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## Plan Overview

*A Data Management Plan created using DMPTool*

**Title:** An Online Toolkit for Managing Shrub Encroachment

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**Template:** USDA-NIFA: National Institute of Food and Agriculture

### Project abstract:

Shrub encroachment and the interventions taken to reduce shrub cover ('brush management') are critical areas of concern for land managers and producers in rangelands across the Great Plains and western US. We propose to bring together research and outreach to begin constructing a practical, user-guided, web-based 'toolkit' for private and public land managers to determine best options and opportunities for managing undesirable woody weeds. We will leverage the existing DroughtView web application in taking the first steps towards toolkit design while formulating new brush management decision-making resources. Our development process will incorporate guidance from stakeholders with past and on-going research projects that identify climate-plant-soil-treatment factors determining shrub invasion risk and options for containment. These factors will be compiled into descriptions and decision trees of management options and alternatives. An iterative, phased design and development approach will package science-based information into an online, user-friendly interface and repository to provide step-by-step guides for decision-making. Primary project goals include: (1) synthesizing known research on controls over and constraints to shrub encroachment and the efficacy of brush management; (2) compiling local and regional stakeholder knowledge and input for use in toolkit design through provided feedback; (3) broadening existing brush management online resources to build the prototypic toolkit with research/management information for open stakeholder access; and (4) developing a framework for land managers and Extension educators to guide and enhance future toolkit functionality and usability. The online toolkit will significantly expand the online presence of land grant university Extension, while promoting sustainable rangeland ecosystem management.

**Start date:** 09-01-2020

**End date:** 08-31-2022

**Last modified:** 03-18-2021

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# An Online Toolkit for Managing Shrub Encroachment

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## Expected Data Type

**Describe the type of data (e.g. digital, non-digital), how it will be generated, and whether the data are primary or metadata. Research examples include: lab work, field work and surveys; Education examples include: number of students enrolled/participated, degrees granted, curriculum, and training products; Extension examples include: outreach materials, number of stakeholders reached, number of activities, and assessment questionnaires.**

This is an Extension project that ties scientific information with outreach to serve stakeholder needs through technology. Following a thorough review of the literature to ensure the most current understanding of shrub management strategies, the proposed project - to develop a prototype 'online toolkit' for brush management - will incorporate factors identified as influencing management decision-making into the specifications for a complete DS tool. At the same time, with the integral involvement of stakeholders in an iterative testing process, there will be results from stakeholder questionnaires and local workshops that will provide the project team with the feedback needed to ensure the toolkit is user-friendly, relevant and practical (see *Evaluation Plan* in the Narrative). To these ends, new scientific data (articles, reports and other documents) and results of stakeholder engagement in the project (questionnaires and workshop outputs) will be compiled and included in project reporting (REEport), project publications (refereed journal, Cooperative Extension bulletins, popular articles), and outreach materials (e.g. *Rangelands Partnership* 'brush management topic [web page](#) and communications outlets therein). These materials will be maintained on both the Gormish (PD) and Archer (co-PD) lab servers in the UA School of Natural Resources and the Environment and with *Rangelands Partnership* via co-PD Merrigan. All primary project data will thus be available in electronic format in Microsoft Word and Excel, HTML, and PDF files as may be appropriate.

## Data Format

**For scientific data to be readily accessible and usable it is critical to use an appropriate community-recognized standard and machine readable formats when they exist. If the data will be managed in domain-specific workspaces or submitted to public databases, indicate that their required formats will be followed. Regardless of the format used, the data set must contain enough information to allow independent use (understand, validate and use) of the data.**

Data will be managed through a web-based content management system (CMS) and Drupal 8 (that stores data in MySQL Relational Database). Data can be exported from the CMS in CSV, JSON, and XML-based formats. Raw database tables in MySQL will also be viewable as SQL text via a mysqldump (<https://dev.mysql.com/doc/refman/5.7/en/mysqldump.html>).

## Data Storage and Preservation

**Data must be stored in a safe environment with adequate measures taken for its long-term preservation. Applicants must describe plans for storing and preserving their data during and after the project and specify the data repositories, if they exist. Databases or data repositories for long-term preservation may be the same that are used to provide Data Sharing and Public Access. Estimate how much data will be preserved and state the planned retention period. Include any strategies, tools, and contingency plans that will be used to avoid data loss, degradation, or damage.**

The web-based 'toolkit' and its underlying database will be maintained and hosted by the University of Arizona College of Agriculture and Life Sciences' Communications and Cyber Technologies (CCT) Unit. This Unit currently provides IT systems for the *Rangelands Partnership*, a nearly 20-year project among 19 land-grant universities (described further in the following Roles & Responsibilities section). CCT's infrastructure is built on servers housed at the University of Arizona and through Amazon Web Service Cloud services. CCT houses servers in both locations for redundancy and disaster recovery purposes. As part of the Service Level Agreement, CCT has agreed to provide services for 5 years, renewable as needed. If the proposed project is funded, the implemented Data Management Plan will be continuously monitored and updated during the award period and into the future based on technological and data storage, organization, and management improvements.

## Data Sharing and Public Access

**Describe your data access and sharing procedures during and after the grant. Name specific repositories and catalogs as appropriate. include a statement, when applicable, of plans to protect confidentiality, personal privacy, proprietary interests, business confidential information, and intellectual property rights. Outline any restrictions such as copyright, confidentiality, patent, appropriate credit, disclaimers, or conditions for use of the data by other parties.**

The online toolkit is a data dissemination instrument. Thus, its goal is to provide tailored recommendations and learning components for the user. Users of the toolkit do not need to provide personal identifiable information - no email or contact information is collected. Rather, the user only enters information about their environment and specifics of their land management area. The recommendations compiled from this information can be printed or retrieved later through a unique URL. The report will not contain any personal information about the user. *Google Analytics* will be used to track anonymous statistics such as number of visitors, page views, and time spent on the online tool.

## Roles and Responsibilities

**Who will ensure DMP implementation? This is particularly important for multi-investigator and multi-institutional projects. Provide a contingency plan in case key personnel leave the project. Also, what resources will be needed for the DMP? If funds are needed, have they been added to the budget request and budget narrative? Projects must budget sufficient resources to develop and implement the proposed DMP.**

The University of Arizona team is composed of highly engaged members of the College of Agriculture and Life Sciences' (CALS) School of Natural Resources and the Environment (SNRE) and Communications and Cyber Technologies (CCT) unit, as well as members of the *Rangelands Partnership* which will all be represented with co-PD Merrigan on the Advisory Committee (see proposal body). Project team members have worked together on various recent projects, with several having collaborated for more than 17 years as part of the Arizona Technical Team for the *Rangelands Partnership*. Advisory Committee members also bring an extensive and proven track-record of scientific, academic, and outreach accomplishments. This consistency coupled with a high degree of collegiality will ensure the proposed project will be implemented successfully and will offer long-term benefits for the stakeholders they serve.

## Monitoring and Reporting

Successful projects should monitor the implementation of the DMP throughout the life of the project and after, as appropriate. Implementation of the DMP must be a component of annual and final reports to NIFA (REEport) and include progress in data sharing (publications, database, software, curriculum, outreach materials, etc.). The final report should also describe the data that was produced during the award period and the components that will be stored and preserved (including the expected duration) after the award ends. The DMP should be compliant with the Research Terms and Conditions that govern NIFA-funded project. The DMP is not intended to be a replacement for other grant reporting requirements.

Designating the *Rangelands Partnership* as the home for the online brush management toolkit will position the project for success via its wealth of personnel and technical infrastructure. The *Rangelands Partnership*, a long-term initiative among 19 western and Great Plains land-grant universities, is a unique collaboration of rangeland specialists, librarians, and technology experts. Together they bring comprehensive and specialized collections to a diversity of audiences by maintaining a database of rangeland resources for public and private land managers, researchers, Extension professionals, educators, and the public in the U.S. and worldwide. Included are information and tools needed for the sustainable management of rangelands, informed decision-making, professional enhancement, and educational activities. Thus, through this linkage, the proposed toolkit for brush management will have a stable, well-developed sustainable home as well as a network of experts to help guide its development, maintenance, and promotion.