

# The Raven Management Program of the Bureau of Land Management: Status As of 1992

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**Abstract.** The common raven (*Corvus corax*) is a major predator on juvenile desert tortoises (*Gopherus* [= *Xerobates*] *agassizii*). In 1988, the Bureau of Land Management (BLM) initiated a program to increase survival of juvenile tortoises by reducing raven predation on tortoises. A final Raven Management Plan and Environmental Impact Statement is scheduled to be released in 1993. In the interim, the BLM will be conducting an experimental program to shoot and live trap ravens. Also, the BLM is coordinating several efforts to survey raven populations in the vicinity of existing or proposed raven attraction sites (e.g., landfills) and is promoting more effective landfill operating methods that will reduce raven use of landfills for food.

## INTRODUCTION

The common raven (*Corvus corax*) is a major predator on juvenile desert tortoises in some areas (Berry 1985, 1990). Several lines of evidence support this contention (Boarman in press): i) large numbers of juvenile tortoise shells have been found beneath known raven nests and perches; ii) many shells that show evidence of predation by ravens are found individually throughout the range of the tortoise, many of which are not necessarily associated with raven perches or nests; iii) significant decreases in juvenile representation in the size/age classes have been identified in well studied tortoise populations; and iv) people have observed ravens killing, carrying, and consuming juvenile tortoises. A 1500% increase in the numbers of ravens in the Mojave desert between 1968 and 1988 (BLM, 1990) indicates that raven predation on tortoises has likely increased significantly in recent years. Because ravens make frequent use of food and water subsidies provided by humans (Knight and Call 1980), their population increase can be tied to the increase of anthropogenic food and water sources, such as landfills, agricultural fields, and septage ponds (Boarman in press).

In 1988 the Bureau of Land Management initiated a process to evaluate, design, and implement a program to reduce raven predation on desert tortoises within the California Desert Conservation Area. A pilot program to shoot and poison ravens was implemented in 1989, but was essentially halted by a Temporary Restraining Order filed by the Humane Society of the United States (*HSUS v. Manuel Lujan et al.*, 1989)<sup>1</sup>. A draft Raven Management Plan (Plan) and a Draft Environmental Impact Statement (EIS) were issued for public comment in 1990 and are now being modified. The modified Plan and EIS are scheduled for release in 1993 and will cover the first of a multi-phased program, with each successive phase depending on the findings from previous phases. The initial phase will include: shooting and live-trapping ravens, reducing the availability of food and water subsidies, monitoring for effects of actions on tortoise populations, and research on raven behavior and ecology to find effective means of manipulating raven behavior and populations to benefit tortoises.

In the meantime, the BLM developed an Interim Control Program which was to be implemented in Spring, 1992. The Interim Control Program was designed to collect data essential for finalizing the long-term Plan and EIS while also removing some problem ravens. If fully implemented, the program will: i) evaluate the impacts poisoned eggs may have on non-target species; ii) determine the cost-effectiveness of live-trapping and shooting ravens; and iii) study the movements and home ranges of ravens. Because of insufficient resources, the BLM postponed implementation of the Interim Control Program. The project to experimentally shoot and live trap ravens will be conducted in Spring 1993, focusing on removing most ravens from the Desert Tortoise Natural Area, while also removing individual birds in other areas where there exists strong evidence of recent predation. Implementation of the studies on the non-target impacts of poisoned eggs and on raven movements are pending funding.

In addition to the Interim Control Program, the BLM is actively working with landfill operators and proponents to reduce the availability of anthropogenic food sources for ravens by changing landfill management methods and monitoring raven use of landfills. To reduce the availability of food to ravens at landfills, landfill operators are being asked to cover the solid waste using the methods most effective at ensuring that the garbage remains covered at all times by: i) covering with a minimum of 6 inches of fill at the end of each day, or more frequently if possible; ii) using up-slope or other maximally effective methods of covering the cells; and iii) investigating more effective means of covering if the other methods are insufficient (e.g., synthetic cover material). Coyote-proof fencing should be installed because coyotes are known to dig up garbage, which makes it more accessible to ravens. Sorting areas, where solid waste is exposed for inspection, should be enclosed with screening and kept free of organic matter and standing water whenever people are not present. Ravens should be prevented from accessing any water on site by: i) installing drains at truck washing facilities or, other places where water runoff may collect; ii) placing screen or monofilament line over septage and leachate ponds; and iii) preventing puddles from remaining in place after a rain. We are currently testing methyl-anthranilate, an artificial food-flavoring that acts as a chemical aversion for several birds species, to see if it can be used at landfills.

Monitoring projects are being initiated in association with several landfill projects. The primary purposes of the monitoring efforts are to i) determine how ravens use the area to help develop viable management actions and ii) to monitor for changes in raven numbers, distribution, or behavior as a result of management actions. Because ravens can fly 65 km or more in a single day (Engel and Young 1992), and much farther over the course of a year (E. Knittle, pers. comm.; pers. obs.), a landfill or other major food or water source may affect raven populations over a relatively large area. Therefore, surveys will be conducted at the specific landfills, proposed landfills, or other likely raven concentration sites and on roads within a 50-km radius of the site.

The surveys are designed to ensure that maximum scientific validity will result. The survey routes will be broken into segments, each encompassing only one major land-use type (e.g., agricultural fields, towns, open desert, powerline or other linear corridor, etc.). If possible, specific land-use types will be replicated at least two times. Each individual segment will be covered at different times of the day throughout each month. Data collected for each raven observation will include: time specific location, number of ravens in group, behavior, approximate distance from road and height off ground, and perch type.

All significant raven concentration sites in the area will be located and numbers of birds will be counted at different times of the day throughout each month of the survey. Several times during the year an extra effort will be placed into locating group roosting sites. This primarily involves careful searching and following of ravens very close to and after sunset. When roosts are located they will be censused at least once per month. An attempt will be made to locate all nest sites within the survey area. The area beneath nests, roosts, and commonly-used perch sites will be searched periodically for tortoise shells.

If ravens use the landfill, it may be necessary to conduct a study of raven movements to determine the influence the project has on regional raven populations. A minimum of ten ravens would be affixed with radio-transmitters (with new birds added as old ones are lost to the study) and followed on a regular basis. Periodic aerial surveys would likely be necessary to locate some of the birds. The distance to be searched may easily exceed 80 km from the capture site. Additional birds should be affixed with wing tags to allow for less intensive monitoring of their movements. The study should be conducted for a minimum of three years.

Effective reduction of raven predation on juvenile tortoises requires a multi-faceted program that includes removal of problem birds, alteration of artificial sources of food, monitoring of tortoise and raven populations, and research into raven ecology and behavior. Because we have limited knowledge of raven ecology and behavior and of effective management methods, constant evaluation is necessary, and modifications in the program may be effected as new information becomes available. By coordinating control and monitoring efforts and evaluating the results, a viable management program will emerge.

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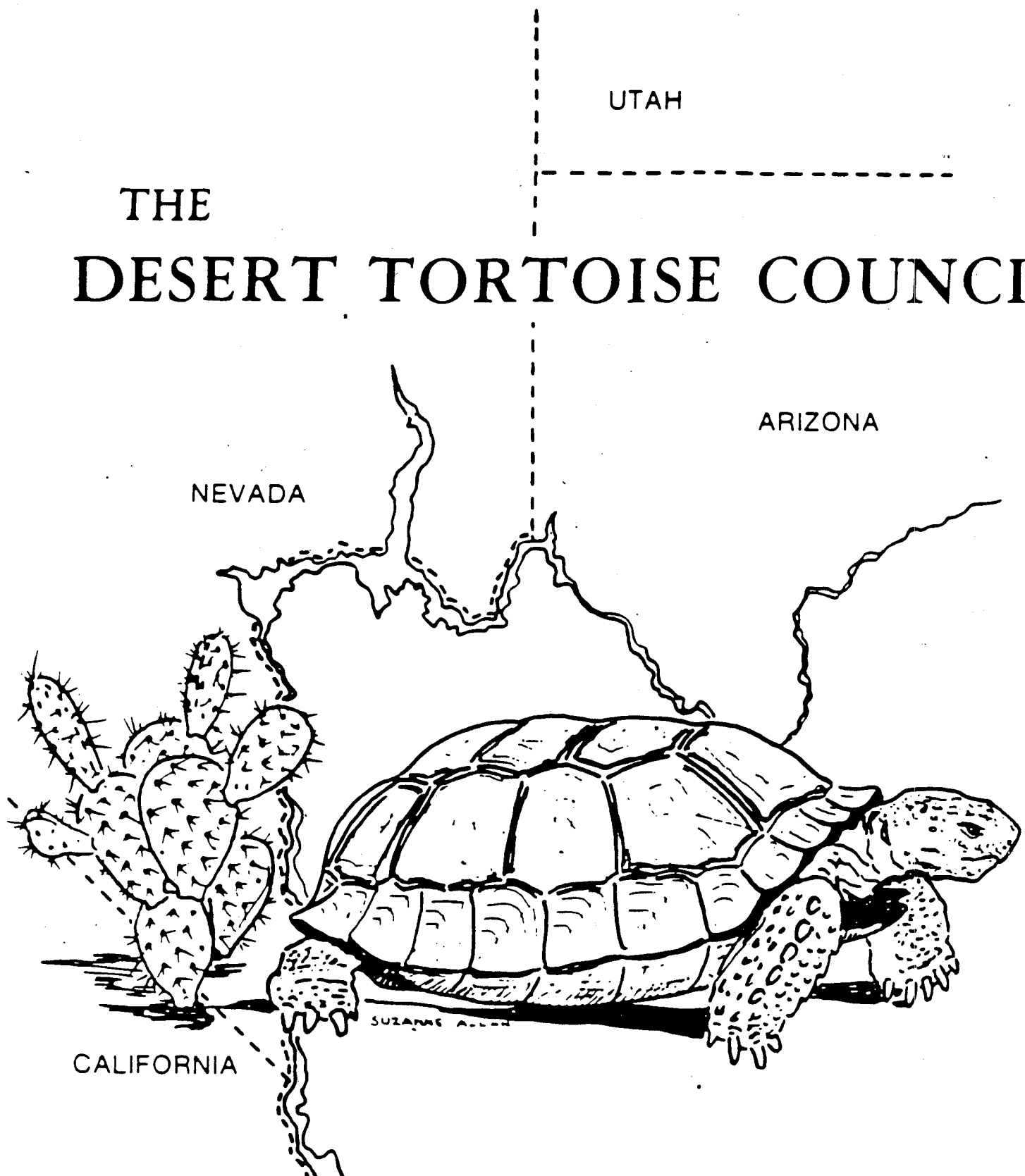
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<sup>1</sup>Humane Society of the United States v. Manuel Lujan et al., Civil Action 89-1523 (RCL), D.D.C., Settlements Agreement filed June 29, 1989.

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