Key Management Issues for Guzzlers in Mojave National Preserve
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Management Issues

- Management issues involved in establishing artificial watering sources and/or reactivating abandoned livestock watering wells are likely to evolve as data are obtained from scientific research, thus a well-designed research study is essential.

- How intensively should mule deer and other wildlife be managed by water manipulation? What is the timing and magnitude of the need?

- The fundamental issue regarding restoration of abandoned wells and/or establishment of new water sources is the effects on and consequences for individual species (e.g. mule deer) and for the desert ecosystem in general. Consequences may include species competition, overpopulation, subsidies for undesirable species, and propagation of invasive and exotic species.

- Management issues are likely unique to each water source. A general management goal for establishment of artificial water sources is to minimize maintenance requirements and undesirable consequences (e.g. raven and burro subsidies).

Research Questions

- What constitutes mule deer habitat in Mojave National Preserve?

- Are new water sources necessary to sustain the mule deer population? If so, where and when?

- What monitoring data are necessary to inform water manipulation management strategy?

- What is the mule deer population size in the Preserve? Is there a trend? What are the recruitment and survival rates?

- What is the range of an individual or group of mule deer? Which water sources do mule deer primarily use? What forage plants do mule deer prefer?

- What are the relationships between existing water sources, new water sources, and mule deer distribution?
    - Dependence on and usage of water.
    - Number of water sources per individual range.
    - Maximum travel distance to water.
    - Gradient of habitat usage away from water sources.

    - Predator evasion potential in habitat where water and forage are available.

- What are the limiting factors of mule deer populations?
    - Nutrition limited by available forage and forage quality.
    - Water limited.
    - Habitat cover limited.
    - Predator limited.
    - Interrelationships between nutrition, water, habitat cover, and predation.

- What are mule deer and vegetation relationships?
    - Assessment of forage in areas where there is water and habitat.
    - Co-locate long-term vegetation monitoring with mule deer research if feasible. Integrate with the National Park Service Inventory and Monitoring Program if possible.

Study Design

- This research will be an impact study design since the locations of existing abandoned wells cannot be randomized. There are two possibilities for treatment: *1)* turn on several wells for a period, collect pre-treatment data, then shut (some portion of) wells off and collect post-treatment data, or *2)* collect pre-treatment data then turn on several wells and collect post-treatment data. In the first case some wells would be turned on immediately and in the second case some wells would be turned on in a few years. The current preference is for the first option with a final determination to be made following analysis of existing data. The initial locations chosen include Eagle Well, Barnwell, and Caruthers with a fourth location to be determined following analysis of existing data. Dr. Sedinger, University of Nevada – Reno, will apply for a research permit from Mojave National Preserve to initiate a pilot study associated with well reactivation.

- The study area will be defined by a polygon with vertices near Bathtub Spring in the New York Mountains, Rock Spring, Cut Spring, and Kessler Spring. The pilot study will involve capture of three mule deer (primarily does) at each of 3 sites. The use of Clover traps to live-capture deer will be considered at those times of the year deemed appropriate, and such traps likely would be most effective during late winter when forage resources are most limiting, or during mid-summer, when temperatures peak and forage quality has declined. Helicopter capture must be done before April 1 or after November 1. Ideally, at least two animals will be equipped with Global Positioning Satellite collars in the first round of captures.