

# Effect of Distance among Bowls on Numbers of Bees Captured

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## *Introduction*

In this report, we compare the abundance of bees caught when traps were placed 0 m, 5m, and 10m apart.

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This study investigates the effect of duration of sampling and of the distance between bowls on the abundance and diversity of bees captured. We try to determine what distance and what sampling duration is the most appropriate for maximum capture rate and yields the most cost-effective sampling.

## **Methods:**

### *Distance effect and the effect radius of individual pan traps:*

To determine the radius of influence of an individual pan trap and how far apart traps need to be set out, to be independent of each other and to sample the greatest diversity of bees, we set out pairs of bowls at 0 m, 5 m and 10 m distance from each other. Pan traps were placed out before 9:00 am and picked up after 5:00 pm. Each pair of pan traps represents the subject in the analysis and we calculated the number of bees caught in pan trap pairs. Data were analyzed using a 1 way ANOVA with 3 levels. We used 6oz Solo Brand Bowls painted with Krylon brand fluorescent yellow throughout the experiment.

### *Study Area:*

Sampling was conducted at Glen Canyon Park in San Francisco, California, U.S.A. Elevations in Glen Canyon Park range from approximately 225 feet to 575 feet above sea level. We conducted most of the sampling on the steep eastern slope of the Canyon, which houses a grassland community, because we observed the greatest abundance of bees in this area of the park. While annual European grasses dominate the community, native wild flowers including *Escholzia californica* (California Poppy), *Sisyrinchium bellum* (blue-eyed grass), *Sidalceae malvaeflora* (checker-bloom) and *Wyethia angustifolia*

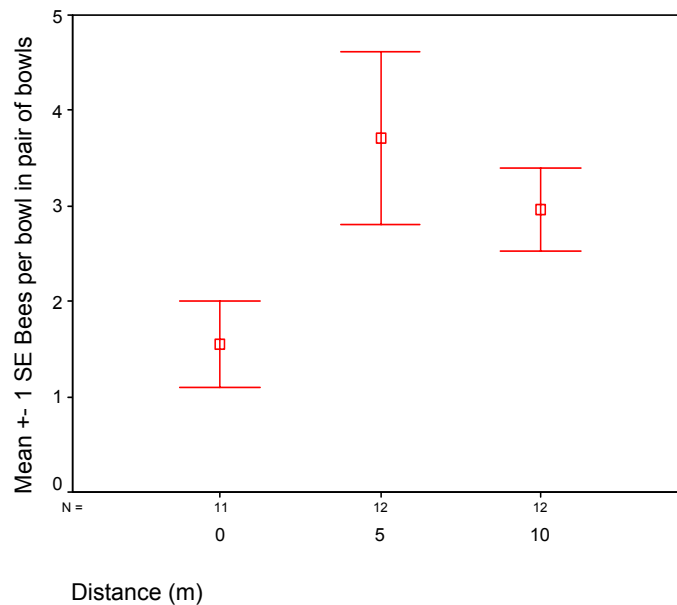
(mule's ear) are strongly represented. Native Lupines are also very common. Other important plants found on the eastern slope include *Toxicodendron diversilobum* (poison oak), *Baccharis pilularis* (coyote brush), *Mimulus aurantiacus* (sticky monkey flower), and *Scrophularia californica* (California bee plant). Native bees in Glen Canyon Park commonly visit many of these flowering plants.

## Results:

There was a significant effect of distance on the abundance of bees caught in the pairs of bowls. Bowls that were next to each other caught significantly fewer bowls than either the 5m or 10 m pairs. There was no difference between the 5 and 10 m pairs. This suggests that when bowls are adjacent they interfere with each other.

Table ANOVA Table. One-way ANOVA with 3 levels (0m, 5m and 10 m) for factor distance

Bees per bowl (from pairs of bowls)				
	df	Sum of Squares	F	Sig.
Between groups	2	27.49	2.80	0.076
Within groups	32	157.19		
Total	34	184.67		



**Contrast Coefficients**

Contrast	Distance (m)		
	0	5	10
1	2	-1	-1
2	0	1	-1

**Contrast Tests**

			Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
Bees/bowl	Assume equal variances	1	-3.5758	1.61396	-2.216	32	.034
		2	.7500	.90481	.829	32	.413
	Does not assume equal variances	1	-3.5758	1.35302	-2.643	25.491	.014
		2	.7500	1.01114	.742	15.804	.469