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Survey of resource managers completed on monitoring and management actions for rare plants in Arizona and Nevada

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In a collaborative project with Northern Arizona University and more than 35 resource managers in Arizona and Nevada, we completed a survey of monitoring and management activities that are ongoing in these states for conserving populations of rare plants. We sent questionnaires consisting of 16 questions to as many resource managers as possible in these states and had follow-up conversations with several managers willing to share their perspective on ongoing conservation actions. The findings may be interesting for managers to see what issues and management strategies other managers in the same or different regions are grappling with. Results will be published as a chapter in a book titled "Advances in Environmental Research" slated for printing in the fourth quarter of 2010. We thank Lake Mead National Recreation Area for partial support of the project and the many resource managers who provided their valuable help with this synthesis. The abstract is shown below:

Conserving rare species is one of the major objectives for protected areas such as U.S. national parks. Arizona and Nevada are in the center of an arid region rich in biodiversity and contain a variety of national parks, wilderness areas, and other conservation areas. We surveyed resource managers of 35 protected areas in these two states by posing 16 questions about threats, monitoring, and conservation management of rare plant species. Half of the managers (51%) cited herbivory by livestock (including feral animals) or native herbivores as threatening the sustainability of rare native plant populations that are protected from wholesale habitat destruction, and 49% also cited exotic plants as problematic threats. Fifteen additional threats were identified by one or more land managers. Some type of monitoring (e.g., presence/absence, demographic) of the status of rare plants is being conducted in 69% of the protected areas, although only 34% of the managers believed that the monitoring and associated conservation measures are adequate for protecting all rare plants. Monitoring was cited as a trigger for policy, management, or additional information-gathering activities in the vast majority of cases in which it was conducted, suggesting that monitoring data were used in conservation decision-making. However, it should be noted that monitoring does not necessarily result in an understanding of the causes of any observed population change, unless experimental treatments or quasi-natural experiments are performed. A wide variety of management activities were reported for rare plants, with avoidance of habitat disturbance and fencing being the two most common activities performed (each cited by 31% of managers), followed by exotic plant treatment (20%). However, 34% of managers reported that passive management is the primary strategy used. Habitat conservation has focused on occupied habitat, as only 11% of managers reported attempts to establish spe-

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Survey of resource managers *(continued from page 1).*

cies on unoccupied but seemingly suitable habitat. With 43% of managers believing that current strategies are insufficient for protecting rare plants and over 17 threats identified, we believe the data suggest that active management (e.g., curtailing tree encroachment, artificial pollination) of rare plant populations could be practiced more widely than it is at present, were it not limited by personnel, funding availability, and

Table 1. Measures that land managers in Arizona and Nevada implemented to protect rare plant populations from threats. Data are the percent of survey respondents that listed each action.

Management action	%
Avoidance during construction	31
Constructing fences	31
Invasive plant treatment	20
Reintroduction and transplant measures	14
Closure to off-road vehicles	9
Closing area to public	6
Road closure	6
Erecting educational signs	6
Prescribed burning/fuels treatments	6
Erosion protection	6
Burro removal	6
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The citation of the upcoming chapter is as follows:

Springer, J.D., S.R. Abella, and T.R. DeKoker. 2010. A survey of monitoring and management activities for conserving rare plants in national parks and protected areas, Arizona and Nevada, USA. Edited by Daniels, J.A. Advances in environmental research, volume 8. Nova Science Publishers, Hauppauge, NY. (in press).