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Lake Mead National Recreation Area Vegetation Monitoring and Analysis: Quarterly Progress Report, Period Ending March 31, 2007

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QUARTERLY PROGRESS REPORT

University of Nevada, Las Vegas
Period Ending March 31, 2007

Cooperative Agreement Number H8R07060001
Task Agreement Number J8R07060011
Lake Mead National Recreation Area
Vegetation Monitoring and Analysis

Executive Summary

- Weed Sentry staff surveyed for exotic species on 208 miles of roads on NPS land and on 61 miles of BLM land. Due to sparse precipitation this winter, exotic species are much less abundant this year compared to last year at this time.
- Other exotic species projects initiated this quarter included an assessment of invasion patterns below native shrubs for early detection of potential invasion “hotspots,” and a community invasibility experiment established near the NPS nursery with substantial involvement from NPS ATR Ms. Alice Newton.
- A manuscript detailing several experiments with the invasive species Sahara mustard was submitted for peer review to the journal Western North American Naturalist.
- Two synergistic projects undertaken this quarter at the request of NPS ATRs included a barrel cactus reassessment and a monitoring study of vegetation manipulations at two springs. Another synergistic project entailed several plant salvages in the Las Vegas Valley to generate plant material for experiments at Lake Mead and on BLM land. This project was partly coordinated by, and had substantial involvement, from NPS ATR Ms. Newton.
- An internet publication on transplant survival of globe mallow was published on the Native Plant Network.

Program Activities

The task agreement was awarded to UNLV on October 1, 2006. For the quarter ending March 31, 2007, the following activities have occurred toward meeting or exceeding deliverables in the statement of work.

Invasive Plant Monitoring and Analysis

A. Mapping and Treatment: National Park Service Holdings

This quarter, Weed Sentry staff surveyed 208 miles, covering 1409 acres. Six exotic species totaling almost 5000 plants were treated this quarter (Table 1). Approved roads treated this quarter included 9, 20, 28, 32, 34, 36, 36a, 36b, 39, 40, 41, 55, 56, 57, 61, 70, 70c, 86, 89, 90, 91, 97, 103, 108, 134, 135, Lakeshore Drive, Old Lakeshore Road and Northshore Road. General areas treated included Nelson Wash, Lake Mead Shoreline, and Lake Mojave Shoreline.

Table 1. Exotic plants treated by Weed Sentry this quarter on National Park Service land.

| Species | Number of plants |
|---|-------------------------|
| <i>Brassica tournefortii</i> (Sahara mustard) | 3578 |
| <i>Malcomia africana</i> (African Mustard) | 5 |
| <i>Nerium oleander</i> (Oleander) | 1 |
| <i>Pennisetum setaceum</i> (Fountain Grass) | 159 |
| <i>Sisymbrium irio</i> (London Rocket) | 1214 |
| <i>Washingtonia filifera</i> (Fan Palm) | 1 |
| Total | 4958 |

B. Mapping and Treatment: Bureau of Land Management Holdings

A total of 61 miles covering 489 acres was surveyed this quarter. BLM holdings were divided up into five regions. One region is surveyed per year, but more intensively, based on recommendations by BLM weed specialists. There were no treatments performed during this quarter on BLM land.

The roads surveyed on BLM land were grouped into three general areas.

1. Roads east of US 95 (Christmas Tree Pass and Eldorado Barrow Pit Road)
2. Roads southeast of Searchlight (Castle Mountain Road, Clarks Well Road, Walking Box Ranch Road and Walking Box Ranch 2).
3. Roads near Temple Bar (AR 134)

C. Aquatic Monitoring

While surveying shorelines of Lakes Mead and Mohave, shoreline invasives were not found.

D. Crews Treating Sahara Mustard: National Park Service

Weed Sentry staff provided six days of guidance to Sahara mustard control crews. The crews used in controlling Sahara mustard were the Nevada Conservation Corp (NCC) and American Conservation Experience (ACE).

E. Other Invasive Species Projects

Plants within an experiment initiated last quarter to examine the competition of purple three-awn and Sahara mustard were harvested. It is expected that data processing and analysis on this project will be conducted next quarter. An additional study examining the competition of desert trumpet and Sahara mustard was initiated.

Research assistant Jill Craig submitted a permit to the National Park Service on February 13, 2007 to study the relationships of dominant native plant species microsites to invasive plant species. This study will be instrumental in determining whether certain native species are stronger facilitators of weed invasion than others. Vegetation within a 50 meter-square area of three study sites was mapped. Initial vegetation sampling on two of the three study sites was conducted in late February, with a second

vegetation collection planned for April. Samples collected during the first clip were processed, and analysis is expected to begin during the next quarter.

As described last quarter, a manuscript is in progress for a project relating the distributions of exotic species in the Weed Sentry database to the Clark County soil survey. This manuscript is co-authored by several members of the Weed Sentry staff.

F. Training/Professional Development

First Aid and CPR training were attended by Ms. Carrie Nazarchyk and Ms. Jessica Spencer on December 18, 2006 (not reported in last quarter's report). Ms. Craig attended CPR and Basic First Aid Training on February 20, 2007. Ms. Craig and Cayenne Engle attended a Watercraft Inspection and Decontamination class which discussed the current threat of Quagga Mussels within Lake Mead NRA on March 2, 2007. Ms. Spencer attended this class on February 28, 2007, as well as boat night navigation training on January 25, 2007. Ms. Craig also attended the NPS Motorboat Operator Certification Course during the week of March 12-16, 2007. Ms. Engel completed Online Federal Information Systems Security Awareness Training on March 5, 2007. Ms. Spencer attended the Biological Soil Crusts Ecology and Management class at Lake Mead on March 13-15, 2007. PI Dr. Scott Abella attended the UNLV workshop "Publish and Flourish" in January this quarter.

G. Agency Meetings Attended

- Resource Management Staff Meeting, January 8, 2007 — attended by Ms. Engel, Ms. Spencer, and Dr. Abella.
- Resource Management Staff Meeting, February 5, 2007 — attended by Ms. Nazarchyk, Ms. Spencer, Ms. Engel, Ms. Craig, and Dr. Abella.
- Resource Management Staff Meeting, March 5, 2007 — attended by Ms. Engel.
- Southern Nevada Restoration Team (SNRT), January 18, 2007 — attended by Ms. Nazarchyk.

Sahara Mustard Research

Research assistant Dianne Bangle has submitted a manuscript for review to the peer-reviewed journal Western North American Naturalist. The title for this manuscript is: "Seed germination in the Mojave Desert invasive plant *Brassica tournefortii* (Sahara mustard)."

Ms. Bangle completed one and has nearly completed two additional *B. tournefortii* experiments (seedpod/resource filling; effectiveness of herbicide on seed development; rosette reburial in sand dune habitat) and started a fourth experiment, which is currently underway (self-pollinating study). A fifth experiment (seed burial/longevity) will begin next quarter as soon as seed from 2007 cohort matures. *Brassica* seeds have been collected (2006 cohort) for a sixth experiment (within population plant size differences) of which the nursery portion will begin after conclusion of self-pollination study.

Rare Plant Monitoring and Analysis

A. *Rare Plant Literature Reviews and Distributions*

Ms. Bangle has completed species status reports, summarizing collection history and distribution, for 11 covered or watch species, as detailed in the 9/30/2006 close-out report. Summarizing these distributions to produce a Geographic Information Systems (GIS) habitat map is ongoing.

B. *Monitoring*

Two, 1-ha plots were sampled in gypsum habitat for monitoring Las Vegas bearpoppy and sticky ringstem population sizes and communities occupying the sites. Monitoring will continue to occur this growing season for the target species. On March 22, we discussed monitoring methods with NPS ATR Ms. Alice Newton that meet new Clark County requirements and NPS information needs. These methods are expected to be implemented this spring and summer during appropriate phenologic time periods for the target species.

At the request of NPS managers, additional monitoring also was conducted this quarter. A second survey of the Overton Powerline Road was conducted with John Walsh (compliance specialist). The purpose of an additional survey was to assess the project after staking was completed in order to evaluate any specific potential damage or destruction of rare plants and rare plant habitat. Data were also gathered on several uncommon plant species (in addition to several rare plant individuals) likely to be destroyed with intentions of coordinating efforts with Lake Mead nursery staff for plant salvage or at minimal seed collection before construction begins.

Ms. Bangle, Ms. Spencer, and two NPS employees conducted a survey at sticky buckwheat sites along the Overton Arm of Lake Mead. The purpose of the survey was to locate potential sites for a fencing project designed to prevent cattle from accessing high density sticky buckwheat areas with hopes of detouring cattle to coves that are not known to support sticky buckwheat.

In addition, *Brassica tournefortii* was re-located at the Overton Arm rare plant site which supports the rare plant *Eriogonum viscidulum* (sticky buckwheat). All *B. tournefortii* plants found within the initial infestation area were removed totaling 3,059 plants. Additional surveys were conducted throughout *E. viscidulum* habitat and five additional *B. tournefortii* infestations were mapped. This information was passed on to Ms. Nazarchyk (Research Assistant, Weed Sentry program) and a weed crew was sent to the site where an additional 19,265 plants were removed. (Surveys and initial weed removal were conducted by Research Assistants Dianne Bangle and Jessica Spencer).

Weather station data were collected at 6 Las Vegas bearpoppy sites by Ms. Spencer and Ms. Bangle. Ms. Bangle met with NPS data managers for instruction on the recently completed weather database.

A draft version of data-sharing protocols for rare plants and animals within Lake Mead NRA was written by GIS staff with assistance from Ms. Bangle and NPS wildlife staff this quarter.

C. *Herbarium*

This quarter, 18 plants were keyed and prepared for processing from old holdings of plant material. Plants were keyed as necessary for all vegetation programs including Exotic Plant Management Team, Weed Sentry, Nursery, and Botany.

A new updated version of the Lake Mead Vascular Plant Checklist was created and printed this quarter. A common and scientific name index has been added to this version as well as corrections of identification of several plants to the subspecies or variety level. Work has begun on a future version of the checklist to add flower color as well as continuing the process of correctly identifying plants to subspecies and variety levels where necessary. Checklists are currently being distributed.

D. Rare Plant Graduate Student Research

An initial student hired to work on this deliverable has not worked out, and we will be hiring another student to conduct this project and meet this deliverable.

E. Rare Plant Presentations Delivered

This quarter, Ms. Bangle was invited to present summary information about two of our rare plant covered species, sticky buckwheat and threecorner milkvetch, at the Lower Colorado River Terrestrial and Riparian Biology Meeting on January 24, 2007. The submitted abstract is below:

STATUS ASSESSMENT OF STICKY BUCKWHEAT AND THREE-CORNER MILKVETCH
WITHIN LAKE MEAD NRA

Eriogonum viscidulum (sticky buckwheat) and Astragalus geyeri var. triquetrus (threecorner milkvetch) are rare, sand loving, annual plants endemic to Clark and Lincoln Counties in southern Nevada and Mojave County in northwestern Arizona. Both species are listed on the Nevada Natural Heritage Programs Sensitive List (ranks G2 S2-defined as imperiled), are MSHCP covered species, and have status as critically endangered plants in the state of Nevada.

Threecorner milkvetch along with sticky buckwheat have a geographic distribution associated with a sedimentary deposit called the Muddy Creek Formation (Niles et al. 1995). This formation is widely exposed in the hills along the Overton Arm, Virgin Basin, and Boulder Basin sections of LMNRA and extends northward along the Virgin River valley and westward along the Muddy River and Meadow Valley Wash. Sticky buckwheat and threecorner milkvetch populations have been monitored within LMNRA since 1997 and 2000 respectively. This work was conducted to determine the species distribution, abundance, and potential threats, and if necessary to take appropriate actions to protect the habitat of this species.

F. Training/Professional Development

Research assistant Dianne Bangle attended the Motorboat Operator Certification Course (MOCC) held from March 12-16, 2007. This course enables individuals (for work related purposes) to operate watercraft for the National Park Service, Department of the Interior. Ms. Bangle received informal training on decontamination procedures for NPS boats that may transport Quagga mussels from contaminated areas to uncontaminated areas and subsequently decontaminated two NPS boats.

Ms. Bangle is currently enrolled in a 3-credit UNLV graduate course in Restoration Ecology (BIO 730A).

Additionally, Ms. Bangle attended the Lower Colorado River Terrestrial and Riparian Biology Meeting on January 24, 2007. The meeting focused on past, present, and future research concerning biota that occur along the Lower Colorado River.

G. Agency Meetings Attended

- Resource Management Staff Meeting: Dianne Bangle attended all RM staff meetings this quarter. Dates: January 8, 2007; February 5, 2007; March 5, 2007.
- Public Lands Institute Vegetation Division staff meeting: Dianne Bangle attended both PLI meetings held this quarter. Dates: January 10, 2007; February 5, 2007.
- BLM, USFS, and FWS (one meeting): Date: January 16, 2007. The purpose of this meeting was to discuss future volunteer weed removal projects on agency land both in and around rare plant habitat.

Technical Assistance/Synergistic Work

A. Barrel cacti survey follow-up

Upon request by ATR Ms. Alice Newton, Research Assistant Jill Craig initiated follow-up surveys of barrel cacti that had been PIT tagged in 2000. It is expected that a small portion of cacti will be resampled this quarter, with a comprehensive follow-up conducted during the Fall Quarter. Ms. Newton will use these data for an upcoming presentation at a conference in St. George, UT. This project involves substantial involvement from the NPS ATR, as she implemented the original study and directed fieldwork in the current re-assessment.

B. Plant Salvage

With substantial involvement from NPS ATR Ms. Alice Newton in the form of directly participating in methods, organization of personnel, and coordinating the NPS nursery, plant salvages were conducted February 9, 19, and March 4 in the Las Vegas Valley. These native plants have already been used in an invasibility experiment initiated at the NPS nursery and in a desert burn revegetation near Goodsprings.

C. Community Invasibility Experiment

In a joint PLI-NPS-UNLV School of Life Science project on February 23, 13 students in BIO 420x (Restoration Ecology) established plants needed for a community invasibility experiment at the NPS nursery. This experiment was coordinated by PI Dr. Abella and NPS ATR Ms. Newton. These students also conducted work at the NPS nursery on a project led by NPS nursery manager John Roberts.

D. Desert Burn Revegetation

With substantial involvement from NPS ATR Ms. Alice Newton and NPS disturbance manager Ms. Michelle Zuro, who coordinated activities and provided guidance on project set up, we finished planting and set up for a desert burn revegetation experiment near Goodsprings, NV. This work involved volunteers from a UNLV Restoration Ecology class, and was a joint project supported by PLI, NPS, BLM, and UNLV School of Life Sciences. A total of 280 plants, 140 driwater, and 140 plant shelters were installed in March at the experimental site.

E. *Springs Rana onca habitat restoration project (Jef Jaeger, PI)*

At the request of NPS ATRs Mr. Kent Turner and Ms. Alice Newton, as well as wildlife PI Dr. Jef Jaeger, we established plant community monitoring plots and protocol to investigate the response of plant community composition to vegetation removal at Rogers Spring and Blue Point Spring. The vegetation removal was conducted in an effort to create better habitat for the relict leopard frog (*Rana onca*). We participated in all aspects of the vegetation manipulation including placement of plot locations, pre-treatment data collection, participating in and oversight of the physical vegetation removal, and we are currently planning for the ongoing monitoring (approximately 4 times annually) of these plots. We established 148 0.5m² plots (60 at Blue Point Spring, 88 at lower Rogers Spring) for plant community monitoring. Within each of these plots we monitored for plant species composition Jan 30-31, 2007. We then clipped and collected the plant biomass Feb 2-3 and 6, 2007. Biomass samples are currently being weighed and data entered at UNLV with the help of two research assistants under the guidance of Dr. Jaeger. We will continue monitoring the response of the plant communities including species abundance and rate of regrowth, with emphasis on encroachment of any exotic species.

F. *Invited Presentation*

Dr. Abella gave the presentation titled “A Systematic Review of Burro and Wild Horse Grazing Effects on Vegetation of the Mojave Desert and Surrounding Regions: on February 15, 2007 at the Society for Management’s symposium in Reno, NV. This symposium was titled: “Ecology and Management of Wild and Non-Native Equids.” Dr. Abella then subsequently presented the findings to NPS managers to support efforts to implement grazing monitoring at Lake Mead.

Papers Published/Submitted

Four papers that were previously submitted during prior work were published this quarter:

- Abella, S.R., and B.W. Zimmer. 2007. Estimating organic carbon from loss-on-ignition in northern Arizona forest soils. *Soil Science Society of America Journal* 71:545-550.
- MacDonald, N.W., B.T. Scull, and S.R. Abella. 2007. Mid-spring burning reduces spotted knapweed and increases native grasses during a Michigan experimental grassland establishment. *Restoration Ecology* 15:118-128.
- Laughlin, D.C., S.R. Abella, W.W. Covington, and J.B. Grace. 2007. Species richness and soil properties in *Pinus ponderosa* forests: a structural equation modeling analysis. *Journal of Vegetation Science* 18:231-242.
- Abella, S.R., J.F. Jaeger, and T.A. Schetter. 2007. Public land acquisition and ecological restoration: an example from northwest Ohio’s Oak Openings region. *Natural Areas Journal* 27:92-97.

An internet publication documenting a plant salvage that has occurred this quarter also was published online this quarter:

- Abella, S.R. 2007. Propagation protocol for vegetative production of container *Sphaeralcea ambigua* Gray plants (1 gallon container). In: Native Plant Network. URL: <http://www.nativeplantnetwork.org> University of Idaho, College of Natural Resources, Forest Research Nursery, Moscow, ID.

The above publication deals with plants housed on Dr. Abella's porch. It is desired to fully integrate this work with the NPS nursery, where many other salvaged plants are being housed.

The following manuscripts were submitted or revised:

Engel, E.C. and J.F. Weltzin. Can community composition be predicted from pairwise species interactions? Revised manuscript submitted to Plant Ecology on Mar 5, 2007.
Bangle, D.N., L.R. Walker, and L. Powell. Seed germination in the Mojave Desert invasive plant *Brassica tournefortii* (Sahara mustard). Submitted to Western North American Naturalist.

The Bangle et al. manuscript reports on the results of several Sahara mustard research projects that were Task Agreement deliverables.

Submitted by:

A black rectangular box redacting the signature of the Principal Investigator.

Margaret N. Rees, Principal Investigator

03/31/2007

Date