

## SHORT NOTE

### A test of burrow occupancy of Sooty Shearwaters (*Puffinus griseus*) using chick response to sound

When studying the breeding biology of burrow-nesting seabirds, correctly identifying burrow occupants and the presence or absence of a nest is important to help ascertain the reproductive and survival rates of populations. However, gathering this information is difficult because eggs and chicks are at the ends of burrows often more than two metres long (Warham 1990).

Adult *Pterodroma* petrels respond strongly to human calls (termed "war whoops") (Tennyson & Taylor 1990), and playback of recorded vocalisations of the Dark-rumped Petrel (*Pterodroma phaeopygia*) resulted in a higher capture rate of adult birds (Podolsky & Kress 1992). Similarly, for Manx Shearwaters (*Puffinus puffinus*), playing a recorded call of adult birds to nestlings sometimes elicited a soft cheeping (Brooke 1990). Some Sooty Shearwater (*Puffinus griseus*) chicks in burrows responded by "cheeping" to an external sound (pers. obs.). The response of chicks to a sound at the burrow entrance may be a quick and useful survey method to determine burrow occupancy at the chick stage of the breeding cycle if most chicks respond consistently.

As most adult Sooty Shearwaters return to breeding colonies after dusk (Warham 1990), it was hypothesized that Sooty Shearwater chicks would respond to a recorded adult call more often after dark than during daylight hours. However, day-time surveying for chicks' response would be more practical, so the experiment was carried out during both day and night.

*Methods.* Twenty eight burrows at Taiaroa Head, Otago Peninsula (45°47'S, 170°44'E) known to contain chicks (using an infra-red "burrowscope", Dyer & Hill 1991) were surveyed every night from 23 March 1993 until 26 March 1993 inclusive; and 12 burrows known to contain chicks at Nugget Point, Otago Coast (46°27'S, 169°49'E) were surveyed every night from 6 April 1993 until 9 April 1993 inclusive.

Three different sounds were used: tape recorded adult call ( $\approx 10$  seconds); "war whoop" (3 "whoops",  $\approx 5$  seconds each) (Tennyson & Taylor 1990); clapping hands (10 successive claps). Each study burrow had the three test sounds presented in the late evening just before dark (i.e. before the first adult bird landed at the colony) and then again after dark (and after the first adult bird landed). Burrows were surveyed in a different random order each evening to control for any effect of time on chick response. All three sounds were made at the entrance of each study burrow in a random order with one minute wait between each type of call. Any "cheeps" from chicks or "calls" from adult birds inside the burrow were noted relative to sound being presented.

Each night after the final trial the burrows were probed with a stick to elicit a peck from the chick and confirm the burrow was still occupied. Small "fences" of upright sticks in burrow entrances were checked (and re-established if disturbed)

at the beginning and end of each trial night to ascertain whether the burrow had been visited.

*Results.* Sooty Shearwater chicks did not consistently respond to sounds in late March/early April at either Taiaroa Head or Nugget Point.

At Taiaroa Head, all chick cheeps in response to sounds were made after dark. Only 29% (N=28) of the chicks cheeped during the four trial nights and four of those had an adult bird present at the time (the adult bird was either heard calling or seen entering the burrow). The eight chicks that cheeped made a total of 21 cheep responses.

At Nugget Point, only 33% (N=12) of the chicks responded during the four trial nights and they made a total of 15 responses. One chick responded to different sounds nine times over the four nights. Three of the four responding chicks cheeped both before and after dark. None of the chicks that cheeped were with an adult bird at the time.

Clumping the Taiaroa Head and Nugget Point data, less than a third (30%) of the 40 chicks responded at all during the four trial nights and only one chick responded on all four trial nights. There were no differences in chick response to the type of sound that each chick first responded to with five chicks first responding to the "war-whoop" call, three first responding to "clapping" and four first responding to the "recorded adult" call ( $\chi^2=0.25$ , d.f.=2,  $P>0.1$ ). There were also no differences in chick response to the order in which sounds were presented (i.e. by looking at the order of sounds which each chick responded to most;  $\chi^2$  test). Only 8% of the 40 chicks responded at all during the "before dark" trials.

At Nugget Point, all chicks which cheeped had been visited (presumably by a parent) the previous night with the exception of the chick which cheeped nine times which was not visited during the four consecutive nights of trialing. At Taiaroa Head, all chicks which cheeped had been visited within the previous two nights. Most of the chicks that did not cheep were visited during the course of the survey.

*Discussion.* Artificial sounds have been used to attract adult birds in some petrel studies (Podolsky & Kress 1992). For *Pterodroma* petrels, the "war-whoop" call was useful and practical in attracting birds and it was suspected that mainly non-breeders or unpaired birds were attracted (Tennyson & Taylor 1990). The breeding birds that responded from burrows gave an aggressive/territorial call, whereas other birds usually gave sexual advertisement calls (Tennyson & Taylor 1990).

In this study the proportion of Sooty Shearwater chicks that responded to sounds was very small and there appeared to be no differences in chick response to the type of sound trialed ("war-whoop", clapping, recorded adult call). Little is known about *Puffinus* calls and so it could be that the recorded adult call used in this trial may have not been an appropriate feeding call. Chicks may also respond more readily to a call from a parent rather than a stranger's call. However, there is no evidence for Manx shearwaters that chicks were more likely to call in response to male or female calls, or to their parents' calls as opposed to strangers' calls

(Brooke 1990). Although sample sizes were small in this study, it appeared that chicks did not preferentially respond to a sound in relation to the order the sounds were presented.

More than two thirds of the Sooty Shearwater chicks did not respond at all during the four trial nights. This may be partly due to their age as the trials were not carried out until the last month before fledging and chicks at this stage are fed less frequently and therefore may not respond so readily to sounds. There was some evidence that hungry chicks cheep more frequently. One chick which was not fed (i.e. the stick fence in the burrow entrance was not disturbed) during the four trial nights, cheeped a total of nine times.

It is unlikely that the response of Sooty Shearwater chicks to sounds can accurately determine burrow occupancy, but further trials using different types of adult calls could be investigated. If the consistency of chick response could be determined, this technique may possibly be adapted to provide a population estimate of occupied burrows. However, the survey method's reliability may vary greatly in different stages of the nesting cycle, and between years of good or poor food supply.

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