, clean removal. Sign which captive stoats left on hen eggs was indistinguishable from that of ship rats (E. Spurr, pers. comm.). Tooth- marks on eggshell may correspond to canines on stoat skull (see photo, King & Moody 1982, p. 72).

##### *Characteristic sign on chicks*

Chicks and adult birds are killed quickly by a bite at the back of the neck. Kills are then dragged to the nearest cover and may be cached for future use. Part clutches may be taken.

Note that all of the predator species above can access all nests, easily. Ship rats, possums and stoats are all magnificent climbers.

Clean removal of eggs or chicks remains the most difficult sign to interpret, because several predator species may do it. *Further progress will come only from using time-lapse video cameras again at nests. Do it! We need another 50 predation events to be filmed.*

Detailed accounts of predation remains should be written on the appropriate nest record sheet (see Appendix 2) and forwarded to Kōkako Specialist Group Leader.

Note also that when introduced predators are controlled in managed blocks, we should expect to see predation by native species increase in importance. Potential native predators include falcon, harrier, morepork, long-tailed cuckoo and kingfisher. Characteristic predation behaviour and sign of these species is virtually unknown.

During research and management work, kōkako eggs are sometimes discovered that have been abandoned, gone well past their due hatch date, been displaced from nests, or failed to develop in captivity. Be aware that during the first week or so of incubation, the first egg of a clutch can be left unattended during the day, meaning that a cold, unattended egg has not necessarily been abandoned. With practice, it is possible to determine whether an egg was fertile and at what stage the egg died. Even broken or excessively rotten eggs are of interest, but determination of the fertility or age at death of such an egg is not guaranteed.

Method of processing abandoned kōkako eggs:

YOU WILL NEED:

- Electrical tape
- Callipers
- Pesola spring balance
- Soft lead pencil
- Small plastic container and padding, e.g. cotton wool, scrunched up tissue paper

1. Secure a broken egg with electrical tape to prevent further breakage and to block any puncture holes.
2. Measure the egg with callipers to the nearest 0.1 mm, recording the maximum length and two width measurements at 90° to one another. Weigh to the nearest gram, either by placing it in a plastic bag or by hanging it from a tab in a tape running right around

the egg (remembering to subtract the bag or tape weight).

3. Write a label with the locality, date, observer, and nest identifier and/or band number of the parents and place in container with the egg.
4. Place the egg in a small plastic container with padding all around and carefully transport it back to the office. Store the egg in the container in a refrigerator, not a freezer, with the container labelled 'FRAGILE', 'PERISHABLE' and 'Refrigerate, DO NOT FREEZE'.
5. Take the egg to an expert to identify the fertility and age of death.
6. Blow the egg contents out carefully by making two holes in the shell and blowing in one, to enable long-term storage of the egg.
7. Send details of egg to Kōkako Specialist Group Leader.

## 7 Advocacy

An advocacy plan for the North Island kōkako has been produced for the KSG (Milton 2015). That plan states that conservation advocacy means raising the profile of a particular species, together with the ecosystems to which it belongs, and encouraging people to gain understanding and appreciation of the species, its role, and the challenges it faces, in order to gain support for conservation. This section discusses kōkako advocacy using material provided in Milton (2015).

Since the *North Island kōkako recovery plan 1999-2009* was published, kōkako conservation has been remarkably successful. The goal of 1,000 pairs by 2020 had been exceeded by 2014, and the number of populations with over 50 pairs has increased. At the time of writing (October 2019) the population stands at around 1900 pairs. This success has been accompanied by a great deal of advocacy activity for and around kōkako by the groups and institutions involved in kōkako conservation. While it is impossible to measure the impact of all this activity, there can be no doubt that it helps to raise the public profile and knowledge of kōkako and, if it is done well, encourages support for kōkako conservation and conservation in general.

## 7.1 Advocacy and science

Species recovery programmes and conservation programmes are ideally governed by principles of ecology and biology. When advocacy is done well, it should raise public understanding of the scientific basis of conservation, but to do this it often uses mechanisms which might appear incompatible with, or at least different from, scientific practice, such as engaging people's emotional attachment to individual animals (such as the kākāpō Sirocco), or emphasising the sensory dimensions of natural experiences (the beauty of a flower, the music of birdsong).

Although the language of science and the language of advocacy can appear to be at odds with each other, conservation is at its most effective when they work in tandem. Science provides the knowledge base for conservation programmes, while advocacy provides the social, cultural and political backing which such programmes need. Advocacy encourages and enables people to care – it gives them reasons to care. The result, if it works well, is more funding for conservation (through sponsorship and donations and subscriptions to conservation NGOs), a stronger volunteer force (essential when government resources for conservation are declining), and an electorate that is better informed about and more inclined to be in favour of conservation.

## 7.2 Key messages for kōkako advocacy

Kōkako advocacy can perform two main functions:

- It can raise the profile of kōkako, and the ecosystems to which they belong, with the aim of increasing support for their recovery,
- It can use kōkako as a vehicle for advocating broader conservation goals and values, with the aim of increasing support for conservation in general.

The following key messages therefore focus both on the birds themselves and on their potential as ambassadors for New Zealand native fauna and flora, and for wider environmental values. The list is not exhaustive or definitive. Its purpose is to suggest reasons why people should care about kōkako, by highlighting how their presence enriches our environment. For advocacy purposes, messages need to be simple and straightforward and must not be misleading; where they refer to scientific knowledge, they need to be accurate.

### **Kōkako are unique, ancient and interesting**

North Island Kōkako belong to a family (*Callaeidae*, New Zealand wattle birds) that is endemic to

New Zealand and is assumed by many scientists to have evolved from ancestors inhabiting the ancient continent of Gondwanaland. They could thus be seen as founding members of New Zealand's biota. Four other species are known; two of these – the North Island and South Island saddleback/tieke – are, like the North Island kōkako, classified as 'At risk – recovering'. The huia is extinct and the South Island kōkako, classified as 'Data deficient' might also be extinct. Nothing like them exists anywhere else in the world. Contrary to what the English name (blue-wattled crow) suggests, they are not closely related to crows. They exhibit a suite of behaviours and features which makes them fascinating to observe and study; their squirrel-like ability in forests, compensating for their poor flight, the way they use their feet as 'hands' when feeding, their extraordinary voices, their evolutionary history, etc.

### **Kōkako are beautiful**

The simple combination of three colours – grey, black and blue – is striking and attractive. In certain lights the blue of the wattles is intense, as are their dark eyes, highlighted by the black mask. Their movement, as they bound through the trees or glide downwards on short rounded wings, is elegant and efficient (though they can look comical when they run along the ground).

### **Kōkako have a distinctive haunting song**

Their song, with its long, organ-like notes, mews and sharp clicks, is unlike any other – immediately recognisable as one of the iconic sounds of New Zealand. When listening to kōkako in the forest, it can be difficult to pinpoint where the sound is coming from; at times it seems to come from everywhere, yet nowhere. The song is widely known, often featured as the 'bird of the day' on Radio NZ's morning programmes and important in other cultural contexts.

### **Kōkako sing in different dialects**

Each kōkako population has its own 'dialect'. Some contiguous populations have several distinct dialects that may reflect social dynamics. In translocated populations, birds from different regions may be reluctant to pair up, and this could be related to the unfamiliarity of dialects. Kōkako song evolves continually. When birds are introduced from another region, they may eventually change their song to match the local dialect, or elements of the new dialect may be adopted by the established residents.

### **Kōkako are territorial**

Singing is used as a means of staking a claim to a territory. Kōkako are highly territorial and defend their territory from neighbouring kōkako. Intrusions can elicit an aggressive response from the

residents and can sometimes result in fights. In high density populations in good habitat, territories can average eight hectares.

### **Kōkako can be highly productive**

Kōkako typically raise one brood of one or two chicks per year, but a brood can have up to three chicks and a pair can raise two or even three broods if conditions are good enough to allow a long breeding season. In ideal mainland conditions, with a high quality of pest control, kōkako populations have been known to increase by rates of up to 50% per annum.

### **Kōkako are faithful**

Although it is not accurate to say that kōkako pair for life, as changes in partners have often been observed, they can stay together for many years and usually remain close to each other throughout the year. The interactions within a pair – courtship feeding, mutual preening, soft contact calls – can be endearing to human observers and help people to engage emotionally with the bird.

### **Kōkako can form single sex pairs**

Kōkako are most vulnerable to predation by introduced mammals during nesting times. As females exclusively incubate eggs and sit with developing chicks, they are more vulnerable to predation than males, which in unmanaged populations can lead to a severe sex ratio imbalance. Some males develop mutual territories with other males, and effectively act like a normal male-female pair (they can even build nests). This can create false impressions of the security of a population. Although a forest might resound with kōkako song and appear to have a good number of pairs, a proportion of these might be male-male pairs, and therefore unproductive. Indeed, an exclusively male and gradually dwindling population might persist for years after all the females have gone.

### **Kōkako are mysterious**

Their natural habitat (forest) and their habits (feeding quietly through much of the day, often high in the canopy) make kōkako difficult to see – many people know the song but have never seen a kōkako. When visiting a site that has kōkako, seeing them can present an interesting challenge, making them a bird that many visitors particularly *want* to see.

### **Kōkako are iconic**

Kōkako as taonga for Māori and all New Zealanders; they feature in Māori tradition as Maui's water carrier, the bird that helped him in his battle against the sun. Their image appears on the \$50 banknote, their song has been used as a sound back-drop in popular movies (for example, *The*

*Piano*), in television advertising and in the bird chorus that welcomes international visitors at Auckland Airport. Their name and image are used by a café and brand of coffee. Along with kiwi, takahē and kākāpō, they are one of our most iconic birds.

### **Kōkako play a role in forest ecology**

Kōkako forage from a wide variety of forest trees, with fruit forming a major part of their diet. This gives them a role as dispersers of seeds. Together with kererū and kākā they are the only birds large enough to digest and transport some of our larger native seeds such as tawa, miro, matai, hinau and pigeonwood. They also feed on the nectar of some plants (pōhutukawa, rata, rewarewa, kiekie, flax, pūriri), which makes them pollinators. Their presence thus helps to keep our forests diverse and healthy.

### **Kōkako as ambassadors for conservation**

Kōkako are ideally placed to act as an ambassador species for native New Zealand forests, and indeed have done so in the past. Logging in Pureora Forest was stopped after conservationists became aware of the plight of kōkako and campaigned for their protection. Although they are rare, they are fairly widely scattered; many New Zealanders live within easy travelling distance of a population. Although they can still be hard to see at many of these sites they can often be heard, especially in the early morning, so there are increasing opportunities for people to have a wild kōkako experience (opportunities that remain a pipe dream in the case of much rarer species such as kākāpō). The fact that their numbers are recovering on the mainland due to pest control means that their survival can be linked unambiguously with the need to continue this effort – the presence of kōkako is a reward for diligence. The effectiveness of this message is heightened in areas of forest close to kōkako populations into which kōkako could move without the need for translocation. In such places, the message, ‘Sort out the pests and kōkako will arrive’ might be a realistic one; their arrival and continued presence would be a sign of success.

### **Kōkako are rare**

They were once common and widespread, but their populations have been drastically reduced. The main causes of decline have been historic clearance of native forest and predation of adults, eggs and nestlings by introduced mammals (currently mainly ship rats and possums, but also stoats). They are recovering due to conservation efforts, but most populations are small and they are widely scattered, mainly over the northern and central regions of the North Island. The small number of founders contributing to these isolated populations (particularly those started by translocations) may lead to reduced reproductive health (due to inbreeding) and reduced genetic diversity, which in turn can



lower resistance to disease and the ability to adapt to other environmental changes. In addition to the impact of forest clearance and predation, kōkako face a reduction in the quality of their remaining habitat, caused by introduced browsing animals. Many key foods for kōkako occur in the sub-canopy and are highly palatable to introduced herbivores such as feral goats, wallabies and deer. Some forests which could once have supported a breeding population of kōkako are no longer able to do so. The total population of North Island kōkako is estimated at about 4000 individuals (2019).

### **Kōkako are threatened**

Although the North Island kōkako is officially classified as ‘At risk – Recovering’, endlessly ongoing predator and browser control is required to sustain this. As well as the obvious and existing threats indicated above, kōkako and other native species could face new challenges posed by economic development and increasing pressure on biosecurity controls. Novel predators (including some invertebrate species such as ants) could slip through and decimate kōkako populations and other native species. Introduced birds, particularly those in the pet trade, could be a reservoir of new pathogens that could potentially harm kōkako, especially if they escaped into the wild.

### **Kōkako are difficult to protect**

A huge management effort is needed to protect kōkako. The following are some of the current and future mechanisms that can be used.

- Kōkako are most vulnerable when nesting. To enable sufficient breeding success for a population to grow, very intensive control of introduced predators is needed. In general, the occurrence of ship rats and possums must be below a 5% index of abundance, using standard monitoring techniques, at the beginning of every breeding season (October-November). This helps ensure the predator numbers don't get too high during the ensuing summer breeding period, although more pest control throughout the breeding season may be required. If the indices for these predators is above 10%, most kōkako nests are likely to fail. There are many effective methods for controlling ship rats and possums, but aerial 1080 is the most cost-effective.
- The quality and long-term sustainability of kōkako habitat needs to be maintained and improved through the management and control of introduced herbivores such as feral goats, wallabies, deer and domestic livestock. Kōkako advocates need to be aware of how forest habitats are changing due to browsing animals.
- Translocations between isolated kōkako populations may help to improve and/or sustain genetic health. At present, translocations normally involve adult birds, but egg-swaps potentially overcome difficulties of adults with different dialects struggling to find local mates. Translocations of adult

birds to appropriate sites (large tracts of suitable forest habitat) can also be used to start new populations and restore kōkako to areas from which they have disappeared.

- Isolated patches of forest could be linked by planted corridors. This could enable kōkako to colonise new areas or interbreed with other populations.

These and other conservation measures depend on a huge amount of human effort and require diligence, political will and financial backing. They also need to be adaptive and respond to new information.

### **Kōkako need research**

The more we know about a species and the threats it faces, the better equipped we are to conserve it. Research is critical if we are to improve our understanding of kōkako ecology, including, for instance, the relationship between habitat quality and breeding success, and the actual levels of inbreeding and genetic change in today's isolated populations. Research might also help to make translocation methods more effective and efficient. A better understanding of the ecology of mammal predators and other introduced pests could improve our ability to control their numbers, as could research on mechanical and chemical methods of control. Funding, political backing, and supportive relationships between research institutions and conservation practitioners are all important in maximising the opportunities for and benefits from research.

These messages are intended to serve as a menu, from which groups engaged in kōkako advocacy can select the ones most relevant to their purposes and circumstances. It is very important that accurate scientific information be used in conveying these messages. A list of easily accessible sources of information is provided at the end of this guide.

## **7.3 Opportunities and mechanisms for kōkako advocacy**

### **7.3.1 Opportunities:**

- Every site which has kōkako, whether naturally present, translocated or captive, provides an opportunity for advocacy, to tell the story of why they are there and what is needed to protect them.
- Every site with (realistic) hopes or plans to have kōkako can explain why they want them, how

they are preparing for them, and how they plan to protect them once they arrive.

- Every translocation is an opportunity to tell a kōkako story and reinforce a general conservation message.
- Every incident involving an individual kōkako is a chance to engage public interest and emotion and build public support (for instance, a kōkako from the Waitakere Ranges crossed Auckland and turned up in a suburban garden).
- Every individual who is enchanted and fascinated by kōkako is a potential advocate for them, and can express that fascination and enchant others too, through whatever media they choose.

### 7.3.2 Mechanisms

The potential mechanisms for kōkako advocacy are countless. The following list is probably far from exhaustive:

- Signage at sites holding kōkako or which hope to have them in future.
- Guided walks at sites where kōkako can be heard and seen.
- School visits to sites with kōkako are an ideal mechanism for engaging children's interest.
- Magazines and newsletters (such as those issued by volunteer groups), and articles in more mainstream press.
- Photography competitions, exhibitions, calendars and other showcases for images are good mechanisms for displaying the beauty of kōkako.
- Cultural events, art, drama, concerts, particularly involving children, can help to engage people's interest.
- Public lectures, conference and workshop presentations.
- Displays at libraries, museums and information centres.
- Videos, both professional and amateur (which could be placed on *YouTube* or other websites).
- Websites run by organisations that engage in kōkako conservation.
- Facebook pages, blogs and other social media.
- Books for different sectors of the market (for instance Maria Gill and Heather Arnold's children's book, *The Call of the Kōkako*).

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## 9 Additional resources

Sharing Best Practice (QD: C1329)

National Requirements for Trapping and Cyanide Use (QD: NH1170)

Prevention of Predator Invasion (QD: NH 1262)

Animal Pests, Obtaining Consents (QD: NH3003)

Animal Pests, Accepting a New Toxin for Use by DOC (QD: NH 3006)

Animal Pests, assessing Applications for DOC Consent (QD: NH 3008)

Translocation of New Zealand's Indigenous Terrestrial Flora and Fauna SOP (QD: NH 1042) (DOCCM-251982)

Inventory and Monitoring Toolbox SOP (DOCCM-259067)

Captive Management SOP (DOCCM-266180)

Wildlife Health Management SOP (QD: NH 1176) (DOCCM-442078)

Avian Blood/Feather & Reptilian Tissue Sampling SOP (DOCCM-531081)

Conservation Dog/Handler Team SOP (DOCCM-749423)

2011 Approved Translocation Process Documents (DOCCM-1089378)

Translocation SOP: Planning through to reporting for DOC translocations (DOCCM-315121) Translocation Guide for Community Groups (DOCCM-363788)

DOC Wildlife Health SOP

Translocation Health Management Workbook (DOCCM-54393)

Animal Welfare (Transport within New Zealand) Code of Welfare (DOCCM-867331)

Air New Zealand species transport guide (DOCCM-999105)

NOTE: For kōkako practitioners outside of DOC, SOPs (Standard Operating Procedures) and DOCCM documents can be requested through your local DOC office.

# Appendix 1

## KEY CONTACTS

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574 4225

New Zealand Centre for Conservation Medicine, Auckland Zoo

Email: [craig.pritchard@aucklandcouncil.govt.nz](mailto:craig.pritchard@aucklandcouncil.govt.nz)  
Phone: (09) 353 0753

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## Appendix 2

### KŌKAKO NEST RECORD SHEET





# Appendix 3

## BANDING AND MEASUREMENT RECORD

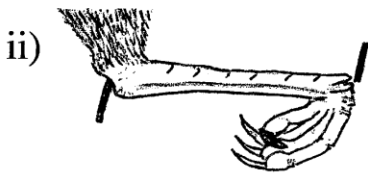
# NORTH ISLAND KOKAKO BANDING AND MEASUREMENT RECORD

PLEASE COPY THIS SHEET TO KOKAKO RECOVERY GROUP LEADER FOR NATIONAL MEASUREMENT FILE

LOCATION (+ grid ref.) \_\_\_\_\_  
 BIRD NAME \_\_\_\_\_ STATUS (S, Pr) \_\_\_\_\_  
 AGE (Ad, Chk, Sub-A) \_\_\_\_\_ SEX \_\_\_\_\_  
 PARENTS (if chick) \_\_\_\_\_  
 DATE / / \_\_\_\_\_

METAL BAND NO. \_\_\_\_\_  
 LEFT LEG BANDS \_\_\_\_\_  
 RIGHT LEG BANDS \_\_\_\_\_  
 TRANSMITTER FQ . \_\_\_\_\_

## MEASUREMENTS



USE CALIPERS, FROM NOTCH OF UPPER JOINT TO END OF BONE WITH FOOT TURNED DOWN.

Bird + Bag weight (g) \_\_\_\_\_

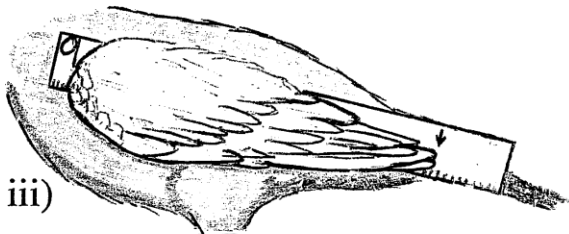
Bag weight (g) \_\_\_\_\_

i) Nett weight [-bag](g) \_\_\_\_\_

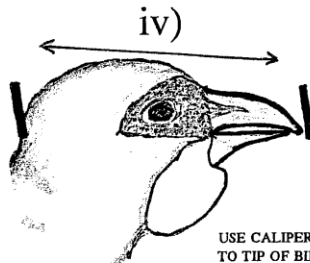
ii) Tarsometatarsus (mm) \_\_\_\_\_

iii) Wing chord (mm) \_\_\_\_\_

iv) Head and Bill (mm) \_\_\_\_\_



USE RULER WITH END PLATE TO BUTT AGAINST LEADING EDGE OF WING. FLATTEN WING ONTO RULER WITH FINGER THEN RELEASE BEFORE READING TO TIP OF PRIMARIES. WING SHOULD LIE NATURALLY, DO NOT STRAIGHTEN.



USE CALIPERS, LONGEST AXIS OF HEAD FROM BACK OF SKULL TO TIP OF BILL. ENSURE CALIPERS ARE PARALLEL TO AXIS OF SKULL

MEASURED BY: \_\_\_\_\_

## OTHER NOTES:

(MOULT, FAECAL CONTENT, DAMAGED/WORN PLUMAGE, BEHAVIOUR ...)

# Appendix 4

## ANNUAL REPORT TEMPLATE

# ANNUAL KŌKAKO REPORT

**Year:**

Only fill out the sections relevant to your project and put N/A for any of the lines that doesn't fit your monitoring.

## Project details

Project name:	
Date of report:	For year:
Project contact person:	
Phone number:	Email address:
Project website:	
Project description:	
Which Kōkako Recovery Plan objectives does the project meet?	

## Section 1: General project reporting for this year

### A: Reporting on your KŌKAKO SURVEY

\*Standard methods as described in the Kōkako management folder – get from KSG or local DOC contact

	<b>This year</b>	<b>Last Survey</b>	<b>2 surveys ago</b>	<b>At project start (year: )</b>
Date of Survey Period				
Area Surveyed (ha)				
Number of person hours used to survey				
Number of Surveyors				
Total Pairs				
Total Singles				
Total Juveniles				
Did you follow Standard methods*?				
Survey type used*				
Did you record and use new/this years song/calls?				
Other				
Comments (including names of surveyors, location name(s) and variations from standard methods if any)				

### B: Nesting success

	<b>This year:</b>	<b>Last year:</b>	<b>2 years ago:</b>
No. pairs monitored			
No. nests monitored			
Ave. No. eggs/nest (clutch size)			
Total no. chicks			

Total no. chicks banded			
Total no. chicks fledged			
Total no. banded chicks fledged			
No. nests found @ building stage			
No. nests found @ incubation stage			
No. nests found @ chick stage			
No. nests to fledge young			
No. monitored pairs to re-nest after fail			
No. monitored pairs to re-nest after fledging			
No. nests climbed/accessed			
Comments (Attach nesting results as appendix if you need more room)			

### B1: Nesting Success per nest (for this reporting period)

	Nest: 1	Nest: 2	Nest: 3	Nest: 4	Nest: 5	Nest: 6
No. eggs						
No. chicks						
No. chicks banded						
No. chicks fledged						
No. banded chicks fledged						
nest found @ building stage?						
nest found @ incubation stage?						
nest found @ chick stage?						
Was this nest a re-nest after failed attempt?						
Was this nest a re-nest after fledging young?						
If failed why? (possum, rat, kahu, stoat other)						
Was this nest climbed/accessed?						
Comments (Attach nesting results as appendix if you need more room)						

### C: PREDATOR CONTROL

	This year	Last year	2 years ago	At project start
Hectares under rat control				
Rat control used (explain what and how in text below)				
Hectares under possum control				
Possum control used (explain what and how in text below)				
Hectares under stoat control				
Number of traps				
Trap type(s)				
Number of trap checks in the year				
Explain trapping or poisoning program in more detail if required:				

--

## D: PREDATOR Monitoring

<b>Species</b>	<b>When (Dates)</b>	<b>What method</b> (RTC, tracking tunnels, wax tags, Trap Catch rate)	<b>Results (% RTC, % tracking)</b>	<b>Used best practice?</b>
Possum				
Rats				
Stoats				
Explain monitoring program in more detail if required:				

## E: Advocacy

Please insert numbers and create additional rows if required.

In the media column please indicate number of print mentions, TV and radio. Even if no coverage received, indicate attempts i.e media release sent out, interviews given.

	Events attended	Schools visited	Media	Visits to your project (by whom?)	Resources developed (what?)	Other
Other advocacy - describe.						
Comments						

## F: OTHER PROJECT WORK

Activity	Description
Comments	

## G: Future plans for the project

Activity	Description
Comments	

## H: Project Reports

If you write an annual report for your kōkako project please send it as an attachment to provide more background or detailed information.



## Section 2: For Recent Translocations

### A: Reporting on your KŌKAKO MONITORING work

(Leave blank if they don't apply to your project)

#### Date of data validity:

	Post Trans. monitor	Translocation year
Date		
Number of male and female kōkako translocated (M/F)		
Where were the kōkako translocated from?		
When were the kōkako translocated?		
Number of male kōkako transmitted		
Number of female kōkako transmitted		
Number birds remaining within pest control area		
Number of pairs formed (consistently seen together showing pairing behavior)		
Number of pairs monitored during nesting period		
Number of nesting attempts		
Number of eggs/nest (clutch size)		
Number of chicks/nest		
Number of chicks surviving to fledge		
Number of adult deaths (and causes)		
Number of juvenile deaths (and causes)		
Number of chick deaths (and causes)		
Other		
Comments: Please attach your post translocation report. If nesting was monitored this year please provide detailed report above in section B or attach.		

### The project in pictures

These photos will provide further information about your work. Credits will be given to the photographer recorded. Please tick the box below if you are happy to have photos posted online and in newsletters.

**Our photos can be used by Kōkako Recovery Group.**

*Caption 1 (Who's in the photo and photographer, Where, When)*

*Caption 2 (Who's in the photo and photographer, Where, When)*

*Caption 3: (Who's in the photo and photographer, Where, When)*