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SOIL INCORPORATION/BIODEGRADATION OF HERBICIDE ORANGE

VOLUME I

MICROBIAL AND BASELINE ECOLOGICAL STUDIES OF A PROPOSED TEST SITE ON THE AFLC TEST RANGE, HILL AFB, UTAH

SUPPLEMENTAL REPORT

BASELINE STUDIES OF VERTEBRATE FAUNA

DECEMBER 1974

LIFE SCIENCES LABORATORY DIVISION
USA DUGWAY PROVING GROUND
DUGWAY, UTAH 84022

1. BACKGROUND:

A 2000-acre site on the Air Force Logistics Command Test Range Complex, Hill Air Force Base, Utah was selected as a potential site for disposal of organic herbicide compounds by incorporation into the soil. A microbiological and baseline ecology study was conducted, starting in August 1973 and ending in June 1974. A total of five visits were made to the area to collect and observe plants and animals and soil samples. The specimens and data were analyzed to prepare an environmental assessment of the area being considered for disposal operations. A final report was prepared for presentation on 6 September 1974. At this time it was suggested that one more visit be made to the area with emphasis on a study of the population dynamics of Peromyscus maniculatus. The final study reported here was conducted 16 to 20 December 1974.

2. SCOPE:

Seven grids of 60 live traps each (420 traps in all) were placed in each of the previously designated and marked study and control areas described in the final report and as shown in the map (Figure 8 of this report). The traps were spaced 10 meters apart. The exact location of each grid is shown in Figure 8 of this supplemental report. Sites were selected on the basis of some of the previous successful sites (Grids Number 1 and 4) and location of former grids (in 1973) in study areas where P. maniculatus should have been found previously, but were not. Individual specimens captured were marked, released and recaptured to determine population density and individual movement.

Six bird nets were erected at the site shown on the map (Figure 8). Horned larks (Eremophila alpestris) were counted as they had been during previous studies, by observation while driving slowly through the study areas for recorded periods and distances. Other animals were counted as they were observed.

Tables in this report are numbered so that they correspond to tables in the final report. In some tables the earlier information of the final report is duplicated with December 1974 data added and final values revised. Thus some of the tables presented in this report are new, and replace the corresponding table in the previous final report. In other tables December information only is provided (listed as supplement tables). In one table an analysis of a portion of data from the year of study is given, making it an original interpretation for both the final and supplemental reports (Table 25). The following list

of tables indicates the relation the new information presented in this report bears to the previous final report.

Table 10a - replacement for Table 10 in final report
Table 11a - supplement to Table 11 in final report
Table 11b - replacement for Table 11 in final report
Table 12a - replacement for Table 12 in final report
Table 18a - supplement following Table 18 in final report
Table 21a - supplement following Table 21 in final report
Table 22a - replacement for Table 22 in final report
Table 23a - supplement to Table 23 in final report
Table 25 - original
Figure 5a - replacement for Figure 5 in final report
Figure 8 - supplement following Figure 6 and 7 in final report

3. RESULTS:

Except for trapped species (Peromyscus maniculatus and Dipodomys ordii) few animals were observed during daytime operations (two ravens, one coyote, and two jackrabbits, Table 10a). Daytime counts of Eremophila alpestris (horned lark) were extremely low: 0.3 bird per minute, the same as during March 1974, or 1.4 bird per mile, the lowest value obtained during any visit (Table 11b). On previous visits the horned larks had been seen mostly along the gravel road through the principal study area to Target 21. Data were tabulated by area as shown in Table 11a, and it is apparent that more birds were observed in the principal study area than in others. Few jackrabbits were counted during night transects during December 1974 (Table 12a). Other studies throughout the Great Basin and in neighboring states have revealed that jackrabbit populations are still declining. Only one coyote was seen during the day; none at night. One other mammal, probably a carnivore, was seen at night about 200 meters from the road. The eyes were close together, and it raised on its hind legs several times before disappearing (characteristic of a mustelid). Identification could not be made, but the animal might have been a ringtail.

Trapping success (measured as the number of animals obtained per 100 trap nights) was 2.8 P. maniculatus, which is less than the 12 mice per 100 trap nights obtained in June 1974. In all, 45 captures and recaptures of 21 Peromyscus maniculatus were obtained in four days of trapping using 420 traps (Table 18a). The number of mice was insufficient to calculate N (estimated total population) for

each grid each day of recovery of makred individuals. The calculations for the December 1974 data shown in Table 21a are similar to those made in March and June. In addition an estimate of N was made for all seven grids combined. The mean number of P. maniculatus was 3.1 in each double grid where 60 traps covered 1.82 acre. Thus, there were 1.6 mice in each acre, a significant decrease from 6.5 mice per acre in March and approximately 9 mice per acre in June 1974. In each square mile (640 acres) there were slightly over 1000 mice during the time of our observations in December 1974. Table 22a compares four acres in which grids were set at or near the same site where they were previously set (and assumed to be comparable). An estimate of N averaged 2.8 for each of these four grids. The greatest drop in density from June to December occurred in grids 1 and 4, which were very dense in June. Trapping results from grids 6 and 7 in the downwind east study area declined slightly from March to June despite an overall increase for most other grids. From June to December P. maniculatus density in downwind east study area (6, 7, and 14) and in and near the control area (8 and 13) decreased to a lesser extent than in grids 1 and 4. A slight decrease was noted by comparing the two grids in and near the control area (eight in June and 13 in December).

Mark, release and recapture methods have long been regarded as a fairly accurate method of estimating population density while trapping success is more subject to variables. Table 25 indicates the extent of change in population density of P. maniculatus (as does also Table 22a), as calculated by both methods. Trapping success or percent capture or trap-night index (expressed as mean number of animals per 100 traps) is criticized as a reliable means for estimating density. Individual trappability is variable and is influenced by season, breeding cycles, forage, competition and other activity, by movement of weather fronts, precipitation, temperature, cloud cover, and lunar cycles. Calculations are adjusted for traps sprung by wind or malfunctions. At best, fluctuations of population densities show up as general trends, which are unmistakable. In mark and release studies, the animal may not be sacrificed for laboratory studies. At least initially, more effort is required in keeping records, and a minimal number of animals must be marked and then recaptured before calculations can be made. This is certainly true for data obtained in August and October 1973 and perhaps true for December 1974 data. Surprisingly, Table 25 shows that the extent of changes is similar whether calculated by trapping success or by mark, release and recapture.

Although a considerable gap exists from June 1974 to December 1974, it is believed these two recent trappings show that P. maniculatus populations reached a peak, probably shortly after June. Decreases were already evident then in two grids while adult and juvenile specimens were captured everywhere. Then the population declined to the December level. All specimens captured in December were full adults. The two females captured were not pregnant or lactating Assessment of data from these two visits also suggests that through 1974 the population has remained well above the levels first noted during 1973.

Males in traps outnumbered females over 10 to 1. Why so few females entered traps is not known. Either they were present in the study areas is very low numbers, or they were not venturing into traps for some reason.

In December 1974, movement of 13 individual male mice captured and recaptured 32 times, averaged 175 feet (53.4 m) between captures (Table 23a). Movement measured in June when three males were captured and recaptured six times (once each) averaged 153 feet. (Table 23 in final report.)

Kangaroo rats (Dipodomys ordii) were captured for the first time within the study areas as originally designated. During June 1974 9 captures and recaptures of D. ordii were made peripheral to downwind east study area and the control area.

In December, three D. ordii specimens were taken five times around a junk pile near the test plots within the principal study area. It is apparent that kangaroo rats probably have invaded the study areas in small numbers, becoming established at suitable locations such as the junk pile which provides harborage.

This concludes studies of flora and fauna at the proposed site for biodegradation of Herbicide Orange. The results and analysis remain much the same as in the final report. The additional period of study adds valuable information regarding small mammal populations and establishes useful techniques for a re-exaimination of the area if this should be necessary. In brief, the P. maniculatus population increased from an extreme low of less than one mouse in each grid in August and Ocober 1973 to a fairly dense population in June 1974. More dense populations are rarely evident even in the highly productive vegetated dunes in other portions of the Bonneville Basin. Within six months or less, the population declined

to about 1/4 the density observed in June. This final period of observation supports the conclusion that the cyclic changes are not necessarily an annual phenomenon. Also it is evident that some rodents (such as the ground squirrels and kangaroo rats) may invade the area periodically and probably disappear during long interim periods. Counts of larger or wide ranging vertebrates (jackrabbits, coyotes and horned larks) vary with population densities throughout the Bonneville Basin.