

**Award Number:** P14AC01013

**Project Number**: UNM-104

**CFDA #:** 15.945

**Park/NPS Unit:** CAVE

**Title of Project:** Monitoring Sensitive Vegetation after the Loop Fire: Tracking Curlyleaf Muhly Grassland Recovery

**Administered through the:**  Colorado Plateau Cooperative Ecosystem Studies Unit Cooperative Agreement Number H1200-09-0005

**CESU Partner:** The Regents ofUniversity of New Mexico for Natural Heritage New Mexico

**PROJECT CONTACTS:**

**Principal Investigator:** Esteban Muldavin, Division Leader and Ecology Coordinator, UNM, Natural Heritage New Mexico, UNM Biology Dept., MSC03 2020, 1 University of New Mexico, Albuquerque NM 87131-0001, 505-277-3822 ext. 228, 505-277-3844, muldavin@unm.edu

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**NPS Certified ATR:** Renee West, Supervisory Biologist, 3225 National Parks Hwy, Carlsbad NM, 88220, 575-785-3099, Fax 575-785-2317, renee\_west@nps.gov

**FUNDING INFORMATION:**

**Amount Funded:** $18,000

**NPS Account Numbers (amounts in parentheses):**

Fund - 14XP112585

Fund Center - PPIMGUMOF0

Functional Area - PF320BR85.RM0000

WBS - PF.FBF4YK014.00.1

**Fund Source (e.g., ONPS, FLREA, CRPP, CESU, etc.):** Fire (BAR)

NPS Funding

Is this funded using a reimbursable account number? If yes, IMR contracting needs a copy of the Interagency Agreement.

**PROJECT DATES:**

**Start Date:** August 15, 2014

**End Date:** April 30, 2015

**NPS Administrative Contacts**

**Interim CESU Coordinator:**  Todd Chaudhry, National Park Service/CPCESU, NAU, P.O. Box 5765, Flagstaff, AZ 86011, 928-523-6638, Fax: 928-523-2014; todd\_chaudhry@nps.gov

**Intermountain Region Administrative Contact:** Kelly Adams, Grants and Agreements Specialist, National Park Service, 12795 West Alameda Pkwy, Lakewood, CO 80228 Phone: 303-969-2303 Fax: 303-969-2992 Email: Kelly\_adams@nps.gov

**FEDERAL FINANCIAL REPORTS AND DRAWDOWN SCHEDULE:**

***Federal Financial Reports*** (Check as required for project based on spending plan, period of performance, risk, cooperator history, etc.)

{ } Quarterly {x} Semi-annually { } Annually {x} Final

**Project SCHEDULE AND TECHNICAL REPORT DEADLINES:**

List all technical reports and products in sequential order as required in the scope (more lines and milestones can be added as needed):

*Project Start Date* – August 15, 2014

*Technical progress reports –* { } Quarterly { } Semi-annually {x} Annually

(Check as needed from PI to monitor progress of specific project. Content should be addressed in the scope.)  
  
*Investigator’s Annual Report (IAR)* – March 31, 2015

*Database, Collections/Specimens, Archives, and Maps provided to the NPS ATR or Technical Expert* – April 30, 2015

*Draft Final Report* – March 15, 2015

*Final Report* – April 15, 2015

*Project End Date* – April 30, 2015

*Final SF425 FFR* must be submitted within 90 days of project end date

**PAYMENTS**

**CFR PART 215.22*:*** Cash advance (drawdown) to recipient organization shall be limited to the minimum amounts needed and be timed to be in accordance with the actual immediate cash requirements of the recipient organization in carrying out the purpose of the approved program or project. The timing and amount of cash advances shall be as close as is administratively feasible to the actual disbursements by the recipient organization for direct program or project costs and the proportionate share of any allowable indirect costs.

**CESU REQUIRED PRODUCTS (may be different from those products required by the ATR – See Statement of Work for Products required by the NPS unit):**

The Principal Investigator will prepare a brief report abstract suitable for public distribution and two hard copies and an electronic version (in PDF file format) of the final report and mail all toTodd Chaudhry, National Park Service, CPCESU, NAU P.O. Box 5765, Flagstaff, AZ 86011. Please be sure to include the project number (e.g.; NAU-###, UMT-###, UAZDS-###) and the P number on the cover page of the final report.

**PROJECT ABSTRACT:**

CAVE Loop Fire post-fire vegetation monitoring in 2012 and 2013 identified clear fire effects patterns, particularly with respect to the native dominant grass Muhlenbergia setifolia and on several native shrubs. We propose to build on the previous two years of work and increase the robustness of the monitoring grid by adding six to eight plots with an emphasis on the burned sites and adding more detailed measurement on all the plots of key shrub and herbaceous species in order track the growth and demography of individuals through time. The outcome will be a detailed stand-alone report to the park with associated data and monitoring photographs.

**Scope of Work:**

The 2011 CAVE Loop Fire burned a large portion of foothill desert grassland dominated by curlyleaf muhly (Muhlenbergia setifolia), an uncommon semi-desert grassland type in the Southwest, one that has the center of its known distribution on CAVE. Following the fire, there was little summer rainfall, and the 24 months between April 2011 and April 2013 have been the driest on record in southeast New Mexico. In the dry summer that followed the fire, there was anecdotal evidence that the combination of fire and drought was contributing to significant grass die-off within the park. This was confirmed in 2012 when we revisited a set of 27 reconnaissance plots that were established between 1999 and 2006 to find that curlyleaf muhly had declined on burned sites between 86% and 99% from the previous sample date, and that the average cover on burned sites in 2012 was 0.5% compared to 15% on unburned sites. There were differential responses among shrubs, e.g., many ocotillo (Fouquieria splendens) and sotol (Dasylirion leiophyllum) were killed, while Pinchot junipers (Juniperus pinchotii) were burned but the majority re-sprouted. See Muldavin et al. (2013) for details.

In 2013, 16 long-term permanent monitoring plots were established to track long-term post-fire vegetation response (forbs, grasses, and shrubs) in a controlled setting (balanced design of treatment and control). Based on the 2012 benchmark survey, plots were distributed in two landscape settings: escarpment slopes (>15% slope) and summits. Within these two landscape settings, we established a set of control plots that have not been burned within the last decade or more, and a set of plots that were burned in 2011 (with burn extents exceeding 80% of the plot area). This creates four treatment classes: slope/unburned; slope/burned; summit unburned; and summit burned) with four plots replications each. Based on this design, we were able to discern fire effects among several shrub species and on the dominant grass, Muhlenbergia setifolia, but the low number of replications per combination precluded detecting differences for several species of interest. See Muldavin et al. (2014) for details. Previous years' reports are: Carlsbad Caverns National Park Monitoring Sensitive Vegetation after the 2011 Loop Fire, 2012 Field Studies Report (for P12AC10863/UNM 85) and Carlsbad Caverns National Park Monitoring Sensitive Vegetation after the 2011 Loop Fire, 2013 Field Studies Report (P13AC00733/UNM-89).

Accordingly, in 2014 we propose to increase the robustness of the monitoring set by adding six to eight plots with an emphasis on the burned sites and adding more detailed measurement on all the plots of key shrub and herbaceous species in order track the growth and demography of individuals through time.

New plots will be identical to the current ones in size, at 20 m x 20 m. Within each plot, we will measure aerial cover of all species in a fine-scale grid of 20, one-square-meter quadrats. A presence list of all species present in the 20 x 20 m and surrounding area within the same vegetation type will be taken as a measure of overall species richness through time. Since curlyleaf muhly grass recovery is a key question, we will establish a set of point-intercept lines within the grid to estimate live basal area cover (a minimum of 300 points following the recommendations of Herrick et al. 2009 http://jornada.nmsu.edu/monit-assess/manuals/monitoring). Grass canopy can be variable based on seasonal precipitation, but how much territory a grass plant occupies at ground level is the best index of abundance through time (grass cover will still be measured in the quadrats). The impact of fires on shrubs is also a key management question. In 2012, in each benchmark plot we took a count of fire impact on all shrubs in three classes: unburned; burned but re-sprouting; and burned and dead. We will repeat this count in the plots, but stratify counts by species-specific size classes (this will complement the cover values from the quadrats).

We will return to the burned plots from 2013 and conduct detailed measurements on the target shrubs and grasses. Target shrubs within the macro-plot will be measured for height and canopy diameters. For grass targets, and in particular Muhlenbergia setifolia, we will record spatially the frequency of occurrence at the decimeter scale on a 50 x 50-cm nested subset of the one-meter quadrats on each plot (15 on each plot).

Representative digital photos will be taken along the transect lines following the 2013 protocol. The plot data will be entered into the NHNM plot database (Microsoft Access) and quality-controlled using NHNM standard protocols. Unknown species will be collected and identified as time allows and the database corrected accordingly. A statistical analysis among the four treatment groups, four growing seasons out from the fire, will be conducted and the results presented with discussion as a final report to the park.

**COOPERATIVE AGREEMENTS OR TASK AGREEMENTS INVOLVING COOPERATORS WORKING ON-SITE**

**Background**

In cooperative agreements or task agreements with universities where the university utilizes interns, student employees, research associates (RAs) or cooperators on-site (hereafter called “cooperator personnel”), these cooperator personnel sometimes work on government sites in close proximity to federal employees. It is illegal (without specific statutory authority) for federal employees to directly supervise the cooperator personnel or any university employees or for the students or other university employees to supervise federal employees. When cooperator personnel are working on an NPS site, it is important that there is a clear distinction between students and federal employees.

**Office Environment and Vehicles**

* The office space of the cooperator personnel and NPS personnel should be clearly labeled (Name and NPS or University affiliation on office or cubicle space).
* Cooperator personnel should be listed separately from NPS personnel in telephone lists, other identification or organizational rosters, and publication credits.
* Cooperator personnel should not receive “all-employee” e-mail or other communications intended for NPS personnel (unless it relates directly to the work the cooperator is doing for the NPS). When the e-mail does relate to the work being done, a copy of the same e-mail message should be sent to the University or cooperator’s supervisor.
* Cooperator personnel may use NPS e-mail systems when the communication relates directly to the work the cooperator is doing for the NPS. The e-mail addresses of the cooperator personnel must include a label associated with their NPS e-mail address that identifies the cooperator’s status (i.e., “Linda Webb, Cooperator” would be the label associated with the e-mail address, [linda\_webb@contractor.nps.gov](mailto:linda_webb@contractor.nps.gov)). Doing so clearly identifies this individual each time they send an e-mail message using the NPS system, and it identifies their status as a research associate, student intern or student employee in the e-mail directory.
* Unless stipulated in the agreement, cooperator personnel should not drive government vehicles.
* Unless stipulated in the agreement, cooperator personnel should not ride as a passenger in a government vehicle. When this is planned as part of the agreement, an appropriate amount of liability insurance should be negotiated.
* Prior written approval by the Park Superintendent or Center Manager must be obtained in order for a task to allow cooperator personnel to drive or ride in government vehicles.

**Supervision and Scheduling**

* Each task must specify the university’s/cooperator’s supervisor for the cooperator personnel.
* Unless stipulated in the agreement, NPS staff should not set hours for cooperator personnel, specify where the work should be done, or conduct performance appraisals. National Park Service staff may give performance feedback to the cooperator personnel supervisor.
* Cooperator personnel should report leave, scheduling, and other related issues to the university or cooperator’s supervisor, not to NPS employees. The supervisor of the cooperator personnel should then communicate with the NPS. National Park Service employees cannot directly supervise cooperator personnel on a day-to-day basis. Work should be given to the cooperator personnel (via the cooperator’s supervisor) on a “task basis.” Cooperators should work without NPS supervision to accomplish each task, although technical consultations and cooperation is permissible.
* The Cooperator will be responsible for any disciplinary action needed to correct student employee conduct or performance problems. The NPS agreements technical representative will inform the university/cooperator’s supervisor of any conduct or performance problems.
* The Cooperator will remove student employees from their positions if they fail to improve performance or address conduct issues.
* The NPS will review and provide feedback to students or interns regarding work assignments.
* The NPS will inform the cooperator of conduct or performance problems with cooperator personnel so that the university can counsel employees and correct the performance problems.
* The NPS will recommend to the cooperator dismissal of cooperator personnel based on conduct or performance issues.
* The Cooperator will hire students, interns or RAs to work on NPS tasks identified in the agreement. Hiring will be conducted in consultation with the NPS Agreements Technical Representative (ATR).
* The Cooperator will: pay students, interns or RAs for hours they have worked in support of the agreement.

**Representation and Communication**

* Cooperator personnel cannot in any way represent themselves to the public as NPS employees.
* Cooperator personnel are required to wear visible identification at all times.

**Other Issues**

* Cooperator personnel should not list an NPS affiliation on publications, but rather should list the cooperative agreement under which the work was performed.
* Cooperator personnel should not be invited to official NPS “social” events.
* Cooperator personnel will follow the local policy of the facility when federal facilities are closed due to early release for holidays, snow days, etc.

**PRODUCTS:**

1) Excel spreadsheet data files of all data with metadata;

2) Plot digital photo files;

3) A stand-alone final report to the park providing details on the monitoring set up and field methods, analysis, and discussion with management recommendations where appropriate.

**BUDGET:***(Please see attached spreadsheet.)*