SOME OBSERVATIONS ON THE USE OF SIGHT COUNTS IN ESTIMATING
POPULATIONS OF THE RABBIT, ORYCTOLAGUS CUNICULUS (L.)*

By K. Myers†

Counts of rabbits taken after their emergence above ground, and before they
disperse to feed, would be very useful in field investigations if one could be confident
that they provided a reasonable approximation to the actual populations of the
warrens. Southern (1948), in his careful study of a warren population, using
individually marked rabbits, showed that “during a period of normal activity some
30 per cent. of the population was usually above ground, and on less frequent
occasions, such as just before a thunderstorm, when they were all feeding hard,
this proportion might be increased”.

In the course of our first large-scale myxomatosis experiment at Gunbower,
Victoria, in 1950, when an undisturbed warren-dwelling rabbit population was kept
under very close observation, we gained the impression that when conditions
favoured normal activity virtually the whole of a warren colony would emerge
before dark, and could be counted before movement confused the situation. During
irrigation operations in April, we took the opportunity of checking this impression
by estimating the numbers of rabbits inhabiting 13 small warrens which were about
to be flooded.

Counts were taken by three different observers for three consecutive evenings
during the period of emergence of the rabbits from their warrens. The days were
pleasant and warm and rabbit activity appeared to be quite normal. The situation
was unusual in that the rabbits had not been previously disturbed in any way for some
time and were unaware of the observers who took up their positions behind trees
each day before the afternoon period of emergence commenced. On the fourth
day irrigation of the pastures proceeded and all the rabbits flooded from their
burrows were caught in entrance nets. The results are set out in Table 1.

Three warrens were dug out as a check. There were no dead rabbits within.
Since they were all adults there was little reason to expect that many would remain
within the burrows to drown.

When these observations were carried out, although kittens had not started
to appear, breeding activities had commenced and there seemed to be a movement
of odd rabbits from larger to smaller warrens. Some discrepancy between the observed
and actual populations of warrens was therefore to be expected. Nevertheless, the
estimates of the numbers of rabbits in the two largest warrens, made by separate
observers, appear to be very accurate; and the total estimation of 90 per cent.
can be regarded as satisfactory and as confirming our impression that virtually all
the warren inhabitants could be observed and counted at the time of emergence.

Since the Gunbower experiment, sight count data have been collected by two
colleagues in the Wildlife Survey Section (Dunnet and Rowley, personal communi-
cations). In the course of a poisoning experiment in Tasmania, Rowley made

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emergence counts on four successive evenings on a large warren that was exception-ally well situated for observation. The counts ranged from 55 to 63 per cent. of the subsequently determined population of the colony, which comprised over 300 adults and young.

In the course of a study carried out in the Australian Capital Territory, Dunnet found that substantial variations in the time-table of emergence were liable to occur, often unpredictably, and that kittens were much more erratic in their behaviour than adults (Dunnet 1957). His emergence counts were made on two warrens which

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<td>ESTIMATE OF WARREN-DWELLING RABBITS BY SIGHT COUNTS</td>
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<table>
<thead>
<tr>
<th>Observer</th>
<th>Number of Rabbits Estimated*</th>
<th>Number of Rabbits Recovered</th>
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<tbody>
<tr>
<td>A</td>
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<tr>
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<td>4</td>
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<td>2</td>
<td>3</td>
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<tr>
<td>C</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Totals</td>
<td>65</td>
<td>73</td>
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* Highest of the three days' counts.

were subsequently dug out and found to have populations of approximately 120 and 60, including a high proportion of young. In the counts, 55–60 per cent. of the population of the larger warren was recorded. The counts on the smaller warren varied widely over the six days' observations: 100 per cent. of the adult inhabitants were recorded on one occasion, the best estimate of the total population being 75 per cent.

It is apparent from the data available that there is an inverse relation between the accuracy of emergence-count population estimates on the one hand, and warren size and the presence of young on the other. The difference between sighted and actual populations must be accounted for by rabbits which stay underground until after dark; and it seems reasonable to suppose that a large warren colony would develop a more complex emergence behaviour pattern than a small one, particularly if it contained litters of various ages.

Sometimes there will be no practicable alternative to emergence sight counts for estimating a rabbit population and its changes. As it is obvious that such counts
must be interpreted with great caution, they should probably only be attempted when conditions are exceptionally favourable, i.e. on a non-breeding population inhabiting small to medium-sized warrens, after careful observation has indicated that the emergence behaviour has become stabilized, as was the case at Gunbower. Under these circumstances, sight counts on warrens could be of considerable value.

The Gunbower counts were made by Mr. F. N. Ratcliffe (observer C), Mr. B. V. Fennessy (observer B), and the author, all of Wildlife Survey Section, C.S.I.R.O., on the property of Mr. C. R. G. Reid, “Gunbower Estate”, Gunbower, Vic. The cooperation of Dr. G. M. Dunnet and Mr. Ian Rowley, in making available unpublished data, is gratefully acknowledged.

References
Dunnet, G. M. (1957).—Notes on emergence behaviour of the rabbit, Oryctolagus cuniculus (L.), and its bearing on the validity of sight counts for population estimates. C.S.I.R.O. Wildl. Res. 2: 85–89.

A LIVE-TRAP FOR BIRDS*

By B. C. Mollison†

There is a need for a simple and efficient trap to capture alive the wide range of birds which can be attracted to food, water, a decoy, or other lure. The trap (Fig. 1) described here was designed to catch the swamp-harrier, Circus approximans (Peale), but with suitable baits and methods of release it can be adapted to take a wide range of sizes and types of birds which land on the ground. It has the following essential requirements of such a trap:

(i) It can be automatic, released by the bird, and an appropriate bait, perch, or other release mechanism can make it selective for species of similar weight or habit, as in the case of the swamp-harrier which pulls the bait. By passing the bridle bar over the main spike the trap can be fixed so that it will not spring during a period of free-feeding or while the bait is being set.

(ii) It can be released by an operator from a distance.

(iii) The “Selfset” trigger mechanism (which is an all-metal mousetrap with that trade name) is easy to set correctly. Although the trip mechanism is sensitive there can be great tension on the release bar; this enables the tension and check cords to be strained in opposite directions so that the net frame cannot be moved from the upright position.

(iv) It can be made to any size, and a trap with a 4 by 3 ft frame, with all components, weighs 9 lb. It is not bulky, and only a light hammer (or stone) and a knife are needed to set it. This operation takes about 15 min, and the trap can be reset in 1 min. It is cheap.

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† Wildlife Survey Section, C.S.I.R.O. Regional Laboratory, Hobart.
The component parts of one trap are:

1 net frame, \( \frac{1}{2} \) in. mild steel rod, with semicircular (or rectangular) frame welded to \( \frac{3}{4} \) -shaped base.

1 main spike, \( \frac{1}{4} \) in. mild steel rod, with \( \frac{1}{2} \) in. nut on end (for hammering), and 3 by 2 in. metal base plate welded on side.

4 holding spikes, \( \frac{1}{2} \) in. mild steel rod, 12 in. long with \( \frac{1}{2} \) in. open eye.

2 extension springs, 4 in. long, extending to 9 in. with 3 lb load.

1 net, \( \frac{1}{4} \) in. (or larger) mesh, cone-shaped; nylon is preferable.

1 net peg, c. 6 in. of 10 or 12 gauge wire.

1 "Selfset" mousetrap, mounted on base plate.

1 bridle bar, rectangular strip of metal to fit under release bar of mousetrap.

50 yd rot-proof fishing-line, for trap and distant release.

Fig. 1.—Live-trap in set position with detail of release mechanism.

To set the trap:

(i) Lay the frame on flat ground and anchor with two holding spikes.

(ii) Drive the other two holding spikes into the ground so that there is slight tension on the springs when their cords are tied.

(iii) Drive the main spike into the ground 3 or 4 ft behind the trap and leaning slightly towards it.
(iv) Lift the frame almost vertical, place the bridle bar under the release bar, set the trigger, and tie the tension cord so that it pulls on the net frame.

(v) Tie the bait (or perch, treadle, etc.) to the release cord, which is left just slack. The forward pull on the release cord, away from the main spike, by which the trigger is tripped, is provided by a bird which attempts to drag away the prey, or by the weight of birds on a perch alongside the bait. The perch can be propped up so that any desired weight is necessary to depress it.

(vi) Tie the wind-check cord so that it pulls against the tension cord but leaves some tension on the springs.

(vii) Prevent the net from flapping or from blowing inside-out by attaching the apex to the net peg which is pressed so lightly into the ground that it is pulled out when the trap is sprung.

During January 12 to February 12, 1957, four of these traps were tested at Woodbury, Tas., the aim being to catch swamp-harriers for banding. Each trap was baited with a rabbit carcass and remained at the same site; it was visited twice daily. The four traps were in operation for 18, 12, 10, and 5 days respectively, and 6 trap-days were lost before check cords were fitted, which leaves 39 effective trap-days. Fourteen swamp-harriers were caught, two were recaptured, and only one false release occurred. No other species of birds were caught.

Since this paper was written, the author has seen a description of a similar bow-net used by Tordoff (1954)* to catch raptors, using live sparrows and mice as decoys, and with a trigger-release mechanism above the decoy platform.

The author is indebted to Dr. R. Carrick of the Wildlife Survey Section, C.S.I.R.O., Canberra, for assistance in the preparation of this paper, and to Mr. L. A. Marshall, who drew the figure.