NBR GRASSHOPPER DENSITY METADATA:

A. COLOR –

1) Gray = year of study
2) Blue = HILL site (UTM 706453 EAST 5249980 NORTH)
3) Rose = TRIANGLE site (UTM 713570 EAST 5248100 NORTH)
4) Green = TRISKY site (UTM 711317 EAST 5242500 NORTH)
5) Light Blue = TOWER 2 – GRASSY site (UTM 708205 EAST 5244024 NORTH)
6) Orange = Misc. sites [HILL 2 (UTM 706407 EAST 5249831 NORTH), PAULINE (UTM 705717 EAST 5247255 NORTH), NORTH BOUNDARY (UTM 710177 EAST 5250023 NORTH), TOWER 2 – ROCKY site (UTM 708212 EAST 5243906 NORTH), WESTSIDE (UTM 708763 EAST 5244773 NORTH), TOWER 1 (UTM 709036 EAST 5247149 NORTH)]

B. YEAR –

1) Study = began in 1981 and has continued every year.
2) Season = EARLY JUNE (6/1 – 6/15), LATE JUNE (6/16 – 6/30), EARLY JULY (7/1 – 7/15), LATE JULY (7/16 – 7/31), EARLY AUGUST (8/1 – 8/15), LATE AUGUST (8/16 – 8/31), EARLY SEPTEMBER (9/1 – 9/15), LATE SEPTEMBER (9/16 – 9/30).

C. WITHIN EACH SITE –

1) Density. Two methods were employed to estimate grasshopper density:
   a) Prior to 1986, a 100 m^2 area was encircled with nylon insect screen (1.52 m high) at select times of the year (peak adult density). Density was estimated by catching the grasshoppers within the enclosed area by two individuals using butterfly nets. Grasshoppers escaping by flying over the enclosing net were counted. Either all grasshoppers were caught or, if there were very large densities, a "catch-effort" technique was employed (Southwood 1978: 230). In the "catch-effort" method, the sum of all grasshoppers caught in the area prior to each 15 min catch period was the independent variable, and the number caught in the 15 min period was the dependent variable. Three or four pairs of values for each area were correlated using linear regression and the regression's x-intercept was an estimate of population size. The coefficient of variation for these density estimates is 5-20%.
   b) Starting in 1986, density was estimated bi-weekly (every two weeks) from late-May to Mid-October in each habitat using 24 - 40 0.1 m^2 rings (Onsager & Henry 1977). Coefficients of variation for these density estimates are less than 10%.
2) Maximum density. With the bi-weekly density estimates for a given year at a site, maximum density is computed as the sum of all increases in grasshopper densities between consecutive periods from late May through mid-October.
3) Peak density. With the bi-weekly density estimates for a given year at a site, peak density is the highest observed density.
4) Average density. With the bi-weekly density estimates for a given year at a site, the average density is the mean of all non-zero values.
5) Days to 50% dead. With the bi-weekly density estimates for a given year at a site, the number of days for the density to decline from peak density by 50% was computed. The days between consecutive density estimates to achieve 50% was linearly interpolated.

6) Day when 50% adults. With the bi-weekly density estimates for a given year at a site, the ordinal day of the Julian year at which 50% of the grasshopper population became adults was computed. The days between consecutive density estimates to achieve 50% was linearly interpolated.

REFERENCES.

Onsager, J. A. and J. E. Henry. 1977. A method for estimating the density of rangeland grasshoppers (Orthoptera, Acrididae) in experimental plots. Acrida 6:231-237.

Southwood, T. R. E. 1978. Ecological Methods: with reference to the study of insect populations. 2nd Ed. Chapman & Hall, London. 524 p.