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AN INNOVATION IN ROOF RAT CONTROL

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ABSTRACT: Within the past ten years, the roof rat (Rattus rattus) problem in residential Santa Clara County has developed from an insignificant nuisance to one of major concern. When a considerable number of complaints to the Santa Clara County Health Department reported roof rats on telephone cables, a study was made of 29 city blocks to determine the feasibility of utility pole baiting as a means of roof rat control. In the baiting process, rat signs were commonly observed on telephone equipment attached to the utility poles. A correlation was observed between bait consumption and the close proximity of vegetation to the telephone cable clamp. Bait consumption profiles on most blocks demonstrated patterns which resembled activity ranges. During the study approximately 190 two ounce bait blocks were consumed and many dead roof rats were found by the Health Department and residents living in the baited areas. The procedure appears to be an effective means of population reduction and has the potential of long range effectiveness.

INTRODUCTION

The roof rat (Rattus rattus) problem in Santa Clara County has been of recent major concern for the Santa Clara County Health Department. According to Ecke (1964), the annual number of domestic rat complaints to the Health Department prior to 1961 was less than 50, with roof rats accounting for less than 10 percent of the total. Since 1961, roof rat complaints have significantly increased. Figure 1 illustrates the trend in rat complaints for Santa Clara County from 1966 to 1971. While the number of Norway rat complaints have not increased, roof rat complaints have steadily increased each year. Although public complaints are an unreliable index to population dynamics due to reporting variables, the investigation of these complaints by competent Vector Control Specialists clearly documented the increasing roof rat problem for Santa Clara County.

The Health Department response to the increasing roof rat problem is discussed in some detail by Ecke (1964) and Jamieson (1965). Generally, the control procedure consisted of complaint investigation, supplemented with systematic area surveys and poisoning programs. Much emphasis was placed on educating the public to the importance of source reduction. However, despite the attention placed on roof rat control, the problem has shown no sign of subsiding. Therefore, the Health Department has investigated new control procedures by concentrating on particular rat habits. This paper reports on one such effort.

Numerous sightings of roof rats traversing telephone cables have been reported to the Health Department. The habit was confirmed when rats were successfully trapped on utility poles above the telephone cable. An analysis of roof rat complaints established that approximately 13 percent reported rat activity on the cables. The actual percentage of cable walking rats is probably much higher since this observation is not routinely reported.

Preliminary control efforts under these circumstances, involved nailing bait blocks low on utility poles which resulted in less than satisfactory control. However, it was hypothesized that if roof rats habitually travel on telephone cables, a baiting program which took advantage of this habit could reduce at least that part of the roof rat population. Therefore the study was initiated.

METHODS

The Pacific Telephone Company, Pacific Gas and Electric Company, and the City of Santa Clara were contacted to determine the feasibility of a utility pole baiting study. Their interest and cooperative attitude was highly favorable to program development. Consequently, a total of 29 city blocks was included in a pilot study, of which three were separate blocks, and two were larger areas consisting of 7 and 19 blocks respectively. The 29 block study area included approximately 920 residences.

Properties were in the $20 to $50 thousand dollar value bracket. Most were well kept residences varying in age from about 10 to 30 years. Lots averaged approximately 6,000

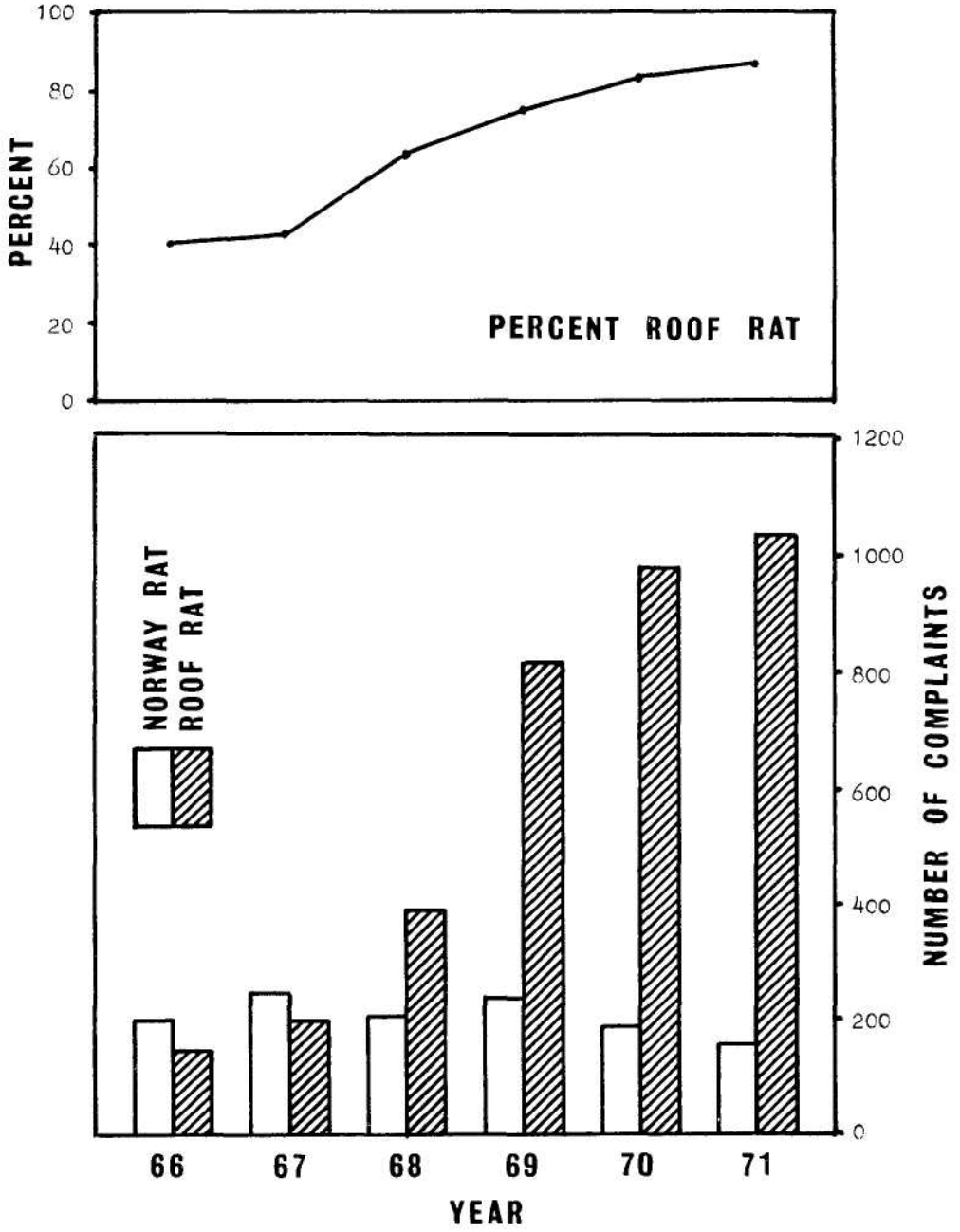


Figure 1. Rat complaints received by the Santa Clara County Health Department from 1966 to 1971.

square feet, and for the most part, were neatly maintained, although trees, shrubbery, and landscaping were mature, and in some cases overgrown.

All blocks included in the study were serviced by utility poles located near the rear property line. Poles were generally located at the corner of the lots and spaced approximately two property widths apart. Depending on block size, the number of poles varied from 4 to 18, with an average of 9 poles per block.

Poles are approximately 30 to 35 feet high with 3 or 4 divisions of wires, the telephone cable being nearest the ground, about 18 to 20 feet high. In some blocks a

television cable is located approximately one foot above, and resembles the telephone cable. Halfway between the telephone cable and the pole top is a group of three wires that provide 120-240 volt electricity to the homes. Atop the poles is another group of high voltage electrical wires. The electrical wires vary in design from one area to another.

The telephone cables are most utilized by rats. The cable, which consists of two parts, the strand and transmission cable, is attached to the poles by clamps which are bolted to the poles. Clamps are 7 inches long, one inch wide, and 2 inches high. The transmission cable is lead or plastic shielded and is firmly attached to the strand by wire wrappings. Attached to the cable adjacent to the poles are rectangular metal boxes called terminals. Telephone drop-lines from the individual homes tie in these boxes.

In older neighborhoods much vegetation comes in contact with the telephone equipment. In many cases, trees have grown up around poles to the extent that climbing the pole is almost impossible. Also, fruit, nut, and other trees and shrubbery drape their limbs on the telephone cables and drop-lines. No block in this study was found lacking in these conditions.

Baits used for the study are a commercially prepared rodenticide consisting of two ounce wax blocks containing an attractant and seeds impregnated with .005% diphacin (2-Diphenylacetyl-1, 3 indandione). Holes were drilled in the center of the bait blocks so they could be securely nailed to the utility pole. In most cases an attempt was made to bait all poles on every block. However, a number of blocks were baited intermittently; that is, one or more unbaited poles separated baited poles.

The poles were climbed to the telephone cable and two or more baits were nailed to the poles a few inches above the clamp (Figure 2). Generally, the pole baiting operation can be completed within 10 to 15 minutes. Subsequent baiting requires slightly less time.

After poles were baited, it was necessary to maintain surveillance of the baits to determine the degree of consumption and the need for rebaiting. Since the baits were located high on the poles, it was discovered that most baits could be easily seen from a vehicle in the street with the aid of 7×50 binoculars. Such a method of observation made possible a rapid means of bait surveillance. This method was not possible where baits were obstructed from view because of vegetation, and it was often necessary to climb the poles to determine consumption. Bait consumption was estimated as near as possible to the following amounts: Nibble, 1/4, 1/2, 3/4, and all. Estimation of these small amounts from a distance with binoculars implies a certain degree of inaccuracy. Realizing this weakness, estimates were conservative.

RESULTS

Of the 29 blocks included in the study, five were excluded from this report. Reasons for their exclusion are discussed later in the paper.

Only five of the 24 blocks included in this report had no bait consumption on any of the utility poles baited. Of the 19 blocks that exhibited rat activity, 65.8 percent of the 146 poles baited had some bait consumption. Consumption varied from a nibble to more than two pounds per pole (Figure 3). Table 1 presents a breakdown of bait consumption for each block. Total bait consumption on all poles was approximately 190 bait blocks. Within nine days from the time baits were placed on utility poles of the first block, the first poisoned roof rat was found. Throughout the study many rats were found by the Department and residents of the areas baited. Because of the nature of the study, no attempt was made to recover all of the dead rats, therefore the actual kill is uncertain. However, the amount of bait consumed suggests a substantial kill.

During the initial baiting phase it was discovered that roof rat signs were commonly found in the vicinity of the utility pole. The most common sign was rat urine stains on the clamp and terminal. In many cases urine had accumulated to such a degree that the odor was easily detectable. Rat droppings were often found on the terminal and at the base of the utility pole (Figure 4). Apparently the clamp and terminal served as a resting place for rats while feeding because gnawed walnut and almond shells, apricot, cherry, and loquat pits were often found on the terminal and at the base of the utility pole. Rub marks were found on the clamp and terminal in areas of heavy infestation.

Figure 2. Diphacin bait blocks being attached to a utility pole above the telephone cable. The terminal is adjacent to the workers right arm.

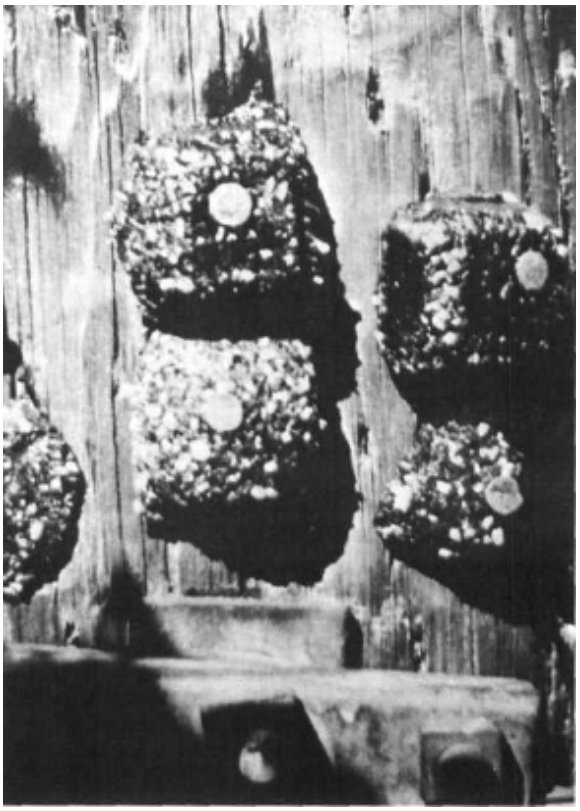


Figure 3. Bait consumption on one of the utility poles included in the study.

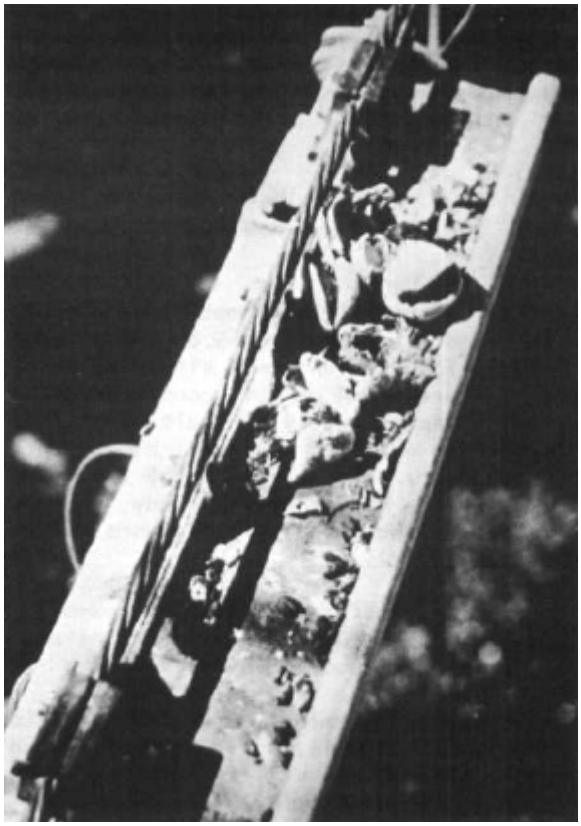


Figure 4. Gnawed almond shells and rat droppings on top of the terminal shown in Figure 2.

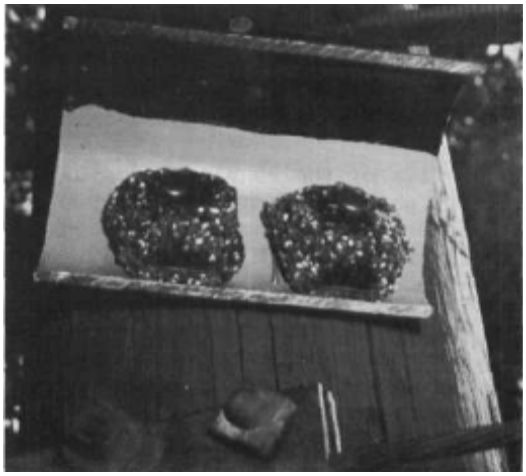


Figure 5. Bait stations made of sewer pipe halves lengthen the life of baits.

Table 1. Individual pole bait consumption of all residential blocks where rat activity was detected.

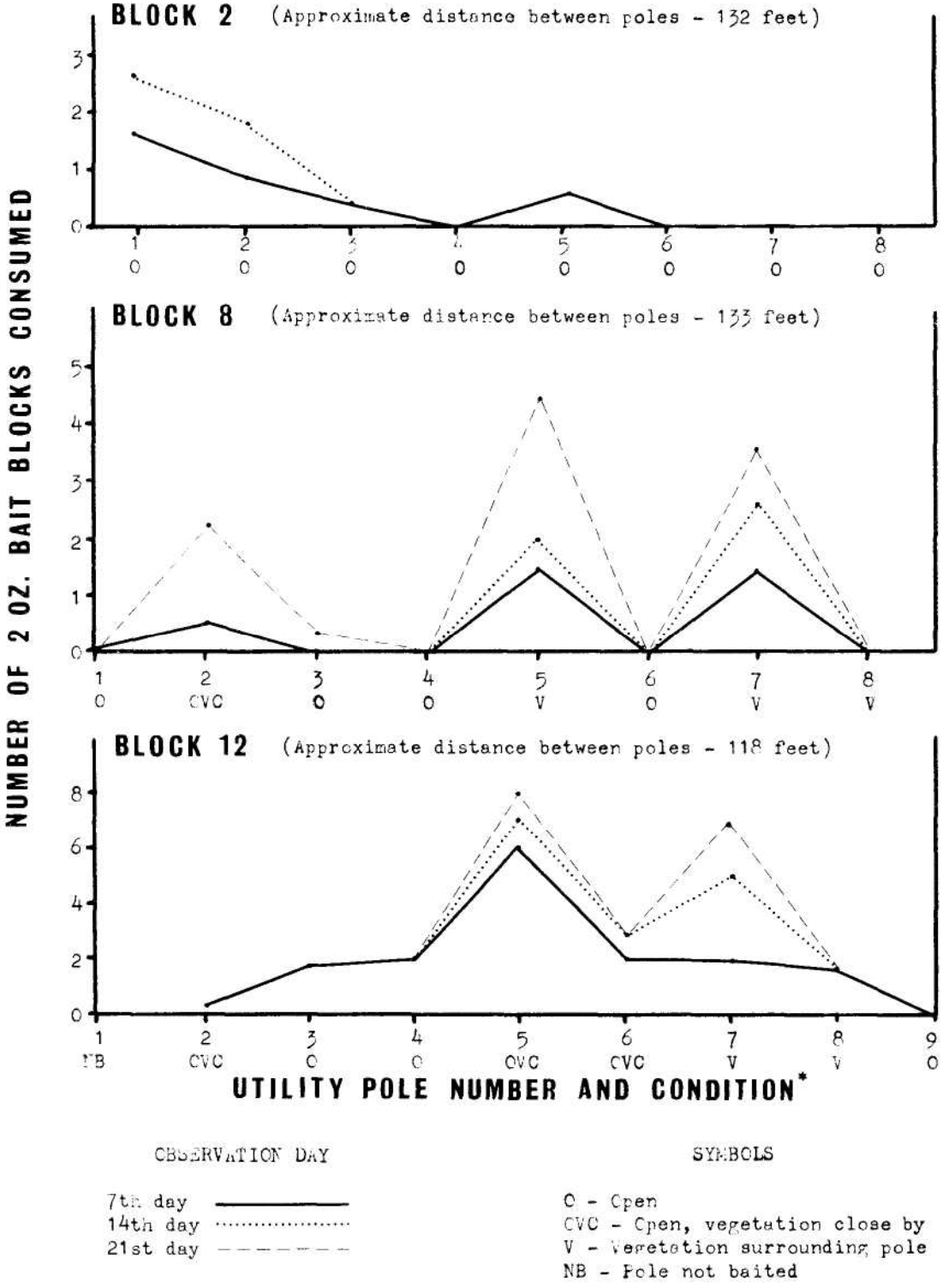
Block number	Amount of 2 ounce bait blocks consumed						Total poles baited
	No consumption	Nibble to 1/2	1/2 to 1	1 to 2	2 to 4	More than 4	
1			1	5	1		7
2	3		2	1	1		7
3	1		1		1	4	7
4		5	1	2	3		11
5	5	5		3	4		17
6	7	3		1	4		15
7	3		2			1	6
8	4	1			2	1	8
9	5		1				6
10	2		2				4
11	6	1			1		8
12	1	1		1	3	2	8
13	6	2			2		10
14		2	1	2	2	1	8
15	4	2	1	1	1		9
16	3	1	1	2			7
17	1				1		2
18	1		1		1		3
19					2	1	3
Total	52	23	14	18	29	10	146

As bait consumption occurred, distinct feeding patterns developed. The most characteristic pattern was the amount of bait consumption on poles in which vegetation was in close proximity to the clamp. It appears that vegetation has a positive effect on bait consumption. In the majority of the cases, bait consumption was greatest on these poles.

Two environmental problems and a physical problem became evident during the study. Precipitation, even in light amounts, was found to deteriorate the wax impregnated baits. Heat also had a deterioration effect. The week of September 12, 1971, included several days of 100+ degrees temperature. Some baits with a southernly exposure softened sufficiently to break from the nail and fall to the ground. Such bait loss during the critical feeding phase cause sufficient disruption to require excluding five blocks from the study. Some baits on other blocks were similarly affected, however, the loss occurred after the feeding peak and control analysis was still possible.

The physical problem was that baits were broken or removed by workmen maintaining equipment on the poles. This was most apparent in an area where cable television was being installed. It was thus impossible to accurately determine bait consumption in the area and observations were terminated when the problem became evident. However, incidental observations determined that rats consumed bait placed above the television cable within two weeks after the cable was installed. Therefore, it may be necessary to bait both cables where they occur together.

Although no accidental bait consumption by pets or children resulted from the above problems, efficiency and safety dictated the development of a bait station. Through field trials a station was designed from a seven inch section of plastic sewer pipe cut lengthwise. The interior was painted gray for easy observation, and holes were drilled, and a wire hook attached (Figure 5). Two baits were attached to the section with 2-inch round head paper fasteners. The bait stations were placed above the clamps in the same approximate position as the individual bait blocks.



* Utility pole condition refers to the immediate area surrounding the pole at the clamp level.

Figure 6. Profiles of accumulative bait consumption for three blocks during three weeks of baiting.

DISCUSSION

In most cases, as to be expected with anticoagulant poisons, the greatest period of bait consumption occurred within the first couple of weeks and decreased substantially thereafter. However, on some poles additional bait consumption was observed after an extended time period of no bait consumption. It is possible that after the initial kill of rats utilizing the telephone cable, other rats on the block expanded their territory and came in contact with the bait. This possibility was tested on one block.

Three weeks after bait consumption had ceased on a seven pole block, 19 baits were placed on fences adjacent to potential roof rat cover. Nine days later two of the baits showed limited consumption, thus indicating that some rats were still present on the block. The baits were removed from the fences and subsequent to that time additional consumption was observed on one of the baited poles.

The profiles of bait consumption on most blocks possess patterns which resemble activity ranges. This condition is especially evident on blocks with several distinct areas of feeding with one or more poles with no bait consumption between them. Further investigation may reveal that utility poles with peak bait consumption represents focal points of individual populations on a block. This is particularly evident on the block illustrated in Figure 6, block 2, poles 1, 2, and 3. Residents adjacent to these poles observed roof rats at dusk traveling down the telephone cable from pole 1 to poles 2 and 3. When almonds were maturing the rats were often observed going down the drop wire attached to pole 2 into an almond tree. The terminal adjacent to pole 2 was covered with gnawed almond shells and rat droppings (Figure 4). There were also a few almond shells and droppings on the terminal adjacent to pole 1. Note that the greatest bait consumption occurred on pole 1 and decreased on poles 2 and 3.

Thus far in the study the advantage of the bait stations is apparent. The sewer pipe protects the baits from the sun, and to a certain degree precipitation, thereby making the baits longer lasting. Since the bait stations are hooked on nails and can be easily removed and replaced, there is less chance of accidental breakage.

In the present program, large areas consisting of many blocks are being pole baited with bait stations that are maintained on a permanent basis. Since all blocks do not have cable walking rats, intermittent pole baiting is used to detect the rats presence. Emphasis is placed on poles with vegetation in close proximity to the cable clamp. When bait consumption is observed, additional poles on the block are baited. After placement, the bait stations are normally checked for bait consumption on the second day, once a week for two weeks, and thereafter bimonthly.

Utility pole baiting for roof rat control appears to be an effective means of population reduction and has the potential of long range effectiveness in residential Santa Clara County. Undoubtedly the program would be equally effective in other geographical areas with similar roof rat problems.

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