Environmental Case Study
North-Central Texas, Wichita County
A Case for Habitat Disturbance in Conservation

Introduction

Traditional approaches to species conservation usually involve setting aside tracts of land as wildlife sanctuaries through legislative procedures at the state or federal level. An interesting case study suggests that, in at least one case, human disturbances of habitat may actually enhance one species' survival.

The animal in question is the Texas kangaroo rat. The scientific name of this small rodent is Dipodomys elator. The Texas kangaroo rat has a body length of approximately 120 mm and a long tail ending in a white tip. Like other kangaroo rats, D. elator has long hind legs and rather short front legs (figure 1). It is active at night and has cheek pouches in which to store seeds and green vegetation for transport to its burrow or to a seed cache. These rats have short ears but expanded auditory bullae that confer excellent hearing. The belly is white and the upper parts are an ochreous color washed with black. The term "kangaroo rat" refers to the rodent's bounding mode of locomotion as it hops away, using its long tail as a balancing stabilizer.

Background

Distribution and Habitat

The Texas kangaroo rat's present-day range includes only a few counties in north-central Texas, where it has been observed in isolated populations. Historically, this kangaroo rat was reported to be from southern Oklahoma, but it is doubtful that D. elator populations are still present in that state because of changing land-use patterns. In fact, the few reported records from Oklahoma have not been confirmed by subsequent field research and collecting efforts.

At present, the counties where the Texas kangaroo rat resides are dominated by mesquite pasturelands. However, this was not always the case. Historic vegetation of the region was a mixed grass prairie. Range fires kept brushy, invading species, such as mesquite, in check. Photographs of the region taken as late as 1940, show a distinct lack of large mesquite trees. Yet there were areas known to have D. elator habitats. Mesquite quickly invaded pasturelands after the incidence of range fires declined and...
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better methods to control these blazes were developed. In the past, heavy seasonal grazing by bison and
cattle kept native bluestem, grama, and buffalo grasses short and provided buffalo wallows for the
kangaroo rats to dust bathe. Most present-day stockmen prefer lighter grazing regimes that allow grasses
to proliferate. As a result, ground cover in many areas is close to 100 percent. Additionally, many species
of grasses presently found in the area are taller invaders that have replaced the original native grasses.

Early researchers associated the Texas kangaroo rat with mesquite grasslands in the region.
Unlike most other species of kangaroo rats, the Texas kangaroo rat occurs in clay and clay-loam soils.
The range of Ord's kangaroo rat (D. ordii) overlaps that of D. elator within north-central Texas, but the two
species are ecologically separated. Ord's kangaroo rat has an edaphic preference for sandy soils within
the region, but the Texas kangaroo rat seems to shun these areas. Both species, however, require bare
patches of soil for dust bathing. Past researchers have implied that mesquite vegetation was an essential
element of D. elator's habitat. It was reported that burrow entrances were invariably found at the base of
mesquite trees.

With this symbiotic animal-plant association in mind, biologists hypothesized that destruction of
mesquite habitat would prove devastating for the Texas kangaroo rat. However, more recent results
obtained by researchers from Midwestern State University in Wichita Falls, Texas may indicate an
intriguing possibility for conservation of this monotypic species.

The Issues

The Case for Disturbance

Researchers from Midwestern State University studied two distinct habitat types within the range
of D. elator. These sites were separated by only 10 km, and land management practices were quite
different on each. One site was lightly grazed and mesquite vegetation was not actively controlled. The
second site had been subjected to prolonged, heavy grazing pressure and mesquite trees were controlled
by herbicides, hand grubbing, and selective root-plowing with heavy equipment. According to previous
hypotheses, the least disturbed habitat should have contained higher densities of D. elator.

Researchers placed a trapping grid on the lightly disturbed site and conducted a survey to
attempt collection and estimation of D. elator populations on this property. The heavily grazed site was
visually surveyed for the presence of kangaroo rat burrows. Presence of the Texas kangaroo rat was
verified by visual surveys at night utilizing a spotlight. Visual surveying was deemed applicable for the
heavily grazed site due to less dense vegetation and easy access to most areas within the pasture.
Access roads for oilfield and ranch equipment were present on both sites.

Contrary to expectations, a higher density of kangaroo rats was found on the heavily grazed site.
In fact, the only locations where D. elator was obtained on the lightly grazed property were adjacent to
access roads and cattle pens. On the heavily grazed property, the rodents occurred along roads, fences,
corrals, buildings, and old, remnant brush piles. Their burrows were also found on the margins of shallow,
eroded areas that were almost devoid of vegetation. The kangaroo rats were almost evenly distributed
throughout the heavily grazed site.

The Texas kangaroo rat seemed to opportunistically utilize disturbed areas within its habitat and
appeared to be quite capable of persistence in areas subjected to heavy, seasonal livestock pressure.
The fact that the present range of D. elator is sympatric with that of the black-tailed prairie dog (Cynomys
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ludovicianus) supports this hypothesis. Prairie dogs disturb and loosen soils through excavation activities and keep vegetation around their burrows very short. Also, prairie dogs remove brush from around their burrows to allow an unobstructed view of predators. This situation would be beneficial to the Texas kangaroo rat. Extirpation of most prairie dogs from within the range of D. elator may have negatively affected populations of the Texas kangaroo rat.

**Suggestions for Future Conservation**

With these results in mind, conservation resource managers may have to reevaluate some land management practices and disturbance regimes in order to assure conservation of the Texas kangaroo rat. Traditional wildlife management and sanctuary areas utilize only limited, or no, control measures for brush. Vegetation is usually allowed to develop into a climax state without disturbance. Any fires are immediately extinguished and livestock grazing usually is not permitted. However, these practices appear to decrease suitable habitats for the Texas kangaroo rat and other species such as the black-tailed prairie dog.

Perhaps controlled burning of habitats and some limited livestock grazing should be utilized to enhance habitats for the Texas kangaroo rat. Small roadways or paths could be constructed within habitats to provide den sites and dispersal routes for the kangaroo rats. These measures may more closely mimic the original disturbance patterns that occurred within the range of D. elator and lead to an increase in kangaroo rat populations within the area.

Indeed, habitat disturbance should not always be perceived as negative. In fact, certain types of disturbances may be crucial to the survival of some species, such as the Texas kangaroo rat. Complete conversion to cropland would most certainly be detrimental to the species, but limited disturbance may have definite benefits for this species.

**References**

**Literature**

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Websites


Key Principles

1. Habitat Management
2. Species Conservation
3. Wildlife Management
4. Sympatric Relationships
5. Human Disturbance

Ethical Considerations

1. What is the value of protecting threatened species?
2. What is obligation of federal and local governments for protecting threatened species?
3. What are the pros and cons of habitat alteration as a method of species preservation?
4. Who should bear the costs of protecting threatened species in a specific habitat?

Civic Engagement & Service Opportunities

1. Volunteer for a local community group involved in monitoring threatened species in your area.
2. Write or e-mail your local politicians about any habitat restoration or alteration projects needed in your area.
3. Form a student group having an environmental preservation mission.
4. Set up a public forum at your school discussing the pros and cons of habitat restoration in your area.

Learn more about community service as part of your educational enrichment by visiting the following websites: http://www.learnandserve.org/, http://www.servicelearning.org/.

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