Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Report on Astragalus geyeri var. triquetrus (threecorner milkvetch) and Eriogonum viscidulum (sticky buckwheat) within Lake Mead National Recreation Area

August 2009

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

Bureau of Reclamation
U.S. Fish and Wildlife Service
National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

Arizona Participant Group

Arizona Department of Water Resources
Arizona Electric Power Cooperative, Inc.
Arizona Game and Fish Department
Arizona Power Authority
Central Arizona Water Conservation District
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Mohave Water Conservation District
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Other Interested Parties Participant Group

QuadState County Government Coalition
Desert Wildlife Unlimited

California Participant Group

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City of Needles
Coachella Valley Water District
Colorado River Board of California
Bard Water District
Imperial Irrigation District
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Southern Nevada Water Authority
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Conservation Participant Group

Ducks Unlimited
Lower Colorado River RC&D Area, Inc.

Lower Colorado River
Multi-Species Conservation Program

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Prepared for Lower Colorado River Multi-Species Conservation Program

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Introduction

The Lower Colorado River Multi-Species Conservation Program (MSCP) is a coordinated, comprehensive, long-term multi-agency effort to conserve and recover endangered species, and protect and maintain wildlife habitat on the lower Colorado River. The MSCP's purposes are to 1) protect the lower Colorado River environment while ensuring the certainty of existing river water and power operations, 2) address the needs of threatened and endangered wildlife under the Endangered Species Act, and 3) prevent the listing of additional species on the lower Colorado River. Two rare plant species occur within the covered areas designated in the MSCP, *Eriogonum viscidulum* and *Astragalus geyeri* var. *triquetrus*. This report was prepared to update the status of these rare plant species and provide insight to future research and monitoring efforts planned by the National Park Service (NPS).

Pilot studies were implemented in the spring of 2007 for *Eriogonum viscidulum* and *Astragalus geyeri* var. *triquetrus*. All newly implemented protocols included randomization in positioning sampling units as well as good interspersion of sampling units throughout the population.

Eriogonum viscidulum (Sticky buckwheat)

Eriogonum viscidulum (sticky buckwheat) is an annual plant endemic to Clark and Lincoln counties in southern Nevada and Mojave County in northwestern Arizona (Howell 1942). The northern- and eastern-most distributions of this rare species are found at Sand Hollow Wash in Lincoln County and just across the state border at Coon Creek in Mojave County. Sticky buckwheat reaches its southern and western extensions in Nevada at Middle Point within the Lake Mead National Recreation Area and Weiser Wash on Bureau of Land Management land (BLM), respectively (Niles et al. 1995). Sticky buckwheat is on the Nevada Natural Heritage Programs Sensitive List (ranks G2 S2, defined as imperiled), is a covered species on the Clark County Multiple Species Habitat Conservation Plan, and has status as a critically endangered species in the state of Nevada.

2007 Pilot Year Monitoring

Select sticky buckwheat populations (Lime Wash and Overton Arm; these are the only two populations where a current status of the population is known) will be monitored annually. Historical populations will be checked in high rainfall years to re-evaluate their status and possibly add additional sites for annual monitoring. Prior monitoring was conducted to determine the species distribution, abundance, and potential threats, and when necessary, take appropriate actions to protect the habitat of this species (Table 1).

Data collected from the 2007 pilot study included associated plant species, cover estimates of all plant species occurring within plots, threats, disturbance (type, amount, possible cause), and number of sticky buckwheat plants and their specific locations.

Data were entered into an Excel database; in addition, frequency, species richness, and relative cover analyses were performed (Figures 1-4, Table 2). The data show that exotic plant species occur more frequently within the monitored areas and suggest that as relative cover of exotics increases, natives including *Eriogonum viscidulum* decrease. Consecutive years of data will provide better information and more detailed analyses.

The results of the pilot year study suggested that modification to the monitoring methods was necessary to get more precise and accurate data in addition to higher statistical power. Modified research and monitoring protocols have been developed and will be implemented in 2008.

Cattle Exclosure Study

Beginning in 2005, trespass cattle were observed at the Overton Arm populations of *Eriogonum viscidulum* (Bangle 2005). Prior to this, only burros were recorded in this area and listed as a potential threat (grazing and trampling). In 2005 (a high rainfall year), the cattle did not appear to be grazing on *Eriogonum viscidulum* as there was plenty of other vegetation including *Schismus arabicus* (Arabian grass), which was apparently the cattle's first choice for grazing. There was evidence of trampling *Eriogonum viscidulum*, which was seemingly inevitable as the cattle's paths crossed *Eriogonum viscidulum* populations on their way to the shoreline. In 2006 (with significantly less rainfall than 2005), there was evidence of grazing in addition to trampling. Little to no Arabian grass germinated in 2006, which left the plants that did germinate (including *Eriogonum viscidulum*) vulnerable to grazing. We observed several areas where grazing of *Eriogonum viscidulum* had occurred near cattle paths. Most grazed *Eriogonum viscidulum* plants were chewed significantly (flowering canopy chewed partially or completely) possibly affecting the future seed bank of this species. This led to a concern that the newly established presence of trespass cattle could be a significant threat to this delicate rare plant population.

A preliminary study was conducted in 2007 to evaluate the cattle's effects on Overton Arm *Eriogonum viscidulum* populations. Six (5 by 5 meter) cattle exclosures and six (5 by 5 meter) control plots were constructed at Cattle Cove near Glory Hole. All plots were monitored at least one time per week while *E. viscidulum* was flowering. Evidence of cattle presence was defined as the presence of cattle, cattle tracks, cattle feces, herbivory, or vegetation trampling. Results of this particular study showed no significant difference in herbivory between the exclosures and paired control plots.

Additional research on cattle grazing in rare plant habitat along the Overton Arm portion of Lake Mead is recommended, including a modified experimental design to better capture cattle movement, grazing preferences, and to determine whether a threat to *Eriogonum viscidulum* populations from trespass cattle exists.

Astragalus geyeri var. *triquetrus* (Threecorner milkvetch)

2007 Pilot Year Monitoring

Monitoring plots were randomly (stratified) placed in key areas on the dunes at Sandy Cove in historically high density threecorner milkvetch areas. Quadrats (5 by 5 meters) were laid within the grid and data collected included presence/absence of threecorner milkvetch for spatial patterning, plant species composition, an estimate of cover for each species, disturbance, threats, and target species counts and specific locations.

Data from the 2007 pilot study were entered into an Excel database and preliminary analyses were complete (Figures 5, 6, Tables 3, 4). Data show that within the study area, native species have higher cover than exotic species. Consecutive years of data will provide better information and more detailed analyses.

Habitat monitoring in select years is recommended for tracking changes in sand dune stabilization by invasive species such as *Schismus arabicus, S. barbatus*, *Brassica tournefortii*, and *Salsola tragus*. Habitat monitoring could also include monitoring sand movement on the dunes.

The results of the pilot year study suggested that modification to the monitoring methods was necessary to get more precise and accurate data in addition to higher statistical power. Modified research and monitoring protocols have been developed and will be implemented in 2008.

Literature Cited

Bangle, D. 2005. Report on *Astragalus geyeri* var. *triquetrus* (threecorner milkvetch) monitoring (2000-2005) within Lake Mead National Recreation Area. Unpublished report to Clark County Multiple Species Habitat Conservation Plan from the National Park Service, Lake Mead National Recreation Area. Boulder City, NV. 24 pages.

Bangle, D. 2005. Report on *Eriogonum viscidulum* (Sticky buckwheat) monitoring (1997-2005) within Lake Mead National Recreation Area. Unpublished report to Clark County Multiple Species Habitat Conservation Plan from the National Park Service, Lake Mead National Recreation Area. Boulder City, NV. 27 pages.

Bangle, D. 2007. Monitoring protocols for *Eriogonum viscidulum* in Clark County, NV, 2005-NPS-535-P. 6 pages.

Bangle, D. 2007. Monitoring protocols for *Astragalus geyeri* var. *triquetrus* in Clark County, NV, 2005-NPS-535-P. 6 pages.

Figure 1. Number of plant species in each of five frequency classes based on percentages of 100 1-m^2 plots. These patterns suggest that within these communities a few species are dominant, whereas most species are uncommon to rare. The dominant species in all three plots was the exotic species *Schismus arabicus,* occurring in 74%, 93%, and 90% of plots monitored (respectively). The rare plant *Eriogonum viscidulum* occurred in 10%, 12%, and 33% of plots monitored (respectively).

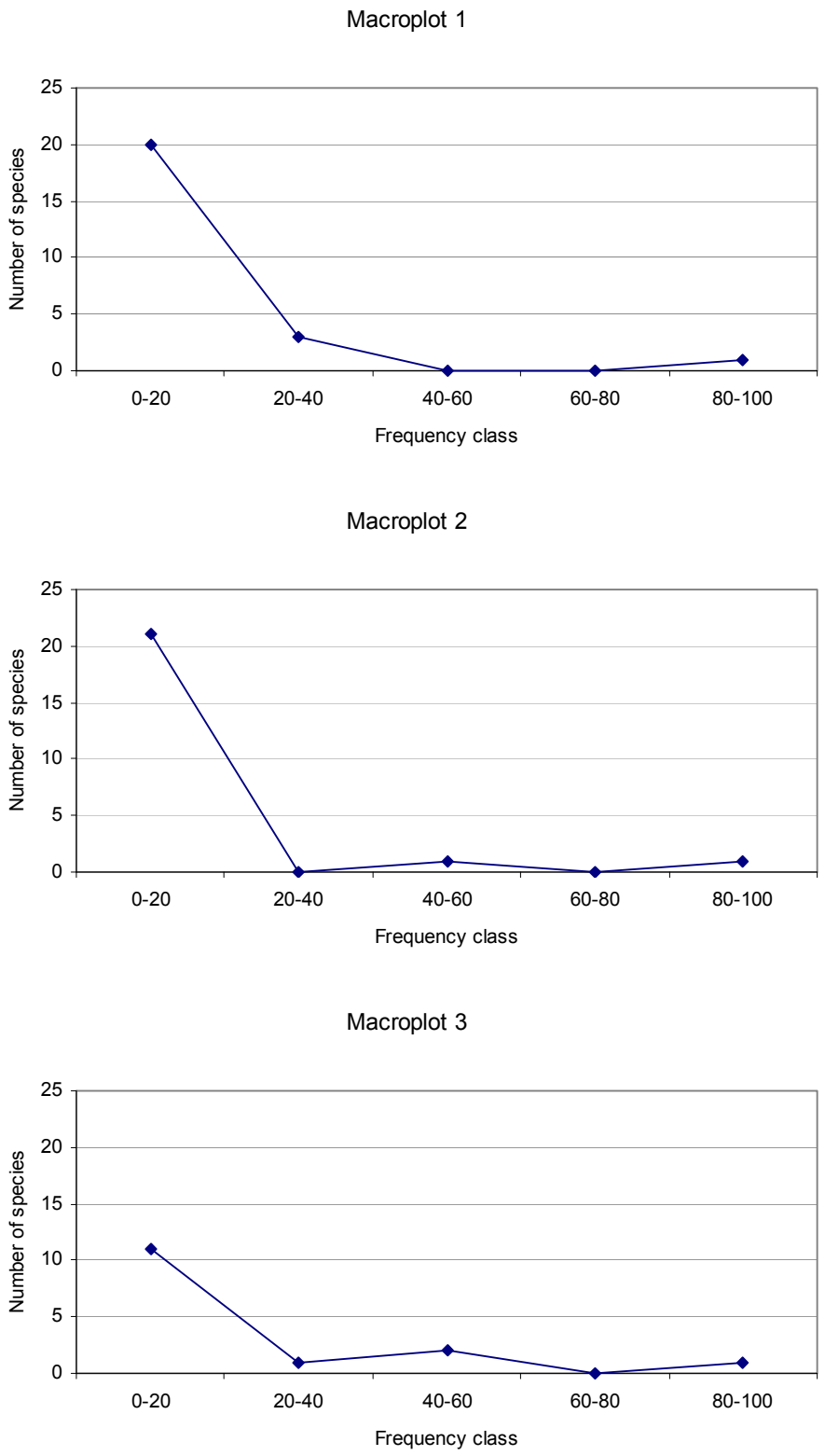

Figure 2. Relative frequency of natives versus exotic species at each of three monitoring sites. Data are shown as percentages of 100 1-m^2 plots.

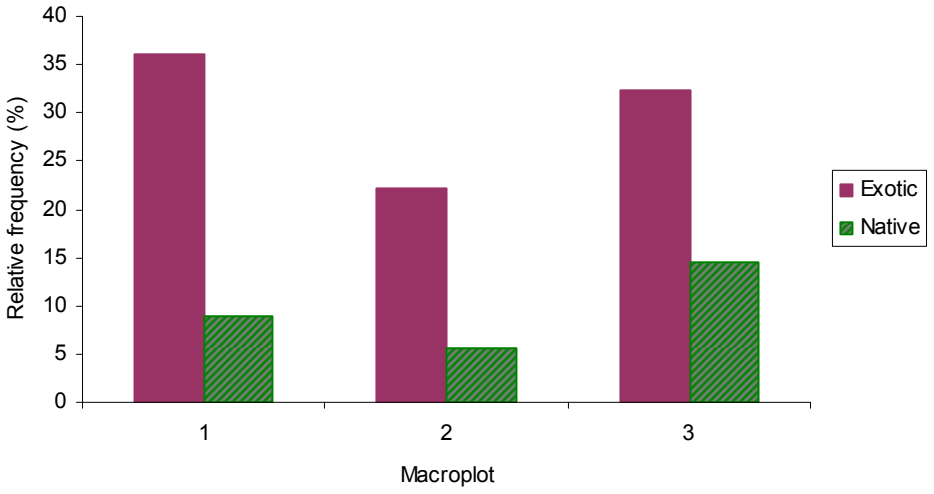

Figure 3. Relative cover of natives, exotics, and *Eriogonum viscidulum.* Data are presented as a percent of total per macroplot.

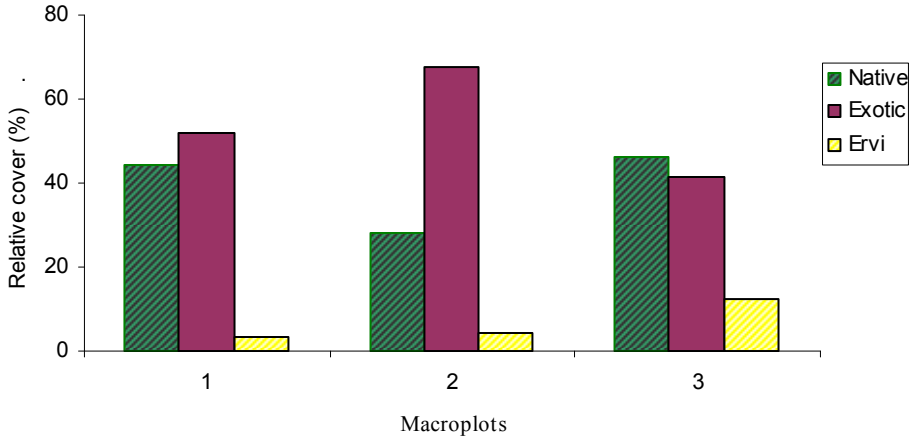

Figure 4. Distribution of *Eriogonum viscidulum* along each of five transects within Macroplot 3. Distribution pattern supports previous observations that this species re-populates over time from plants occurring above high water down to exposed sandy areas towards the shoreline.

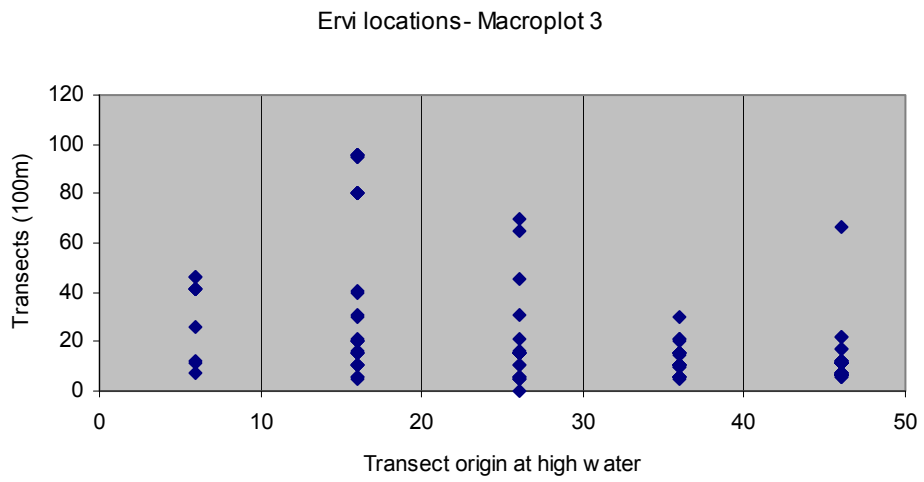

Table 1. Number of *Eriogonum viscidulum* (sticky buckwheat) plants surveyed at four sites on the Lake Mead National Recreation Area between 1991 and 2005. No surveys were planned for 1996. Dashes in other years indicate no surveys were conducted. No surveys were conducted at any site in 2002 because of severe drought. Survey methods may have varied. The survey in 1991 was conducted by Knight (1992). The surveys in 1995 were conducted by Niles et al. (1995) as part of the regional inventory. Methods also have differed between surveys conducted during the period of 1997–2007. *2007 marked the first year of a pilot study and was not a total area survey like previous survey years.

	Number of Plants per Site Surveyed			
Year	Lime Cove	Glory Hole	Kline Hole	Overton Beach Road
1991	350-600	-	-	-
1995	11,000	1,000	1,500	-
1997	1,500	500	3,000	200
1998	-	-	-	100
1999	25	-	21	180
2000	23	-	60	100
2001	-	-	-	150
2002	-	-	-	-
2003	1,420	100	100	440
2004	2,850	630	-	-
2005	9,866	678	496	101
2006		839		65
2007*		191		125

Table 2. Species richness at three *Eriogonum viscidulum* monitoring sites. Data are presented at plot, transect, and site levels.

AREA	ha (m^2)	MACROPLOT 1	MACROPLOT 2	MACROPLOT 3
Plot	0.0001 (1-m^2)	3	2	3
Transect	0.04 (400 m^2)	15	10	10
Site	1 (10,000 m^2)	24	24	15

Figure 5. Relative cover of natives, exotics, and *Astragalus geyeri var. triquetrus.* Data are presented as a percent of total across all eight grids at Sandy Cove.

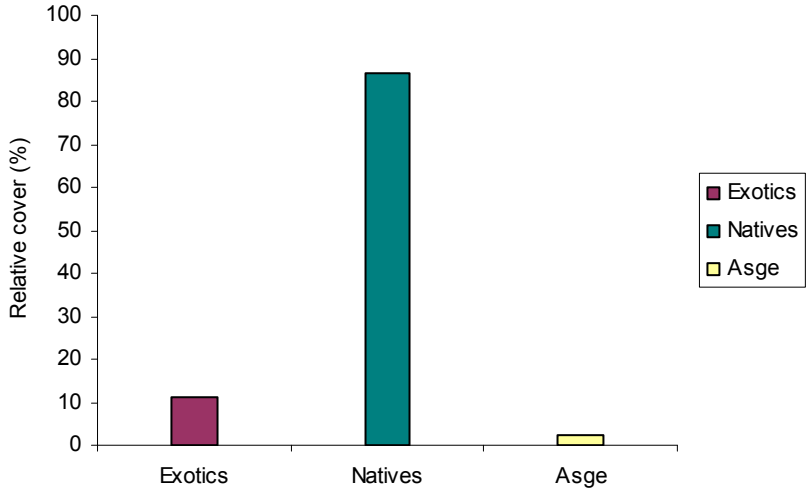

Figure 6. Distribution map for *Astragalus geyeri var. triquetrus* showing slight clumping. Data shown are from Grid 6 (400m^2 area).

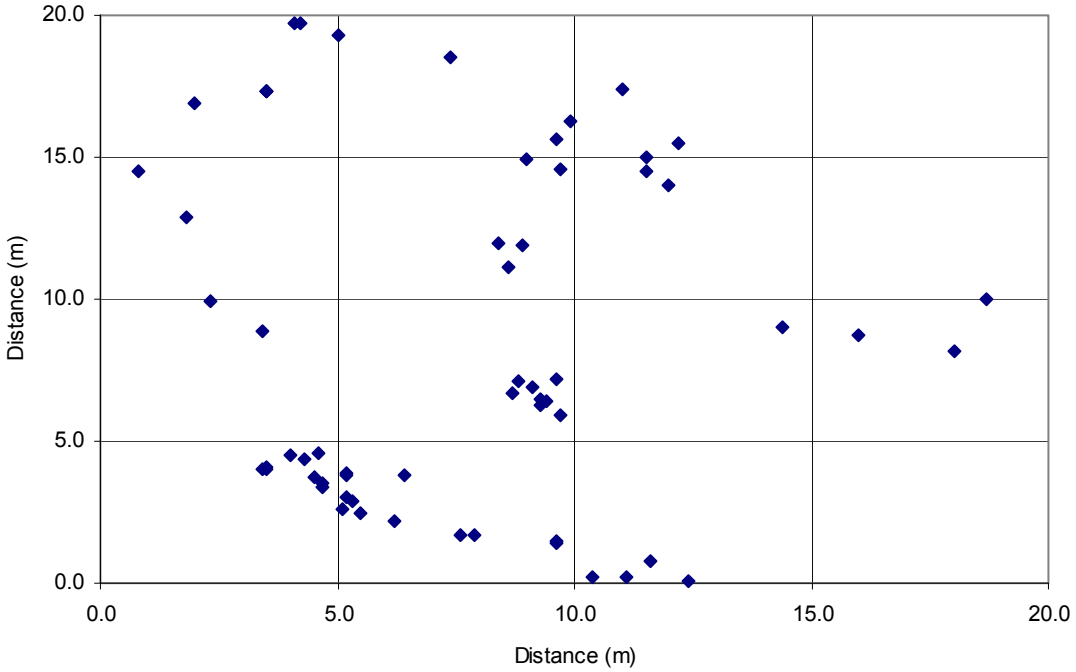

Table 3. Species richness within *Astragalus geyeri* var. *triquetrus* monitoring plots on Sandy Cove. Data are presented at cell, grid, and site level.

	Area (ha) m2	1	2	3	4	5	6	7	8
Cell	0.0025 (25m^2)	14	8	7	6	9	10	7	7
Grid	0.04 (400m^2)	33	22	26	19	27	24	21	19
Site	0.32 (3200m^2)				72				

Table 4. Number of plants for each surveyed year is recorded from Sandy Cove. Dashes indicate no survey conducted. * 2007 marked the first year of a pilot study and was not a total area survey like previous survey years.

Survey Year	Plants Counted
1995	1,500
1996	-
1997	83
1998	131
1999	-
2000	1,473
2001	2,898
2002	0
2003	134
2004	998
2005	8,035
2006	75
2007*	108