

COMPLETED PROJECT REPORT

Project Title: Ecology and behavior of endangered kangaroo rats.

Research Agency: University of California - Davis

Principal Investigator: Whisson

Budget: \$2750

Summary:

In central and southern California, ground squirrels are a major problem in areas which also support populations of endangered kangaroo rats, namely Stephen's (*Dipodomys stephensi*), the giant (*D. ingens*), the Fresno (*D. nitratoides exilis*), and Tipton's (*D. nitratoides nitratoides*) kangaroo rats. To protect small, relictual populations, it is necessary to minimize other hazards including those associated with Calif. ground squirrel control. To formulate guidelines for rodenticide use in endangered kangaroo rat habitat and to identify additional ways of reducing nontarget risks associated with ground squirrel control it is necessary to have a good understanding of kangaroo rat ecology and behavior in areas where such control will be undertaken.

A review of the literature identified the following which should be considered when developing management strategies for Calif. ground squirrels:

1. There is extensive overlap between range and habitats of kangaroo rats and Calif. ground squirrels. Many areas currently supporting the most viable populations of kangaroo rats are actually those where rodenticide applications for ground squirrel control were historically most intensive (i.e., grazing lands).
2. In many areas, kangaroo rat colonies inhabit raised areas such as berms and margins of crops. They are not known to inhabit intensively cultivated areas, however, there have been no studies on the potential for kangaroo rats to establish colonies in crops or orchards under minimum tillage and drip irrigation systems.
3. Kangaroo rats are granivorous and are attracted to seed "clumps" which they locate through their highly developed olfactory system. Any grain supplied in a bait station or any grain used in spot baiting is likely to be very attractive to them.
4. Kangaroo rats are very curious and will readily explore new objects in their environment (e.g., bait boxes).

5. Kangaroo rats are nocturnal. They therefore aren't at risk of poisoning from bait that is spilled on the ground during the day, as long as such bait is picked up before dusk.
6. Kangaroo rats do not have the morphology of climbing animals, although, there is anecdotal evidence to suggest that they can climb or jump if necessary to escape predation or to access favored food resources. Elevated bait stations may therefore have the potential to exclude kangaroo rats, but research is needed to determine a minimum height and design required to restrict climbing or jumping of kangaroo rats into the station.
7. Seed in caches created by ground squirrels may be readily taken by kangaroo rats. If baiting occurs in fall when ground squirrels are caching seed, ground squirrels may move poison bait from bait boxes designed to exclude kangaroo rats to caches where it becomes accessible to them.
8. Kangaroo rat burrows are easily distinguished from Calif. ground squirrel burrows by size and form. Kangaroo rat burrow systems are typically found on slightly elevated land, often in association with shrubs or other vegetation. With the exception of the smaller species (Fresno and Tipton's kangaroo rats), soil excavation from kangaroo rat burrow systems results in mounds of soil around burrow entrances. The burrow entrances are often plugged with loose soil to maintain temperature within the system.
9. Although kangaroo rats have physical and behavioral adaptations for predator avoidance, the impact of predators on their populations may be severe.
10. Although there is no direct evidence of competition occurring, overlap in dietary requirements and habitat selection may lead to ground squirrels competitively excluding kangaroo rats from some areas.

Behavioral differences between kangaroo rats and ground squirrels make it possible to mitigate potential hazards to the endangered species. Differences in burrow size and other burrow characteristics enable fumigants to be selectively directed to ground squirrels. The use of elevated bait stations and careful timing of baiting will also minimize hazards. Calif. growers can both protect kangaroo rats and control ground squirrels to protect their crops and livelihood.

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