0.68, with a nearly Gaussian distribution.

Although the maximum possible weight is over 19 gms., the majority of birds weigh less than 15 gms. at my location.

It is proposed to sink *Guiraca* in *Passerina*.

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TRAPPING COMMON PUFFIN FLEDGLINGS

BY DAVID N. NETTLESHIP

INTRODUCTION

Several techniques for capturing adult Common Puffins (*Fratercula arctica*) have been described and reviewed by Lockley (1953) and Lockley and Russell (1953), but none for the young. During recent studies of puffins at Great Island, Ferryland, Newfoundland, a method for trapping fledglings on their nocturnal journey from their burrows to the sea was devised. This paper reports trap materials, method of construction, and capture results.

In 1967 puffin chicks were banded and measured at their burrow prior to fledging (Nettleship, 1968), however, several difficulties were encountered. In addition to the great amount of time that was required to locate occupied burrows, we were frequently hampered in our banding attempt by the inaccessability of the chick within the nest chamber because of the burrow length, shape, and structure. Most puffin burrows tend to extend beyond an outstretched arm and often curve at sharp angles, which renders locating and capturing the chick difficult, sometimes impossible (e.g. this study; Bent, 1919; Lockley, 1953; and Myrberget, 1962). In high density nesting areas, tunnels from different burrows often interconnect,

Figure 1. Trapping site, showing puffin nesting habitat and position of fencing and box-traps.

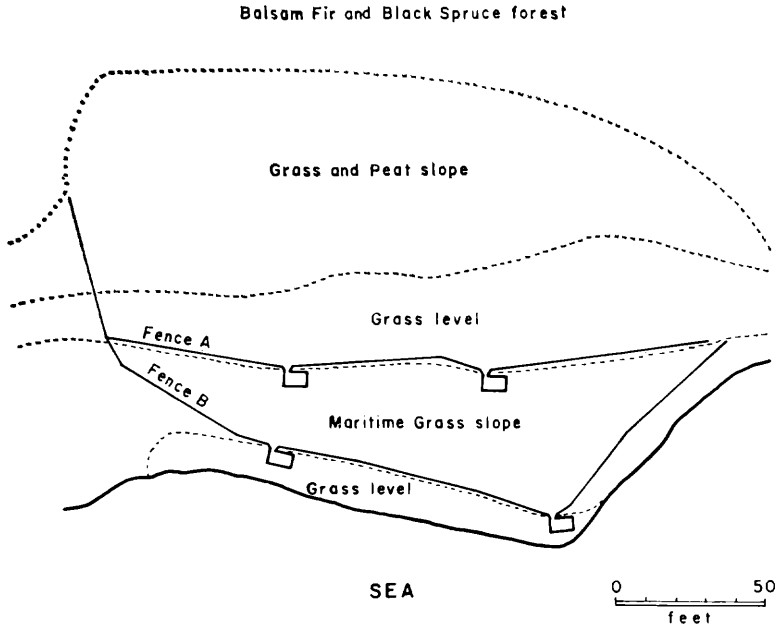
further reducing the likelihood of locating the chick. Even after a chick has been captured, banded, and replaced into its burrow, pre-fledging mortality and band loss still lowers the success of the program, the extent of which is difficult to estimate. Because of these shortcomings, chicks were caught by means of a wire fence and drop-trap collecting boxes in 1968. The object was to erect a barrier between the nesting habitat and the sea to funnel chicks that were walking to the cliff-edge into a collecting box.

TRAPPING TECHNIQUES

Site. The selection of a trap site is largely determined by the departure behaviour of fledglings. Most chicks observed at Great Island walked down the slopes to the cliff-edge, but some did fly out to sea directly from terrain with a high angle of slope ($> 30°$). The most productive trapping location will therefore be a colony with gentle slopes and flattish ground rather than steep mountainsides that would permit chicks to take off and fly over the fence. With these requirements in mind, a trap site was selected on the southeast coast of the island where puffins were nesting from the hummocked maritime grass slope inland through a grass level area and mixed grass and peat slope to the edge of a stunted Balsam Fir and Black Spruce forest (Figure 1).

Construction. Figure 2 is a diagram of the general layout of the fences and box traps over the nesting habitat. Two fences were

Figure 2. Schematical sketch map, showing principal habitats and layout of fences and box-traps (traps not drawn to scale).



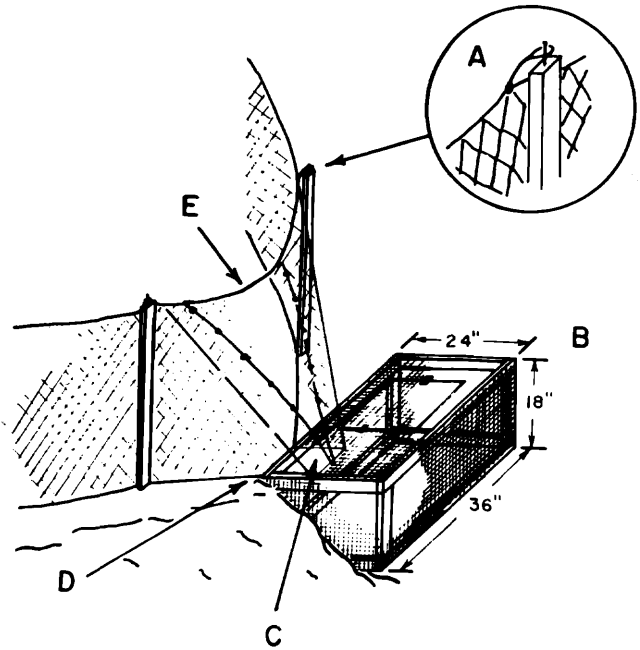
erected on the colony, an upper one (A), which extended 204 feet along the crest of the maritime slope and a lower one (B) at the base of the slope near the cliff-edge. Fence B continued up both sides of the colony inland. Four traps were used: two along both Fence A and Fence B. A total area of some 2,901 square yards of nesting habitat was enclosed by the fencing.

Lengths of poultry wire (150 x 3 feet; 1-inch mesh, 20 gauge) were attached to 4-foot wood stakes (2 x 1 inches) that had been driven approximately one foot into the ground at 6-10 foot intervals. The wire fencing of Fence B was stapled to the exposed portion of each stake, leaving a six-inch wire tongue at the bottom of the stake on which to pile loose gravel and stones to prevent chicks from passing under the fence. Unlike Fence B, Fence A was not stapled up the entire length of the support stake, only at its base. Instead, a wire loop, fastened to the top edge of the fence, was placed over a nail on the upper tip of the wood stake to keep the fencing wire taut (Figure 3A). This allowed Fence A to be lowered during the day to prevent it interfering with adults flying in with meals for chicks in the grass level area.

The fences were V-shaped with a box trap positioned at the apex (Figure 2). The funnel effect was to direct the chick's movements down the slope and ultimately to the opening of the trap.

The box traps were constructed in a rectangular form with half-

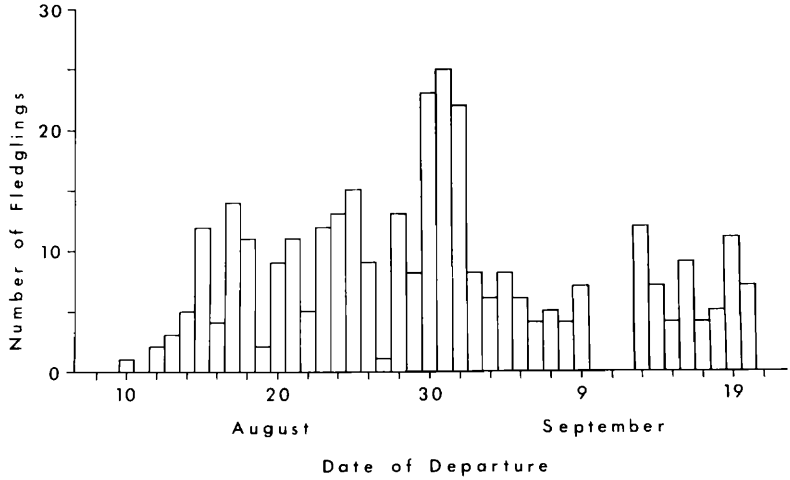
Figure 3. Box-trap and fence arrangement for capturing puffin fledglings. A, wire loop of fence A; B, box-trap; C, trap entrance; D, position of trap entrance with ground surface; E, trap funnel.



inch galvanized wire mesh stapled onto a wood frame made of 2 x 1 inch strapping (Figure 3B). The sides of each trap measured 36 inches long and 18 inches high. The top and bottom were 36 inches long by 24 inches wide. An entrance, 10 inches long and 8 inches wide, was cut out of a corner of the top wire mesh (Figure 3C). Once the trap was positioned against the slope so that the roof was level with the ground surface (Figure 3D) the poultry wire fencing was attached to the trap entrance with heavy cord to form a funnel (Figure 3E). Part of the poultry wire extended two to three inches inside the trap to prevent chicks caught from escaping out through the entrance. A door was made in the roof of the trap to permit the removal of chicks caught. The walls inside the trap were covered with cardboard to reduce possible injury to captive birds, such as cutting their beak while probing through the bare wire mesh. Heavy plastic sheeting may be a superior material for the inner covering.

Procedure. The procedure at Great Island was to put Fence A up just before sunset and to check Fence B for adult puffins or gulls that may have been accidently caught in the traps or tangled in the fencing wire during the daylight hours. The traps were then revisited the next morning and Fence A lowered. Birds caught

Figure 4. Dates of departure for 327 fledglings.



overnight were placed into burlap bags and carried back to the field station where they were banded and measured. They were held in boxes for the remainder of the day and released after dark on a seaward facing slope.

RESULTS AND DISCUSSION

A total of 327 fledglings (Figure 4) were caught in the traps between 10 August and 20 September (traps closed 10-12 September). Thus, the average nightly catch (38 trap nights) was 8.6. The maximum number caught during one night was 25 and the most in any single trap was 12. Two hundred and thirty-three chicks (71.2 percent) were caught in the traps along Fence A and 94 (28.8 percent) in Fence B traps.

This number of birds caught from such a small area exemplifies the enormous potential of this technique for large-scale banding operations. In addition to reducing the effect of pre-fledging mortality on the success of banding programs and obtaining 'true' measurements of fledging condition at departure, this trapping technique may also be used for quantitative ecological studies. One such example would be to determine the differences within and between populations: frequency distribution of time of fledging, fledging condition at departure, pre-fledging mortality (fledging success), and production.

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GENERAL NOTES

Wing formula as a means of distinguishing Summer Tanager, Piranga rubra, from Hepatic Tanager, P. flava.—The eastern race of the Summer Tanager, *P. r. rubra,* occurs widely, as a migrant and winter resident, through Middle America and western South America, where it overlaps the breeding ranges of various races of the Hepatic Tanager, *P. flava,* found chiefly in open woods of hilly or mountain country. While the northern races of *P. flava* can be separated readily from *P. rubra* by the grayish to dusky of lore and cheek, this does not hold for the southern races, which can present difficulty where the bird is in female or first basic (postjuvenal) plumage if no specimen series is available for comparison. Recently I encountered the problem in identifying a *Piranga* from South America. The literature gives as characters for distinguishing *P. flava* (in the broad species sense) from *P. rubra* the presence in the former of a distinct median "tooth" on the sides of the maxilla, and the dusky to blackish color of the maxilla (in dry skins) compared with the lighter brownish or horn color in *P. rubra* (yellowish brown in life). Although these differences generally hold, The American Museum of Natural History collection shows that some examples of *P. rubra* have an evident maxillary "tooth", which, while distinctly less marked than that in most specimens of *P. flava,* is as obvious as in some. Zimmer (1929. *Field Mus. Nat. Hist., Zool. Ser.,* **17,** (5): 173) long ago observed that in some specimens of *P. flava* there is little trace of the "tooth" (thus approaching the usual condition in *P. rubra*). In some specimens bill color does not provide an adequate basis for identification. Phillips *et al.* (Birds of Arizona, p. 176, 1964) refer to the dark bill color of fall *P. rubra,* particularly of young birds. I have noted another difference, which, although subject to some variation, can be useful as a supplemental character, especially to banders and others unable to make color comparisons. As might be expected of a long-distance migrant, the eastern race of the Summer Tanager, *P. r. rubra,* has a more pointed wing than the essentially sedentary Hepatic Tanager, *P. flava.* In *P. r. rubra* the 6th primary is distinctly shorter than the 7th (usually from 3-5 mm. shorter in fairly fresh plumage), and almost always slightly shorter than the 9th (outermost); the 8th primary is definitely the longest. In *P. flava,* although the 8th primary is generally