Data Management Plan

Name of Contractor	**Teton Research Institute**
Name of project	**Effects of Wildlife Warning Reflectors ("Deer Delineators") on Wildlife-Vehicle Collisions in Central Wyoming**
Project Duration	**Start date : October 2012** **End: June 2015**
DMP Version	**1**
Date Amended, if any	
Name of all authors, and ORCID number for each author	**Corinna Riginos: 0000-0001-9082-5206** **Morgan William Graham: 0000-0003-3420-0513** **Melanie Davis: 0000-0003-1734-7177** **Chauncey Smith: 0000-0001-8861-6763** **Andrew Johnson: 0000-0002-5658-811X**
WYDOT Project Number	**RS05121**
Any Digital Object Identifier (DOI), including any CROSSREF number, which has been assigned to any peer reviewed publication or data generated by this project	**Not yet assigned.**
Name of all peer reviewed publications which have been generated using data from this project	**Wildlife warning reflectors and white canvas reduce deer-vehicle collisions and risky behavior. In review. *Wildlife Society Bulletin*.**
URLs for all peer reviewed publications which have been generated using data from this project	**None yet**
RiP RH Display ID Number	**35610**
Dataset URL, if available	**None yet**

What constitutes such data will be determined by the Principle Investigator, Project Champion, and the Research Manager. In general, your plan should address final research data. This

includes recorded factual material commonly accepted in the scientific community as necessary to validate research findings. Final research data do not include laboratory notebooks, partial datasets, preliminary analyses, drafts of scientific papers, plans for future research, peer review reports, communications with colleagues, or physical objects, such as gels or laboratory specimens. As part of your research, you may also generate unique data, which are data that cannot be readily replicated. Your DMP should also address unique data that may arise from your research.

WYDOT expects the timely release and sharing of data to be no later than the acceptance for publication of the main findings from the final dataset, unless the Principle Investigator will be embargoing the data. In such a case, the data cannot be embargoed for a period longer than twelve (12) months.

1. Introduction

The purpose of this research project is to:

The purpose of this study was to provide the Wyoming Department of Transportation with information about (1) the effectiveness of Streiter-Lite wildlife warning reflectors that had been installed in three locations within Wyoming's District 5, and (2) preliminary analysis of patterns of deer-vehicle collisions across Wyoming and the habitat and road variables associated with collision hotspots.

2. Definitions

a. Code or scripts include code used in the collection, manipulation, processing, analysis or visualization of data, but may also include software developed for other purposes.

b. Copyright is a set of legal rights extended to copyright owners that govern such activities as reproducing, distributing, adapting, or exhibiting original works fixed in tangible forms.

c. Data means the recorded factual material commonly accepted in the scientific community as necessary to validate research findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, communications with colleagues. Recorded material excludes physical objects (e.g. laboratory samples). Research data also does not include trade secrets, commercial information, materials necessary to be held confidential; and personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.

d. Data Archive is a site where machine readable materials are stored, preserved or possibly redistributed to individuals interested in the materials.

e. Data Management Plan is a document that specifies your plans for managing

your data and files for a research project.

f. Dataset means collection of data.

g. Metadata refers to structured data about data which helps define administrative, technical, or structural characteristics of the digital content.

3. Data Types and Storage

The types of data and/or datasets generated and/or used in this project include …

ArcGIS geodatabase (.gdb v10) including:

1) Point feature class of all wildlife-vehicle collision records 1990-2013 in the state of Wyoming, with duplication removed between records obtained from WYDOT's crash and carcass databases
2) Point and line feature class locations of data collection sites in the field (Thermopolis, Basin-Graybull and Kinnear areas), including experimental treatment areas and locations where FLIR (infrared camera) observations of deer behavior were made.

Spreadsheet (.csv) files with data on:

1) Deer carcasses observed in the field at sites where wildlife warning reflectors were installed and manipulated experimentally (by covering with bags or removing reflectors), 2013-2014
2) Location, timing, and duration of experimental treatments in 2013 and 2014 field seasons
3) Behavioral observations of deer crossing roads, obtained from FLIR video footage
4) Traffic counts from the same FLIR video footage
5) Site and environmental information for each location where the FLIR video footage was taken

Data collection protocols are documented fully in the project final report.

All data are reproducible since we have the original FLIR video footage and original crash and carcass databases that WYDOT created.

Data are housed on servers at Teton Science Schools, and on backup external hard drives held by three of the project PIs.

Provide a description of the data that you will be gathering in the course of your project. You should address the nature, scope, and scale of the data that will be collected. Describe the characteristics of the data, their relationship to other data, and provide sufficient detail so that reviewers will understand any disclosure risks that may apply. Discuss value of the data over the long-term. Please provide the name of all repositories where the data will be housed during the lifetime of the project.

Checklist

o What type of data will be produced?

o How will data be collected? In what formats?

o How will the data collection be documented?
o Will it be reproducible? What would happen if it got lost or became unusable later?
o How much data will it be, and at what growth rate? How often will it change?
o Are there tools or software needed to create/process/visualize the data?
o Will you use pre-existing data? From where?
o Storage and backup strategy?

3. Data Organization, Documentation and Metadata

The plan for organizing, documenting, and using descriptive metadata to assure quality control and reproducibility of these data include …

All GIS data (in the geodatabase) have embedded metadata adhering to standards of the Federal Geographic Data Committee (FGDC). Naming conventions have been used to maximize clarity and efficient access to data.

All .csv files will be accompanied by a metadata text file explaining the individual data files and their relationship to each other.

Data identifiers will be assigned upon upload to a public access website after the embargo period has ended.

Your DMP should describe the anticipated formats that your data and related files will use. To the maximum extent practicable, and in accordance with generally accepted practices in your field, your DMP should address how you will use platform-independent and non-proprietary formats to ensure maximum utility of the data in the future. If you are unable to use platform-independent and non-proprietary formats, you should specify the standards and formats that will be used and the rationale for using those standards and formats.

NOTE: Attach the Metadata transmittal form or URL for data generated or peer reviewed publications from this project.

Checklist

o What standards will be used for documentation and metadata?
o Is there good project and data documentation format/standard?
o What directory and file naming convention will be used?
o What project and data identifiers will be assigned?
o Is there a community standard for metadata sharing/integration?

4. Data and/or Database Access and Intellectual

Property

What access and ownership concerns are there…

There are no privacy or confidentiality concerns. A 12-month embargo period will be implemented. After the embargo period, data will be publicly accessible. Data archiving and any updates will be controlled by the PIs.

Protecting research participants and guarding against the disclosure of identities and/or confidential business information is an essential norm in scientific research. Your DMP should address these issues and outline the efforts you will take to provide informed consent statements to participants, the steps you will take the protect privacy and confidentiality prior to archiving your data, and any additional concerns. If necessary, describe any division of responsibilities for stewarding and protecting the data among Principal Investigators.

If you will not be able to deidentify the data in a manner that protects privacy and confidentiality while maintaining the utility of the dataset, you should describe the necessary restrictions on access and use. In general, in matters of human subject research, your DMP should describe how your informed consent forms will permit sharing with the research community and whether additional steps, such as an Institutional Review Board (IRB), may be used to protect privacy and confidentiality.

Checklist

o What steps will be taken to protect privacy, security, confidentiality, intellectual property or other rights?
o Does your data have any access concerns? Describe the process someone would take to access your data.
o Who controls it (e.g., PI, student, lab, University, funder) ?
o Any special privacy or security requirements (e.g., personal data, high-security data) ?
o Any embargo periods to uphold?

5. Data Sharing and Reuse

The data will be released for sharing in the following way …

Intellectual property rights will be held by the lead PIs (Corinna Riginos and Morgan Graham), Teton Science Schools, WYDOT, and the State of Wyoming. Data will be made available on the widely-used internet repository, Knowledge Network for Biocomplexity (KNB): https://knb.ecoinformatics.org/
This site is maintained by the National Center for Ecological Synthesis, with support from the National Science Foundation. Data can be found by searching on key terms such as “mule

deer" and "wildlife-vehicle collision" and can be downloaded for use from that site. Data will be available for future re-use in meta-analyses.

Describe who will hold the intellectual property rights for the data created by your project. Describe whether you will transfer those rights to a data archive, if appropriate. Identify whether any copyrights apply to the data, as might be the case when using copyrighted instruments. If you will be enforcing terms of use or a requirement for data citation through a license, indicate as much in your DMP. Describe any other legal requirements that might need to be addressed.

Checklist

o If you allow others to reuse your data, how will the data be discovered and shared?
o Any sharing requirements (e.g., funder data sharing policy) ?
o Audience for reuse? Who will use it now? Who will use it later?
o When will I publish it and where?
o Tools/software needed to work with data?

6. Data Preservation and Archiving

The data will be preserved and archived in the following ways …

Data will be made available on the widely-used internet repository, Knowledge Network for Biocomplexity (KNB):
https://knb.ecoinformatics.org/
This site is maintained by the National Center for Ecological Synthesis, with support from the National Science Foundation. KNB supports the upload of any data file format. Each uploaded dataset and repository will conform to KNB's best management practices for managing data files. Per KNB standards, each dataset will be assigned a Digital Object Identifier (DOI).
Data will be retained there indefinitely.

Describe how you intend to archive your data and why you have chosen that particular option. You may select from a variety of options including, but not limited to:

- Use of an institutional repository
- Use of an archive or other community-accepted data storage facility
- Self-dissemination

You must describe the dataset that is being archived with a minimum amount of metadata that ensures its discoverability. Whatever archive option you choose, that archive must support the capture and provision of the US Federal Government "Common Core" metadata. In addition, the archive you choose must support the creation and maintenance of persistent identifiers and must provide for maintenance of those identifiers throughout the preservation lifecycle of the data. Your plan should address how your archiving and preservation choices meet these requirements.

Checklist
o How will the data be archived for preservation and long-term access?
o How long should it be retained (e.g., 3-5 years, 10-20 years, permanently) ?
o What file formats? Are they long-lived?
o Are there data archives that my data is appropriate for (subject-based? Or institutional)?
o Who will maintain my data for the long-term?

NOTE:

Researchers evaluating data repositories as the option(s) for storing and preserving their data should examine evidence demonstrating that the repository:

a. Promotes an explicit mission of digital data archiving;
b. Ensures compliance with legal regulations, and maintains all applicable licenses covering data access and use, including, if applicable, mechanisms to protect privacy rights and maintain the confidentiality of respondents;
c. Has a documented plan for long-term preservation of its holdings;
d. Applies documented processes and procedures in managing data storage;
e. Performs archiving according to explicit work flows across the data life cycle;
f. Enables the users to discover and use the data, and refer to them in a persistent way through proper citation;
g. Enables reuse of data, ensuring appropriate formats and application of metadata;
h. Ensures the integrity and authenticity of the data;
i. Is adequately funded and staffed, and has a system of governance in place to support its mission; and
j. Possesses a technical infrastructure that explicitly supports the tasks and functions described in internationally accepted archival standards like Open Archival Information System (OAIS).

**These guidelines are based on the Data Seal of Approval.

METADATA TRANSMITTAL FORM

Title[1]	Human-readable name of the asset. Should be in plain English and include sufficient detail to facilitate search and discovery.
Creator	
Publication Date(s)	
Description	Human-readable description (e.g., an abstract) with sufficient detail to enable a user to quickly understand whether the asset is of interest.
Keywords	Tags (or keywords) help users discover your dataset; please include terms that would be used by technical and non-technical users.
Subject	
Identifier[2]	A unique identifier for the dataset
Edition	Most recent date on which the dataset was changed, updated or modified.
Abstract	
Geographic Coverage	
Language	The language of the dataset.
Publisher	The publishing entity and optionally their parent organization(s).
Contact Point	Contact person's name and email for the asset.
Funding agency	
Access Restrictions	The degree to which this dataset **could** be made publicly-available, *regardless of whether it has been made available*.

[1] *To include alternate title; conference title; and journal title if they are different.*

[2] *To include record numbers; report numbers; NTIS number; TRIS Accession Number; OCLC Number; ISBN; ISSN; contract number; and DOI if available.*

	Choices: public (Data asset is or could be made publicly available to all without restrictions), restricted public (Data asset is available under certain use restrictions), or non-public (Data asset is not available to members of the public).
Intellectual Property and Other Rights	This may include information regarding access or restrictions based on privacy, security, or other policies. This should also serve as an explanation for the selected “accessLevel” including instructions for how to access a restricted file, if applicable, or explanation for why a “non-public” or “restricted public” data asset is not “public,” if applicable.
License	The license or non-license (i.e. Public Domain) status with which the dataset or API has been published.
Format	The machine-readable file format
Collection	The collection of which the dataset is a subset.
Related Documents	Related documents such as technical information about a dataset, developer documentation, etc.
Data Organization	
Size of file	