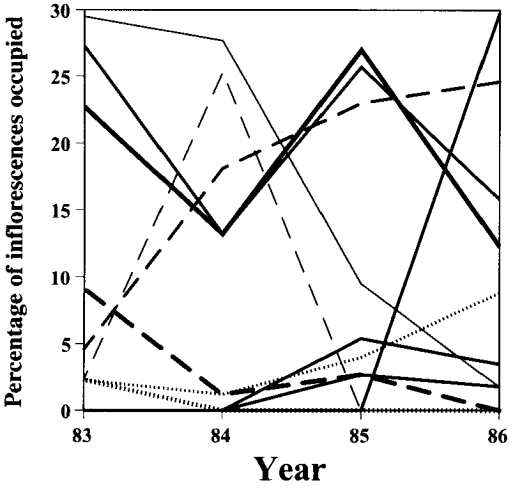

Figure 7.1. Abundance (measured as percentage of surveyed inflorescenses occupied) of 11 species of ant guard on *Calathea ovandensis* in a Neotropical rainforest (for species names, see Horvitz and Schemske 1990). Flowers act as "ant baits," and this bait study suggests great interannual variation in population densities, colony sizes, bait attractiveness, or some combination of the three factors.

In three of four sites, the numerically dominant ant at *C. ovandensis* changed over the four years. In each plot, ant numbers were highly dynamic, with no apparent trends in shifting species composition. Figure 7.1 summarizes data from one of their plots. For example, *Pheidole gouldi,* the dominant ant in this plot from 1983 to 1984, was found on fewer than 5% of the flowers by 1986. *Pheidole* "sp. A" alternated between dominance and rarity. The causes of these fluctuations are difficult to pinpoint without further study. Apart from changes in the successional stage of the forest, changes in ant numbers could also reflect changes in, for example, population densities, colony sizes, or the availability of alternate food types and hence bait attractiveness. Bait studies, one would conclude, should be interpreted with caution.

Such fluctuations in insect numbers are common (Andrewartha and Birch 1954). For example, in a 14-year light trap sample on Barro Colorado Island, Panama, one in five Homoptera species showed a 10% change in numbers (Wolda 1992). Do these changes represent normal variation around an equilibrium (hence "baseline" variation)? Or are the Homoptera "indicating" subtle changes in the forest? This is, as we shall see, a basic problem in interpreting monitoring data. Interestingly, even as individual species waxed and waned, Wolda found that two measures of species richness were rather constant.

Two Northern Harvester Ants

The remaining studies all come from arid North America. All resulted from counts of large, soil-nesting species that build conspicuous nest mounds. Two population studies come from northern desert-grasslands, two from southern desert-grasslands. The former two feature the genus *Pogonomyrmex,* harvester ants that construct nest disks and mounds of fine gravel. These harvester ants store large quantities of seeds in underground middens.

A population of *Pogonomyrmex salinus* was monitored in a Great Basin sagebrush habitat in Idaho (Porter and Jorgensen 1988). Mounds were censused on three plots (two of 0.25 ha and one of 2.72 ha) three times over 9 years. The populations varied little from 1977 to 1986, although there was considerable population turnover (Fig. 7.2).

In shortgrass prairie of Nebraska a population of *Pogonomyrmex occidentalis* was monitored in a 1-ha plot (Keeler 1993). Mounds were marked and censused yearly for 15 years. In contrast to those of *P. salinus, P. occidentalis* densities at this site increased 41% from 1977 to 1991, during a period of no apparent change in grazing pressure or site characteristics but higher than average rainfall (K. Keeler, pers. comm.). The causes of this increase are unknown.