

## ARTIFICIAL RHINOCEROS AUKLET BURROWS: A USEFUL TOOL FOR MANAGEMENT AND RESEARCH

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Studies of burrowing alcids often require excavation of burrows for nest access. The associated habitat damage and disturbance to the birds has often been of minor concern mainly because it was considered temporary. This concern becomes a much more serious issue in long-term research or population monitoring studies, especially those involving alcids that nest in long burrows that need to be extensively excavated for access to young, eggs, or adults. In many colonies the effects of yearly burrow excavations could be devastating to the birds and their nesting habitat if carried out over 10-20 yrs.

During a study of the breeding biology of the Rhinoceros Auklet (*Cerorhinca monocerata*) in Washington (Wilson and Manuwal 1986), I became increasingly aware of the need for methods by which the birds could be studied with less disturbance and habitat damage. This caused me to investigate the feasibility of using artificial burrows to study Rhinoceros Auklets. Various types of artificial burrows have been used in previous alcid studies. Ainley et al. (1981) used wooden burrows for easy access to nesting Cassin's Auklets (*Ptychoramphus aleuticus*), but did not discuss the method in detail. Nettleship (1972) and Kress (1982) used artificial burrows to rear and observe nestling Common Puffins (*Fratercula arctica*) taken from natural burrows. There are no published accounts of artificial burrow use in the three Pacific puffins. Clearly the use of artificial burrows in alcid studies needs to be investigated more thoroughly to fully realize its potential as a research and management tool. In this paper I report the use of artificial burrows by breeding Rhinoceros Auklets.

### METHODS

Artificial burrows consisted of two parts: an elongated rectangular nest box and an entrance tunnel. These were joined to form a right angle (Fig. 1). The nest box was constructed from 1.3 cm ( $\frac{1}{2}$  in) exterior grade plywood treated with wood preservative, and had numerous holes drilled into the bottom to allow water to drain. For easy access the top of the box was provided with a hinged door. Pieces of 15 cm (6 in) diameter black plastic sewer pipe were used as entrance tunnels. Because of a shortage of this pipe I provided several boxes with 13 cm (5 in) square plywood tunnels. These worked equally well.

In April 1980, 10 such burrows were installed on Protection Island, located at the southeastern end of the Strait of Juan de Fuca in Washington State. The island has an estimated breeding population of 17,000+ pairs of Rhinoceros Auklets (Wilson and Manuwal 1986). Because of

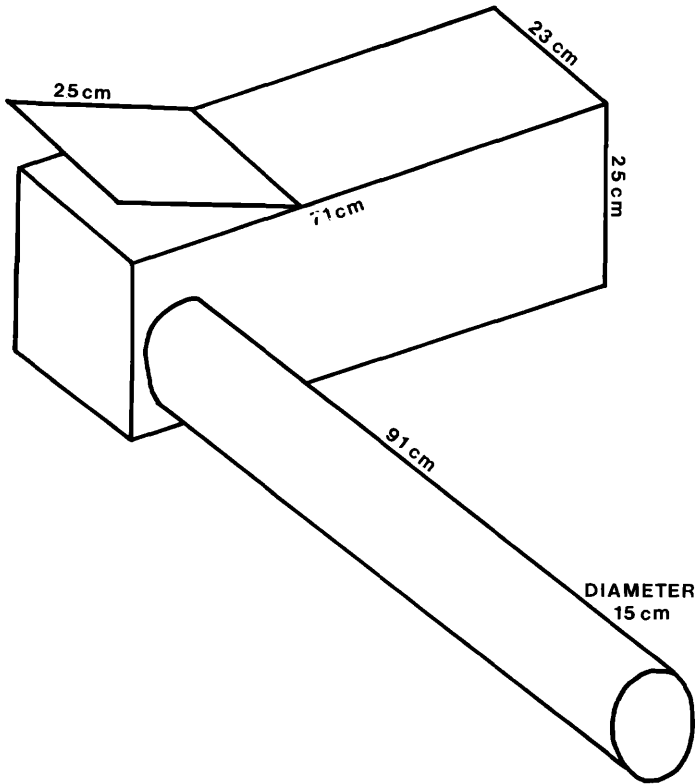


FIGURE 1. Artificial Rhinoceros Auklet burrow.

the initial success of these artificial burrows, 10 more were installed in March 1981.

The study area was a relatively flat, grassy, bowl-shaped area bordered by a steep 24 m high cliff along the southwest end of the island. The density of natural burrows here was low for the island, approximately 0.15 burrows/m<sup>2</sup> (Wilson and Manuwal 1986). The artificial burrows were located so that the entrances faced the water and were within 10 m of the cliff edge. Individual burrows were 2–6 m apart and spread over 55 m.

Installation involved burying the entire unit so that the top of the nest box was about 15 cm below ground level. Prior to covering the box it was filled with 8 cm of fresh dirt. The bottom of the entrance tunnel was also covered with a thin layer of soil.

The units were maintained and monitored from 1980 through 1984. Maintaining the burrows involved visiting the island during March prior to the onset of the breeding season to make sure the entrances had not filled in with dirt during the winter. At the same time each nest box was checked and provided with fresh soil.

TABLE 1. Rhinoceros Auklet artificial burrow status, Protection Island, Washington, 1980–1984.

Artificial burrow no.	1980	1981	1982	1983	1984
1	C (chick)	E (deserted egg)	C		C
2		C	C	C	C
3	C	C	C	C	C
4		NU (not used)			C
5		C	C	C	Lost
6		E		C	C
7	C	C	C	C	C
8	NU	C	C		C
9	C		C	C	
10	C			C	C
11	— (not present)		C	C	C
12	—	C		C	C
13	—				C
14	—	C	C	C	C
15	—			C	C
16	—	NU	C	C	C
17	—	NU			
18	—		E	C	C
19	—	C	C	C	C
20	—		C	C	C
Artificial burrows with chicks (%)	50	40	60	75	89

Auklet use of the artificial burrows was checked on 2 visits to the island during the chick stage, once during the first week of July, and again 14–18 d later. Chicks were weighed and aged during both visits. The average daily weight gain was calculated for each chick. In 1980 and 1981 growth of chicks from artificial burrows was compared with growth of nestlings from natural burrows.

During these July burrow checks an attempt was also made to capture and band adults that were visiting burrows with chicks. Chicks produced in the artificial burrows were banded as well.

#### RESULTS AND DISCUSSION

Most of the artificial burrows were used immediately by auklets, as indicated by feathers, fecal deposits, and nest material. Use of the burrows by successful breeders increased from 50% in 1980 to 89% in 1984 (Table 1). Previous estimates of the percentage of successful natural Rhinoceros Auklet burrows range from 53 to 56% for Protection Island (Wilson and Manuwal 1986). Thus it appears that well-established artificial burrows may eventually be used more by breeding pairs than are natural burrows. This difference is probably not due to an actual preference of the birds for the boxes, but rather a difference in the stability of natural vs. artificial burrows. Erosion, burrow collapse, accidental

TABLE 2. Rhinoceros Auklet chick growth and age in artificial vs. natural burrows, Protection Island, Washington, 1980-1981.

	1980: 22 June-8 July		1981: 4 July-22 July	
	Artificial burrow <i>n</i> = 5	Natural burrow <i>n</i> = 8	Artificial burrow <i>n</i> = 7	Natural burrow <i>n</i> = 9
Average chick growth (g/d)	7.2	7.0	8.0	8.1
Average initial age <sup>1</sup> (d)	18.8	20.2	10.4	13.8

<sup>1</sup> Determined from age/wing length data in Wilson and Manuwal (1986).

joining of two or more burrows, and entrance obstructions, all eventually make natural burrows unsuitable for nesting and force the inhabitants to find a new nest site. The permanence of artificial burrows probably leads to their eventual saturation with breeders.

Data suggest that the breeding success of birds is related to the age and experience of the adults. Experienced birds frequently have chicks that hatch earlier and grow better than young of less experienced parents (Coulson and White 1956, 1960). Thus, one might expect the growth and development of chicks reared in artificial burrows to reflect the nesting of pairs not representative of the population. Or, on the other hand, the environment of artificial burrows might be sufficiently different from that of natural burrows to measurably affect chick growth. During this study I found no evidence of this (Table 2). During 1980 and 1981 there was no significant difference in weight gains ( $t = 0.148$ ,  $P > 0.8$ ;  $t = 0.329$ ,  $P > 0.6$  respectively) and ages ( $t = -0.670$ ,  $P > 0.4$ ;  $t = -1.030$ ,  $P > 0.2$  respectively) of artificial- vs. natural-burrow young.

Nest-site tenacity in Rhinoceros Auklets is not well understood because of the nature of their nesting environment. I banded 24 adults visiting chicks in artificial burrows, and recaptured 8 of them in the same boxes during later years. Some of these birds occupied the same burrow over several breeding seasons. More banded birds probably returned to the artificial burrows, but auklets feeding chicks were difficult to capture because their visits were irregular and unpredictable. These limited data suggest that some auklets return to the artificial burrows year after year. None of the banded chicks was ever recovered in any of the artificial burrows.

#### SUMMARY

The feasibility of using artificial burrows for studying Rhinoceros Auklets was studied. Monitoring 20 artificial burrows on Protection Island, Washington from 1980 through 1984, showed that Rhinoceros Auklets readily use such burrows for nesting. The percentage of artificial burrows producing chicks increased from 50% in 1980 to 89% in 1984. Chick growth in artificial burrows appeared comparable to that of natural burrows. Breeders often used the burrows year after year. Use of

artificial burrows thus may be employed in long-term studies, where habitat damage and efficiency in the field are of concern.

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#### NOTES AND NEWS

**THE ASSOCIATION OF FIELD ORNITHOLOGISTS** (formerly NEBBA) will hold its annual meeting 1-3 **May 1987** at the Laboratory of Ornithology, Cornell University, Ithaca, New York. Housing and the Saturday program will be at the Arnot Forest Facility. The theme of the meeting will be Monitoring Bird Populations. The featured speakers will be Steve and Evelyn Kress, and Charles Walcott. For information on the meeting contact **SCOTT SUTCLIFFE**, *Chairman, Local Committee AFO, Laboratory of Ornithology, Cornell University, 159 Sapsucker Woods Road, Ithaca, NY 14850 (607-255-4288)*. For information on the scientific program contact **WILLIAM E. DAVIS, JR.**, *Chairman Program Committee, College of Basic Studies, Boston University, 871 Commonwealth Ave., Boston, MA 02215 (617-353-2886)*.

**The E. Alexander Bergstrom Memorial Research Fund** of the Association of Field Ornithologists (formerly the Northeastern Bird-Banding Association) promotes research on birds. Small grants, usually not exceeding \$250, are available to cover expenses (but not salaries or overhead charges to institutions). Awards are not limited to those with formal college or university affiliation. Details and application forms may be obtained from **DR. VALERIE N. FREER**, *Chairman, AFO Research Committee, Science Department, Sullivan County Community College, Loch Sheldrake, NY 12759*. The deadline for applications is **15 February 1987**.