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Using Smart Foodscapes to Enhance the Sustainability of Western Rangelands

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Data Management Plan

Project Title Using Smart Foodscapes to Enhance the Sustainability of Western Rangelands

Overview

This Data Management Plan (DMP) describes the management, dissemination, retention, and archiving of deliverables (data, video, website and publications) from the proposed coordinated agricultural project (CAP). The proposed DMP follows USDA-NIFA guidelines, and to the greatest extent possible, adheres to best practices developed by the Research Data Management Services (https://datamanagement.usu.edu/index) at Utah State University.

1. Expected Data Types: Table 1 details the types of data collected and produced during this research with responsible PI. Standards for metadata format and content will be: Ecological Metadata Language (EML) for Obj.1-4, 7, https://eml.ecoinformatics.org/; Geospatial (GIS) metadata standard ISO 19115 (Obj 2a,b); DDI (https://ddialliance.org/) for Objs. 6 and 8.

2. Table 1. Data Formats and Standards

Expected data type	PI	Description of Data
Objs. 1 to 9		Data will be entered into Excel spreadsheets, converted to CSV format for storage
Obj. 1a. Vegetation assessment, chemical analyses	Mac Adam	Laboratory & field work.
Obj. 1b. Model MINDY, parameter estimates	Dillon	Outputs from models.
Obj. 1c. Chemical analyses, digestibility analyses,	Batistel	Laboratory & field work
Obj. 2a. GIS	Ramsey	All data will be entered into a MySQL database. Scripts written in Python
Obj. 2b. Animal performance, GHG, soil chemistry, GPS data	Villalba	Laboratory & field work
Obj. 2c. fecal pellet numbers, brood survey, scan sampling	Dahl-gren	Laboratory & field work
Obj. 3. Environmental impact, soil chemistry, animal performance	Dillon	Outputs from life cycle assessment models.
Obj. 4. Financial metrics, revenue earned, costs saved	Koontz	Outputs from models.
Obj. 6. Interviews and surveys	Schad	Transcripts of interviews and surveys. Audio files (converted to NVivo-ready format). Survey data.
Obj. 7. Animal performance, vegetation assessment.	Thacker	Laboratory & field work
Obj. 8. Surveys. Number of students participating, curriculum, and training products	Trundle Hagevik	Videoclips. Citizen Sci data will be uploaded by individuals to iNaturalist, Great Sunflower Project, and Bumblebee Watch. Researchers will follow FTC guidelines for privacy and security. Online survey data (e.g. Qualtrics).
Obj. 9. Outreach materials, activities, number of stakeholders	Thacker	You tube videos, website. Section 508 compliant

3. Data Storage and Preservation of Access

Physical specimens: Dried plant specimens and soil samples will be stored in the labs of PI and Co-PIs for at least five years beyond the duration of this proposed research. Seed will be retained at least five years beyond the end of the project in freezers in the Co-PIs' laboratories.

Chemical/nutritional data: Vegetation assessments, chemical and nutritional data, and associated metadata will be routinely backed up on an external hard drive in the PI's and Co-PIs' laboratories, and by their Institution's cloud storage system, such as Box.com, which meets security and compliance standards for ITAR, GDPR, and FedRAMP. Four hard drives will be purchased for preliminary data storage and backup.

Social data: Survey data after IRB approval (digital) will be gathered from K-12 students (elementary ~ 240, middle school ~ 720, high school ~ 420), teachers (~ 27), undergraduate students (~ 30), doctoral students (~ 2), and families of students (~ 300). Data will be routinely backed up on two external hard drive in the Co-PIs' offices, and by their Institution's cloud storage system, such as Box.com. Two hard drives will be purchased for preliminary data storage and backup. All data will be stored for at least 5 years beyond the end of the award. Data supporting research findings published in journal articles will deposited to USDA AG DATA COMMONS (https://data.nal.usda.gov). Remaining processed data will be also deposited into USDA AG DATA COMMONS. ReadMe/Data Dictionary files will be created for each dataset, with assistance from USU Data Librarian.

4. Data Sharing and Public Access: Data supporting research published in journal articles will be made available publication by depositing in USDA AG DATA COMMONS. All parties involved are committed to the free and open sharing of the scientific data and educational materials produced during this research. Data will be deposited with an Open Data Commons Open data License (https://opendatacommons.org/licenses/odbl/1-0/) to facilitate reuse. Under the terms of the license, users may share, create, and/or adapt the research data; we request attribution, sharing by users under the terms of the ODbL, and redistribution without digital restriction measures. Any additional materials, such as Fact Sheets, will also be deposited in DigitalCommons@USU. No plant or soil materials will be shared**.**

5. Roles and Responsibilities: PI Villalba at Utah State University is ultimately responsible for carrying out the DMP. He will monitor the implementation of the plan throughout the life of the project and beyond. In addition, Co-PIs (See Table 1) will be responsible for collecting, curating, and archiving data at their respective institutions, and linking with PI Villalba at USU. Senior project personnel will train field technicians and students and supervise data collection. After initial data entry, data will be examined for outliers indicative of data entry errors. The PI, Co-PIs, and lab staff are responsible for data management and security. All research data generated during this project will be retained by the PI and Co-PIs, including all plant material.

6. Monitoring and reporting: The PI and Co-PIs will work with USU's Research Data Management Services to revisit this data management plan if needed, on an annual or more frequent basis to make any necessary changes or additions to the plan. They will ensure that data are adequately described with appropriate metadata, headers, and/or ReadMe files prior to archiving. The USU Research Data Librarian will be available to the PI and Co-PIs for consultation throughout the data collection activities. Data publications will be listed in annual project reports.