NBR PREDATOR EXCLUSION 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)

B. YEAR –

1) HILL site – experiments started in 1985 and every year thereafter except 1988.
3) TRIANGLE – experiments started in 1994 and every year thereafter.
4) TRISKY site – experiments started in 1990 and every year thereafter.
5) TOWER 2 – experiments started in 1989 and every year thereafter.

C. AVIAN EXCLUSION – Birds are the major natural enemy of grasshoppers in this system.

1) Avian exclosure and control areas were used at each site to measure the impact of avian predation (Joern 1986; Belovsky & Slade 1993). Belovsky & Slade (1993) demonstrated the absence of experimental artifacts.
2) At each site, three 100 m^2 areas have birds excluded using nylon avian netting (5 cm squares) and each was paired with a 100 m^2 control area where birds had access. Areas were erected in early June of each year.
3) In mid-September of each year, each exclosure and matching control area was surrounded by insect netting (1.25 m wide) and the avian netting was removed. The insect netting either contained escaping grasshoppers or forced them to fly high enough, so that their departure was observed.
4) Two researchers with insect nets immediately caught grasshoppers and spiders (abdomen > 5mm) in each exclosure and matching control for three - 15 min periods with a 15 min period between each catch period. The grasshoppers and spiders were preserved in 70% ethyl alcohol for later identification to species (Brooks 1958; Brusven 1972; Handford 1946; Hebard 1928, 1934; Helfer 1963; Otte 1981, 1984; Pfadt 2002; Scoggin & Brusven 1972; Scott 2010) and sex. Large grasshoppers have an adult body mass >500mg and small grasshoppers have an adult body mass <250mg).
5) Grasshopper density was estimated using a "catch-effort" technique (Southwood 1978). The sum of all grasshoppers caught in an 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. These 3 pairs of values for each area were used in a linear regression, where the regression's x-intercept provided an estimate of population size with a coefficient of variation (CV observed: 5-20%).

D. ENVIRONMENTAL TRAITS – After censusing grasshoppers, these measures were made:

1) Live (green) plant biomass inside each exclosure and matching control area was measured by clipping the plants in five 0.1 m^2 plots that are randomly located. Clipped vegetation was separated between grasses and forbs, dried at 60^oC, and weighed.
2) Plant N content and solubility are measured on the dried clipped grass and forb samples. N content was measured using micro-Kjeldahl methods in 1994 – 2000 (AOAC 1984)

and combustion in an elemental analyzer (©Costech) after 2000 (Robertson et al. 1999). Solubility was determined by digestion in HCl and pepsin (an index of digestibility to grasshoppers: Belovsky and Slade 1995).

3) Vegetation and bareground cover was measured using 25 toe-points (Daubenmire 1947) in each exclosure and matching control that were located randomly.
4) Soil N available to vegetation was measured using ion exchange resin bags (Rexyn © Fisher Scientific, Binkley & Hart 1989). A resin bag was buried 15 cm at a random location in each exclosure and matching control area in May and collected in Oct to measure N during the growing season, and in Oct. and collected in May to measure N at the start of the growing season. Resin bags were kept frozen after collection until analyzed, nitrogen was extracted using 2M KCl, and extract was analyzed for NO_3^- and NH_4^+ via spectrophotometer (©Latchat) (Robertson et al. 1999).

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