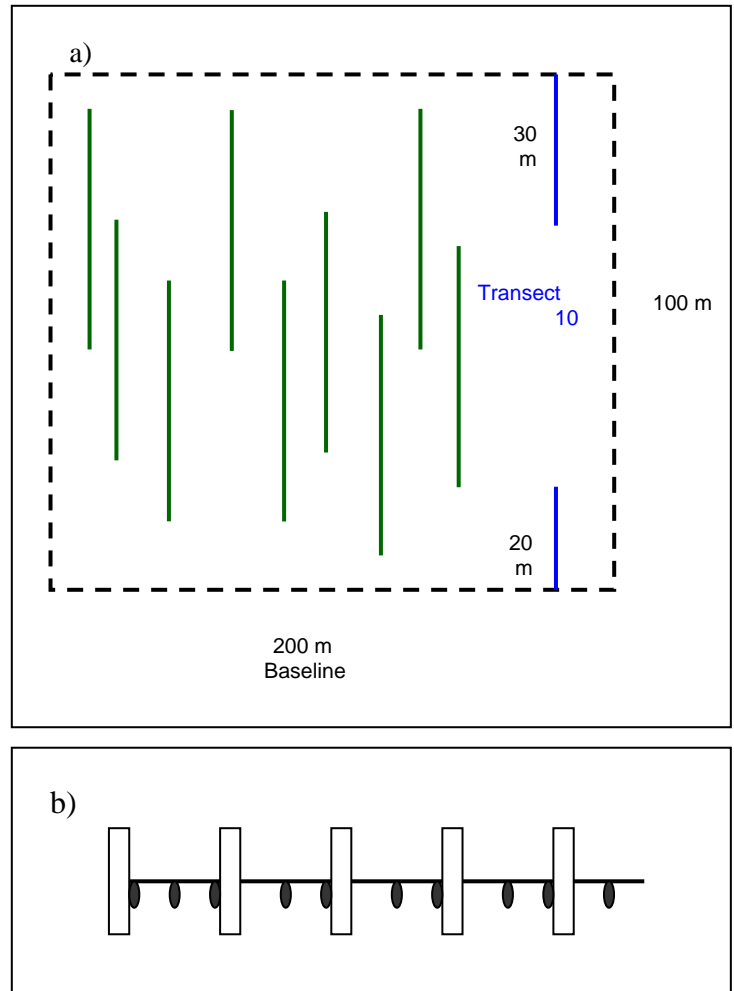


the 0 position of the second axis (fig. 3a). At 10 m intervals beginning at meter 0, 2 m x 1 m quadrats were placed with the 2 m axis perpendicular to the sampling transect (fig. 3b). The cover of individual alien species and the total cover of all native species were estimated in each quadrat. The total numbers of alien and native species present in each sampling transect were also recorded. Canopy cover was measured every 5 m along each sampling transect using the point-intercept method with a GRS brand densiometer. Because some alien species did not fall within the sampling transects, the entire sampling area was surveyed to compile a complete list of all alien species present. Areas with high densities of buildings or very few plants were not sampled, but surveyed only. The abundance of species in each patch was estimated on a log scale after the patch was surveyed.

Trails in Yosemite were sampled based on levels of use by hikers and recreational stock. The Yosemite National Park Wilderness Office supplied data on the number of backpacking wilderness permits issued on each trail, and the trails were grouped into three categories: low use (0-50 people/year), moderate use (51-1100 people/year) and high use (1101-6900 people/year). Seven trails were randomly selected for sampling from each use category. The Wilderness Office also supplied data on the number of stock using the trails in categories of low (3-10/day), medium (11-25/day), and high (26+/day). The concession stables provided route information for their daily rides in Yosemite Valley. Stock are only allowed on certain trails, and all trails open to stock use were sampled. The high use backpacking permit category contained the fewest number of trails, and most of these popular trails also received medium-high stock use. By comparison, low use backpacking permit trails had no stock use. No records were available for day-use by private stock parties on trails, so Mirror Lake Pack Trail and Yosemite Falls Trail had higher stock-use levels than indicated by the Wilderness Office data. Therefore, those trails were placed in the next higher stock-use category. At each trailhead the survey crews placed the first of ten 50 m by 2 m transects on the right side of and parallel to the trail, one meter from the tread of the trail.

Subsequent transects were placed on alternating sides of the trail and were begun across from the end of the previous transect. Transects were sampled using the same methods as were used to sample patches. After sampling within the transects, the field crews walked 3 km from the trailhead, recording all alien species that occurred within 2 m of the trail in each kilometer. Abundances of alien species were



**Figure 3.** (a) Arrangement of 1999 transects in Yosemite National Park in campgrounds, developments and corrals that were sampled for alien species. Two dimensions of the sample site were measured, and the transects were arranged randomly along the two axes. When a transect ran outside of the sample area, as in Transect 10, it was continued at the same position on the first axis and from the 0 position of the second axis. (b) Sampling along 50 m transects. 1 by 2 m quadrats (rectangles) were placed every 10 m, and canopy cover was sampled every 5m (black points).