Methods for Capturing and Banding Kalij Pheasants

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ABSTRACT

We developed methods to capture and band Kalij Pheasants *(Lophura leucomelanos)* in their introduced range at Hawaii Volcanoes National Park, where they are not hunted and are relatively tame. Kalij were wary of foreign structures, such as traps, but readily took cracked corn bait and entered baited traps, provided they were introduced to them gradually. The majority of Kalij on the study site (53 of 64 birds) were captured using three trap designs: open-door trap, large box trap with hinged door, and drop trap. While the open-door trap was more mobile and easily set up in cramped forest spaces, only groups of as many as five birds could be captured at a time. The large, more cumber-some box traps captured groups of up to eight birds, whereas drop traps successfully captured only one bird at a time. Females were more difficult to capture than males. Band size was 7A for males and 6 for females.

INTRODUCTION

The Kalij Pheasant *(Lophura leucomelanos;* Kalij, herein), native to southeast Asia, was introduced to the Island of Hawaii in 1962 (Lewin and Lewin 1984, Johnsgard 1999). By 1977, Kalij had become so abundant on the island that they were declared a legal game species. Although these pheasants have spread through forests island-wide, their impact on native ecosystems has not yet been investigated. In preparing to study the impact and ecology of Kalij, we first developed methods to capture and band them.

The trapping of gallinaceous birds has included a wide range of techniques, such as lead fences directing the birds to funnel traps, drop nets, walk-in traps, large box traps, snares, and hand nets (Bub 1991, Schemnitz 1994). Baits have typically been food, but decoys, play-back calls, and other attractants have been used effectively. Our initial trials at trapping Kalij suggested that two challenges are posed by their behavior. First, Kalij live and travel in stable family groups that can include as many as five adult males, an adult female, and progeny from the previous breeding season (Pratt 2001). Second, though wild Kalij seem rather tame around people, they avoid unfamiliar structures and will not readily approach or enter traps of any sort. Thus, we sought a cryptic trap that would least alarm the birds, a bait to lure them in, and a design that would capture entire families of birds at once. (We presumed that birds escaping capture would be harder to trap in any subsequent attempt.) We also required appropriate bands.

METHODS

Study Site - We trapped Kalij Pheasants in K•puka Puaulu at Hawaii Volcanoes National Park, where the birds are not hunted. This ~40 ha stand of thick Koa/Ó'•hi'a/A'e *(Acacia/Metrosideros/Sapindus)* forest on well-developed volcanic soil contains many rare endemic trees (Gagné and Cuddihy 1990). The k•puka is surrounded by younger lava substrate supporting sparse Koa/Ó•hi'a montane dry forest with poorer plant species diversity and with a grassy understory, a habitat generally shunned by these pheasants. The Kalij population in the k•puka appeared to be at carrying capacity, judging from the high density of ~3 birds/ha, skewed sex ratio with male bias, frequency of families with helpers, and low recruitment despite high intrinsic rate of reproduction (USGS Pacific Island Ecosystems Research Center [PIERC],

unpubl. data). A loop trail traverses the area and is frequented by visiting hikers and park personnel, so the birds are well habituated to people. Some of the birds were accustomed to eating food offered by visitors and various baits placed out by a rat-trapping program.

Bait Development - To lure Kalij to traps, we tried different methods and discovered that food bait was more attractive than voice playbacks or stuffed decoys, which elicited a limited response. Playback of recorded fighting and foraging vocalizations were used both with and without stuffed Kalij decoys. When just the playback was used, the birds arrived alarmed, and it was difficult to lead them into a trap. Confrontation with decoys also made the birds wary.

When introducing Kalij to food bait, we first identified the locations where they frequently resided. This was determined by visual observations of the birds as well as by location of fresh droppings, dust baths, and fruiting trees, such as mamaki *(Pipturus albidus)* and pilo *(Coprosma rhynchocarpa).* On encountering Kalij, we waited until they had observed us and begun to forage. Pilo berries were then thrown to them, and the birds readily picked them up. After 5-10 tosses the pheasants realized that they were being given food, and a small amount of cracked corn, a commercial poultry feed, was thrown. Once the birds identified cracked corn as food, they almost always accepted it.

Trap Development - To trap Kalij, we sought portable, cryptic, and low-cost designs that could be set up in the cramped and cluttered forest interior, would be acceptable to the birds, and would ensure negligible risk of injury. Three trap designs met these requirements.

Open-door traps. Our most successful trap, herein "open-door trap," was a highly modified funnel trap (variously Seth Low's trap, McClure 1984, or lily-pad trap, Backs et al. 1985). We lured the birds to the trap with bait rather than lead fences. When we realized that the birds more readily entered the traps with the funnels removed, we did away with funneled entrances, leaving the main body of the trap with the door(s) open. A funnel-less doorway also allowed trap-shy birds time to enter the trap while their less-wary family members could enter and leave at will without becoming alarmed.

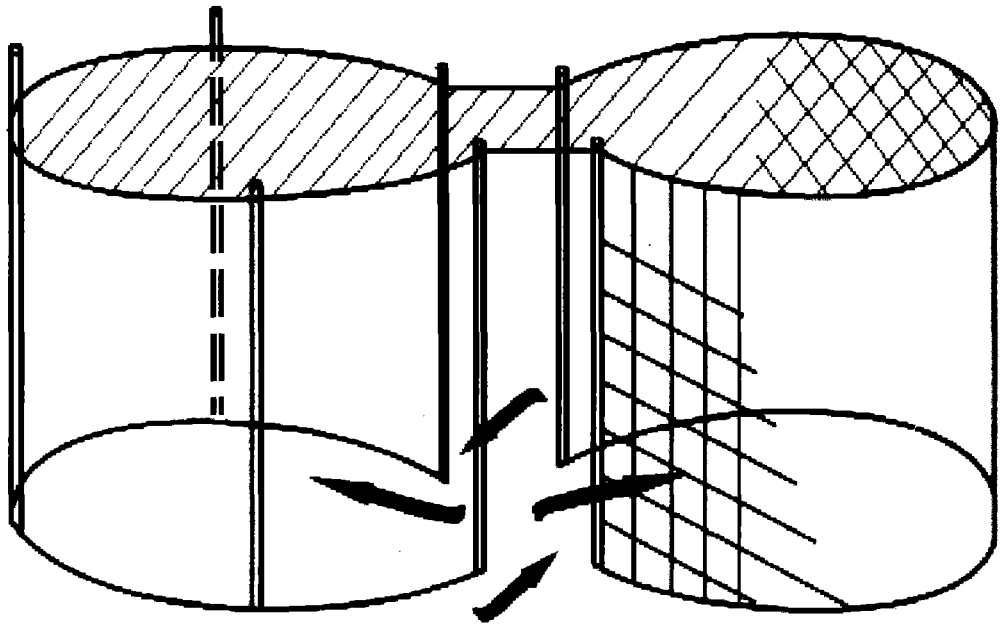
These traps were constructed using wire fencing of 100 x 50 mm mesh in 1.25 m x 4 m sections that were bent into a semicircle, with two sections per trap (Fig. 1). A single section was staked down using 1 m bamboo sticks and tent stakes. The birds were first fed in the initial semicircular section until they were habituated to the wire. On a subsequent visit, the second semicircular section was then added with the opening facing the opening of the initial section, but with the wire ends 30 cm apart to form the simple gap doorway on either one or both sides. Thus, the trap viewed from above was peanut-shaped with one doorway on each side at the narrow middle. Each doorway was about 25 cm wide. (This design was modified so that there was only one door and three closed sides.) The roof of either plastic netting or nylon net was secured in place last. To catch the birds, bait was placed in the trap, and we stepped back about 5 meters to observe birds as they entered the trap. We waited until all of the birds desired were in the trap, and then we approached the doors. The birds moved away from us and toward the far ends of the trap. The doors were closed with a piece of wire mesh or were blocked by the person removing the birds. The birds were removed with hand nets through the side openings of the trap.

Large-box traps. These traps were constructed of PVC pipe and nylon netting, with variations. Two traps were constructed of 1.25 m by 2.5 m rectangular frames of white 2.5 cm PVC pipe covered with woven black plastic poultry netting. Three sides were erected in the forest, and the birds were habituated to go into the three-sided structure. Once the birds were comfortable entering, a roof of poultry netting was added. A door was positioned so that, when the birds were in the trap, a person could approach and slide it shut. This was possible because the birds would flee to the back of the trap. An even larger box trap was constructed using 3 cm PVC pipe frame (1.5 m by 3 m) that was camouflaged by spray-painting brown and green and covered with brown woven nylon fish netting (125 lb, 6.3 cm stretched).

Drop traps. We tried drop traps of two different material designs. The first was constructed with a 1.25 cm PVC pipe frame, 2.5 x 2.5 m, that supported a double-thickness of mist-net (210 denier, 4 ply, 127 mm) sewn into a sleeve of camouflage-patterned nylon material. The frame could be slid into the sleeve, hiding the white pipes. The trap was hung approximately 1.25 m above the ground. Initially the birds went under the trap, but if the apparatus moved in the wind, it scared the birds away, and they would not go under it any more. Therefore, the trap was set in a leaning position to prevent it from moving. One side rested on the ground, and the other was suspended from a rope threaded through a pulley and stretched about 5-10 meters from the trap. Bait was placed beneath and just outside the trap so that the birds would walk under the trap while eating. When birds passed under the trap, the rope was cut and the trap fell on them. Although we caught birds with this design, they easily ripped the mist-netting. A second drop trap was designed using a frame of 2 cm copper conduit and 125 lb. test nylon net, of mesh size 3.5 by 6 cm.

Unsuccessful traps. We also tried unsuccessfully to catch Kalij by other methods. The birds would not go inside small baited, commercial box traps (several sizes, the smallest being 22 cm square by 64 cm long). Kalij broke through the heaviest mist nets we tried (210 denier, 4 ply, 127 mm mesh). Noose carpets proved hazardous because the birds could not be coaxed onto the apparatus unless food was placed near or upon it, risking a bird getting caught by its head.

Figure 1. An open-door trap for catching Kalij Pheasants. The trap has sides of wire fencing anchored with bamboo stakes, and it has a top of soft netting. Once pheasants are accustomed to people and bait, they can be lured into the trap. Birds can enter from either of two doors, and they tend to move further into the wings of the trap as the trappers approach the doors. They can then be captured with a hand net.



Banding - We banded each bird with a numbered aluminum band on one leg and a single plastic color band on the other leg. Aluminum bands from Gey Band and Tag Co. (made to material specifications of the U.S. Bird Banding Laboratory) were applied with standard banding pliers and ovalled to accommodate the tarsus shape, which was oval in cross section. The USGS band sizes of 7A for males and 6 for females were determined by measuring the tarsus width approximately 3 scutes above the spur on the bird's right leg. Color bands from Haggie Engraving Co. were constructed of two different materials: (1) solid-color Darvic bands, and (2) grooved laminated acrylic bands made of RX-FE (acrylic). The laminated bands were grooved by the manufacturer to produce one or two stripes of contrasting color. Darvic material was either 10 or 15 mm tall and 1.0 mm thick; acrylic material was 10 mm tall and 0.5 mm thick. Both Darvic and acrylic material overlapped 2.5 times, and we filed the edges of the bands to minimize abrasion. All bands were placed above the bird's spur, and the seams of color bands were sealed with glue supplied by the manufacturer. Birds were sexed and aged via plumage differences. Males are black, whereas females are brown. Juvenile males compared with older males have much shorter spurs and have subtly mottled secondaries and wing coverts. Juvenile females are difficult to distinguish from their mothers, but generally have less worn, more color-saturated plumage. We took morphological measurements, plumage data, and blood samples for genetic and disease studies by either jugular or brachial venipuncture.

RESULTS

We captured and banded 53 Kalij, from a total of 62 birds in 13 (all) family groups which we attempted to capture. The open-door traps proved to be the most convenient method of capturing Kalij in smaller family groups (< 5 birds). We captured 29 birds in these traps out of 34 attempted captures (85 %). The maximum number of birds captured at a time was five. The length of time between the initial introduction of the trap and capture of the first birds varied due to many factors, including design modification, weather conditions, and the delay to capture entire family groups. The actual period ranged from 8 to 20 days, but this stage involved anywhere from five to nine feedings at the trap site. One exceptional group of birds, not prebaited by us, was captured the first time they encountered the trap. We captured all 19 males that we attempted with this trap type, but only 10 of 15 females. As evidenced by one male recaptured two days later and numerous other observations, the birds often returned to the traps shortly after capture and could be recaptured easily. A few minor injuries occurred in these traps, mostly cuts and abrasions around the face and bill from birds attempting to escape through the wire.

Large box traps had similar success rate compared with the open-door traps, capturing 18 of 22 birds attempted (82%). Up to seven birds were captured at a time. The time between the introduction of the trap and the capture date varied somewhat between the two kinds of large box traps, with the smaller, white-framed trap taking 18 days and the larger, dark-framed trap taking 15 days. The major difference between the two types of box traps was in the number of feedings required to capture the group, 10 for the white-framed trap and four for the dark-framed trap. We captured 12 of 15 males and six of seven females attempted, with most of those missed because they would not enter the white-framed trap. As with the open-door traps, some birds would go back into the traps within a day or two of capture. A few birds suffered abrasions when they thrust their heads through the netting.

Drop traps were much less successful than the previous two methods, especially in catching more than one bird at a time. We captured five birds in this manner, three males and two females. One male escaped from the second design, due to the lightness of the frame and the ability of the bird to move underneath the net. One disadvantage of drop trap was that after an attempted capture, Kalij were cautious to go underneath the trap again. Only one minor injury occurred in a drop trap, an abrasion on the wing because of the birds moving underneath the net.

Finally, one infirm (old?) male was captured with a hand net.

Tarsus width for adult males averaged 10.3 mm (n = 27, range 8.9-11.5) , indicating a band size of 7A (11.3 mm internal diameter). Tarsus width for adult

females averaged 9.2 mm (n = 6, range 8.2-9.7), indicating a band size of 6 (9.5 mm internal diameter). Note that the bands' internal diameters were somewhat greater than the standard sizes given above, because the aluminum bands were ovalled when applied and the overlapping color bands were adjusted to match the individual tarsi.

After one year, 40 of the 53 birds were still present in the study area. Of those, two males lost their 15 mm high 1.0 mm thick Darvic band and one female lost her aluminum band.

DISCUSSION

The key to our trapping procedure was baiting the birds with food. This proved relatively easy in the national park, where most birds along hiking trails were already tame and some had learned to take food from people. In other circumstances, successful baiting of distrustful Kalij is likely to be problematic and will probably require starting off with baiting stations.

A potential disadvantage to feeding Kalij is that this could encourage panhandling. The majority of birds we trapped did not practice panhandling behavior after baiting and trapping was over. During the course of baiting our birds learned to seek out their human feeders. Once captured, however, many birds became wary. One month after the study, we found that 9 of 13 family groups either ignored or avoided humans who did not attempt to feed them. Three other groups casually approached people but continued to move on if not fed. In the one final group, an infirm and apparently old male begged persistently while his group members waited nearby. After three months, all birds had abandoned overt panhandling. To minimize lingering effects of habituating Kalij, we recommend that trapping and banding be conducted during a short period of time scheduled well before the beginning of behavioral study. The birds should not be fed at any other time. Also, to avoid continued feeding of birds between multiple trapping attempts, it is best to simultaneously capture as many birds as possible in a group, preferably all, on the first attempt.

In our search for trap designs to capture Kalij, portability and the ability to situate a trap in thick forest were important factors. An additional, conflicting factor was to capture entire family groups. The most effective trap was the open-door trap because it was easily portable, took minimal time to set up, and could be squeezed in small openings in the forest. For our particular study area, an additional advantage was that the birds may already have been familiar with wire fencing, which had been used previously to construct bird exclosures of similar dimensions around rare plants planted throughout the forest. The main drawback to open-door traps was that they could not accommodate large groups of Kalij, as the maximum number of birds that entered this trap was five. Our larger family groups contained up to nine birds. A larger trap could remedy this problem, but there exists a trade-off with portability and stability. Another drawback of the open-door trap was the small entrances required, allowing only one bird passage at a time. This problem was especially acute for warier females, reluctant in many cases to enter a confined space occupied by an aggressive male.

The large box traps were ideal for capturing many pheasants at a time, and functionally these traps are not much more than larger versions of the open-door traps. One important advantage was the wider entrance, because the birds typically advanced into the trap shoulder-to-shoulder as one feeding group. Females appeared more comfortable entering these roomier traps. The two large box trap designs were both effective, although the camouflage painted trap was accepted more quickly. The biggest drawback for the large box traps was size of the panels, which makes transport into the forest very cumbersome.

The drop traps were successful at catching single birds. While the traps were portable when disassembled and easy to reassemble and set, both designs had serious drawbacks, and we feel that improvements could be made with increases in weight of the frame and mesh size of the net.

The bands we used were satisfactory. The 1 mm thick, 15 mm tall color bands looked cumbersome on the birds and appeared to alter their stride and some of them fell off within one year, whereas the 0.5 mm thick, 10 mm tall acrylic bands were worn without visible effect. The Darvic bands were more difficult to apply than the acrylic.

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Using Wing Plumage to Determine Age of Mountain Quail

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ABSTRACT

We analyzed the occurrence of mottled versus solid-colored upper greater primary coverts on the wings of Mountain Quail *(Oreortyx pictus)* to evaluate the use of wing plumage as an indicator of Mountain Quail age. Mountain Quail retain their juvenal primary coverts through the first prebasic molt and subsequently enter their first breeding season with juvenal coverts still intact. Juvenal primary coverts #1-7 are mottled, and juvenal primary coverts #8 (usually) and #9 are solid-colored. At the end of their first breeding season, quail shed their juvenal primary coverts during the second (definitive) prebasic molt and replace them with solid-colored adult primary coverts. All primary coverts of quail >15 mo age consistently are solid-colored. Thus, color pattern of primary coverts provides a reliable means for aging Mountain Quail. Individuals that possess one or more mottled coverts are < approximately 15 mo old, while individuals with only solid-colored coverts are > approximately 15 mo old. Solid-colored coverts #8 and #9 are not informative for aging quail.