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## A Conical Pitfall Trap for Small Mammals

### Abstract

Pitfalls are more efficient than other types of traps for capturing certain small mammals. The conical pitfalls we used are more convenient than cylindrical ones because they "nest" and are easier to implant into the ground.

Pitfall traps, usually gallon or quart cans, are more efficient for capturing certain small mammals, especially shrews, than are live- or snap-traps (Clarke, 1937; Moore, 1949; Edwards, 1952; Fowle and Edwards, 1954; MacLeod and Lethiecq, 1963; Brown, 1967; Pucek, 1969). Pitfalls have yielded rare shrews from areas where they had not been reported previously (Peterson and Symansky, 1963; Wharton, 1968; Hoffmann, Wright, and Newby, 1969; Layne and Shoop, 1971) and have facilitated the study of shrew populations (Buckner, 1969; Warren, 1971). Cylindrical pitfall traps (cans) are difficult to carry and set into the ground; and their placement causes enough disturbance to reduce capture efficiency for a few days (Brown, 1967). These considerations led Wiener and Smith (1972:872) to conclude that pitfalls are "generally not practical for short-term studies." Our observation of conical pitfall traps in Poland suggested that, in transport and placement, they offered advantages over cylindrical ones. Therefore, we tested the cones described in this report.

These cones were obtained from Northwest Metal Products Co., Kent, Washington, for \$1.00 each. They are constructed of 26-gauge, galvanized sheet metal with the seams riveted or spot-welded, or both. Top diameter is 6 inches, bottom diameter  $\frac{1}{4}$  inch, and depth 10 inches. To set the cone in the ground, a hole is first started with an iron bar or a pick. The cone is then shoved into the ground by means of a metal-covered, wooden plug, which fills the interior of the cone but is 2 inches longer. A handle on the plug allows its removal when the cone is in place. If the setting plug is not metal-covered nor kept clean, it will stick to the cone. A cone can serve as the metal cover. Before being reset, cones should be cleaned because dirt will cause them to stick together. These cones are easily and rapidly implanted, except in rocky areas.

Inasmuch as our cone traps were designed to replace cylindrical gallon cans (both have a 6-inch top diameter), we compared the efficiency of these two pitfalls for taking insectivores. The cans were slightly, but not significantly ( $P \leq 0.25$ ), more efficient.

We have used these cones in combination with snap-traps for censusing (with

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Calhoun lines) small mammal populations in a wide variety of habitats in western Washington. Because of differential selectivity by trap type (Table 1), a combination of traps for general census work is advisable. The cones are especially valuable where large numbers of insectivores are present in the census area.

TABLE 1. Comparison of the relative efficiencies of Victor mouse traps and conical pitfall traps for capturing small mammals.

Taxon	Catch/100 trap-nights		Chi-square	Level of significance
	Victor trap	Pitfall trap		
<i>Sorex</i> (4 species) <sup>1</sup>	1.11	8.58	432.14	<0.001
<i>Neurotrichus gibbsii</i>	0.51	0.77	1.84	<0.20
<i>Scapanus orarius</i>	0	0.03	—	—
<i>Peromyscus maniculatus</i>	6.23	0.31	193.68	<0.001
<i>Zapus trinotatus</i>	0.61	0.12	13.37	<0.001
Microtines (3 genera) <sup>2</sup>	0.43	0.96	9.68	<0.005
<i>Eutamias</i> (2 species) <sup>3</sup>	0.17	0.03	3.96	<0.05
Effort (trap-nights)	10,023	3,227	—	—

<sup>1</sup>*Sorex cinereus*, *S. palustris*, *S. trowbridgii*, and *S. vagrans*.

<sup>2</sup>*Clethrionomys gapperi*, *Microtus oregoni*, and *Phenacomys intermedius*.

<sup>3</sup>*Eutamias amoenus* and *E. townsendii*.

We caught 13 species (Table 1). Cone traps failed to catch *Clethrionomys gapperi* and *Eutamias townsendii* but caught 11 other species. Snap-traps, even with three times the effort, caught only 9 of the 13 species; they missed the infrequent *Phenacomys intermedius*, *Scapanus orarius*, *Sorex cinereus*, and *S. palustris*.

Multiple captures are improbable with snap-traps but many were obtained with the cones. Up to 5 shrews or 3 juvenile *Microtus* were taken in a single cone in one night.

Because a recent article by Wiener and Smith (1972) showed that Museum Special snap-traps were more efficient than the Victor mouse traps we used, possibly some of the differences reported in Table 1 are exaggerated. Museum Specials might be as efficient as our cones for capturing Microtines; but they probably would not change the difference noted on *Sorex*, especially since Smith *et al.* (1971) found that both types of snap-traps were equally effective in taking shrews.

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