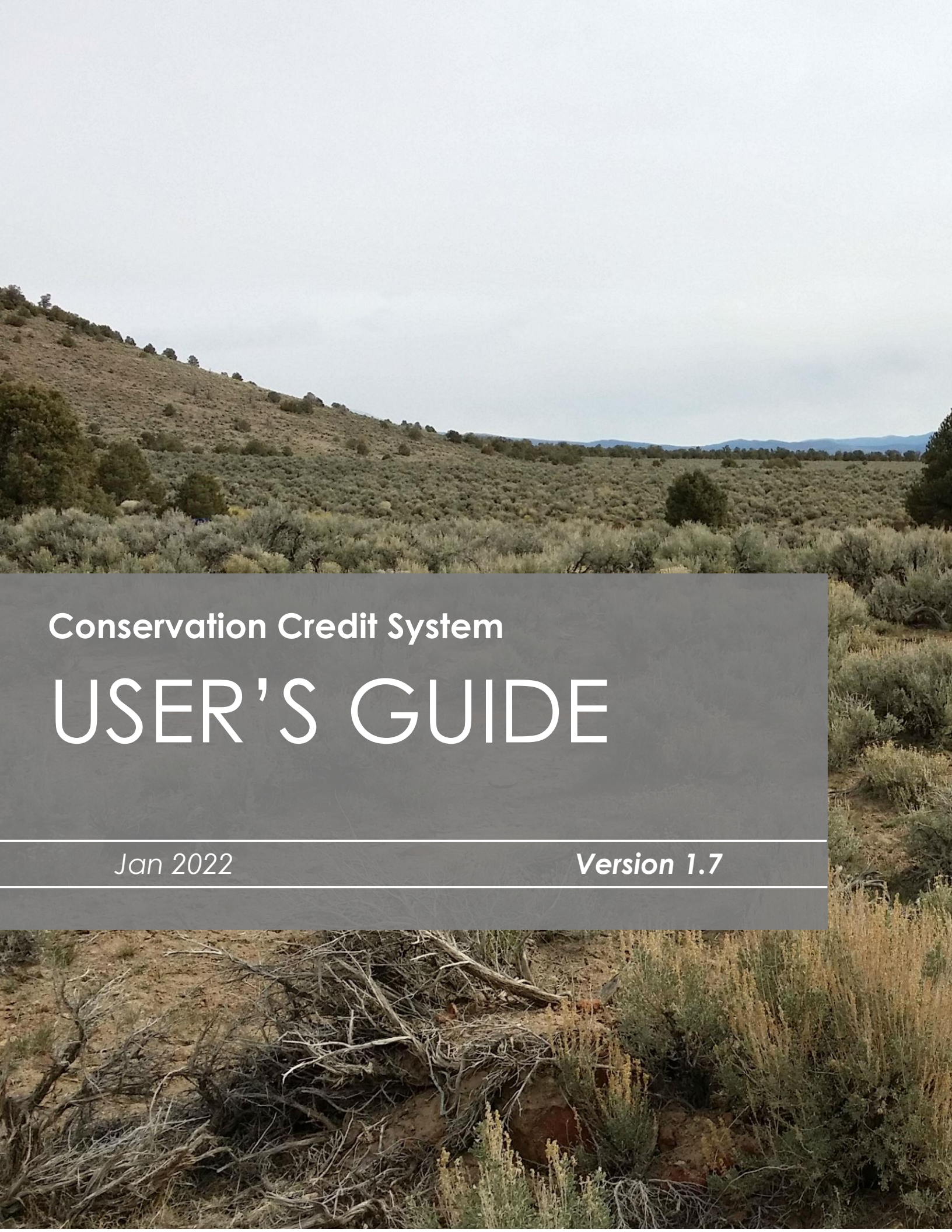

Conservation Credit System

USER'S GUIDE

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Version 1.7

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INTRODUCTION

The User's Guide describes the detailed steps necessary to calculate credits and credit obligations for credit and debit sites, respectively, for the Nevada Conservation Credit System.

USER REQUIREMENTS

The User's Guide is intended for use by the Credit System Administrator, Technical Support Providers and Verifiers to calculate credits and credit obligations. Evaluating credit or debit projects requires moderate GIS capabilities. Completing field data collection requires substantial knowledge of sage-grouse biology and extensive experience with field data collection methods, including identification of Great Basin plant species. In addition, there are specific software requirements (as defined at the beginning of each section), including an ESRI ArcGIS license with the Spatial Analyst extension and Microsoft Excel 2007 or later.

HOW TO USE THE USER'S GUIDE

The User's Guide is organized into three major steps summarized below. All steps should be executed in sequence listed—unless the user has extensive experience and a deep understanding of the steps—in order to ensure accurate calculation of credits and credit obligations and take advantage of efficiencies built into the design of the User's Guide.

1. **Desktop Analysis:** The pre-field Desktop Analysis should be completed first, because a) the Desktop Analysis informs the sampling protocol used in the field analysis, and b) the Desktop Analysis pre-screens credit project sites to ensure that they meet the credit site eligibility requirements (see the Credit System Manual for more on credit site eligibility) before investing significantly more resources to collect field data. The Desktop Analysis should be re-run after field data have been collected and all aspects of the analysis have been finalized and verified, such as the map units and the anthropogenic features. Useful information related to the Desktop Analysis is included in appendices to this User's Guide—please review these appendices carefully if you are unfamiliar with the Desktop Analysis.
2. **Field Data Collections Method:** The Field Data Collection Method can be conducted after the Desktop Analysis. Map units and transect locations may need to be revised during the field visit, which would require portions of the Desktop Analysis to be rerun.
3. **Credit/Credit Obligation Calculation:** The complete Credit/Credit Obligation calculation can only be performed after completing both the Desktop Analysis and Field Data Collection Methods. It is possible to generate some partial estimates of the credit/credit obligation calculation that may be of interest in particular situations (e.g., projected local-scale function, site-scale habitat function) once required data for those elements are available.

1. **Desktop** Analysis

DESKTOP ANALYSIS

TOOLS REQUIRED

In order to complete the Desktop Analysis, the following tools are required:

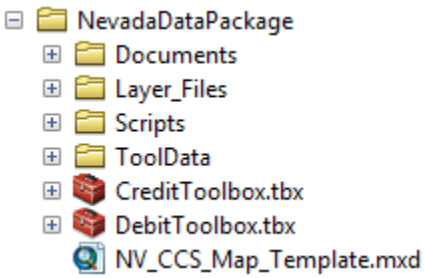
- ArcMap (ESRI) version 10.1 or later—Basic (ArcView) license or better required
- Spatial Analyst extension license
- Python 2.7.2 or later (automatically installed with ArcMap)
- Microsoft Excel (2007 or higher)
- Credit or Debit Project Calculator Version 1.6
- Management Plan and Validation Checklist (credit projects only)
- *Recommended:* Nevada Conservation Credit System Manual and HQT Scientific Methods Document for reference

DATA REQUIRED

The following data should be acquired before beginning the Desktop Analysis:

1. Download and extract the compressed file **NevadaDataPackage_v1_6.zip** to a location on the computer's hard drive. We recommend saving the Nevada Data Package locally, as opposed to an external server, to improve processing time. The Nevada Data Package is available at: https://dcnrftp.ndep.nv.gov.
   Username: SET_public
   Password: SET@1234

   The contents should appear as shown to the right.



   - A new inclusion to serve as a starting point in delineating wet meadows that should be particularly helpful in identifying stringer and riparian areas at smaller scales is the MVRN1e shapefile (Saito 2020, available at https://www.dri.edu/project/wetland-mapnvnew/) called NV_Wet_Meadows in the mxd, though meadow delineations should ultimately be confirmed with aerial imagery and later in the field.
     - A product description as well as the original shapefiles are also available at: https://www.dri.edu/project/mrvn/

2. Download supplemental data sources:
   - **Synth Map 2008 (or most recent version)**: Use as a supplemental data source for delineating map units. Available at http://heritage.nv.gov/node/164. Download the 'Map High Resolution' and unzip the folder to the desired location. Add the layer file (.lyr) and set the data source as the shapefile (.shp).
   - **Sage-grouse Initiative (SGI) Mesic Resources Maps:** Use the SGI mesic resources maps to assist in delineating meadows. To access the Mesic Resources Layer on ArcGIS:

- Install this ArcServer: click the Add Data button> from the look in menu navigate to GIS Server (toward the bottom)> Add WMTS Server> Enter http://map.sagegrouseinitiative.com/wmts.xml into the internet server box> Ok.
- Use the data from the above server: click the Add Data button> navigate to GIS Servers> WMTSGate on map.sagegrouseinitiative.com> Mesic Resources – Persistence.
- Further information can be found at https://map.sagegrouseinitiative.com.

- **SSURGO (Soil Survey Geographic Database)**: Use the web soil survey data to assist with delineating map units based on ecological site descriptions. Available at http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Download soils data either by navigating to appropriate county and select the most appropriate soils survey based on description or by defining area of interest (AOI) and downloading data for the AOI (Area of Interest).
- **USGS Topographic Maps**: Use for assistance delineating map units. In ArcMap, go to File> 'Add data from ArcGIS Online'. Search for USA Topo. Click "Add" for most recent version. Also available at http://nationalmap.gov/ustopo/.

3. Acquire field data sheets and guidance for the scorecards, located in the Appendices.
4. Acquire the **Proposed Surface Disturbance** or **Credit Project Boundary** shapefile or feature class. This is the area that is being proposed as the debit or credit project and should be provided by the project proponent. If the proposed surface disturbance or credit project boundary shapefile or feature class is not provided, follow the steps below to create it. Ensure you have sufficient information to accurately digitize this layer.
   a. For credit projects:
      i. Create a new feature class, type— "Polygon Features". Name this file **Credit_Project_Boundary**.
      ii. Start an editing session by right-clicking on the layer in the Table of Contents, clicking 'Edit Features', then 'Start Editing'.
      iii. Digitize the area of land on which credits can be generated. For example, areas not designated within management categories are to be excluded as well as lands not eligible to be included in the project. Be sure to save edits and stop editing when done.
   b. For debit projects:
      i. Proceed with the Desktop Analysis, a template feature class will be created for you.
5. You will need to acquire the **Dist_Lek** layer from the Nevada Department of Wildlife by submitting a Data Request Form, available from the NDOW website at http://www.ndow.org/Nevada_Wildlife/Maps_and_Data/Data/. You will be prompted to request this information during the Desktop Analysis and a required shapefile will be generated for you. For Debit projects, see step D6 for more information. For Credit projects, see step C6.
6. Transect locations will be provided by the SETT for credit and debit projects. For Debit projects, see step D13 for more information. For Credit projects, see step C10.

ANTHROPOGENIC FEATURES EVALUATED DURING THE DESKTOP ANALYSIS

Table 1 contains the codes and indirect effect weights and distances of anthropogenic features. This table is referenced throughout the Desktop Analysis to evaluate impacts from existing and proposed anthropogenic features. It is provided here for quick reference.

Table 1. Anthropogenic Features Considered in the Nevada Conservation Credit System

TYPE	SUBTYPE	TYPE CODE†	SUBTYPE CODE†	WEIGHT (%)	DISTANCE (Meters)
Towers	Communications	**Towers**	**Communications**	75%	6,000 m
	Meteorological	**Towers**	**Meteorological**	75%	6,000 m
Powerlines[1]	Nest Facilitating	**Powerlines**	**Nest_Facilitating**	75%	6,000 m
	Non-Nest Facilitating	**Powerlines**	**Non_Nest_Facilitating**	25%	6,000 m
Mines	Active – Large	**Mines**	**Active_Large**	100%	6,000 m
	Active – Med or Small	**Mines**	**Active_Small**	100%	3,000 m
	Inactive – Large	**Mines**	**Inactive_Large**	50%	1,000 m
	Inactive – Med or Small	**Mines**	**Inactive_Small**	10%	1,000 m
	Ancillary – Large	**Mines**	**Active_Large_Ancillary**	50%	3,000 m
	Ancillary – Med or Small	**Mines**	**Active_Small_Ancillary**	50%	1,500 m
Oil & Gas Wells	Producing	**Oil_Gas**	**Producing**	100%	3,000 m
	Inactive	**Oil_Gas**	**Inactive**	0%	0 m
Urban, Suburban, Ex-Urban Development[2]	Med – High	**Urban**	**High**	100%	6,000 m
	Low	**Urban**	**Low**	75%	3,000 m
Roads	Interstate	**Roads**	**Interstate**	100%	6,000 m
	High Use – Paved or Improved; Commercial	**Roads**	**High_Use**	100%	3,000 m
	Low Use – Improved; Local	**Roads**	**Low_Use**	25%	1,000 m
Railways	Railways	**Railway**	**Railway**	100%	3,000 m
Renewable	Geothermal	**Renewable**	**Geothermal**	100%	6,000 m

	Ancillary – Geothermal	**Renewable**	**Geothermal_Ancillary**	50%	3,000 m
	Solar	**Renewable**	**Solar**	25%	1,000 m
	Wind	**Renewable**	**Wind**	25%	6,000 m
Linear Rights of Way	LROW – High	**LROW**	**LROW_High**	50%	1,000 m
	LROW – Low	**LROW**	**LROW_Low**	25%	500 m
Mineral Exploration[3]	Mineral Exploration	**Exploration**	**Exploration**	100%	0 m
Other Disturbance	Other -High[4]	**Other**	**Other_High**	75%	6,000 m
	Other – Medium[5]	**Other**	**Other_Medium**	50%	3,000 m
	Other – Low[6]	**Other**	**Other_Low**	25%	1,000 m
	No Indirect Disturbance	**Other**	**No_Indirect_Dist**	100%	0 m

[1]The project proponent may request to review and adjust the weight and distance criteria based upon powerline height, construction, perch deterrents or other site-specific factors. Any requests must be submitted to the Administrator and approved by the Scientific Committee.

[2]The Urban Low classification includes landfills.

[t] When digitizing anthropogenic features or categorizing proposed surface disturbance, the Type and Subtype attributes must be exactly the same as the Type and Subtype codes provided in this table, including capitalization. To aid in digitization, editing templates have been provided.

[3]Mineral exploration is a special case of impact type and includes exploration associated with CCS defined disturbance within Table 2, including mining, oil and gas, renewable, etc. Additional information is provided throughout this guide for this type of impact.

[4] Examples include: Structures that could be used as perching and nesting by ravens; consistent or continuous noise; subsidies that would act as predator attractants; continuous activity and other attributes that suggest large-scale disturbance. The SETT intends to capture the majority of disturbances within the provided weights and distances. If warranted, the SETT may determine the 75% weight for the High category be adjusted to 100% under certain circumstances. The SETT would bring any proposed disturbances that may warrant a 100% weight to the SEC for consideration.

[5]Examples include: Disturbances that are minimized using measurable methodologies; intermittent or less continuous noise and activity.

[6]Examples include: Disturbances that do not exhibit significant indirect impacts; general presence of infrastructure, direct habitat loss, and potential for invasive weed spread from ground disturbance will be the primary impacts expected.

DEBIT PROJECTS: GUIDANCE FOR COMPLETING THE DESKTOP ANALYSIS

This section describes the process required to assess a debit project. Only a Desktop Certified Verifier should run these tools. Tools provided in the Debit Toolbox are intended to facilitate the assessment of debit projects. User input is required. Please read each step carefully. User tips are provided for each step, some of which may be required to successfully complete the step in certain circumstances. We recommend reviewing this guide in its entirety before starting.

Each tool will add one or more feature classes to the default file geodatabase. Subsequent tools require these feature classes in order to run. Do not modify or rename these feature classes. Only outputs that are added to the Table of Contents and map display should be edited.

If you have already delineated map units and/or current anthropogenic features, you will be able to use those layers in this process. You do not need to re-create those layers. If you have already delineated map units, instructions will be provided in step D11. If you have already digitized current anthropogenic features, instructions will be provided in step D7.

For a description of the tools and the calculations the automated tools are completing, refer to Appendix 5. Debit Tool Overview.

D1. Create project folder, project geodatabase, and map document

D1.1 In ArcCatalog, create a new folder for the project. Name this folder following the convention ProjectName_YYYYMMDD.

D1.2 Within the folder, create a new File Geodatabase (.gdb) by right-clicking on the folder and selecting 'New' > 'File Geodatabase'. Give it the same name as the project folder.

D1.3 Open **NV_CCS_Map_Template** (.mxd), located in the Nevada Data Package, and save a copy of the map document within the project folder. Give it the same name as the project folder.

D1.4 If necessary, add the Debit Toolbox to ArcToolbox by right-clicking on the parent ArcToolbox ( ) in the ArcToolbox window and selecting 'Add Toolbox'. Navigate to the Toolbox saved in the Nevada Data Package (see Data Required Section) and click 'Open'. The toolbox should now be available in the list of toolboxes. When working from **The Nevada CCS Map Template**, all toolboxes should already be available.

D1.5 In ArcMap, open the Catalog window ( ), navigate to the new geodatabase, right click on it and select 'Make Default Database'.

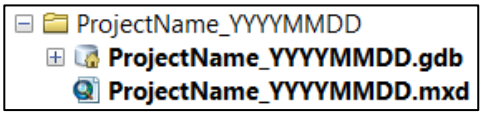


Figure 1: Structure of the project folder

You will submit this Project Folder as a zipped folder (.zip) to the Credit System Administrator along with the Project Calculator.

ArcPro Note: In ArcPro, starting a new "project" will automatically create a geodatabase and folder with the same name.

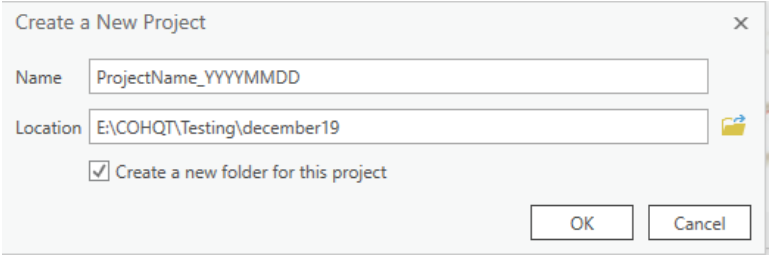


Figure 2: ArcPro Project Creation Prompt

Once a new project is started, import the **NV_CCS_Map_Template** as your starting map. The default geodatabase and folder should be in the catalogue, demarcated by the home symbol ( )

Tips

- When creating folder names and file names, use only letters, numbers, and underscores. Do not use other characters. Do not start file names with a number. Some tools will not run properly if there are periods, hyphens, or other symbols in the folder or file names.

D2. Run Debit Tool 1

[ArcToolbox > DebitTools > Debit Tool 1]

- **Project Geodatabase** = the unique project geodatabase for this project.
- **Proposed Surface Disturbance** = a shapefile or feature class of the area of the proposed surface disturbance. If no feature class or shapefile is provided, a template will be created for you. *Note: for exploration, a Plan of Operations Project Area or an appropriate pre-determined spatial area can be used, additional clarification for exploration can be found in Appendix 1.*
- **Debit Project will remove or modify existing anthropogenic features? (optional)** = *check* if the debit project proposes to remove or mitigate existing anthropogenic features. DO NOT check this box if the project is expanding or upgrading an existing feature--only check this box when the project will remove or mitigate the impact of an existing anthropogenic feature.
- **Proposed Modified Features (optional)** = Provide a shapefile or feature class that outlies the specific anthropogenic features to be modified or removed. If no shapefile is provided, a template will be created for you. If the project is expanding or upgrading an existing feature, leave this blank.

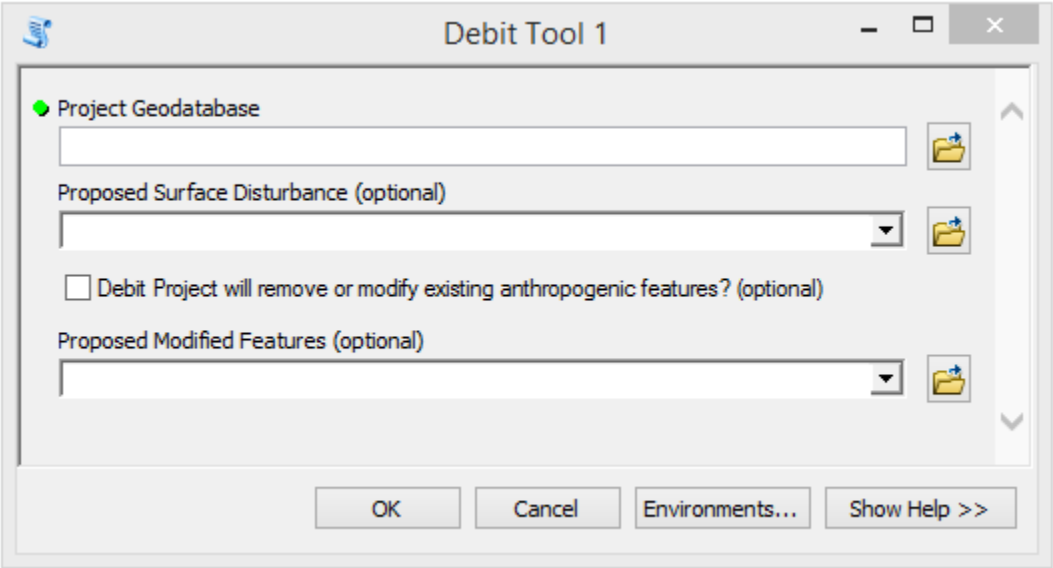


Figure 3. Debit Tool 1 interface

Tips

- If the **Proposed_Surface_Disturbance** provided by the project proponent is represented by multiple shapefiles, use the Merge tool to merge the shapefiles into a single feature class. Ensure you are using the 'as built' shapefiles for the proposed disturbance layers. Do NOT use a PoO, full Plan Boundary, or full construction ROW widths for disturbance. Often a construction ROW is many times greater than what the actual disturbance will be. Delineate what will actually be put on the ground individually. See Mineral Exploration in Appendix A for when an exception may be in order.

[ArcToolbox> Data Management> General> Merge]

- Input Datasets = All shapefiles representing the **Proposed_Surface_Disturbance,**
- Output Dataset = **Proposed_Surface_Disturbance,**
- Field Map = *leave as default*.

- Overlapping polygons must be removed from the **Proposed_Surface_Disturbance** layer provided by the project proponent before running Debit Tool 1. Use the Intersect tool to determine if the layer contains overlapping polygons.

[ArcTools> Analysis> Overlay> Intersect]

- Input Features = **Proposed_Surface_Disturbance**
- Output Feature Class = *append* **'_Merged'** *to feature class name*
- Join Attributes = ALL,
- XY Tolerance = *blank*,
- Output Type = INPUT.

- If the Proposed_Surface_Disturbance comprises multiple disturbance types and subtypes (Table 1) or different term limits (temporary or permanent), represent each as a separate polygon. To efficiently split polygons, use the Cut Polygon tool ( ) in the Editor toolbar.

- If overlapping polygons are present, remove any areas of overlap: In an editing session, select an overlapping polygon. Select the Clip tool in the Editor toolbar (Editor> Clip). A dialog box will pop up. Leave the Buffer Distance = 0.0 and select 'Discard the area that

intersects', then click OK. Any polygon portions overlapping the selected polygons will be deleted. Repeat for all overlapping polygons. Consult the project proponent if unsure about how to categorize overlapping areas.

D3. Categorize the Type & Subtype of the Proposed_Surface_Disturbance_Debits layer

D3.1 In the Table of Contents window, right-click on the **Proposed_Surface_Disturbance_Debit**s layer and open the attribute table.

D3.2 Start an editing session by right-clicking on the **Proposed_Surface_Distubance_Debits** layer in the Table of Contents and selecting 'Edit Features > Start Editing'.

ArcPro Note: Editing sessions will automatically start upon double clicking on the attribute table. Ensure all edits are saved and editing session is over by clicking "Save" on the editing toolbar once all editing is complete.

- If a shapefile or feature class was provided, review the features and edit as needed. If not, digitize the outer extent of all proposed anthropogenic features. Ensure that the outer extents of all proposed anthropogenic features are digitized correctly and all pre-populated data is accurate. Ensure you are using the 'as built' shapefiles for the proposed disturbance layers. Do NOT use a PoO, full Plan Boundary, or full construction ROW widths for disturbance. Often a construction ROW is many times greater than what the actual disturbance will be. Delineate what will actually be put on the ground individually. See Mineral Exploration in Appendix A for when an exception may be in order.

D3.3 Populate the 'Type' and 'Subtype' fields for each feature based on the descriptions in Table 1 (see Appendix 1 for definitions). The 'Proposed Surface Disturbance' file provided by the project proponent will likely contain field codes analogous to the 'Type' and 'Subtype' fields populated with information from Table 1. Work with the project proponent to re-categorize the layer using those field codes if necessary.

D3.4 Populate the 'Surface_Disturbance' field for each feature based on the type of surface disturbance permitted for that feature. Refer to field code definitions below.

i. **Term_Reclaimed**: a feature permitted for a limited term disturbance (i.e., not perpetual) that will be reclaimed at the end of the project permit.

ii. **Term_Retired**: a feature permitted for a limited term disturbance that will NOT be reclaimed at the end of the project permit (e.g., a mine pit).

iii. **Term_Reclassified**: a feature permitted for a limited term disturbance that will be reclassified to another disturbance type at the end of the permit term (e.g., a High Use haul road or ingress/egress route to a facility that will remain for local traffic following disturbance as a Low Use road).

iv. **Permanent**: a feature permitted for disturbance in perpetuity (e.g. a new High Use road).

D3.5 For surface disturbance classified as 'Term_Reclassified', populate the 'Reclassified_Subtype' field with the Subtype of the feature planned after the permit expires (see Table 1). For all other features, leave this field blank.

D3.6 Save the edits and stop editing when done.

Table

Proposed_Surface_Disturbance_Debits

OBJECTID *	SHAPE *	Name	Type	Subtype	Surface_Disturbance	Reclassified_Subtype
1	Polygon ZM	AncillaryMiscAreas	Mines	Active_Large	Term_Reclaimed	<Null>
2	Polygon ZM	AncillaryService	Mines	Active_Large	Term_Reclaimed	<Null>
3	Polygon ZM	CrusherStageVI	Mines	Active_Large	Term_Reclaimed	<Null>
4	Polygon ZM	GrowthMedia	Mines	Active_Large	Term_Reclaimed	<Null>
5	Polygon ZM	Minor Diversion	Mines	Active_Large	Term_Reclaimed	<Null>

0 (0 out of 22 Selected)

Proposed_Surface_Disturbance_Debits

Figure 4: Example Completed Attribute Table for 'Proposed_Surface_Disturbance_Debits' Layer

Tips

- For debit projects with multiple debit terms, consult with the Credit System Administrator to estimate the credit obligation at each phase of the project.

D4. OPTIONAL - Identify and delineate anthropogenic features proposed for modification or removal

For debit projects that will remove or reduce the impact of existing anthropogenic features, digitize and/or populate the attribute table with the 'Type' and 'Subtype' of the anthropogenic features to be removed or modified.

D4.1 In the Table of Contents window, right-click on the **Proposed_Modified_Features** layer and open the attribute table.

D4.2 Start an editing session by right-clicking on the **Proposed_Modified_Features** layer in the Table of Contents and selecting 'Edit Features > Start Editing'.

ArcPro Note: ArcGIS Pro automatically starts an edit session when you modify existing data or create new data. Saving or discarding your edits automatically stops the edit session.

D4.3 Review any features that are already delineated and edit as needed. Ensure that the outer extents of all anthropogenic features proposed for modification are digitized correctly. Delineate additional features as needed.

D4.4 Populate the 'Type' and 'Subtype' fields for each entry. Be sure to save edits and stop editing when done. The 'Type' and 'Subtype' provided here should reflect the current 'Type' and 'Subtype' of the feature, NOT the 'Type' and 'Subtype' after modification.

D5. Run Debit Tool 2

[ArcToolbox > DebitTools > Debit Tool 2]

- **Proposed_Surface_Disturbance_Debits** = the **Proposed_Surface_Disturbance_Debits** layer edited in step D3. Ensure the attribute table has been populated appropriately.
- **Proposed Modified Features (optional) =** the feature class containing the anthropogenic features proposed for modification or removal, if applicable. Ensure the 'Type' and 'Subtype' fields in the attribute table have been populated with the current (not proposed/modified) anthropogenic type and subtype.
- **Project Folder** = the unique folder for this project. A copy of the **Debit_Project_Area** will be saved as a shapefile to this folder. Provide this layer as the 'Project Extent' to NDOW to request the **Dist_Lek** layer.

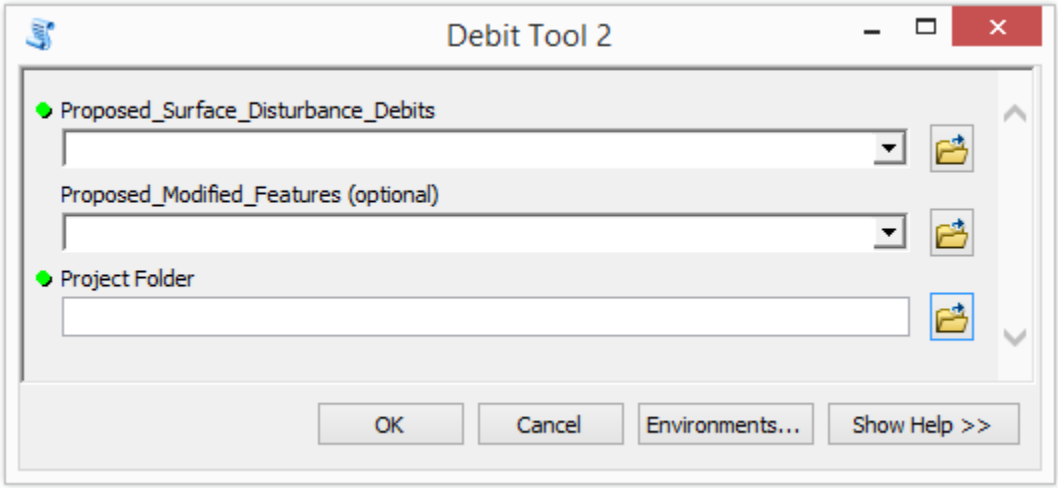


Figure 5. Debit Tool 2 interface

D6. Acquire the Dist_Lek layer from the Nevada Department of Wildlife (NDOW)

D6.1 Submit a Data Request Form, available from the NDOW website at http://www.ndow.org/Nevada_Wildlife/Maps_and_Data/Data/.

D6.2 Provide the **Debit_Project_Area** shapefile as the 'Project Extent'. The **Debit_Project_Area** shapefile is saved in the project folder. Clarify that you are requesting the **Dist_Lek** layer for the purpose of assessing a Debit project site for the Conservation Credit System.

D7. Identify and delineate anthropogenic features

Review each layer in the Anthro_Feature.gdb feature group within the Nevada Data Package as a starting point to help identify and delineate anthropogenic features that exist within the extent of the Analysis_Area. A combination of these layers, aerial imagery, and knowledge of the site should be used to identify existing anthropogenic features within the extent of the Analysis_Area layer. Also see the additional guidance provided in Appendix 1. If historical or recent mineral exploration is within the analysis area, please refer to the related section of Appendix 1.

If you have already digitized anthropogenic features and all features have been merged into a single feature class, skip this step and provide that feature class or shapefile as the 'Current_Anthro_Features' parameter in Debit Tool 4. Ensure the 'Type' and 'Subtype' fields in the attribute table are populated with the correct codes found in Table 1. Note that the fields 'Overlap_Status', and 'Returned' are new in version 1.6 of the HQT and must be included in the Current_Anthro_Features feature class. See step D9 and Appendix 16 for additional guidance.

For each anthropogenic feature layer in the Anthro_Feature feature group of the map document that requires modification or digitization, edit as follows:

D7.1 Right click on the layer in the Table of Contents, click 'Edit Features', then click 'Start Editing'. Using editing tools, modify and/or create features as needed. Use the Create Features window ( ) to access templates for easier editing.

D7.2 Open the attribute table and populate the 'Type' and 'Subtype' fields for each entry. Use the 'Type Code' and 'Subtype Code' for each attribute as provided in Table 1. Be sure to save edits and stop editing when done.

D7.3 If the project proposes to remove or modify anthropogenic features, ensure that feature is delineated within the correct layer in the Anthro_Feature.gdb.

Tips

- When editing existing anthropogenic feature layers, use the templates available in the Create Feature toolbar ( ). This will automatically pre-populate the required fields with the specified defaults, saving time and reducing data entry errors.
- Do not add new anthro features to an existing Current_Anthro_Features. Add them to the base Anthro_*feature type** layers and create a new Current_Anthro_Features layer. Not starting from scratch can significantly affect the final calculation.
- Do not change the names of the '**Anthro_*feature type***' feature classes in the project's geodatabase. If existing anthropogenic features of a specific type are digitized in a layer other than the '**Anthro_*feature type***' layer created by Debit Tool 3, copy and paste those features into the appropriate '**Anthro_*feature type***' layer.

- Click the Edit tool ( ) on the Editor toolbar
- Click the feature you want to copy. Hold down SHIFT while clicking features to select additional features.
- Click the Copy button ( ) on the Standard toolbar.
- Click the Paste button ( ) on the Standard toolbar.
- Click the '**Anthro_*feature type***' layer in which to store the pasted feature.
- Click OK. The feature is pasted into the appropriate layer.

- Use the Data Driven Pages feature in ArcGIS to check your work before moving on:
  - Create a grid index to facilitate review of aerial imagery at approximately 1:3,000 scale.

[ArcToolbox> Cartography Tools> Data Driven Pages> Grid Index Features]

- Output Feature Class = a new layer named **GridIndexFeatures**
- Input Features = **Analysis_Area**
- Generate Polygon Grid that intersects input feature layers or datasets = *checked*
- Use Page Unit and Scale = *unchecked*
- Polygon Width = 1000 (in meters)
- Polygon Height = 1000 (in meters)
- *All other fields = blank*
  - Add the Data Driven Pages toolbar (Customize >Toolbars >Data Driven Pages), then set up data driven pages by clicking the Data Driven Page Setup icon ( ) and selecting **GridIndexFeatures** as the Layer. Leave all other options unchanged and click 'OK'.
  - Flip through every page using the next page icon ( ) for a thorough review.

D8. Run Debit Tool 3

[ArcToolbox > DebitTools > Debit Tool 3]

- **Proposed_Surface_Disturbance_Eligible:** the **Proposed_Surface_Disturbance_Eligible** layer created by Debit Tool 2. This layer MUST be located within the project's unique geodatabase.

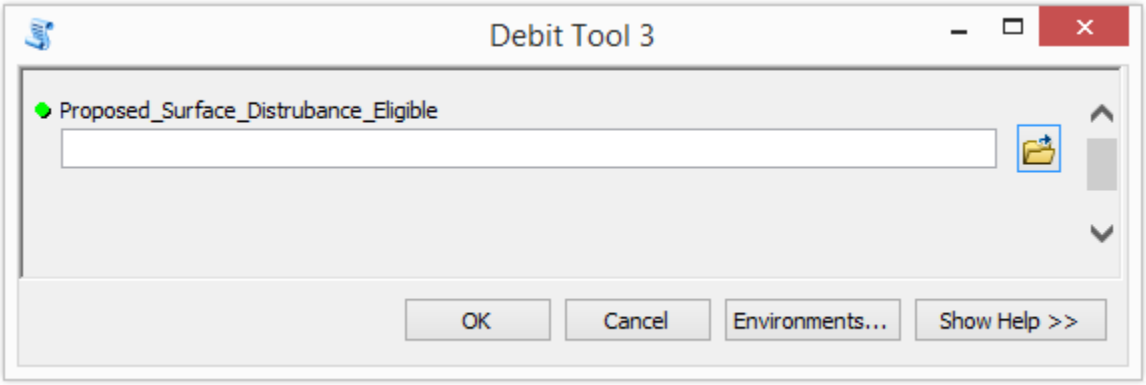


Figure 6. Debit Tool 3 interface

D9. Categorize existing features that overlap with proposed disturbance

Debit Tool 3 will identify and isolate existing anthropogenic features that overlap eligible (i.e., located on public land) proposed surface disturbance. These overlapping features require additional categorization in order to be represented properly in the Projected and Permanent Anthro Feature layers. For each anthropogenic feature where overlap was identified, edit the 'Overlap_Status' and 'Returned' attributes as follows. Anthropogenic feature layers will now be named '**Anthro_*feature type*_Clip**', where *feature type* refers to a specific anthropogenic Subtype (e.g. Mines – Large, Active).

D9.1 Right click on the layer in the Table of Contents, click 'Edit Features', then click 'Start Editing'.

D9.2 Update the 'Overlap Status' field for existing features that overlap the debit project. This is important and usually overlooked, especially when rerunning. Existing features are classified as 'Retained' by default, unless they overlap the proposed surface disturbance, in which case they are classified as 'Removed'. Powerlines are a special case that are classified as 'Retained' by default. Refer to field code definitions below.

i. **Retained:** features that will not be removed during the permitted term of the debit project. For example, an existing powerline co-located with a new roadway or mine.

ii. **Removed:** features that will be removed during the permitted term of the debit project, or features that will be upgraded from one subtype to another. For example, a low use road upgraded to a high use road or overlapping low use road upgraded to a mine.

D9.3 Update the 'Returned' field for existing features that overlap the debit project or are permanently modified (only for debit projects that propose to remove or mitigate existing anthropogenic features, note this is only available to debit projects with permanent impact terms). Existing features are classified as 'Returned' equals True by default. Refer to field code definitions below.

i. **True:** features will be returned to their current subtype classification after the permitted term of the debit project.

ii. **False:** features that will not be returned to their current subtype classification after the permitted term of the debit project. Note, only overlapping features permitted for disturbance in perpetuity (i.e., a permanent term) are allowed to use this code.

D9.4 Update the 'Subtype_As_Modified' field for existing features that are modified by the debit project. Populate this field with the subtype that the existing feature will be downgraded to

during the permitted term of the debit project. If the existing feature will be removed, input 'N/A'.

For features that will be permanently modified or removed, make sure to populate the 'Returned' field with 'False'

Tips

The 'Overlap_Type' and 'Overlap_Subtype' are additional fields that identify which existing '**Anthro_*feature type***' features overlap with the **Proposed_Surface_Disturbance_Eligible** layer to assist in updating the 'Overlap_Status' and 'Returned' fields.

D10. Run Debit Tool 4

[ArcToolbox > DebitTools > Debit Tool 4]

- **Analysis_Area** = the **Analysis_Area** layer created by Debit Tool 2. This layer MUST be located within the project's unique geodatabase
- **Dist_Lek** = the **Dist_Lek** layer provided by NDOW. This layer should be scaled from 0 - 1 (or within that range) and have the same extent as the **Analysis_Area**. See step D6.
- **Current_Anthro_Features** (optional) = leave blank, unless existing anthropogenic features were not delineated within each '**Anthro_*feature type*_Clip**' layer in step D7, in which provide the feature class or shapefile in which anthropogenic features were delineated. Ensure that the provided layer has a 'Type' and 'Subtype' field in the attribute table, and that the Type and Subtype are categorized according to the 'Type Code' and 'Subtype Code' provided in Table 1.

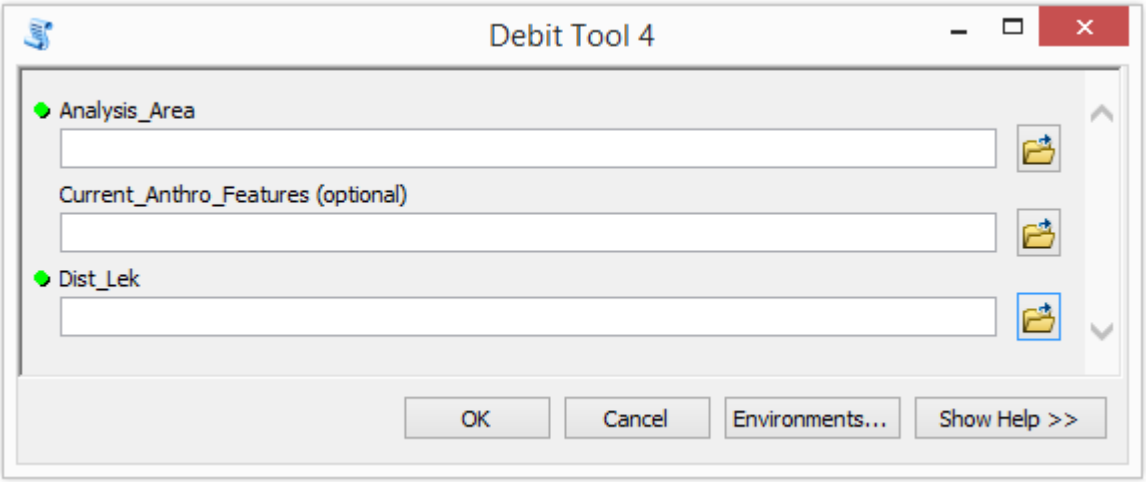


Figure 7: Debit Tool 4 interface

Tips

- After running Debit Tool 4, a raster layer named **Debit_Project_Impact** has been added to the map document illustrating where the debit project has the most impact on greater sage-grouse habitat. To reduce debits, consider modifying the debit project design to avoid areas of high impact. Re-run the Desktop Analysis to evaluate changes to the project design. You may want to create a new geodatabase so as not to have the original results overwritten.

D11. Divide Map_Units layer into discrete map units & populate attribute table

If you have already digitized map units, combine the **Map_Units** layer created by Debit Tool 3 and your previously created layer. Under Table Options, uncheck 'Show Field Aliases'. Review the instructions below to ensure the attribute table is populated correctly (ensure you are editing the correct field based on its field name, not alias). In step D12, provided the feature layer created as the 'Map_Units' parameter. Note this layer MUST be located within the project's geodatabase.

D11.1 Open the attribute table of the **Map_Units** layer.

D11.2 Start an editing session by right-clicking on the layer in the Table of Contents, clicking 'Edit Features', then 'Start Editing'.

ArcPro Note: ArcGIS Pro automatically starts an edit session when you modify existing data or create new data. Saving or discarding your edits automatically stops the edit session.

D11.3 Using the Cut Polygon tool ( ) in the Editor Toolbar, delineate map units in the **Map_Units** layer. See Appendix 2. Guidance for Delineating Map Units for detailed information. You may also use any other geoprocessing tools you desire to create map units. When running Debit Tool 4, provide the final feature class as the **Map_Units** layer. This layer does not need to be named 'Map_Units'.

ArcPro Note: This tool is called "Split"

D11.4 Map units that have been automatically delineated as meadows due to their presence in the NV_Wet_Meadows layer should be confirmed as such using aerial imagery and other sources and refined as appropriate. The NV_Wet_Meadows layer is also present in the mxd, which has further detail in the attribute table that might aid in refining delineations. It should be noted that this layer is a rough delineation and irrigated areas that meet definitions of meadow habitat in the program have often been excluded. These will often need to be delineated as well, with the exception of center pivot agriculture, which should be excluded. 'Unaltered' meadows are now the default description and 'Altered' meadows should be categorized as such. For all other map units, populate the 'Meadow' attribute with 'No_Meadow'.

- Unaltered meadows are defined at naturally occurring wetland complexes, dominated by wetland vegetation and soils (e.g. stringer meadows, springs, seeps) where the hydrology has been minimally altered or is currently not being managed.
- Altered meadows are defined as receiving either controlled irrigation, where the hydrology is currently being altered or managed (e.g. diversions, spreaders), or where the landscape is being functionally altered.

D11.5 Any proposed direct disturbance area will be sampled in the field to verify habitat function. Map units automatically labeled as 'Phase III' due to greater canopy cover in the 'Conifer_Phase' column that overlap with the proposed direct disturbance are not to be removed as non-habitat (this includes exploration). Instead, running transects will indicate whether or not a depauperate understory does indeed occur or whether habitat function is apparent due to the presence of a healthier understory. If this occurs, replace 'Phase_III' with 'N/A' in the Conifer_Phase column. In the indirect disturbance area, areas labeled 'Phase III', however, can be removed as non-habitat (Selecting Yes for "was field data collected"). Due to being indirect to and often more distant from the disturbance, it is

simply not as critical to ground-truth whether it indeed has a depauperate understory and is thus, non-habitat.

D11.6 Name map units numerically and record the name in the 'Map_Unit_ID' field. Map units that appear to be very similar, but not adjacent to each other, can receive the same numerical name and be considered a single map unit. In the field, a visual walk-through should confirm this is the case.

D11.7 Name each map unit by providing a short description, typically associated with the major vegetation type, in the 'Map_Unit_Name' field. *Important: Ensure that each map unit name associated with a unique map unit is identical, but separate map units must have a unique name.*

D11.8 Optional – Capture additional information related to each map unit in the 'Notes' field. The Notes field does not need to be identical for each unique map unit ID. The 'Notes' field for each map unit will be concatenated when dissolving the Map_Units features by Map_Unit_ID. The concatenated notes will be truncated if greater than 255 characters in length.

D11.9 Run the Intersect tool (ArcTools> Analysis> Overlay> Intersect) to ensure there are no intersects throughout the map units. Intersects can skew the final calculations. If intersects are found, they must be removed. Use the prior instructions or the Union tool to union the intersect tool results and map units, and for each sliver of overlap, determine only one map unit to assign it to, and delete any duplicates.

D11.10 Save the edits and stop editing when done.

Table

Map_Units

OBJECTID *	SHAPE *	Conifer_Phase	PJ	BROTEC	Disturbance_Type	SHAPE_Length	SHAPE_Area	Map_Unit_ID	Map_Unit_Name	Meadow	Notes
2	Polygon ZM		N/A	N/A	Direct_Term_Reclaimed	60333.956634	6066883.602301	2	Big Sagebrush	No Meadow	<Null>
3	Polygon ZM		N/A	N/A	Direct_Term_Reclassified	1321.205099	14267.672283	3	Low Sagebrush	No Meadow	<Null>
4	Polygon ZM		N/A	N/A	Direct_Term_Retired	4140.895599	262128.115187	4	Mountain Mahoga	No Meadow	<Null>
5	Polygon ZM	Phase I	True	True	Indirect	476667.766388	71460836.65821	5	Phase I PJ	No Meadow	<Null>
6	Polygon ZM	Phase I	True	True	Direct_Term_Reclaimed	69945.576095	4441127.652139	6	Phase I PJ	No Meadow	<Null>

6 (0 out of 11 Selected)

Map_Units

Figure 8: Example completed map unit attribute table

Tips

- Before beginning to delineate map units, we recommend referencing the DRG layer and grouping the ecological sites into the identified DRG groups that are listed in the attribute table. Use supplemental data sources identified in the *Data Required* section for assistance in meadow delineation and other unique features.
- Useful information about stratification has been developed by the US Department of Agriculture (Herrick et al., 2009, Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems, Chapter 2 – "Stratify Land into Monitoring Units", page 131).
- Map units should always be confirmed in the field.

- Ensure snapping is enabled (add the Snapping Toolbar if necessary). Also ensure 'Snap to Sketch' is enabled once in your editing session, this will allow you to create map units that are fully contained within one other map unit.
- Meadows should be digitized as distinct map units. Meadows are important resources for sage-grouse and so take care in identifying and delineating all meadows within the project area.

D12. Run Debit Tool 5

[ArcToolbox > DebitTools > Debit Tool 5]

- **Map Units** = the feature class or shapefile containing the delineated map units, most often the **Map_Units** layer. The provided feature class MUST be located within the project's unique geodatabase.
- **Project Folder** = the unique folder for this project. Excel files containing the outputs from this process will be saved to this folder.
- **Project Name** = a unique name which will be included in the output file name, if desired.

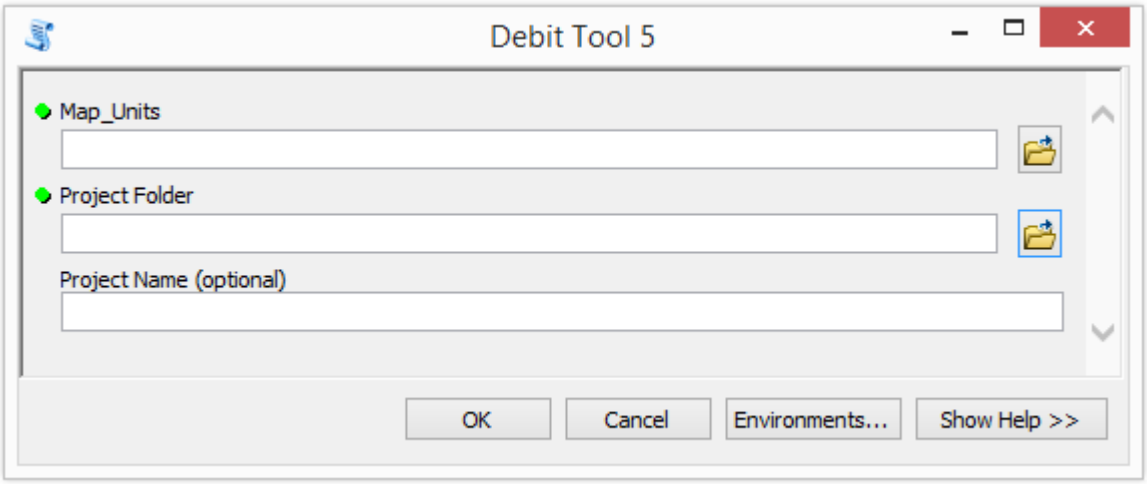


Figure 9: Debit Tool 5 interface

Tips

- If a feature class named **Map_Units_Dissolve** already exists in the project geodatabase (which may be the case if you did not follow these steps but delineated map units through a separate process), that feature class will be overwritten by Debit Tool 4. You may either change that layer's name (we recommend **Map_Units_Copy**) or save a copy outside of the project geodatabase if overwriting that layer is not desired.

D13. Specify number of transects for each map unit

D13.1 Open the attribute table of the **Map_Units_Dissolve** layer.

D13.2 Populate the 'Transects' field for each map unit with the number of transects to be sampled within each map unit according to the necessary sampling intensity (see Appendix 4. Minimum Transects Per Map Unit). For the map unit associated with existing surface disturbance, and any other map units where field data will not be collected, input '0'.

D13.3 Save edits and stop editing when done.

Tips

- A number of transects should only be specified for map units that will be sampled in the field. For map units where field data will not be collected, input '0' in the 'Transects' field.

D14. Acquire an approved Transects layer from the SETT

D14.1 Provide the **Map_Units_Dissolve** shapefile to the SETT with the Transect attribute populated. SETT will generate spatially balanced transects pre-screened for hazards including steep slopes for each project.

D15. Run Debit Tool 6

[ArcToolbox > DebitTools > Debit Tool 6]

- **Map_Units_Dissolve** = the Map_Units_Dissolve layer created by Debit Tool 4. Ensure the 'Transects' field of the attribute table has been populated appropriately (if Transects have not been generated through a separate process).
- **Transects** = A point shapefile or feature class that represents transect locations, provided by the SETT.
- **Project_Folder =** The unique folder for this project. An Excel file with transect locations and bearings will be saved here.
  Project_Name (optional) = Provide a unique name which will be included in the output file name, if desired.

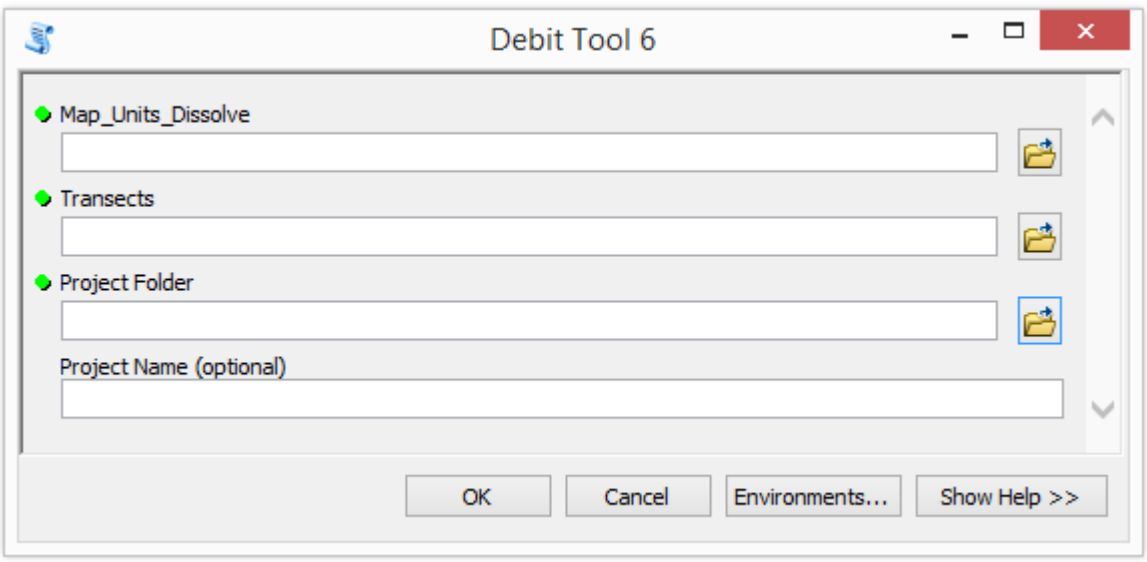


Figure 10: Debit Tool 6 interface

D16. Add the exported data to the Debit Project Calculator

D16.1 Open the project folder to find exported data tables as Excel files.

D16.2 Copy the relevant columns from the tables and Paste Values into the corresponding worksheets and columns in the Project calculator. Strict copy and paste can lead to cell formatting changes. See Figure 11 for a list of data generated during the Desktop Analysis that must be inputted into the Project HQT Calculator.

	EXPORT TABLE	CALCULATOR WORKSHEET
☐	**Map_Units_Dissolve**	1.1 Enter Map Unit Data
☐	**Current_Mgmt_Cat**	1.3 Enter Mgmt Cats Data

☐	**Current_WMZ**	1.3 Enter Mgmt Cats Data
☐	**Current_PMU**	1.3 Enter Mgmt Cats Data
☐	**Current_Precip**	1.3 Enter Mgmt Cats Data
☐	**Transects_SpatialJoin**	1.2 Enter Transects Data

Figure 11: Export Tables generated and corresponding Calculator worksheet

Exploration Special Instructions

- If an exploration project is being analyzed, replace the acreage summarized during the Desktop analysis in Tab 1.1, column L for the direct disturbance map units with the actual acreage planned for exploration. Due to analyzing a larger spatial area to account for flexibility in drill sites and roads, the correct acreage needs to replace the acreage of the Plan of Operations (PoO) Project Area or equivalent spatial area. If multiple map units exist for the direct disturbance, apply the proportion of each map unit acres of the Plan of Operations Project area to the proposed exploration acreage to calculate the appropriate acreage. For example, if 10 acres of proposed disturbance within a 1,000-acre Plan area consisted of 5 map units of 200 acres each, each map unit acreage of 200 would be replaced with 2 acres to reflect the total proposed disturbance of 10 acres. Exploration projects can either use 100% site scale function or collect field data using standard HQT protocol.
- If any of the PoO falls within mapped habitat, the entirety of the proposed exploration acreage will be applied when analyzing the project. When exploration phases are more defined, the HQT will be re-run to adjust for actual proposed or disturbed acreage.
- Phase III conifer is not removed as a map unit when analyzing exploration.
- Meadows must be delineated as map units within a PoO when analyzing exploration.

Tips

- The Calculator includes more detailed instructions for how to input data from each field datasheet. See rows 1 and 2 in the relevant worksheet in the Calculator.
- After receiving Transect locations from the SETT, you are ready to complete Section 2. *Field Data Collection Method*. The field crew will confirm the boundaries of map units, add or remove transect locations, and confirm the location of anthropogenic features. When field work is complete, make any necessary revisions to the **Map_Units_Dissolve** layer, **Transects** layer, and **Current_Anthro_Features** layer.
- If the field crews recommend changes to the **Map_Units_Dissolve** layer, **Transects** layer, and **Current_Anthro_Features** layer, make necessary revisions and redo steps D8, D12, D15 and D16. Specify the updated **Map_Units_Dissolve** layer for the Map_Units parameter in Debit Tool 3 and updated **Current_Anthro_Features** layer for the Current_Anthro_Features parameters in Debit Tool 4.
- In Tab 2.6, under access to map unit for field sampling, put "yes" in areas of non-habitat like Phase III PJ that was not sampled. This will count the acreage but not assign any debits to those areas.
- If the Credit Buyer has decided to use 100% site scale function in lieu of field sampling, change the "Current Average Seasonal HSI" for Spring, Summer, and Winter to 100% in Sheet '1.1 Enter Map Unit Data' in the Debit Project Calculator.

CREDIT PROJECTS: GUIDANCE FOR COMPLETING THE DESKTOP ANALYSIS

This section describes the process required to assess credit projects. Only a Desktop Certified Verifier should run these tools. Tools provided in the Credit Toolbox are intended to facilitate the assessment of credit projects. User input is required. Please read each step carefully. User tips are provided for each step, some of which may be required to successfully complete the step in certain circumstances. We recommend reviewing this guide in its entirety before starting.

Each tool will add one or more feature classes to the default file geodatabase. Subsequent tools require these feature classes in order to run. Do not modify or rename these feature classes. Only outputs that are added to the Table of Contents and map display should be edited.

If you have already delineated map units and anthropogenic features, you will be able to use those layers in this process. You do not need to recreate those layers. If you have already delineated map units, instructions will be provided in step C2. If you have already digitized existing anthropogenic features, instructions will be provided in step C7.

For a description of the tools and the calculations the automated tools are completing, refer to Appendix 6. Credit Tool Overview.

C1. Create project folder, project geodatabase, and map document

C1.1 In ArcCatalog, create a new folder for the project. Name this folder following the convention **ProjectName_YYYYMMDD.**

ArcPro Note: In ArcPro, start a new template project and save it in the correct location. Then "Import Map" (in the "Insert" toolbar) and insert CO_HQT_Map_Template. (see below)

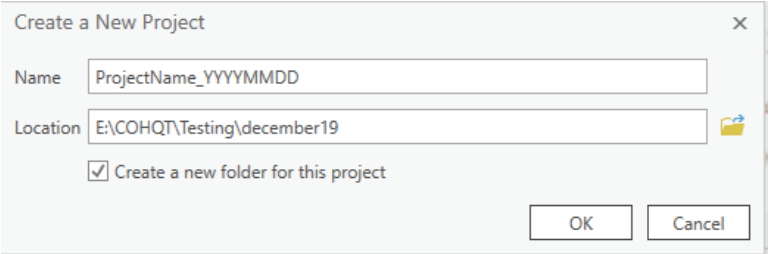


Figure 12. ArcPro Project Creation Prompt

C1.2 Within the folder, create a new File Geodatabase (.gdb) by right-clicking on the folder and selecting 'New' > 'File Geodatabase'. Give it the same name as the project folder.

ArcPro Note: In ArcPro, starting a new project will automatically create a geodatabase and folder with the same name. The default geodatabase and folder should be in the catalogue, demarcated by the home symbol ( )

C1.3 Open **NV_CCS_Map_Template** (.mxd), located in the Nevada Data Package, and save a copy of the map document within the project folder. Give it the same name as the project folder.

C1.4 If necessary, add the Credit Toolbox to ArcToolbox by right-clicking on the parent ArcToolbox) in the ArcToolbox window and selecting 'Add Toolbox'. Navigate to the Toolbox saved in the Nevada Data Package (see Data Required Section) and click 'Open'. The toolbox should now be available in the list of

toolboxes. When working from The Nevada CCS Map Template, all toolboxes should already be available.

C1.5 In ArcMap, open the Catalog window ( ), navigate to the new geodatabase, right click on it and select 'Make Default Database'.

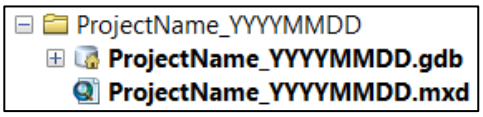


Figure 13: Structure of the project folder

You will submit this Project Folder as a zipped folder (.zip) to the Credit System Administrator along with the Project Calculator.

Tips

- When creating folder names and file names, use only letters, numbers, and underscores. Do not use other characters. Do not start file names with a number. Some tools will not run properly if there are periods, hyphens, or other symbols in the folder or file names.

C2. Run Credit Tool 1

If you have already delineated map units, provide that feature class or shapefile as the 'Credit_Project_Boundary' parameter in Credit Tool 1. Review step C3 to ensure map units were delineated correctly and, after running Credit Tool 1, populate the attribute table appropriately.

[ArcToolbox > CreditTools > Credit Tool 1]

- **Project Geodatabase** = the unique project geodatabase for this project.
- **Credit_Project_Boundary** (optional) = the area that is being proposed as the credit project, provided by the project proponent. If no shapefile was provided, see step 4 in the *Data Required* section to create this layer. If the credit project proponent does not own or control any land related to the project, leave blank. This parameter is only optional if the credit project proposes to remove or modify existing anthropogenic features and the project proponent does not own or control any land within the area of indirect benefits.
- **Credit Project will remove or modify existing anthropogenic features?** (optional) = *check* if the project proposes to remove or modify existing anthropogenic features.
- **Proposed Modified Features** (optional) = provide a shapefile or feature class that outlines the specific anthropogenic features to be modified or removed. If no shapefile is provided, a template feature class will be generated for you, provided the box described above is checked.

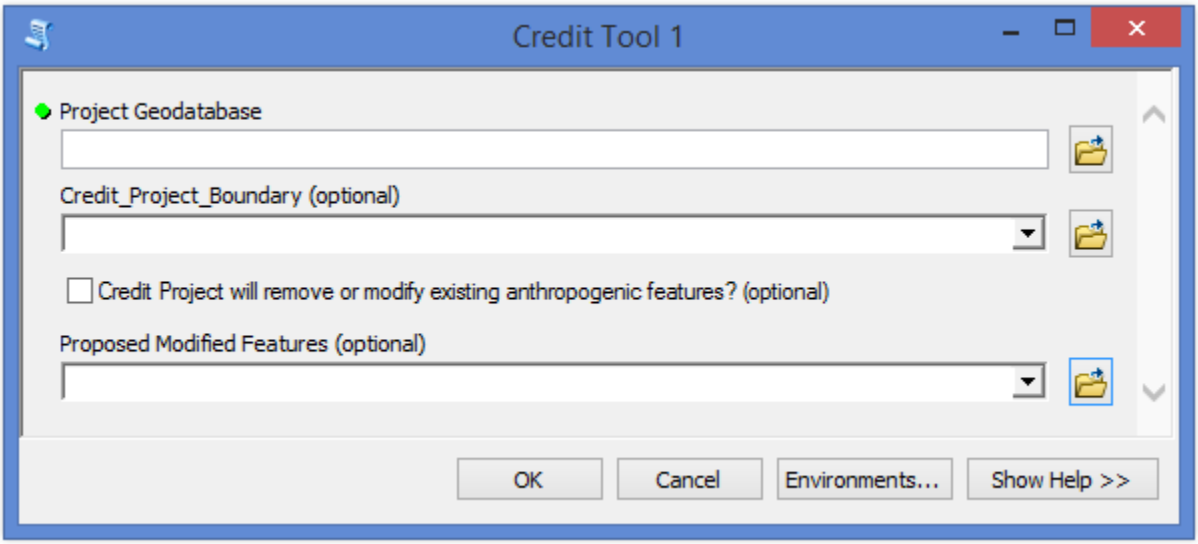


Figure 14: Credit Tool 1 interface

Tips

- If the **Credit_Project_Boundary** provided by the project proponent is represented by multiple shapefiles, use the Merge tool to merge the shapefiles into a single feature class.

[ArcToolbox> Data Management> General> Merge]

- Input Datasets = All shapefiles representing the **Credit_Project_Boundary,**
- Output Dataset = *append* **'_Merged'** *to feature class name***,**
- Field Map = *leave as default*.

- Overlapping polygons must be removed from the **Credit_Project_Boundary** layer provided by the project proponent before running Credit Tool 1. Use the Intersect tool to determine if the layer contains overlapping polygons.

[ArcTools> Analysis> Overlay> Intersect]

- Input Features = **Credit_Project_Boundary**
- Output Feature Class = *append* **'_Merged'** *to feature class name*
- Join Attributes = ALL,
- XY Tolerance = *blank,*
- Output Type = INPUT.
- If overlapping polygons are present, remove any areas of overlap: In an editing session, select an overlapping polygon. Select the Clip tool in the Editor toolbar (Editor> Clip). A dialog box will pop up. Leave the Buffer Distance = 0.0 and select 'Discard the area that intersects', then click OK. Any polygon portions overlapping the selected polygons will be deleted. Repeat for all overlapping polygons. Consult the project proponent if unsure about how to categorize overlapping areas.

- The box for the *Credit Project will remove or modify existing anthropogenic features?* MUST be checked if the project proposes to modify or remove existing anthropogenic features, even if a shapefile is provided for the Proposed Surface Disturbance parameter.

C3. Divide Map_Units layer into discrete map units & populate attribute table

C3.1 Open the attribute table of the Map_Units layer.

C3.2 Start an editing session by right-clicking on the layer in the Table of Contents, clicking 'Edit Features', then 'Start Editing'.

C3.3 Using the Cut Polygon tool ( ) in the Editor Toolbar, delineate map units in the **Map_Units** layer. See Appendix 3. Guidance for Delineating Map Units for detailed information. You may also use any other geoprocessing tools you desire to create map units. When running Credit Tool 2, provide the final feature class as the **Map_Units** layer. This layer does not need to be named 'Map_Units'.

C3.4 Map units that have been automatically delineated as meadows due to their presence in the NV_Wet_Meadows layer should be confirmed as such using aerial imagery and other sources and refined as appropriate. The NV_Wet_Meadows layer is also present in the mxd, which has further detail in the attribute table that might aid in refining delineations. It should be noted that this layer is a rough delineation, and irrigated areas that meet definitions of meadow habitat in the program have often been excluded. These will often need to be delineated as well, with the exception of center pivot agriculture, which should be excluded from credit projects in their entirety. 'Unaltered' meadows are now the default description and 'Altered' meadows should be categorized as such. For all other map units, populate the 'Meadow' attribute with 'No_Meadow'.

- Unaltered meadows are defined at naturally occurring wetland complexes, dominated by wetland vegetation and soils (e.g. stringer meadows, springs, seeps) where the hydrology has been minimally altered or is currently not being managed.
- Altered meadows are defined as receiving either controlled irrigation, where the hydrology is currently being altered or managed (e.g. diversions, spreaders), or where the landscape is being functionally altered.

C3.5 For projects proposing to remove conifer cover, the PJ_Phases shapefile will be used to automatically identify areas of Phase I and II conifer to delineate as separate map units.

- These Phase I and II layers should be ground-truthed and modified as needed. The conifer layers occasionally pick up Mountain Mahogany, and thick tree-like riparian shrubs. If a PJ layer needs to be modified, work closely with the SETT to receive an updated PJ_Phases and PJ_Uplift layers that are required to calculate uplift from conifer removal.

C3.6 Name map units numerically and record the name in the 'Map_Unit_ID' field. Map units that appear to be very similar, but not adjacent to each other, can receive the same numerical name and be considered a single map unit. In the field, a visual walk-through should confirm this is the case.

C3.7 Name each map unit by providing a short description, typically associated with the major vegetation type, in the 'Map_Unit_Name' field. *Important: Ensure that each map unit name associated with a unique map unit is identical, but separate map units must have a unique name.*

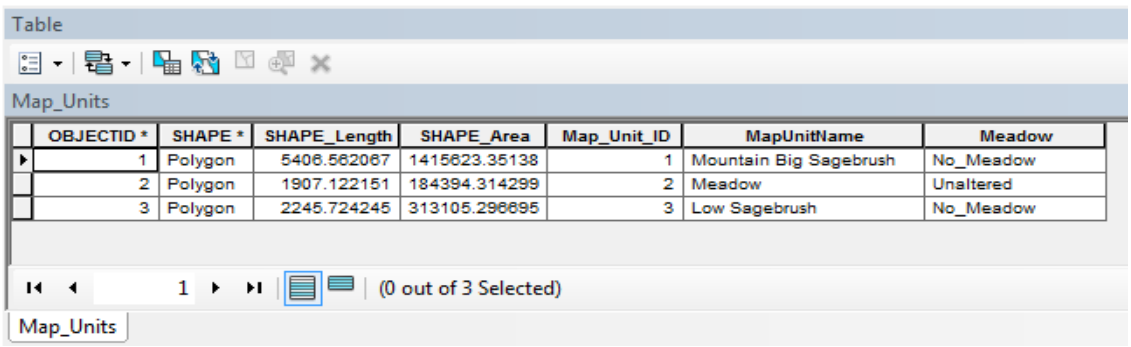
C3.8 Optional – Capture additional information related to each map unit in the 'Notes' field. The 'Notes' field does not need to be identical for each unique map unit ID. The 'Notes' field for each map unit will be concatenated when dissolving the Map_Units features by Map_Unit_ID. The concatenated notes will be truncated if greater than 255 characters in length.

C3.9 Run the Intersect tool (ArcTools> Analysis> Overlay> Intersect) to ensure there are no intersects throughout the map units. Intersects can skew the final calculations. If

intersects are found, they must be removed. Use the prior instructions or the Union tool to union the intersect tool results and map units, and for each sliver of overlap, determine only one map unit to assign it to, and delete any duplicates.

C3.10 Save the edits and stop editing when done.

NOTE If changes to the PJ layer are necessary to what has been automatically mapped, then please make changes based on the coverage of pinyon-juniper observed and delineated in the field in a clipped version in the pinyon-juniper layer. This layer should be submitted to the SETT when completed so that the necessary changes can be made at the administrative level prior to running the final Desktop Analysis. This process would be similarly necessary if there was an omission of pinyon-juniper in the layer that is present within the project area.



OBJECTID *	SHAPE *	SHAPE_Length	SHAPE_Area	Map_Unit_ID	MapUnitName	Meadow
1	Polygon	5406.562067	1415623.35138	1	Mountain Big Sagebrush	No_Meadow
2	Polygon	1907.122151	184394.314299	2	Meadow	Unaltered
3	Polygon	2245.724245	313105.296695	3	Low Sagebrush	No_Meadow

Figure 15: Example completed Map_Unit attribute table

Tips

- Before beginning to delineate map units, we recommend referencing the DRG layer and grouping the ecological sites into the identified DRG groups that are listed in the attribute table. Use supplemental data sources identified in the *Data Required* section for assistance in meadow delineation and other unique features.
- Useful information about stratification has been developed by the US Department of Agriculture (Herrick, et al., 2009, Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems, Chapter 2 – "Stratify Land into Monitoring Units", page 131).
- Map units should always be confirmed in the field.
- Ensure snapping is enabled (add the Snapping Toolbar if necessary). Also ensure 'Snap to Sketch' is enabled once in your editing session, this will allow you to create map units that are fully contained within one other map unit.
- Meadows should be digitized as distinct map units. Meadows are important resources for sage-grouse and so take care in identifying and delineating all meadows within the project area.
- If very small (< 900 square meters) map units are created when the conifer map units are automatically created, use the Delete Vertex tool ( ) to delete the vertices that segment the small map unit from the surrounding map unit. That small map unit will be subsumed into the surrounding map unit.

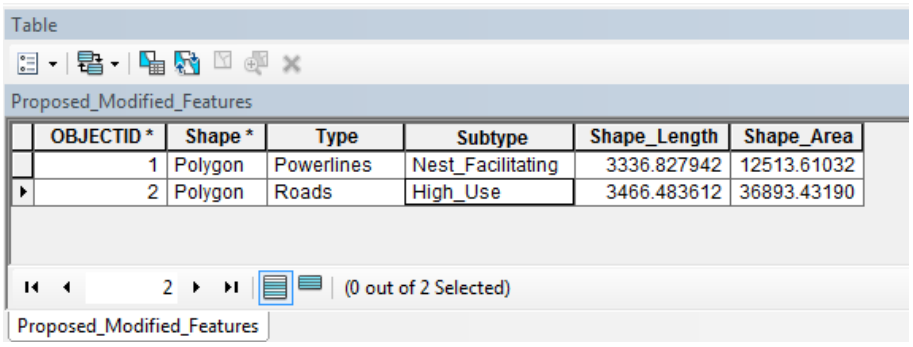
C4. OPTIONAL - Identify and delineate anthropogenic features proposed for modification

C4.1 In the Table of Contents window, right-click on the **Proposed_Modified_Features** layer and open the attribute table.

C4.2 Start an editing session by right-clicking on the **Proposed_Modified_Features** layer in the Table of Contents and selecting 'Edit Features > Start Editing'.

C4.3 Review any features that are already delineated and edit as needed. Ensure that the outer extents of all anthropogenic features proposed for modification are digitized correctly. Delineate additional features as needed.

C4.4 Populate the 'Type' and 'Subtype' fields for each entry. Be sure to save edits and stop editing when done. The 'Type' and 'Subtype' provided here should reflect the current 'Type' and 'Subtype' of the feature, NOT the 'Type' and 'Subtype' after modification.



OBJECTID *	Shape *	Type	Subtype	Shape_Length	Shape_Area
1	Polygon	Powerlines	Nest_Facilitating	3336.827942	12513.61032
2	Polygon	Roads	High_Use	3466.483612	36893.43190

Figure 16: Example completed Proposed_Modified_Features attribute table

C5. Run Credit Tool 2

[ArcToolbox > CreditTools > Credit Tool 2]

- **Map_Units or Modified_Anthro_Features** = the Map_Units layer edited in step C3. The provided feature class MUST be located within the project's unique geodatabase.
- **Proposed_Modified_Features** (optional) = the Proposed_Modified_Features layer edited in step C4. The provided feature class MUST be located within the project's unique geodatabase.
- **Project Folder** = the unique folder for this project. A copy of the **Credit_Project_Area** will be saved as a shapefile to this folder. Provide this layer as the 'Project Extent' to NDOW to request the **Dist_Lek** layer.

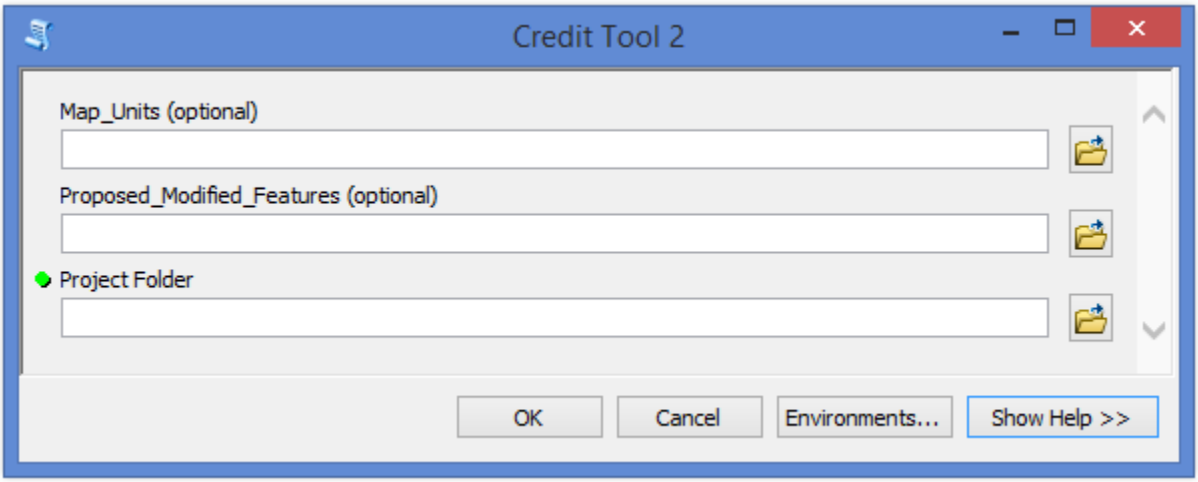


Figure 17: Credit Tool 2 interface

C6. Acquire the Dist_Lek layer from the Nevada Department of Wildlife (NDOW)

C6.1 Submit a Data Request Form, available from the NDOW website at http://www.ndow.org/Nevada_Wildlife/Maps_and_Data/Data/.

C6.2 Provide the **Credit_Project_Area** layer as the 'Project Extent'. The **Credit_Project_Area** layer is saved as a shapefile in the project folder. Clarify that you are requesting the **Dist_Lek** layer for the purpose of assessing a Credit project site for the Conservation Credit System.

C7. Identify and delineate anthropogenic features

Review each layer in the Anthro_Feature feature group that was created in Credit Tool 2as a starting point to help identify and delineate anthropogenic features that exist within the extent of the Analysis_Area. These layers are named 'Anthro_*feature type*_Clip' in the project .gdb, where *feature type* refers to a specific anthropogenic Subtype (e.g. Mines). A combination of these layers, aerial imagery, and knowledge of the site should be used to identify existing anthropogenic features within the Analysis_Area layer. Also see the additional guidance provided in Appendix 1.

If you have already digitized anthropogenic features and all features have been merged into a single feature class, skip this step and provide that feature class or shapefile as the 'Current_Anthro_Features' parameter in Credit Tool 3. Ensure the 'Type' and 'Subtype' fields in the attribute table are populated with the correct codes found in Table 1. Note that some Subtype codes have changed for anthropogenic features listed in Table 1 in v1.4 of the HQT.

For each anthropogenic feature layer in the Anthro_Feature feature group of the map document that requires modification, edit as follows:

C7.1 Right click on the layer in the Table of Contents, click 'Edit Features', then click 'Start Editing'. Using editing tools, modify and/or delineate features as needed.

C7.2 Open the attribute table and populate the 'Type' and 'Subtype' fields for each entry. Use the Type Code and Subtype Code for each attribute as provided in Table 1. Be sure to save edits and stop editing when done.

C7.3 For credit projects that propose to remove or modify existing anthropogenic features, populate the 'Subytpe_As_Modified' field with the subtype that the feature will be modified to. If the feature is to be removed, select N/A. If the project will not

remove or modify existing anthropogenic features, this attribute field will not be present.

Save features and stop editing.

Tips

- Do not add new anthro features to an existing Current_Anthro_Features. Add them to the base Anthro_**feature type** layers and create a new Current_Anthro_Features layer. Not starting from scratch can significantly affect the final calculation.
- Do not change the names of the '**Anthro_*feature type*_Clip**' layers. If existing anthropogenic features of a specific type are digitized in a layer other than the '**Anthro_*feature type*_Clip**' layer created by Credit Tool 2, copy and paste those features into the appropriate '**Anthro_*feature type*_Clip**' layer.

- Click the Edit tool ( ) on the Editor toolbar
- Click the feature you want to copy. Hold down SHIFT while clicking features to select additional features.
- Click the Copy button ( ) on the Standard toolbar.
- Click the Paste button ( ) on the Standard toolbar.
- Click the '**Anthro_*feature type*_Clip**' layer in which to store the pasted feature.
- Click OK. The feature is pasted into the appropriate layer.

- Use the Data Driven Pages feature in ArcGIS to check your work before moving on:
  - Create a grid index to facilitate review of aerial imagery at approximately 1:3,000 scale.

[ArcToolbox> Cartography Tools> Data Driven Pages> Grid Index Features]

- Output Feature Class = a new layer named **GridIndexFeatures**
- Input Features = **Analysis_Area**
- Generate Polygon Grid that intersects input feature layers or datasets = *checked*
- Use Page Unit and Scale = *unchecked*
- Polygon Width = 1000 (in meters)
- Polygon Height = 1000 (in meters)
- *All other fields = blank*
  - Add the Data Driven Pages toolbar (Customize >Toolbars >Data Driven Pages), then set up data driven pages by clicking the Data Driven Page Setup icon ( ) and selecting **GridIndexFeatures** as the Layer. Leave all other options unchanged and click 'OK'.
  - Flip through every page using the next page icon ( ) for a thorough review.

C8. Run Credit Tool 3

[ArcToolbox > CreditTools > Credit Tool 3]

- **Analysis_Area** = the **Analysis_Area** layer created by Credit Tool 2. This layer MUST be located within the project's unique geodatabase.
- **Dist_Lek** = the Dist_Lek layer provided by NDOW. This layer should be scaled from 0 - 1 (or within that range) and have the same extent as the **Analysis_Area**. See step C6.
- **Current_Anthro_Features** (optional) = leave blank, unless existing anthropogenic features were not delineated within each '**Anthro_*feature type*_Clip**' feature in step C7, in which provide the feature class or shapefile in which anthropogenic features were delineated.

Ensure that the provided layer has a 'Type' and 'Subtype' field in the attribute table, and that the Type and Subtype are categorized according to the 'Type Code' and 'Subtype Code' provided in Table 1.

- **Project Folder** = the unique folder for this project. Excel files containing the outputs from this process will be saved to this folder.
- **Project Name** (optional) = a unique name which will be included in the output file name, if desired.

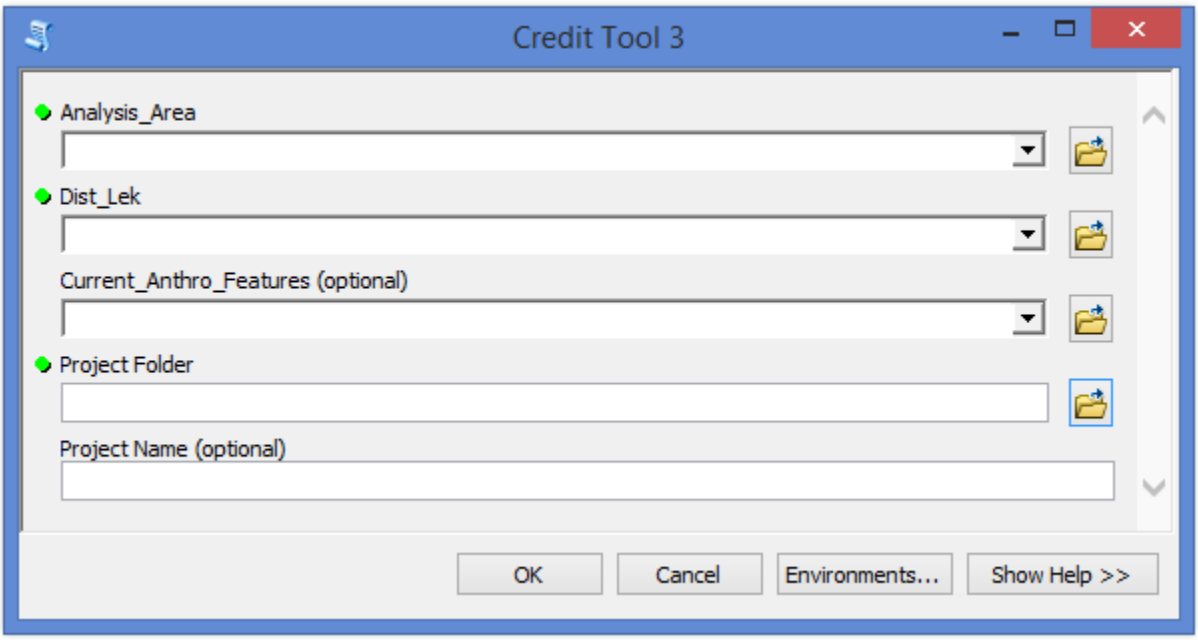


Figure 18: Credit Tool 3 interface

Tips

- If a feature class named **Map_Units_Dissolve** already exists in the project geodatabase (which may be the case if you did not follow these steps but delineated map units through a separate process), that feature class will be overwritten by Credit Tool 3. You may either change that layer's name (we recommend **Map_Units_Dissolve_Copy**) or save a copy outside of the project geodatabase if overwriting that layer is not desired.

C9. Specify number of transects for each map unit

C9.1 Open the attribute table of the **Map_Units_Dissolve** layer.

C9.2 Populate the 'Transects' field for each map unit with the number of transects to be sampled within each map unit according to the necessary sampling intensity (see Appendix 4. Minimum Transects Per Map Unit). Refer to Appendix 3 for more guidance in transect generation and screening in the Desktop Analysis. For the map unit associated with existing surface disturbance, and any other map units where field data will not be collected, input '0'.

C9.3 Save edits and stop editing when done.

Tips

- Transect numbers should only be specified for map units that will be sampled in the field. For map units where field data will not be collected, input '0' in the 'Transects' field.

- After running Credit Tool 3, a raster layer named **Credit_Quality** has been added to the map document illustrating the local-scale habitat quality of the project. You may consider changing the credit project design if local-scale habitat quality is poor. Re-run the Desktop Analysis to evaluate changes to the project design. You may want to create a new geodatabase so as not to have the original results overwritten.

C10. Acquire an approved Transects layer from the SETT

C10.1 Provide the **Map_Units_Dissolve** shapefile to the SETT with the Transect attribute populated. SETT will generate spatially balanced transects pre-screened for hazards including steep slopes for each project.

C11. Run Credit Tool 4

[ArcToolbox > CreditTools > Credit Tool 4]

- **Map_Units_Dissolve** = the Map_Units_Dissolve layer created by Credit Tool 3. Ensure the 'Transects' field of the attribute table has been populated appropriately (if Transects have not been generated through a separate process)
- **Transects** = A point shapefile or feature class that represents transect locations, provided by the SETT
- **Project_Folder =** The unique folder for this project. An Excel file with transect locations and bearings will be saved here.
  Project_Name (optional) = Provide a unique name which will be included in the output file name, if desired.

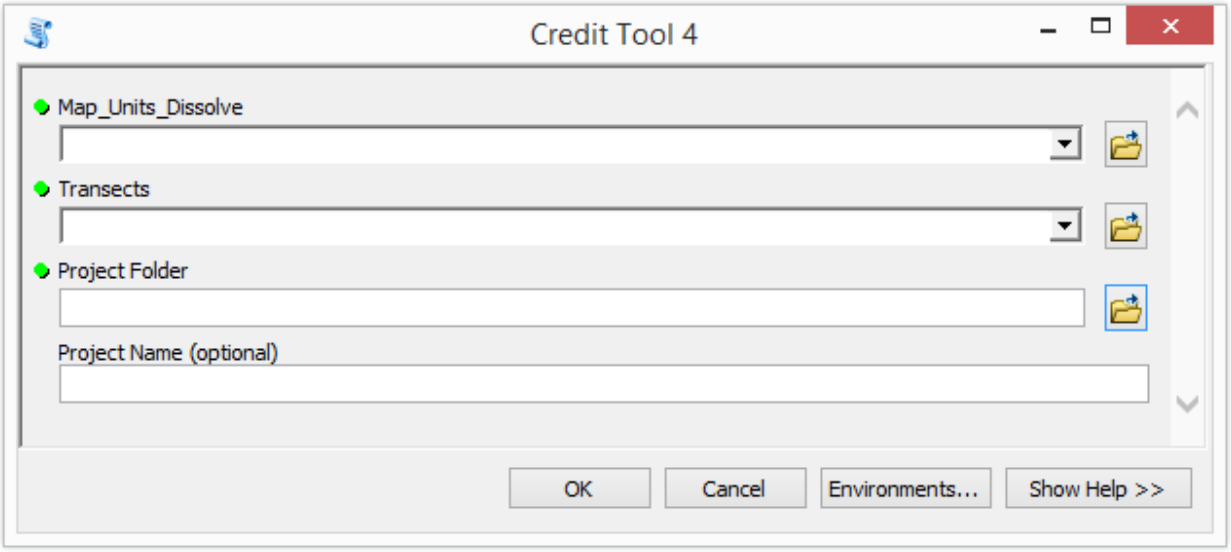


Figure 19: Credit Tool 4 interface

C12. Add the exported data to the Credit Project Calculator

C12.1 Open the project folder to find exported data tables as Excel files.

C12.2 Copy the relevant columns from the tables and Paste Values into the corresponding worksheets and columns in the Project calculator. Strict copy and paste can lead to cell formatting changes See Figure 20 for a list of data generated during the Desktop Analysis that must be inputted into the Project HQT Calculator.

	EXPORT TABLE	CALCULATOR WORKSHEET
☐	**Map_Units_Dissolve**	1.1 Enter Map Unit Data

☐	**Current_Mgmt_Cat**	1.3 Enter Mgmt Cats Data
☐	**Current_WMZ**	1.3 Enter Mgmt Cats Data
☐	**Current_PMU**	1.3 Enter Mgmt Cats Data
☐	**Current_Precip**	1.3 Enter Mgmt Cats Data
☐	**Transects_SpatialJoin**	1.2 Enter Transects Data

Figure 20: Export Tables generated and corresponding Calculator worksheet

Tips

- The Calculator includes more detailed instructions for how to input data from each field datasheet. See rows 1 and 2 in the relevant worksheet in the Calculator.
- After receiving an approved Transects layer from the SETT, you are now ready to complete Section 2. *Field Data Collection Method*. The field crew will confirm the boundaries of map units, add or remove transect locations, and confirm the location of anthropogenic features. When field work is complete, make any necessary revisions to the **Map_Units_Dissolve** layer, **Transects** layer, and **Current_Anthro_Features** layer.
- If the field crews recommend changes to the **Map_Units_Dissolve** layer, **Transects** layer, and **Current_Anthro_Features** layer, you must redo steps C8, C10 and C12. Specify the updated **Map_Units_Dissolve** layer for the Map_Units parameter and updated **Current_Anthro_Features** layer for the Current_Anthro_Features parameter in Credit Tool 3. Modify the **Transects** layer as necessary before running Credit Tool 4.
- Uplift from conifer removal will automatically be reflected in the Projected Seasonal Habitat Functions columns in the Map_Units_Dissolve layer.
- For Preliminary Credit Estimates, enter 'Yes' in the 'Summary' tab of the Project Calculator (cell F6). Preliminary Credit Estimates are intended to help with project planning and design before field data is collected. The average seasonal HSI value will be used in place of site-scale habitat quality for each map unit.

2. **Field Data**
Collection Method

FIELD DATA COLLECTIONS METHODS

The methods outlined below must be used for field data collection of attributes associated with the site scale, which defines habitat conditions at the site of proposed activities. Table 2 describes the attributes measured to calculate site-scale functional-acres for specified seasonal habitats. While non-certified personnel may assist independently in the collection of field data, a Field Certified Verifier is required to be within the credit or debit project area during field collection.

TIMING OF FIELD DATA COLLECTION

Vegetation sampling of sage-grouse habitat attributes must be conducted during the peak of the growing season. The peak of the growing season on northern Nevada rangeland generally occurs between **April 15th and June 30th**. These dates may vary slightly annually due to temperature and precipitation. The peak of the growing season varies between sites based upon elevation, latitude, and winter and spring precipitation. Take annual and site variations into account when approximating the peak of the growing season within the permissible window for the site. Peak growing season is indicated when the culms of cool season grasses have fully elongated and seed heads have emerged (not necessarily seed-ripe) and the majority of forb species are between early bloom and seed set phenological stages.

Field data must be collected during the permissible window in order for functional acre scores to be official and approved by the Administrator; however shrub data may be collected during any time of year. When making repeat visits to a site, attempt to collect data at a phenologically-similar time, or within two weeks of the first data collection for the site.

FIELD MATERIALS REQUIRED

The following materials should be collected before the field visit:

1. Credit or Debit Project Calculator
2. Hand-held sub-meter accuracy GPS unit, preloaded with transect start points (accurate to 1-5 m)
3. Field maps, using aerial photos as background
4. Datasheets
5. Camera
6. 50-meter tape
7. Chaining pins
8. 1-meter tape or wooden ruler
9. PVC or wooden Daubenmire frame (20X50cm)
10. White board for photo of transects or photo transect datasheets
11. Rangefinder or 100-meter tape for distance to sagebrush
12. Plant field guides for the area
13. Walkie talkies (optional)
14. Resistance & Resilience Scorecard & Guide, available at: http://www.fs.fed.us/rm/pubs/rmrs_gtr322.pdf
15. A User's Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas and Lentic Checklist (if applicable), available at: https://sagebrusheco.nv.gov/CCS/Program_Documents/
16. A User's Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas and Lotic Checklist (if applicable), available at: https://sagebrusheco.nv.gov/CCS/Program_Documents/
17. Ability to Control Wildfire Scorecard: *Contact the Sagebrush Ecosystem Technical Team (SETT).*

Table 2. Attributes measured and summary of data collection methods

ATTRIBUTE	RESOURCE	SAGE-GROUSE SEASON	DATA COLLECTION SUMMARY
Sagebrush canopy cover	Cover	▪ BREEDING ▪ LATE BROOD-REARING	The percent canopy cover is estimated with line intercept (% of sagebrush canopy intersecting transect line).
	Cover and Foraging	▪ WINTER	
Total shrub canopy cover (including sagebrush)	Cover	▪ BREEDING	The percent canopy cover is estimated with line intercept (% of total shrub canopy intersecting transect line).
Sagebrush height	Cover and Foraging	▪ WINTER	The sagebrush height is determined by measuring the tallest point of a shrub that is intersecting the transect line.
Distance to sagebrush cover	Cover -Trigger	▪ LATE BROOD-REARING	Distance to nearest sagebrush cover (cover equivalent to area of at least ~30x30 m, with density of 10% canopy cover, and average height of 30cm) is measured from the 30 m point along each 50 m transect.
Perennial forb canopy cover	Foraging	▪ BREEDING ▪ LATE BROOD-REARING	Percent cover of perennial forbs is determined by sampling within a standard-sized Daubenmire plot (20x50 cm) at 10 meter increments along a 50 m transect (5 plots total/ transect).
Forb species richness (# of species)	Foraging	▪ BREEDING ▪ LATE BROOD-REARING	Abundance of forbs (annual and perennial) is determined by sampling within a standard-sized Daubenmire plot (20x50 cm) at 10 meter increments along a 50 m transect (5 plots total/ transect).
Perennial grass canopy cover	Cover-Trigger	▪ BREEDING	Species and percent cover of perennial grasses is determined by sampling within a standard-sized area of Daubenmire plot (20x50 cm) at 10 meter increments along a 50 m transect (5 plots total/ transect).
	Cover	▪ LATE BROOD-REARING	
Invasive annual grass canopy cover	Modifier	▪ BREEDING ▪ LATE BROOD-REARING	Percent cover of annual grasses is determined by sampling within a standard-sized area of Daubenmire plot (20x50 cm) at 10 meter increments along a 50 m transect (5 plots total/ transect).

DETAILED INSTRUCTIONS

F1. Conduct Site Reconnaissance

Upon initial arrival at the site, field crews should conduct reconnaissance (walking or driving) together to roughly quality-check the map unit delineations. Map units, especially in agricultural and meadow areas, often change from year to year, and may not reflect even relatively recent aerial photography. As well, changes in some vegetation communities may not be evident on aerial photographs, such as understory composition. If pinyon-juniper is indicated to be present within the Desktop Analysis map template pinyon-juniper layer, relevant areas should be assessed in the field for verification that pinyon or juniper species are indeed present as mapped. The pinyon-juniper layer includes occasional misclassifications of other conifer or deciduous species such as mahogany that create this need for ground-truthing. In addition, it is possible omissions in the pinyon-juniper layer exist that require inclusion. Crews should be prepared to modify map unit boundaries (both further sub-dividing maps units and conglomerating existing maps units) and potentially the pinyon-juniper layer in the field based on observations. Crews should also come to a common understanding of the plants present, and the protocol that follows. Any changes to map units must be noted and map unit and relevant GIS data files must be corrected after field work is complete. In addition, if sites have high variability that cannot be accounted for through changes in map unit delineations, additional transects should be added to the protocol based on the best judgement of the verifier. While crews are checking out the map units, effort should be expended looking at the terrain and checking the presence of roads in order to identify areas where alternate routes may be needed. In addition to checking the map unit delineations, crews should also confirm placement and type of anthropogenic features, especially powerlines, and fill out the Anthropogenic Features Datasheet, especially with any changes or additions to the anthropogenic layer.

F2. Document Anthropogenic Features

F2.1 The anthropogenic features map developed in the pre-field desktop analysis should be ground-truthed on foot or in a vehicle. Additional features that are identified should be marked on the map and digitized in the office in ArcGIS; similarly GPS coordinates collected and recorded in the field should be added to ArcGIS in the office.

F2.2 Newly identified features should be noted on the anthropogenic features datasheet for the project site.

F2.2(a) If features are marked on the map, be sure to attach map to the anthropogenic features datasheet.

F2.2(b) If features are marked using GPS, be sure to record GPS unit name and use the following naming code: **XXX-** # where **XXX** is the three letter abbreviation for project site, and # is a unique sequential number for each feature identified in the field.

F3. [Repeat Steps F4 - F12 for each Map Unit]

F4. Complete Map Unit Datasheet

The map unit datasheet should be the first form filled out when arriving at the site and continued to be filled out as the sampling is completed (see Appendix 9. Map Unit Datasheet). For each map unit, record the date, map unit description, and other mandatory information. The total number of map units sampled within the project site should be counted and recorded after all map units have been sampled.

F5. Complete Resistance & Resilience Scorecard

Complete the Resistance and Resilience Score Sheet for each ecological site/map unit within the project area (see *Field Materials Required*, the Resistance & Resilience Scorecard should have been partially filled

out during the Desktop Analysis), referring to the accompanying field guide[1]. Once the score cards are complete, the total score for the project site should be calculated and entered into the Calculator on the Baseline and Reserve Account tab.

F6. Complete Ability to Control Wildfire Scorecard

Complete Wildfire Score Sheet for each ecological site/map unit within the project area (see *Field Materials Required*, the Wildfire Scorecard should have been partially filled out during the Desktop Analysis), referring to the accompanying field guide. Once the score cards are complete, the total score for the project site should be calculated and entered into the Calculator on the Baseline and Reserve Account tab.

F7. Complete Lentic or Lotic PFC Checklist (if applicable)

F7.1 Complete the Lentic or Lotic PFC Assessment Checklists for the credit projects only.

- F7.1(a) Proof of PFC training is required and must be renewed every 5 years.
- F7.1(b) One checklist must be completed per riparian system or reach if system can be divided into reaches.
- F7.1(c) At least two people, but three are recommended, must complete PFC together.
- F7.1(d) Each PFC Reach will be named as followed: **XXX-PFC-[ReachName]**
- F7.1(e) Photos should be labeled as XXX_PFC_ReachName_##_YYMMDD.jpg
  - (i) Detailed photos should be taken of each reach displaying the reasoning for the final rating. If it is PFC, show a proper functioning reach. If there are issues, display the issues such as a cut bank or lack of vegetation.
- F7.1(f) Datasheets should be compiled together into one scan and labeled **XXX_PFC**_Datasheets_YYYYMMDD.pdf
- F7.1(g) **XXX** is three letter abbreviation for project site and the **Reach Name** should be a descriptive location name of the reach surveyed (LowerKidCreek; UpperFish)
- F7.1(h) Example: DBR-PFC-Lower, DBR_PFC_Lower_1_20180628.jpg, DBR_PFC_ Datasheets_20180628.pdf

F8. [Repeat Steps F9 - F12 for each Transect]

F9. Navigate to Transect and Begin Data Collection

F9.1 Establishing a Transect

- F9.1(a) Navigate to a transect start point via hand-held GPS. Insert a chaining pin in the ground, and lay out or thread a 50-meter transect using the random bearing generated for that transect, using magnetic north. Pull the tape taut and anchor the 50 m end with a chaining pin. Populate all fields at the top of transect datasheet (Appendix 14. Transect Datasheet), with the date, observer initials, site name, map unit number, the transect number and UTMs (including UTM Zone and Datum), GPS type, transect bearing, whether the transect is within an altered or unaltered meadow, photo point numbers, and camera type.
- F9.1(b) **Always note any changes in transect location, methods, and bearings and the reason for the change on the datasheet if you deviate from the general methods or reject. Photograph if you need to justify. Always make a note of rejections and include those notes with the post-field submissions.**

[1] Miller, Richard F.; Chambers, Jeanne C.; Pellant, Mike. 2014. A field guide for selecting the most appropriate treatment in sagebrush and piñon-juniper ecosystems in the great basin: Evaluating resilience to disturbance and resistance to invasive annual grasses, and predicting vegetation response. Gen. Tech. Rep. RMRS-GTR-322 REVISED. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 66 p.

NOTE **Rejections should be made sparingly and logically, with reasons always noted on the datasheets and photos if necessary.** Reasons for rejection are, but not limited to, safety hazard (>50% slopes, large unsafe rock outcrops, talus slopes, or unsafe hiking routes), pre-established bearings do not allow for sampling, or the transect falls on or in a barrier (e.g. a thicket, body of water) and cannot be moved over ≤5m to be out of it even when reflected. **Inclusions, grazing, or non- or over-representation of the landscape or map unit are not reasons for moving or rejecting a transect.**

NOTE: If a transect crosses a map unit boundary into another map unit or outside of the project area, or runs into a fence, a body of water, or a road, the transect will need to be reflected back into the map unit by 90 degrees at that point of contact, priority to the right, if not, then left. If that doesn't work for all provided bearings, pick the next randomly generated point in that map unit.

NOTE: If a transect passes through a thicket too dense to sample properly (i.e., willow, serviceberry, mahogany, desert peach, etc.) that would run along the entire length of the transect (versus only being an issue for a few meters of the transect), reflect the transect 90 degrees at that point of contact to the right, if not possible then reflect 90 degrees to the left. If reflecting does not work for all provided bearings, pick the next randomly generated point for that map unit. If the transect falls on or in a barrier (e.g. a thicket, body of water) and can be moved over ≤5m and be out of it, then move and sample. If not, then pick the next randomly generated point for that map unit.

Figure 21. Transect reflection examples (a. map unit boundary, b. stream, c. moving the transect 3 meters out of dense shrubs, reflecting off of other dense shrubs, and sampling through less-dense shrubs)

NOTE: If, upon arriving at the assigned transect, the map unit was mapped incorrectly and the transect now falls outside of the designated map unit, please follow the procedure below:

If you can see the correct map unit within a reasonable distance

Starting with North, moving to East, South, and then West if each previous does not work, determine a direction that will, using the shortest route, place you within the map unit. At the border of the map unit, measure 50 meters in the cardinal direction you have determined, and at the end of the 50m is the location of your new transect. If moving 50m will again place you outside the desired map unit, move as far as you can and stop just before exiting the desired map unit. This is the location of your new transect. Proceed as normal with your bearings, even with having to reflect the transect if needed. **Record new UTMs and make note of the transect relocation and what direction was chosen**.

If you cannot see the map unit, or map unit is outside of a reasonable distance

Sample and reassign the transect to the map unit it currently falls within. Go to the next backup transect for this map unit and just add the transect into the map unit that you sampled in. **Record change in transect map unit delineation.**

Do not move the transect locations except in the instances described.

NOTE: If sampling a very small meadow (e.g. upland spring or seep) in which a transect will reflect multiple times and has the potential overlap onto itself, follow one of the two procedures depending on what will be most effective for site specific conditions:

1. **For seeps or springs:** Reflect the transect off the boundary of the map unit using an angle of your choice that will keep the transect from overlapping on itself (this can be done in GIS to prescreen applicability of this method).
2. **For thin, linear stringer meadows:** Prescreen your points prior to field collection to ensure a point falls in an area that will ensure a full 50 meters can be sampled. The goal is to quantify the best habitat possible in the map unit. Starting at the transect location, choose an initial bearing and subsequent bearings that offer the least number of reflections.

Always note what methods and bearings you used and the reason for the change on the datasheet if you deviate from the general methods or reject. Photograph if you need to justify.

F9.1(c) Transects will be named as followed: **XXX-MU#-T##**

F9.1(d) **XXX** is three letter abbreviation for project site, **MU#** is the map unit number (3-digits), and **T##** is the transect number (3-digits), all of which should be named based on information from the pre-field work desktop analysis.

F9.1(e) Example: DBR-001-001

F9.2 Photo Points

F9.2(a) Using a white board label it with the project site, date, transect name, and transect direction. Lean it next to the chaining pin it at the 0 meter mark of the transect.

(i) If the photo board is obstructed in any way at the chaining pin, move the photo board until it is visible or move the vegetation aside. Should someone be required to hold the photo board, ensure they hide their face and are crouching low in order to be as least visible as possible.

F9.2(b) Stand away from the start of the transect and align camera in direction of the transect so that the bottom of the white board is at the photo's bottom center (Figure 22) and the camera is in landscape (not portrait) format.

F9.2(c) Take photo.

F9.2(d) Photos will be named as followed: **XXX_MU#_T##_[Descriptor]**_YYYYMMDD.jpg

F9.2(e) **XXX** is three letter abbreviation for project site, **MU#** is the map unit number, and **T#** is the transect number, all of which should be named the same as the transect or reach name. The Descriptor describes the type of photo. Use **T#** for each photo of the same transect and **AF##_#** for Unknown Photos. For all other photos, use a descriptor with no spaces (BigSagebrush#; MuddyPool#) or a general Miscellaneous descriptor (Misc#), where # is a unique sequential number for each photo of that type.

F9.2(f) Example: DBR_001_001_T3_20180512.jpg, DBR_005_007_AF04_01_20180515.jpg, DBR_003_010_GiantHole01_20180515.jpg, DBR_002_003_Misc07_20180515.jpg

NOTE: For data collection: Always stand on the right side of the transect. Field data should be collected on the left side of the transect.

Figure 22. Transect photo example

NOTE: All species from Line intercept, Daubenmire plots, and general species lists, should be recorded using the following nomenclature. Species names should be recorded using full scientific name or the USDA PLANTS database species code (http://plants.usda.gov/).

If you can identify the genus, but not the species, use the PLANTS database genus code (http://plants.usda.gov). ALWAYS try to define the genus portion of the code in the notes section of the transect datasheet (e.g., *Artemisia* species = ARTEM). In addition, note if it is annual or perennial for forbs and graminoids.

Do not use common names.

If you *cannot* identify the genus, use the following codes and a short description/drawing:

- **AF#** = Annual forb (also includes biennials)
- **PF#** = Perennial forb
- **AG#** = Annual graminoid
- **PG#** = Perennial graminoid
- **SH#** = Shrub

F10. Distance to Sagebrush Cover

F10.1 Measure the distance to the nearest sagebrush, or sagebrush mixed shrub community, cover from the 30 m mark of the transect and record the distance in meters on the datasheet.

F10.1(a) Sagebrush or sagebrush mixed shrub community cover must have at least of 10% canopy cover in a minimum 30x30 m patch size with average height of 30 cm.

F10.1(b) If the transect is located within sagebrush cover, then record distance as 0 m.

F11. Line Intercept

F11.1 Shrub Canopy Cover

F11.1(a) You can begin at the 0 m or the 50 m mark for line intercept. For the entire length of the transect, record start and stop locations for all shrub species intercepting the transect using the following categories:

- Low sagebrush
- Big sagebrush
- Other

F11.1(b) Interceptions less than 5 cm are not recorded as canopy cover.

F11.1(c) If a gap is greater than or equal to 5 cm stop your intercept recording. Resume intercept once you reach canopy cover that is greater than or equal to 5 cm.

F11.1(d) Dead or decadent shrubs, if still rooted, count towards shrub canopy cover.

(i) If the entire sagebrush, including the parts not measured, is dead, categorize it as "Other" because it is no longer providing forage.

F11.1(e) Canopy cover for each shrub species is recorded, even if multiple species are overlapping.

F11.1(f) For multiple non-sagebrush shrubs of the same species that overlap, you may record the start and stop of the entire section instead of for each individual shrub.

F11.1(g) Trees and sub-trees do not count as shrub canopy cover

NOTE: The total lengths of shrubs will be added together over the 50 meters to calculate the percent canopy cover of sagebrush and total shrubs.

NOTE: The following sagebrush species are the species of sagebrush in Nevada that the CCS recognizes. No other species should be counted as sagebrush. For example, *Artemisia spinescens*, *Artemisia ludoviciana*, while they are "sage" species, they should not count as sagebrush, but are considered as "other" shrub canopy cover.

- *Artemisia arbuscula (L)*
- *Artemisia cana (B)*
- *Artemisia frigida (L)*
- *Artemisia longiloba (L)*
- *Artemisia nova (L)*
- *Artemisia papposa (L)*
- *Artemisia tridentata ssp. tridentata (B)*
- *Artemisia tridentata ssp. vaseyana (B)*
- *Artemisia tridentata ssp. Wyomingensis (B)*
- *Artemisia tripartita (B)*

F11.2 Sagebrush Height

F11.2(a) For each sagebrush plant intercepting the transect, record once the tallest vegetative portion to the nearest cm. Do not include the inflorescence of sagebrush as height.

(i) "Other" species do not need height recorded.

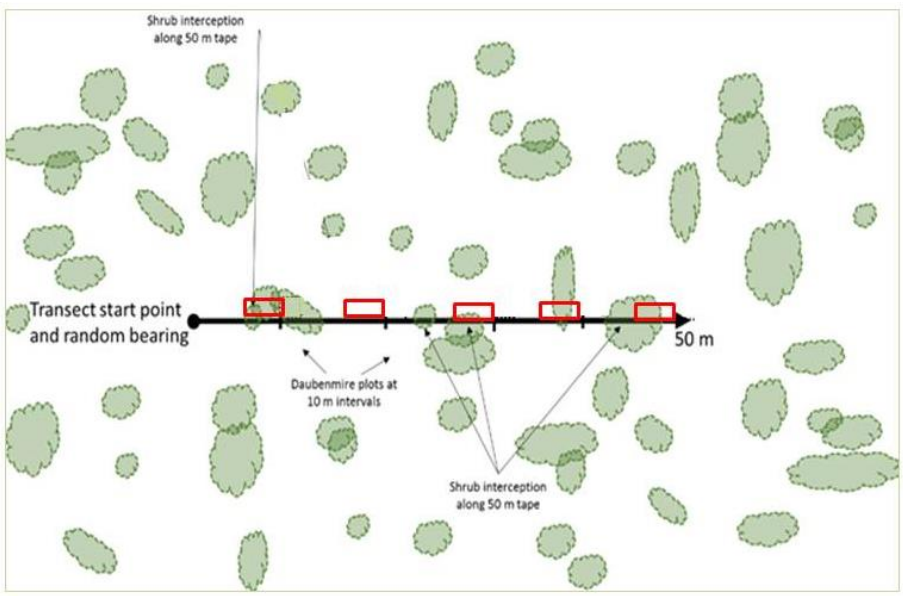


Figure 23. Diagram of transect and plots

F12. Daubenmire Plots

F12.1 Daubenmire Frame Placement

F12.1(a) Place the top of a Daubenmire frame on the left side of the transect line with the top at the 10 meter mark, aligned down the transect line (see Figure 33). The frame should be placed with the long side parallel to the transect. Take care not to damage any vegetation. Repeat these placements every 10 m, for a total of 5 plots along the 50 m transect.

F12.2 Grass and Forb Cover

F12.2(a) Record all grass and forb cover that falls within the plot using the following cover classes listed in Table 3. If the plant is rooted outside the plot, but its cover falls within the plot, those estimates should be counted towards cover. Do not include cover of a plant that falls outside of the plot, even if the plant is rooted within the plot.

F12.2(b) Identify cover for each of the following functional group categories:

- PF = perennial forb (live cover only)
- PG = perennial grass (live or residual)
- IAG = invasive annual grass (live or residual)

Table 3. Cover classes for use when estimating cover in Daubenmire frames

COVER CLASS	RANGE OF COVER (%)	MID-POINT OF CLASS (%)
1	0-5	2.5
2	5-25	15.0
3	25-50	37.5
4	50-75	62.5
5	75-95	85.0
6	95-100	97.5

NOTE: The following invasive annual grass species should be included, but not limited to, in the estimate of annual invasive grass cover:

- Cheatgrass (*Bromus tectorum*)
- Medusahead (*Taeniatherum caput-medusae*)
- Red Brome (*Bromus rubens*)
- Rattlesnake chess (*Bromus briziformis*)
- Ventenata (*Ventenata dubia*)

F12.3 Forb Species Count

F12.3(a) For each Daubenmire plot, record the USDA PLANT code or scientific name for each forb species that are rooted within the plot, annual and perennial. Once all 5 plots are completed for a transect, tally and record the count of all forb species identified within the 5 plots, this will give you a total forb species count per transect.

F12.3(b) Record all plant species encountered along the transect in the notes section of the datasheet.

F12.3(c) State listed noxious weeds should not be counted in Daubenmire counts nor forb species counts. Noxious weeds list can be found here.

F13. Input Data into Credit or Debit Project Calculator

DATA REQUIRED: All Field Datasheets completed during the Desktop Analysis, Credit or Debit Project Calculator

F13.1 Open the Project Calculator.

For each Field Datasheet:

F13.2 Enter the relevant data into the corresponding worksheets and columns in the Calculator. See Table 4 for a list of field datasheets completed during the field data collection that must be inputted into the Calculator.

Table 4. Field Datasheets completed during the Field Data Collection and corresponding Calculator Worksheet

	FIELD DATASHEETS	REFERENCE STEP	CALCULATOR WORKSHEET
☐	**Map Unit Datasheets**	F4	2.1 Track Field Sheets
☐	**Resistance & Resilience Scorecard**	F5	3.1 Enter Baseline & Rsrv Acct
☐	**Ability to Control Wildfire**	F6	3.1 Enter Baseline & Rsrv Acct
☐	**Transect Datasheets**	F9 - F12	2.2 Enter Field Info 2.3 Enter Shrub Data 2.4 Enter Forbs & Grass Data

NOTE: The Calculator includes more detailed instructions for how to input data from each field datasheet. See row 1 in the relevant worksheet in the Calculator.

NOTE: If the Credit Buyer has decided to use 100% site scale function in lieu of field sampling, change the "Current Average Seasonal HSI" for Spring, Summer, and Winter to 100% in Tab 1.1 Enter Map Unit Data in the Debit Project Calculator.

F14. Scan Datasheets

F14.1 Scanned Datasheets (one .pdf per transect or reach) will be named as followed: **XXX_MU**#_Datasheets_YYYYMMDD.pdf and **XXX_Anthro**_Datasheets_YYYYMMDD.pdf

F14.2 **XXX** is three letter abbreviations for project site and **MU**# is the map unit number.

F14.3 The order of scanned sheets per transect will be as follows: Map Unit Datasheet, Resistance & Resilience Scorecard, Ability to Control Wildfire Scorecard, Transect 1 Photopoint Datasheet, Transect 1 Datasheets, Transect 2 Photopoint Datasheet, Transect 2 Datasheets, Transect # Photopoint Datasheet, Transect # Datasheets. The Anthropogenic Datasheets should be a separate scan.

F14.4 Example: DBR_052_Datasheets_20180527.pdf, DBR_Anthro_Datasheets_20180512.pdf

POST-FIELD SUBMITTAL

After all the collected field data is entered into the calculator and a preemptive internal quality assessment is run on it, zip all documents listed in the List of Uploaded Documents within the Verifier Project Assessment Submission Form into a final package. The forms should be signed and authorized by the certified verifier for the project. Upload all the required information to the Credit System Verifier FTP site (www.dcnrftp.ndep.nv.gov) in its own folder labeled with the project name. Email your point of contact for the SETT that all the information is online.

The SETT will run a quality assessment on the date and return the information to the verifier with corrections that need to be made. Expect one month post-submission for a final return on the QA results.

For credit projects, once the QA is signed, the management plan can be submitted. Reminder, if the management plan is not completed within 90 days from approval of a new Version, then the Credits will be subject to the new Version and must be rerun under this Version. Only when the management plan is signed are the credits eligible for sale.

For debit projects, once the QA is signed, then credits may be purchased to offset the locked-in debits.

3. Credit/Credit Obligation Calculation

CREDIT/CREDIT OBLIGATION CALCULATION

This section provides a step-by-step overview of the field process for generating credits and securing credits to offset a credit obligation. These steps will be completed by the Project Proponent, Technical Service Providers, Verifiers and the Credit System Administrator, depending on their roles and skillsets. All pre-field and post-field work steps are detailed in Sections 3.1 and 3.2 in the CCS Manual or are outlined in the Project Checklist in the Appendix.

Please contact the Sagebrush Ecosystem Technical Team (SETT) with questions on any step in this process.

TOOL PREREQUISITES

- Credit or Debit Project Calculator (NOTE: *Section 1: Desktop Analysis* and *Section 2: Field Data Collection Methods* contain critical information on completing the Calculator.)
- Credit Projects
  - Pre-Field Work Submittal Checklist (completed)
  - Verifier Project Assessment Submission Packet
  - Quality Assessment
  - Management Plan
  - Participant Contract
  - Financial Assurances
  - Credit Purchase Agreement
  - Credit Transfer Form
  - Annual Monitoring Form
  - Notice of Validation
- Debit Projects:
  - Pre-Field Work Submittal Checklist (completed)
  - Verifier Project Assessment Submission Packet
  - Quality Assessment
  - Debit Project Review Form
  - Credit Purchase Agreement
- Recommended: Current versions of the Nevada Conservation Credit System Manual and HQT Methods document for reference.

DETAILED STEPS TO CALCULATE CREDITS

The User's Guide covers steps D2 in *Section 3.1: Generating Credits* of the Nevada Conservation Credit System Manual (Figure 24) and steps B2 in *Section 3.2: Acquiring Credits* of the Nevada Conservation Credit System Manual for regulatory offset credit Buyers only. Before beginning, ensure the project has been planned in a way that avoids and minimizes residual impact to the maximum practical extent. Review *Section 3: Credit System Operations* of the Manual for more information.

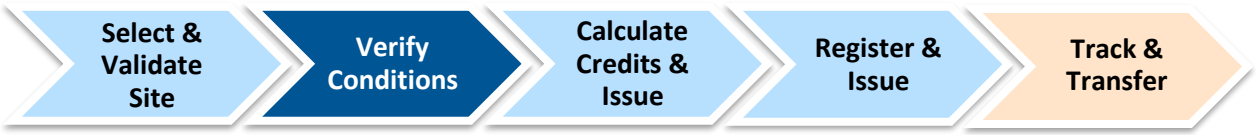


Figure 24. Overview of the process steps to generate credits

Figure 25. Overview of the process to calculate credit obligation and acquire credits

D/B2.1 SUBMIT PROJECT VALIDATION CHECKLIST

The Project Proponent completes an eligibility screen, describing a potential project and completing some pre-project paperwork. This step is typically supported by a knowledgeable Technical Support Provider, Verifier, or Aggregator who helps the Project Proponent complete this Pre-Field Work Submittal Packet, which includes a Validation Checklist, Debit Project Review Form if applicable, and valid shapefiles of the project site. This checklist records proposed management actions, timeline, and location of a proposed project site. It also confirms certain minimum eligibility criteria, such as basic information related to ownership, site history, and land protection.

Product ■ Completed Pre-Field Work Submittal Packet

D/B2.2 VALIDATE & IDENTIFY CONSERVATION OPPORTUNITY

The Administrator reviews the Pre-Field Work Submittal Packet. If all criteria are met, the Administrator coordinates approval from any additional validation leads, such as relevant regulatory agencies, and issues a notice of validation to the Project Proponent. A notice of validation is a statement that the project is eligible to generate credits if all information provided is accurate and complete. It is not a confirmation of the quantity of credits or debits to be issued.

If criteria are not met, the Administrator provides reasons why the project may not be eligible to participate in the CCS.

D/B2.3 PROJECT VERIFICATION

Once a notice of validation is submitted, the Verifier, working closely with the Project Proponent, is able to begin the process of field verification. The Verifier performs a review of all relevant forms and documentation, and schedules a site visit with the Project Proponent[2] to determine the most logical division of the project site for site verification. The pre-field ArcGIS work must be completed and approved by the Administrator prior to any project verification. The Verifier follows the process defined in the HQT to define the credit project boundaries and calculate the pre-project conditions.

Once the map units and sampling locations have been approved, the verifier can then begin field verification of the pre-project conditions. This approval is not a confirmation of the quantity of the credit amount or obligation. Although baseline habitat function for credit projects is based on the site scale, regional standard baseline, calculating pre-project condition is necessary for the Credit Project Proponent to confidently estimate and Administrator to agree to post-project habitat function performance standards. For debits, baseline is defined as the condition of the site prior to any new or expansion of an existing anthropogenic disturbance. Debit sites require a field assessment to determine pre-project conditions. Verification of debit baseline functional acres occurs before the anthropogenic disturbance has been implemented.

[2] Verifiers follow a defined Verification Protocol that is the focus of the Verifier certification training conduct by the Credit System Administrator.

Complete the Competing Land Use assessment and input contribution percentage from Table 5 for projects on private land into the Calculator.

Table 5. Competing Land Uses reserve account categories and contribution percentages for credits on privately-owned land

MINIMUM COMPETING LAND USE RELATED REQUIREMENTS	CONTRIBUTION PERCENTAGE
Participant Contract and Conservation Easement and Ownership of Subsurface Rights	0%
Participant Contract and Conservation Easement	1%
Participant Contract and Ownership of Subsurface Rights	3%
Participant Contract	4%

The Verifier fills in the pre-project data results from the field inventory, completes any necessary calculations using the HQT, and provides the completed Verifier Project Assessment Submission Packet to the Administrator. This packet should include all GIS data within a geodatabase with the appropriate naming conventions, transect and map unit datasheets, transects photographs, field maps, meaningful notes, anthropogenic disturbance review forms, PFC checklists for each riparian area, R&R and Wildfire scorecards representing each map unit, the completed HQT calculator indicating the credit estimate, the Verifier Project Assessment Submission Form, as well as notes on any assumptions made, potential discrepancies, issues, etc.

The Verifier must then work with the Administrator to go through a Quality Assessment Process, which must be signed by the Administrator before the credit amount can be finalized. From the approval of a Quality Assessment Process, the Credit Project Proponent begins drafting a Management Plan and can move forward with the project.

All pre-field and post-field work steps are detailed in Sections 3.1 and 3.2 in the CCS Manual or are outlined in the Project Checklist in the Appendix.

Product ■ Verifier Project Assessment Submission Packet
Product ■ Quality Assessment

APPENDICES

APPENDIX 1. GUIDANCE FOR DELINEATING ANTHROPOGENIC FEATURES
APPENDIX 2. GUIDANCE ON CLASSIFYING OVERLAPPING AND EXISTING ANTHROPOGENIC FEATURES
APPENDIX 3. GUIDANCE FOR DELINEATING MAP UNITS
APPENDIX 4. MINIMUM TRANSECTS PER MAP UNIT
APPENDIX 5. DEBIT TOOL OVERVIEW
APPENDIX 6. CREDIT TOOL OVERVIEW
APPENDIX 7. DATA DESCRIPTIONS
APPENDIX 8. ANTHROPOGENIC FEATURES DATASHEET
APPENDIX 9. MAP UNIT DATASHEET
APPENDIX 10. TRANSECT NOTES DATASHEET (OPTIONAL)
APPENDIX 11. RESISTANCE & RESILIENCE SCORECARD
APPENDIX 12. ABILITY TO CONTROL WILDFIRE SCORECARD
APPENDIX 13. PHOTO TRANSECT DATASHEET
APPENDIX 14. TRANSECT DATASHEET
APPENDIX 15. PROJECT CHECKLIST
APPENDIX 16. BIENNIALS AND SUBSHRUBS GUIDE

Appendix 1. Guidance for Delineating Anthropogenic Features

The layers of anthropogenic features provided in the Nevada Data Package are to be used initially when delineating disturbance within the analysis area. Every project will require extensive research and manually searching of the Analysis Area in order to accurately assess existing anthropogenic disturbance. The layers provided for many features are only intended to help identify locations for certain disturbances, and further delineating of boundaries and information regarding status will be needed. The sections below describe further explanations and guidance for individual or groups of anthropogenic features.

General Guidance

All anthropogenic features should be digitized as polygon features. If you prefer, you may digitize linear features such as transmission lines as line features, then use the buffer tool to buffer each feature by the appropriate distance to create a polygon feature class. Add a 'Buff_Dist' field, type— "long integer", to the attribute table as you are digitizing and record half of the estimated road or transmission line width in this field (we recommend 5 m for powerlines and roads, and 3 m for distribution lines). The buffer is related to the width of the transmission or distribution line, not the weight. Use the 'Buff_Dist' field as the buffer distance in the buffer tool. Then copy the new anthropogenic polygons over to their appropriate, pre-generated layer.

For mining or renewable energy facilities, proposed infrastructure such as roads and powerlines that are located within or immediately adjacent to anthropogenic features should be categorized as mining or renewable energy features, however this only applies to active operations. Roads or powerlines or sections of the roads or powerlines that fall outside of the project footprint, such as those connecting the project to existing infrastructure, should be categorized as roads and powerlines. Active roads or powerlines within inactive operations should receive their respective weights and distances and not be incorporated within the inactive operation footprint.

Features that are pulled out as non-habitat (i.e., homesteads, feedlots, clearings, etc.) and do not fall within a classification type can be assigned 'Other' in Type and 'No_Indirect_Dist' in the Subtype. This will delineate the features as direct disturbance that do not have an indirect buffer. Exploration is classified as 'Exploration' in the Type and Subtype. For these features that do not have an indirect buffer applied, there is no need to delineate these features in the Analysis Area (not occurring in a map unit) because without an indirect buffer applied it will not have any impact on the HQT calculations.

NOTE For existing disturbances that have not mitigated through the CCS, delineate the disturbance boundaries using aerial imagery.

For disturbances that have mitigated through the CCS, delineate them using the authorized boundary that was used in the HQT analysis for the project. Contact the SETT to confirm CCS mitigated disturbances are included within a new HQT analysis.

Towers

Look for towers at the end of seemingly dead-end roads that wind up into the mountains.

- **Communications (**Communications)**:** Tall structures designed to support antennas for telecommunications and broadcasting.
- **Meteorological** (Meteorological)**:** Tall structures designed to support meteorological measuring instruments, including those installed to test the feasibility of wind farms.

Powerlines

The Powerlines layer contains some powerlines. However, they still need to be verified using imagery or field checked, as there are some discrepancies in the data layer compared to powerlines as built on the landscape. This layer only includes the larger transmission lines and does not include the majority of the smaller distribution and other transmission lines. This layer will serve as a starting point only, additional effort should be made to identify other powerlines within a project area including use of aerial imagery, contacting local rural electric associations, and field verification.

- **Nest Facilitating** (Nest_Facilitating): Major and minor three phase electrical power transmission and distribution lines with cross members, supporting arms, etc. Do not include buried transmission lines.
- **Non-Nest Facilitating** (Non_Nest_Facilitating): Single phase distribution lines or any three phase distribution lines with no or a single cross arm that does not support nesting raven or raptor occupancy. Documentation is required if not obvious from aerial imagery.

Mines

The Mines layer identifies the location of some current mining operations during various stages of activity. It is the responsibility of the verifier to confirm and obtain accurate footprints, status, and other information from the BLM or other sources to delineate a mining anthropogenic disturbance. Delineate the individual existing or authorized features of mining site, not a Plan of Operations (PoO) area or Project Area. The CCS analyzes and mitigates for the proposed footprint of a disturbance, not the greater extent of a PoO. For most mines, this will involve delineating the existing features that are visible using aerial imagery. If a project has mitigated using the CCS, then the authorized footprint may be used as existing disturbance even if it has not been built out yet, this is because those impacts have already been mitigated for.

- **Active – Large** (Active_Large): Total area of 60 acres or more, active
- **Active – Medium or Small** (Acitve_Small): Total area less than 60 acres, active
- **Inactive – Large** (Inactive_Large): Total area of 60 acres or more, inactive. No longer removing material from the ground and very little, if any, associated human activity. Some infrastructure, hard structures, or facilities are still present on the site. Do not include reclaimed mines or non-reclaimed mines with no remaining infrastructure.
- **Inactive – Medium or Small** (Inactive_Small): Total area less than 60 acres, inactive (see above definition of inactive).
- **Ancillary – Large** (Active_Large_Ancillary): Features at the discretion of the Administrator to include but not limited to: rapid infiltration basins (RIBs), productions shafts, pipelines, quarries, and other structures that are not located within the primary footprint of the anthropogenic feature and will generally be located away from the main disturbance.
- **Ancillary – Medium or Small** (Active_Small_Ancillary): Same description as Ancillary – Large.

Inactive Mines

Inactive mines are defined as those no longer removing material from the ground and very little, if any, associated human activity. This includes mines that are actively being reclaimed. The entire footprint of a mine during the reclamation process is considered inactive. The footprint of a mine that is not being reclaimed but still contains some major infrastructure, hard structures, or facilities may be considered inactive in some cases. In most cases, historic disturbances that were never reclaimed will be classified as

'NA' in the subtype. This will account for the direct disturbance of existing features, however an indirect impact will not be assigned to the disturbance.

For mines that are considered reclaimed, only the permanent feature (i.e, pit), should be delineated and classified as an inactive mine. Non-reclaimed mines with no remaining infrastructure are not considered inactive, except for the permanent pit. For historic and inactive underground mines that show little to no surface disturbance (may include entrances or shafts), only delineate the visible surface disturbance from an aerial view and classify them as 'NA' in the subtype.

Urban

The Urban layer should be used 'as is.' Specific criteria were used to delineate areas meeting a threshold to qualify as a low or high urban area. Do not digitize houses, ranches, ranching or agricultural infrastructure as Urban. If within the project area, these features will be delineated as a non-habitat map unit and removed from analysis when running the HQT.

Oil and Gas

The Oil and Gas layer is a point feature shapefile that identifies the location of some current oil and gas operations during various stages of activity. It is the responsibility of the verifier to obtain an accurate footprint, status, and other information from the BLM or other sources to delineate an Oil and Gas anthropogenic disturbance.

- **Producing** (Producing): Activity (excluding exploration) and production is occurring at the well pads.
- **Inactive** (Inactive): Activity is not occurring at the location.

The layers for oil and gas projects vary extensively in activity status and boundaries, ensure that adequate research is conducted to verify the extent of active energy projects.

Roads

- **Interstate** (Interstate): Roads with an Interstate functional classification as defined by the Federal Highway Administration.
- **High Use – Paved or Improved; Commercial** (High_Use): Roads with an Arterial or Major Collector functional classification as defined by the Federal Highway Administration. Roads to commercial facilities (e.g., mines, geothermal plants), which may not necessarily be classified by the Federal Highway Administration.
- **Low Use – Improved; Local** (Low_Use): Roads with a Minor Collector or Local functional classification as defined by the Federal Highway Administration.

The Roads layer should be used 'as is' unless there is justification for removing or adding roads. There is substantial subjectivity in delineating roads (primarily smaller, secondary roads and two tracks), so to avoid potential for bias, the layer should be used consistently for all projects. However, changes (Low_Use to High_Use) will likely need to be made in situations where increased activity exists or is planned as part of debit projects, such as road access to a mine or other industrial or commercial development. Some roads that are authorized for mine use and access may not be included in the Roads layer. Roads should be recharacterized when mines and other commercial/industrial facilities are present or being developed that have or are going to increase the amount of traffic along ingress/egress routes that were previously low-use roads as high-use until they intersect with other high-use roads. New roads for similar commercial purposes should also be characterized as high use within or as part of debit projects. Please coordinate with the SETT to add roads that are included and authorized for project proponent use in a mine or other operation.

For mining or renewable energy facilities, proposed infrastructure such as roads and powerlines that are located within or immediately adjacent to anthropogenic features should be categorized as mining or

renewable energy features. Proposed roads or powerlines that fall outside of the project footprint, such as those connecting the project to existing infrastructure, should be categorized as roads and powerlines.

Do not digitize pipeline rights-of-way as roads, unless the right-of-way contains a road that meets the definitions above.

Railways

The Railways layer is a polygon feature shapefile that identifies the footprint of current railway operations. The Railways layer should be used 'as is' unless there is justification for removing or adding railways. Some railways that are authorized for mine use may not be included in the Railways layer. Please coordinate with the SETT to add railways that are included and authorized for project proponent use in a mine or other operation.

Renewable

The Renewable layer is a polygon feature shapefile that only identifies the location of current Renewable operations during various stages of activity. It is the responsibility of the verifier to obtain an accurate footprint, status, and other information from the BLM or other sources to delineate a Renewable anthropogenic disturbance.

- **Geothermal** (Geothermal): Utility-scale geothermal projects
- **Geothermal Ancillary** (Geothermal_Ancillary): Any above-ground facilities associated with utility-scale geothermal projects at the discretion of the Administrator to include predominantly above ground pipelines and other structures that are not located within the primary footprint of the anthropogenic feature and will generally be located away from the main disturbance.
- **Solar** (Solar): Utility-scale solar projects and any associated above-ground facilities.
- **Wind** (Wind): Utility-scale wind farm projects and any associated above-ground facilities.

The Renewable layer (wind, solar, geothermal) includes leased parcels, which may or may not be in development or production. These boundaries are a very rough guideline to help identify areas that may have renewable energy development and further research to confirm the status is essential. Exclude transmission lines connecting to the main grid (categorize as 'Power Lines').

Linear Rights of Way

Linear Rights of Way (LROW) include linear features that do not fall under the Roads, Railways, or Powerlines classifications. Linear features that are permitted within Linear Rights of Way can include but are not limited to pipelines, buried transmission lines, buried fiber optic cables, etc. LROW will fall under two categories:

- **LROW – High**: A linear feature that meets one of the following criteria 1) height greater than 48 inches or 2) width (ground disturbance) greater than 25 feet.
- **LROW – Low**: A linear right of way feature that is less than 48 inches in height and 25 feet in width.

Substations that are associated with a LROW feature should be classified according to the height and width criteria that classifies whether a feature falls within a Low or High LROW. If a substation contains a communications tower, that substation should be classified as Tower rather than a LROW feature.

Mineral Exploration

Mineral exploration includes exploration associated with CCS defined disturbances, including mining, oil and gas, renewable, etc.

<u>For calculating the debits that need to be mitigated for an exploration debit project:</u> If drill locations or road locations are not yet certain, a Plan of Operations Project Area, or equivalent, can be used as the

proposed disturbance boundary in order to get an average local scale habitat functional score. This score (along with rest of the HQT analysis) will be applied to the actual acres planned for disturbance. By analyzing a greater extent or project area than what is expected, the proposed disturbance does not have to be spatially explicit, which increase flexibility when analyzing exploration projects. If the exact disturbance footprint is known, the SETT will work with the proponent to define a large enough and acceptable area to allow transects to be placed within the project area.

For delineating exploration as part of the analysis of other debit projects: Recent exploration that has been mitigated for can be delineated as 'Exploration' in the Type and Subtype within the Current_Anthro_Features layer in the direct and indirect impact areas of debit projects. An exception to this is the area in which permanent disturbance is planned, due to the vast incongruency of planned terms of impact when transitioning from short-term to permanent disturbance. Exploration cannot be delineated in this area. If this mitigated exploration has yet to be implemented on the ground and the precise location of plans is still uncertain, contact the SETT if there is interest in accounting for it. When areas on the landscape still appear largely denuded of vegetation and unrestored but are very likely the result of historical exploration, they can be delineated as their own map unit and sampled. Recent exploration that occurred prior to mitigation requirements can be treated similarly, though reclamation efforts should be occurring to better naturalize these disturbances in the near future.

Other Disturbance

For disturbances that do not fall within a previously identified anthropogenic category (e.g., hydroelectric power projects, gravel pits, mineral materials sites, renewable or non-renewable energy projects beyond solar, wind, and geothermal, maintenance or transfer stations, staging areas) , it will default to the Other Disturbance category. Consultation with the SETT will determine which subtype is most appropriate for the proposed disturbance, however the following guidance will be used to assist in determining the subtype:

- Other Disturbance – High*: Proposed disturbance will be of high impact and will exhibit one or more of the following impacts:
    - Structures that could be used as perching and nesting by ravens.
    - Consistent or continuous noise from construction and operation of the disturbance (i.e., greater than 10 dBA following disturbance).
    - Subsidies that would act as predator attractants.
    - Continuous activity and other attributes that suggest large-scale disturbance (e.g., ground disturbance, heavy use or traffic).

  * The SETT intends to capture the majority of disturbances within the provided weights and distances. If warranted, the SETT may determine the 75% weight for the High category be adjusted to 100% under certain circumstances. The SETT would bring any proposed disturbances that may warrant a 100% weight to the SEC for consideration.
- Other Disturbance – Medium: Proposed disturbance may exhibit similar impacts as listed above but have been minimized or have a lower scale of impact and could include:
    - Disturbances that are minimized using measurable methodologies.
    - Intermittent or less continuous noise and activity (i.e., noise less than 10 dBA following disturbance).
- Other Disturbance – Low:
    - Does not exhibit significant indirect impacts as listed above. General presence of infrastructure, direct habitat loss, and potential for invasive weed spread from ground disturbance will be the primary impacts expected from a Low category.
- Other Disturbance – No Indirect Disturbance:
    - Does not exhibit indirect impacts. Direct habitat loss will be the primary impacts expected from a No Indirect Disturbance category.

- Ranking of criteria and a comparative analysis using established anthropogenic disturbances and new science as guidance will determine which category is most appropriate for a given disturbance

Excluded Features

Anthropogenic features not described in Table 1 are considered 'de minimus' and should not be digitized, including:

- Fences
- Agricultural or Ranching related activities or infrastructure

Anthropogenic Feature Review

When changes are made that deviate from the layers provided or when classifying status of mines or other anthropogenic features, the SETT will require a brief synopsis with justification and rationale behind these decisions. This is primarily to ensure that changes (i.e. adding or removing roads) are done in a consistent manner across credit and debit projects. This will also aid in maintaining records to increase transparency during the HQT process. See the Anthropogenic Disturbance Review Form in Appendix 8. Anthropogenic Features Datasheet.

APPENDIX 2. GUIDANCE ON CLASSIFYING OVERLAPPING AND EXISTING ANTHROPOGENIC FEATURES

Version 1.6 of the Habitat Quantification Tool introduces new attributes required to classify existing anthropogenic features: 'Overlap_Status' and 'Returned'. These fields may need to be edited for (1) debit projects whose proposed surface disturbance overlaps existing anthropogenic features and (2) debit projects that propose to remove or reduce the impact of existing anthropogenic features permanently. These new attributes provide more control over the handling of existing anthropogenic features during the Desktop Analysis.

For Debit Projects with Overlapping Features

Where existing anthropogenic features are co-located with proposed features such that they occupy the same point on Earth, they are said to be overlapping. Existing features that overlap proposed features may be retained or removed. An existing powerline that is co-located with a proposed roadway is an example of a feature that will be retained during the debit project; it should be classified as 'Retained' in the 'Overlap_Status' field.

When a debit project proposes to upgrade an existing feature from one subtype to another, the existing feature should be classified as 'Removed'. For example, a low use road that a mine project proposes to use during the permit term, which will be upgraded to a high use road during the permit term, should be classified as 'Removed'. The portion of the road that will be upgraded to a high use road must be included in the shapefile that represents the proposed surface disturbance. A low use road that is overlapped by the mine site should also be classified as 'Removed' and that portion of overlapping road would be upgraded to mine.

For temporary debit projects, the 'Returned' field for all existing anthropogenic features must be classified as 'True'. It is assumed that temporary debit projects return the landscape to its original condition following the project.

For existing features that overlap permanent impacts (i.e., where the 'Surface_Disturbance' field in the Proposed_Surface_Disturbance_Debits feature class is 'Permanent'), the 'Returned' field should be classified as 'False.'

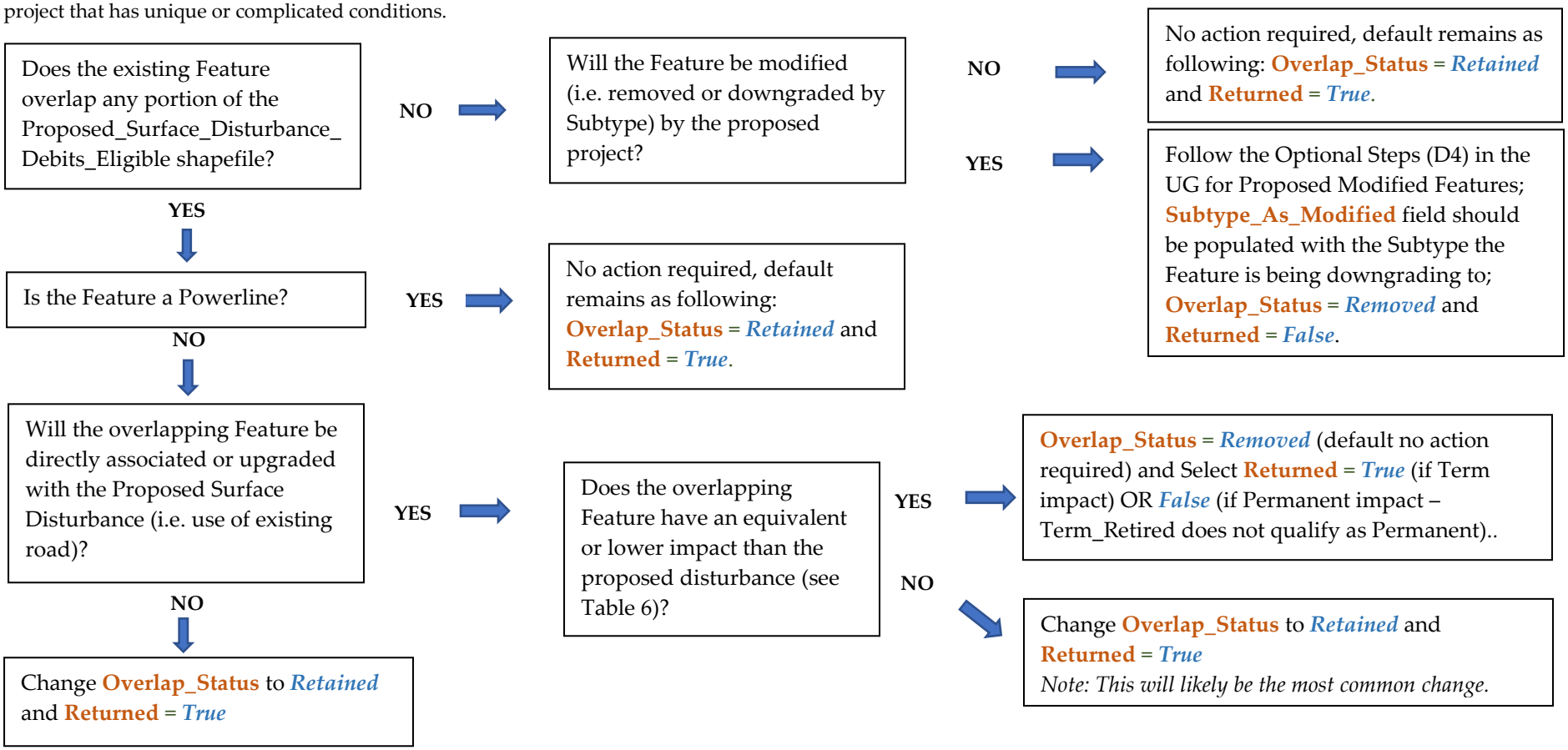
For Debit Projects that Proposed to Remove or Reduce the Impact of Existing Features

Debit projects that propose to remove or reduce the impact of existing features should check the "Debit project will remove or modify existing anthropogenic features (optional)" box in Debit Tool 1 and follow the subsequent steps in the User's Guide to account for remove or modification of existing features. Update the 'Subtype_As_Modified' field to the subtype that represents the feature during the permitted term of the debit project. If the feature will be removed, update the 'Subtype_As_Modified' field to 'N/A' (do not classify as 'Removed').

Decision Tree when overlapping features exist on Debit Projects

For each existing anthropogenic feature class following Steps D7 – D9 in the User's Guide: **Overlap_Status** and **Returned** are new column headers in each Anthro_*Feature Type* layer. **Overlap_Status** options are either ***Retained*** or ***Removed***. **Returned** options are either ***True*** or ***False***. The **Subtype_As_Modified** field is not new but now has additional options.

IMPORTANT: In general, the only changes from defaults will be when an existing Feature overlaps with and has a greater impact (weight, distance) than the proposed disturbance; this will require a change from default **Overlap_Status** = ***Removed*** to **Overlap_Status** = ***Retained***. The following flowchart should guide the classification process for the majority of situations; however, there are scenarios that may not fit the pathways listed below. Ensure to consult with the SETT when working on a Debit project that has unique or complicated conditions.



General descriptions for new column headings in the Anthro_Feature_Clip layers:

New or edited Category	*Description*
Overlap_Status = Retained	Existing features that can either overlap or not overlap any proposed disturbance and **will not be** modified, upgraded, or removed during the project, or will not be utilized in the project's permit or operation. (e.g. Road in analysis area, existing powerline overlapping a proposed mine site).
Overlap_Status = Removed	Existing features that **overlap** with any proposed disturbance that will be either replaced by the proposed disturbance (e.g. existing Low Use road will be replaced by new Mine); existing features that will be upgraded by Subtype by (e.g. Low Use to High Use Road); or existing features that will be downgraded by Subtype.
Returned = True	Existing features that **will be** returned to their current subtype. If feature is classified as *Removed*, select *True* for a Term impact. If the feature is classified as *Retained*, ***Returned*** field should **always** be *True*.
Returned = False	Existing features that **will not** be returned to their current subtype. If feature is classified as *Removed*, select *False* for a Permanent impact. Not applicable for *Retained* features. Projects that propose to modify features will select *False* as the feature will be removed or downgraded.
Subtype_As_Modified	If *Retained*, the Subtype_As_Modified should **always** be the same as the Current Subtype. If the project proposed to modify features, the Subtype_As_Modified should reflect the removal or downgrade of the existing feature (e.g. High Use Road to a Low Use Road). Put inputs here: ***Overlap_Status*** = *Removed* and ***Returned*** = *False*

Table 6. Ranking of all Anthropogenic Features by degree of impact

Rank	Type	Subtype
1	Mines	Active_Large
2	Urban	High
3	Roads	Interstate
4	Renewable	Geothermal
5	Mines	Active_Small
6	Oil & Gas	Producing
7	Roads	High_Use
8	Railways	Railways
9	Exploration	Exploration
10	Other	No_Indirect
11	Towers	Communications
12	Towers	Meteorological
13	Powerlines	Nest Facilitating
14	Other	High
15	Urban	Low
16	Mines	Ancillary_Large
17	Renewable	Geothermal_Ancillary
18	Other	Medium
19	Mines	Ancillary_Small
20	Mines	Inactive_Large
21	LROW	LROW_High
22	Powerlines	Non-Nest Facilitating
23	Renewable	Wind
24	Renewable	Solar
25	Other	Low
26	Roads	Low_Use
27	LROW	LROW_Low
28	Mines	Inactive_Small
29	Oil & Gas	Inactive

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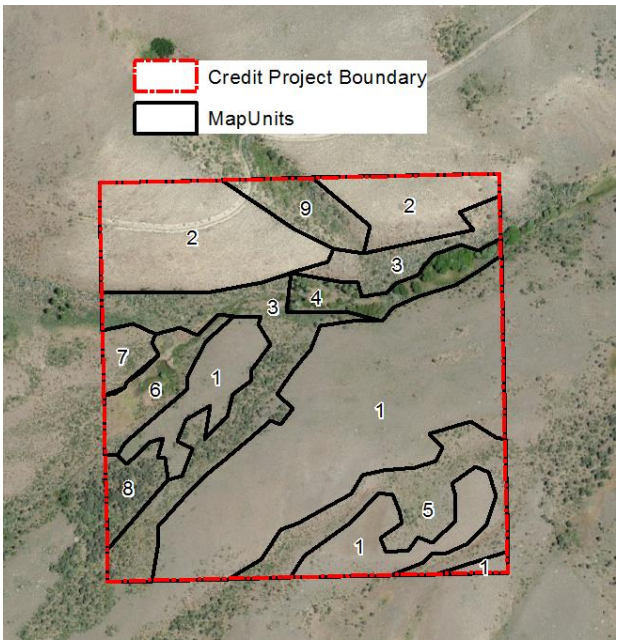
APPENDIX 3. GUIDANCE FOR DELINEATING MAP UNITS

Project Area: The project area is the area that is being evaluated, and includes all habitats within the boundaries of what is delineated as the project area. For credit projects, the project area is the extent of the obligation by the credit developers. For debit projects, the project area is the extent of the proposed surface disturbance plus the indirect effects area.



Map Units: The map units are sub-divisions of the project area based on unique vegetation communities, structure, and site potential. Map units need to be defined in order to capture differences in the site-scale habitat attributes assessed to more accurately inform the functional acre scores. See the *Field Data Collection Methods* for a list of attributes assessed. When delineating map units, it is important to keep these attributes in mind as they are the drivers of the habitat function scores. For example, map units should be delineated based on expected variation in sagebrush canopy cover and distance to sagebrush cover. Elevation, slope, aspect, soil type and other factors should also be considered, as they may impact vegetation distribution.

At the least, ensure map units are divided by WAFWA zone. No map unit should cross a WAFWA boundary.

Although map units can be somewhat subjective, a map unit should encompass a relatively homogenous area of vegetation. Map units should also be delineated based on the potential of the site to support a particular vegetation community, so that map unit boundaries will not become less relevant over time. Map units should be delineated based on ecological sites, recent aerial photography, and ground verification. Major breaks such as changes in vegetation community, relative abundance of species, water vs. terrestrial, shrub land vs. meadow, and roads vs. undeveloped area, are relatively straight-forward to delineate via aerial photography. In addition, supplemental data layers within GIS can help identify other distinctions such as changes in topography (elevation, slope, and aspect) or soils which may affect vegetation composition. Defining map units requires a good working knowledge of the habitats important to sage-grouse and local site conditions. If possible, a site visit is encouraged to help inform the map unit delineation process prior to initiating the Desktop Analysis. Map unit boundaries may also be modified based on site conditions identified during field data collection. If the field crews recommend changes to the **Map_Units_Dissolve** layer, you must update the **Map_Units_Dissolv**e layer and redo steps D12/C8, and D16/C12. Specify the updated **Map_Units_Dissolve** layer for the Map_Units parameter in step D12/C8.

Meadows: A meadow is generally defined as a mesic area containing obligate or facultative wetland forbs and grasses that is typically free of upland shrubs. This area will typically be wet for most of an average water year, and thus green (NDVI >0.3) through the end of summer that likely serve as late brood-rearing habitat. Dry meadows (upland patches of non-riparian grasses) are not considered to be meadows. Meadows that are dried to the extent that they are not likely to be functioning in the future as late-brood rearing habitat (i.e., encroachment of upland shrubs, loss of riparian plants expected over time) should not be considered. Meadows that are dried due to drought but have the potential to function when the water year approaches normal, should still be considered.

Map units that have been automatically delineated as meadows due to their presence in the NV_Wet_Meadows layer (derived from Saito 2020 https://www.dri.edu/project/wetland-mapnvnew/) should be confirmed as such using aerial imagery and other sources or refined as appropriate. The NV_Wet_Meadows layer is also present in the mxd, which has further detail in the attribute table that might aid in refining delineations. It should be noted that this layer is a rough delineation and irrigated areas that meet definitions of meadow habitat in the program have often been excluded. These will often need to be delineated as well, with the exception of center pivot agriculture, which should be excluded from all projects in their entirety as non-habitat. Unaltered meadows are defined at naturally occurring wetland complexes, dominated by wetland vegetation and soils (e.g. stringer meadows, springs, seeps) where the hydrology has been minimally altered or is currently not being managed. Altered meadows are defined as receiving either controlled irrigation, where the hydrology is currently being altered or managed (e.g. diversions, spreaders), or where the landscape is being functionally altered.

If it appears to possibly be a meadow, err on the side of it being a meadow. If reconnaissance or field sampling determines it to not be a meadow or falling within the above exceptions, it is easier to merge the polygon into a larger upland map unit than to divide it out as a small meadow later. All potential meadows should be visually confirmed.

Stepwise Order of Additional Sources to Use in Delineation of Meadow Map Units:

- Aerial Imagery within GIS and compared to other sources (i.e., Google Earth).
    a. Begin to define general meadow areas.
    b. Compare various years' imagery (Various layers or the Google Earth Timeline).
- SGI Mesic Resources Layer (Detailed 30-year NDVI average during the brood-rearing season).
    a. See Data Required Section for access instructions.
    b. **Note:** Target areas with a 30-year average NDVI value of >0.3, which are the four shades of green provided in the Mesic Resources – Persistence layer. If different management practices have been applied over the last 30 years that have significantly altered the management of water in an area, utilize the online interactive map to get an average NDVI that reflects current management for the appropriate period of time.
    c. **Note:** This only helps fine-tune delineation of large meadows and lotic systems and will generally not pick up smaller riparian systems.
- Create a grid index to facilitate review of aerial imagery at approximately 1:3,000 or finer scale.
    a. [ArcToolbox> Cartography Tools> Data Driven Pages> Grid Index Features]
        i. Output Feature Class = a new layer named **GridIndexFeatures**
        ii. Input Features = Project Area for Credit Projects OR Direct and Indirect Impacts Areas Generate Polygon Grid that intersects input feature layers or datasets = *checked*
        iii. Use Page Unit and Scale = *unchecked*
        iv. Polygon Width = 1000 (in meters)
        v. Polygon Height = 1000 (in meters)
        vi. All other fields = blank

vii. Add the Data Driven Pages toolbar (Customize >Toolbars >Data Driven Pages), then set up data driven pages by clicking the Data Driven Page Setup icon ( ) and selecting **GridIndexFeatures** as the Layer. Leave all other options unchanged and click 'OK'.

b. Flip through every page using the next page icon ( ) for a thorough review of small riparian systems (i.e., stringer meadows, hillside seeps).

- Review other layers for additional insight such as Annual Grass or Topography.

Stepwise Order of Sources to Use for Further Map Unit Delineation:

1. DRG or ESD layer provided in Data Packet.
   a. Clip, then Union the DRG layer with the Map Units Layer.
   b. Visually inspect, and if more detail is needed, utilize the ESD layer for smaller scale delineation.
   c. **Note:** This only helps delineate general ecosite boundaries and fine tuning may be needed.
2. Aerial Imagery within GIS and compared to other sources (i.e., Google Earth).
   a. Visually confirm DRG or ESD delineation and adjust and further define as needed**.**
   b. **Note:** Aerial imagery should verify that map units should be relatively homogenous.
3. Examine NRCS Soil Series Maps to get to a more fine-scale map unit delineation.
   a. See Data Required Section for access instructions.
4. Review other layers for additional insight such as Fire, PJ, Annual Grass, Topography, etc.
5. **Note:** DRGs will typically be sufficient for larger-scale Debit Projects in addition to meadow delineation, while finer-scale ecosite delineation is needed for Credit Projects.
6. **Note:** Areas known to exhibit higher annual invasive abundance are recommended to be separate map units. Aspect should also be considered when reviewing map unit delineation due to the greater propensity of annual invasive dominance on South-facing slope.

Additional rules for map unit delineation:

1. Minimum map unit size should generally be 0.5 acres, unless there are features such as stringer meadows that are appropriate to delineate at a smaller scale. Map units less than 5 meters in width may be excluded from the credit or debit calculation.
2. Clusters of willow or other dense catches of woody riparian vegetation within meadows should not be delineated as separate map units. However, transects should not be run through long stretches of dense willow patches.
3. For debit projects, map units should first be delineated by indirect disturbance area, proposed surface disturbance, and already existing disturbance areas. Indirect and proposed should then be further subdivided according to the standards guidelines. No sampling will occur in existing disturbance areas, so no further subdivision is needed. This map unit will be assigned a site scale score of zero and no transects will be generated in this map unit.
4. For debit projects, term features should be separate map units from permanent features.

5. For debit projects, reclaimed mine (or other disturbance type) areas should be delineated as separate map units
6. For credit projects, treatment areas where a change in the site scale score is anticipated should be delineated as separate map units. (Even if currently they are similar in vegetation to other areas, but a change is not expected in those areas.)
7. Run the Intersect tool to ensure there are no overlapping polygons.

NOTE While pinyon-juniper is mapped automatically, if changes to the PJ layer are necessary after ground-truthing, then please make changes based on the coverage of pinyon-juniper observed and delineated in the field in a clipped version in the pinyon-juniper layer. This layer should be submitted to the SETT when completed so that the necessary changes can be made at the administrative level prior to running the final Desktop Analysis. This process would be similarly necessary if there was an omission of pinyon-juniper in the layer that is present within the project area.

APPENDIX 4. MINIMUM TRANSECTS PER MAP UNIT

After delineating map units that seek to maximize map unit area while minimizing variability within each map unit, the number of transects to be assessed per map unit needs to be determined. This section provides requirements for the minimum numbers of transects per map unit based on area, habitat type, and project type with guidance on when to consider sampling additional transects. Minimum transect requirements are outlined to solidify SETT expectations for pre-field and post-field submissions. These minimum requirements also reflect the differences in habitat value, variability, and how the data will be used.

Meadows, uplift areas, and heterogeneous uplands require more transects for the following reasons:

- Meadows tend to be smaller, are highly valued within the CCS (8x), tend to be opportunities for uplift, and, in highly naturalized states such as stringer meadows, can also exhibit quite a bit of variation. Transects in meadows also generally take far less time to sample.
- Uplift areas also require more transects due to the need for pre-project conditions to be compared to post-improvement conditions in the future to quantify uplift credits. Even when these pre- and post-project comparisons are not necessary to quantify uplift as with pinyon-juniper projects, the variation in habitat between areas with pinyon-juniper and the surrounding areas is important to try to capture.
- Map units consisting of heterogeneous uplands require more transects to more accurately characterize the habitat.

There is also a different category for Uplands on Debit Projects because transects are generated based on debit project impacts, which are calculated using a decay curve where impacts decrease with distance. Field data collection is focused on closer, more impacted areas. Further removed areas within map units represent lower impacts and thus result in fewer debits regardless of habitat quality. The following table indicates the minimum transects required within map units of different types according to acreage (Figure 26).

Acres	Meadows, Uplift Areas, Heterogeneous Uplands on Credit Projects	Homogeneous Uplands on Credit Projects	Uplands on Debit Projects
> 0*	2-4	2	2
10	4	2	2
25	5	3	3
100	6	4	4
200	7	5	5
250	7	5	5
300	8	5	5
350	8	6	6
400	9	6	6
450	9	7	7
500	10	7	7
550	10	8	8
1000	11	9	9
1250	11	9	9
1500	12	10	9
1750	12	10	9
2000	13	11	10
2500	13	11	10
2750	14	12	10
3000	14	12	10
3250	14	12	11
3500	15	13	11
4000	15	13	11
4250	16	14	11
4500	16	14	12
5000	17	15	12
5500	17	15	12
6000	17	15	12

Figure 26. The minimum transects required for sampling various map unit types.

*Meadow map units between 0 - 10 acres may allow for, and require up to 4 transects, depending on shape, size, and homogeneity.

Variability of the habitat within the map unit should be considered as to whether additional transects are needed, but the above figures should be taken as an absolute minimum. When aerial imagery and other observations reveal more of a mosaic of vegetation or patchiness within a map unit, the greater level of sampling intensity associated with heterogeneous uplands may better capture a map unit. Should the technician feel more transects are needed, please increase as appropriate. More transects can always be completed in sequential order from the backup batches of transects if the results do not seem to adequately represent the landscape.

Additional guidance for generating random transect locations and bearings:

1. Transects that are covered by clusters of willow or other dense patches of riparian woody vegetation within meadows should have an alternate bearing chosen or be reflected off the shrubs. If the transect falls within the thicket and can be moved over <5m and be out of it or the thicket only lasts a few meters, then move and sample. If not, then an alternative, random sample point should be chosen. To avoid creating an incentive to modify riparian habitat that supports sage-grouse habitats but is not used directly by sage-grouse, and thus does not receive credits, clusters of willows or other riparian woody vegetation will receive the habitat function score of the map unit that it is contained within.
2. If a transect will cross a map unit boundary into another map unit or outside of the project area or runs into a fence, a body of water, or a road, the transect will need to be reflected back into the map unit at the point of contact by the field crew and continued. Do not discard transects near map unit boundaries, as this would bias results.
3. Transects falling within areas having steep slopes (>50%), large unsafe rock outcrops, talus slopes, or unsafe hiking routes can be rejected and an alternative random sample point be used in sequence. The SETT will do an initial pre-screening for these features to exclude these areas. If transects are rejected in the field, document all rejected points and justification for the rejection.
4. The pre-field submission calculator should include the number of transects planned for each map unit, and a roads layer, to the best of the Verifier's knowledge, that are accessible by vehicle, ATV, or UTV that is planned to be used by the Verifier.

Do not sample transects that originate in or cross existing surface disturbance. Discard and select an alternative, random sample point.

APPENDIX 5. DEBIT TOOL OVERVIEW

This appendix describes what each Debit Tool is doing 'under the hood' so users have a better understanding of how the Debit Tools work.

Debit Tool 1

Debit Tool 1 prepares the user for digitizing and/or categorizing the proposed surface disturbance of the debit project. If a feature class or shapefile is provided as Proposed_Surface_Disturbance, the tool projects the provided layer to the standard coordinate system of the Desktop Analysis, adds the layer named 'Proposed_Surface_Disturbance_Debits' to the map document, adds fields for Type, Subtype, Surface Disturbance, and Reclassified Subtype, and applies domains for the added fields to restrict data entry to valid inputs. If a feature class or shapefile is not provided, an empty feature class with the same projection, fields, and domains is created and added to the map document. The map document is saved before the tool finishes.

Debit Tool 2

Debit Tool 2 uses the Proposed_Surface_Disturbance_Debits feature class as edited by the user to create the Proposed_Surface_Disturbance_Eligible feature class by clipping out any impact located on private lands. A new field 'Disturbance_Type' is added to the Proposed_Surface_Disturbance_Eligible feature class to indicate these features represent direct disturbance (as opposed to indirect disturbance). The 'Proposed_Surface_Disturbane_Eligible' feature class is buffered by the distance effect associated with each feature to create the Debit Project Area. The 'Subtype' field is used to lookup the distance for buffering each feature to create the Analysis_Area. Distances for each subtype are provided in Table 1. It is important that the Subtype field is populated and all values are exact matches of those found in Table 1. All existing anthropogenic features within the Analysis_Area should be digitized within the Anthro_Feature classes within the Nevada Data Package prior to proceeding to Debit Tool 3. The Debit_Project_Area is also saved as a shapefile in the project's folder so that the Dist_Lek layer can be acquired from NDOW within its extent. The map document is saved before the tool finishes.

Debit Tool 3

Debit Tool 3 uses the 'Proposed_Surface_Disturbance_Eligible' to identify potential overlapping existing anthropogenic features with the proposed disturbance. For overlapping features, new fields are added to identify the status of the existing feature during and after the proposed project ('Overlap_Status' and 'Returned'). Also, the type and subtype of the feature in the Proposed_Surface_Disturbance_Eligible feature class that overlap the existing feature are recorded in the 'Overlap_Type' and 'Overlap_Subtype' fields. Existing anthropogenic features are clipped to the Analysis_Area. Following Debit Tool 3, the user muse review and update the 'Overlap_Status' and 'Returned' fields for overlapping features within the **'Anthro_*feature type*_Clip'** feature classes if they do not conform for the default classifications.

Debit Tool 4

Debit Tool 4 completes a majority of the geoprocessing necessary to evaluate the debit project. It takes as input the Analysis_Area created in Debit Tool 2 (which MUST be located within the project's geodatabase) and a folder to save the output Excel files within. Optionally, a feature class or shapefile containing current anthropogenic features within the Analysis_Area may be provided. This layer will be copied to the project's geodatabase (overwriting any existing feature class named "Current_Anthro_Features") and used instead of merging the individual anthropogenic feature layers. This is intended to allow users who have previously digitized anthropogenic features through a different process to use those data. It is not recommended; ensure that the Subtype field is populated appropriately.

Debit Tool 4 merges all anthropogenic feature layers to create "Current_Anthro_Features", and then calculates the indirect anthropogenic disturbance associated with those features by using the Subtype field to lookup the weight and distance associated with that feature, which is provided in Table 1. The "Current_Anthro_Disturbance" raster is created in the project's geodatabase. It repeats this process for "Projected_Anthro_Features", which is created by merging the proposed surface disturbance with the current anthropogenic features (less any features that are classified as removed), and updating the Subtype field with the Subtype as Modified value for features that are classified as 'Modified'. The process is repeated for "Permanent_Anthro_Features", which is created by merging proposed surface disturbance that is classified as 'Permanent' or 'Term_Reclassified', where the Subtype is updated with the Reclassified Subtype value, and existing features that are classified as 'Returned' equals True or where the 'Subtype_As_Modified' field is not equal to the 'Subtype' field and 'Returned' equals False; the Subtype is updated with the Subtype_as_Modified value.

Next, the tool calculates the seasonal local-scale modifiers for each term by multiplying the rasters created above by the appropriate seasonal modifiers. See the HQT Methods Document for information on which modifiers apply to which seasons. Using these results, the tool creates a visual depiction of the project impact by selecting the maximum per season impact from each seasonal local-scale habitat raster.

The tool then creates the Map_Units layer. First, it creates map units for areas that overlap existing surface disturbance, and areas categorized as 'de minimus' habitat quality based on pinon-juniper cover and annual grass cover. It also creates map units for the proposed surface disturbance. Finally, it adds fields for 'Map_Unit_ID', 'Map_Unit_Name', and 'Meadow' and assigns domains to those fields. The map document is saved before the tool finishes.

Debit Tool 5

Debit Tool 5 is run after the user has delineated map units based on vegetation types. The tool creates another set of unique map units and then dissolves all multi-part map units to create Map_Units_Dissolve. The tool calculates the area in acres for each map unit. The tool calculates the proportion of each map unit in each Management Category, WAFWA management zone, Priority Management Unit, and Precipitation zone. These proportions are exported to Excel files in the project's folder. The tool calculates the average HSI value for each season and the average local-scale modifier for each season. Finally, the tool adds a 'Transects' field to the Map_Units_Dissolve layer to allow the user to create a number of transects per map unit. The map document is saved before the tool finishes.

Debit Tool 6

Debit Tool 5 performs a spatial join of the transects feature class provided by the SETT with the Map_Units_Dissolve layer and exports the data table to an Excel file within the project's folder.

APPENDIX 6. CREDIT TOOL OVERVIEW

This appendix describes what each Credit Tool is doing 'under the hood' so users have a better understanding of how the Credit Tools work.

Credit Tool 1

For most credit projects, Credit Tool 1 prepares the user for digitizing map units within the credit project boundaries. A feature class or shapefile defining the outer extent of the credit project must be provided as 'Credit_Project_Boundary'. If the provided layer contains multiple features, those features will be retained (e.g., the provided layer is not dissolved; multiple features are acceptable). The tool projects the provided layer to the standard coordinate system of the Desktop Analysis, clips out any areas that are not within management categories PHMA, GHMA, or OHMA (this is normal), and names this feature class 'Credit_Project_Area'. The tool uses that to create the Map_Units layer, adds the layer to the map document, adds fields for 'Map_Unit_ID', 'MapUnitName', and 'Meadow', and applies domains for the added fields to restrict data entry to valid inputs.

For projects that propose to modify or remove existing anthropogenic features, the user should check the corresponding box before running Credit Tool 1. The user may also, but is not required to, provide a feature class or shapefile defining the outer extent of the feature to be modified or removed. If that is not provided, the tool will create a template. The tool adds fields for 'Type' and 'Subtype' and applies domains for the added fields to restrict data entry to valid inputs. If the provided feature class or shapefile already has those fields present, the tool will copy those fields to a new field named 'Type_copy' or 'Subtype_copy'. The user must populate the 'Type' and 'Subtype' fields with the *current* status of the feature. The map document is saved before the tool finishes.

Credit Tool 2

For most credit projects, Credit Tool 2 uses the Map_Units feature class as edited by the user to create the Analysis_Area and clip all provided anthropogenic feature templates to the Analysis_Area for the user to digitize new features and confirm existing. The feature class provided by the user MUST be located within the project's geodatabase, however, it may be a different feature class than that created as an output of Credit Tool 1. This is intended to allow the user to use geoprocessing tools as necessary when digitizing the map units. Credit Tool 2 creates the Analysis_Area by buffering the Map_Units layer by the maximum distance found in Table 1. This is to ensure that any anthropogenic features that may have an indirect impact on the project are captured during digitization of existing anthropogenic features.

For projects that proposed to modify or remove existing anthropogenic features, Credit Tool 2 uses the Proposed_Modified_Features layer to calculate the area of indirect benefit of the project, named "Indirect_Benefit_Area". Any areas that are not within management categories PHMA, GHMA, or OHMA are clipped out. The tool also adds a field named 'Subtype_as_Modified' to each clipped anthropogenic feature layer for the user to indicate which features will be modified or removed, and to what status they will be modified. The map document is saved before the tool finishes.

Credit Tool 3

Credit Tool 3 completes a majority of the geoprocessing necessary to evaluate the credit project. It takes as input the Analysis_Area created in Credit Tool 2 (which MUST be located within the project's geodatabase) and a folder to save the output Excel files within. Optionally, a feature class or shapefile containing current anthropogenic features within the Analysis_Area may be provided. This layer will be copied to the project's geodatabase (overwriting any existing feature class named "Current_Anthro_Features") and used instead of merging the individual anthropogenic feature layers. This is intended to allow users who have previously digitized anthropogenic features through a different

process to use those data. It is not recommended; ensure that the Subtype field is populated appropriately.

Credit Tool 3 merges all anthropogenic feature layers to create "Current_Anthro_Features", and then calculates the indirect anthropogenic disturbance associated with those features by using the Subtype field to lookup the weight and distance associated with that feature, which is provided in Table 1. The "Current_Anthro_Disturbance" raster is created in the project's geodatabase. It repeats this process for projected condition for credit projects that propose to modify or remove existing anthropogenic features by using the 'Subtype_As_Modified' field instead of the 'Subtype' field. The area of indirect benefit is merged with the Map_Units layer and a field named 'Indirect' is added to the Map_Units layer signifying 'True' if the map unit is outside of the credit project boundary but within the indirect benefits area. For most credit projects, the 'Indirect' field will read 'False' for all map units.

Next, the tool calculates the seasonal local-scale modifiers for each term by multiplying the rasters created above by the appropriate seasonal modifiers. See the HQT for information on which modifiers apply to which seasons. A multiplier for removal of pinon juniper is also applied depending on the cover (i.e., phase) of pinon juniper present. For map units where the actual percent cover is less than 1%, this multiplier is removed at a later step. Using these results, the tool creates a visual depiction of the project benefit by selecting the maximum per season benefit from each seasonal local-scale habitat raster, subtracting the regional average site-scale habitat quality and multiplying by the management importance factor. This visualization is intended as an aid only, site-scale habitat quality data must be collected before credits can be known.

The tool then dissolves all multi-part map units to create Map_Units_Dissolve. The tool calculates the area in acres for each map unit. The tool calculates the proportion of each map unit in each Management Category, WAFWA management zone, Priority Management Unit, and Precipitation zone. These proportions are exported to Excel files in the project's folder. The tool calculates the average HSI value for each season and the average local-scale modifier for each season.

Finally, the tool adds a 'Transects' field to the Map_Units_Dissolve layer to allow the user to create a number of transects per map unit. The map document is saved before the tool finishes.

Credit Tool 4

Credit Tool 4 performs a spatial join of the transects feature class provided by the SETT with the Map_Units_Dissolve layer and exports the data table to an Excel file within the project's folder.

APPENDIX 7. DATA DESCRIPTIONS

Provided Data

- Nevada Wet Meadows (**NV_Wet_Meadows**): This feature class delineates the boundaries of possible riparian areas in Nevada.
- Distance to Brood-Rearing Habitat (**Dist_Brood**): This raster represents habitat function associated with distance to brood-rearing habitats in Nevada. Use to calculate the Distance to Brood-Rearing Habitat modifier.
- SEP Management Categories Map (**Mgmt_Cat**): This feature class delineates the boundaries of Sagebrush Ecosystem Program (SEP) Management Categories in Nevada. Use for informing the Credit System's Mitigation Ratio.
- Biological Significant Units (**NV_BSU**): This feature class delineates the boundaries of the Biological Significant Units in Nevada.
- Nevada Counties (**NV_Counties**): This feature class represents county boundaries in Nevada.
- Nevada Disturbance Response Groups (**NV_DRG**) [3]: This feature class delineates the boundaries of ecological sites that have been grouped into identified disturbance response groups.
- Nevada Ecological Site Descriptions (**NV_ESD**): This feature class delineates the boundaries of ecological sites.
- Priority Conservation Areas (**NV_PCA**): This feature class delineates the boundaries of Priority Conservation Areas, which are defined as the intersection between Sagebrush Focal Areas and (SFA) and Priority Habitat Management Areas (PHMA) in Nevada.
- Population Management Units (**NV_PMU**): This feature class delineates the boundaries of the NDOW Population Management Units in Nevada.
- Public (non-private) Lands: This feature class delineates land ownership that is not private land in the state of Nevada.
- WAFWA Management Zones (**NV_WAFWA**): This feature class delineates the boundaries of the WAFWA Management Zones in Nevada.
- MVRN Meadows (NV_Wet_Meadows): This feature from Saito 2020 MVRN shapefile delineates wet meadows from existing geospatial and remote sensing data.
- Percent Cover of Pinon Juniper (**PJ_Cover**): This raster represents percent cover of pinon juniper at a 30m pixel resolution.
- Phase III Pinon-Juniper (**PJ_Phase_III**): This feature class represents areas of Phase III (>20% cover) pinon-juniper.
- Pinon-Juniper Phase Map (**PJ_Phases**): This feature class represents pinon-juniper by phase, where phase I is <10% cover, phase II is 10% - 20% cover, and phase III is >20% cover.
- Uplift from Pinon-Juniper Removal (**PJ_Uplift**): This raster represents the multiplier applied to credit projects that propose to remove pinon juniper.
- Precipitation Regime (**Precip**): This feature layer is reclassified such that areas with less than 25.4 cm of precipitation are categorized as arid, and areas with greater than 25.4 cm are categorized as mesic. It is derived from the 30-year normal PRISM dataset available at http://prism.oregonstate.edu/normals/. Use for identifying the precipitation regime of individual map units.

[3] Disturbance Response Grouping of Ecological Sites Increases Utility of Ecological Sites and State-and-Transition Models for Landscape Scale Planning in the Great Basin. Tamzen K. Stringham, Patti Novak-Echenique, Devon K. Snyder, Sarah Peterson, and Keirith A. Snyder. *Rangelands* 2016 38 (6), 371-378

- Breeding Habitat Suitability Index (**Spring_HSI**): This raster dataset provides an index of local-scale habitat functionality for sage-grouse in Nevada during the spring season, which corresponds to the breeding life history period for sage-grouse.
- Late Brood-rearing Habitat Suitability Index (**Summer_HSI**): This raster dataset provides an index of local-scale habitat functionality for sage-grouse in Nevada during the summer season, which corresponds to the late brood-rearing life history period for sage-grouse.
- Over-Wintering Habitat Suitability Index (**Winter_HSI**): This raster dataset provides an index of local-scale habitat functionality for sage-grouse in Nevada during the winter season, which corresponds to the over-wintering life history period for sage-grouse.

- **Anthropogenic Features Geodatabase (Anthro_Features.gdb)**
  - Anthro_Attribute_Table: This table provides the indirect-effect weights and distances of anthropogenic features. Data in this table is also provided in Table 1.
  - emptyRaster: This raster is used to ensure consistent raster processing by serving as a snap raster and providing cell sizes for raster calculations.
  - Exploration: Empty feature class to allow users to more easily delineate exploration areas.
  - LROW: Empty feature class to allow users to more easily delineate linear rights-of-way.
  - Mines: Federal mine locations derived from Mineral Resource Data System (MRDS) data.
  - Oil_Gas: Federal oil and gas well locations derived from Automated Fluid Mineral Support System (AFMSS) data dated 12/2012.
  - Powerlines: Empty feature class to allow users to more easily delineate powerlines.
  - Renewable: Geothermal leases dated 2013.
  - Roads: State, federal, and county roads compiled by Nevada Department of Transportation (NDOT).
  - Towers: Communications tower locations derived from FCC data.
  - Urban: Boundaries of census blocks in Nevada categorized based on a Wikipedia search of all cities/townships.
- **Layer_Files Folder**: Includes layer files that may be used to standardize the symbology of outputs of the Desktop Analysis. Instructions for applying symbology to layers using layer files are provided throughout the User's Guide at appropriate steps.
- **Scripts Folder**: Contains text of the Python scripts used to generate the Desktop Analysis Tools, to be used for reference if desired.

APPENDIX 8. ANTHROPOGENIC FEATURES DATASHEET

NEVADA CONSERVATION CREDIT SYSTEM

Anthropogenic Disturbance Review Form

Due to the significant variability in anthropogenic disturbance delineation within the CCS, the SETT requires justification and rationale for delineation of anthropogenic features associated with credit and debit projects. This form is to help track and justify delineation of features completed by the certified verifier in order to assure the most accurate assessment of anthropogenic disturbance for each project. Generally, these questions do not apply to the proposed surface disturbance for a debit project; the SETT primarily is interested in the classification of anthropogenic features within the Analysis Area. Proposed surface disturbance will be analyzed separately by the SETT.

1. Please describe any deviation from the provided Roads layer in the Nevada Data Package. If applicable, please provide rationale for any removals or additions.

2. What sources were used to verify and confirm the status of a mine or geothermal facility (e.g. active, inactive, actively being reclaimed, etc.) within the analysis area?

3. What sources in addition to aerial imagery (e.g. Rural Electric Association (REA) data, visual inspection and documentations) were used to confirm Powerline Subtypes?

4. If a Phase III Distribution line identified from a REA was reclassified as Non Nest Facilitating, please provide the documentation and evidence below. This would include photographs, recorded distance of continuous single crossarm Phase III poles, or other documentation.

Project: _____

Name of Certified Verifier: _____ Date: _____

Project Site Name:	Version: SETT 061217
Marked on map or with GPS unit (circle one).	**GPS Unit name if applicable:**

ANTHROPOGENIC FEATURES

Feature Type	Camera/ Photo #	Name (if marked using GPS)	UTM E	UTM N	Notes

Notes :	

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APPENDIX 9. MAP UNIT DATASHEET

Project Site Name:
Total number of Map units within Project Site:

Map Unit Number:	Dates of map unit transects:
Total number of transects: Names of transects:	Total number of photos: Aspect of MU: Slope of MU:
Map Unit Description (1 to 2 sentences describing vegetation, topography, and other features relevant to sage-grouse within map-unit):	
Notes:	

APPENDIX 10. TRANSECT NOTES DATASHEET (OPTIONAL)

Project Site Name:

Map Unit Number:	Date:
Transect number:	Observers:
Moved or Reflected?	Rejected?
Notes (Include reasoning for changes and new transect starting location and aspects):	

Map Unit Number:	Date:
Transect number:	Observers:
Moved or Reflected?	Rejected?
Notes (Include reasoning for changes and new transect starting location and aspects):	

APPENDIX 11. RESISTANCE & RESILIENCE SCORECARD

Score Sheet for Rating Resistance and Resilience to Disturbance to Invasive Annual Grasses in the Great Basin (adapted from Miller et al. 2014)

Map Unit Name/Number:	**Ecological Site Name/Number:**	**Date:**
Acreage of Map Unit/Ecosite:	**UTMs:**	
SITE CHARACTERISTICS	**SITE CONDITION (select one)**	**SITE SCORE**
Temperature (Soil temperature regime + Species or subspecies of sagebrush) - Desktop		
Soil temperature regime	**1** = hot-mesic **2** = warm-mesic **3** = cool-mesic or cool-cryic **4** = warm frigid **5** = cool-frigid **6** = warm-cryic	
Species or subspecies of sagebrush	**1** = Wyoming, low, black, or Lahontan **2** = basin, Bonneville, or xeric **3 =** mountain	
Moisture (Precipitation + Soil Texture + Soil Depth) - Desktop		
Precipitation (in)	**1** = <10 **2** = 10-12 **3** = 12-14 **4** = >14	
Soil texture	**1** = clay, sand, or silt **2** = silty loam, sandy loam, or clay loam **3** = loam	
Soil depth (in)	**0 =** very shallow (<10) **1 =** shallow (10-20) **3 =** moderately deep to deep	
Vegetation (Plant groups modified by soil depth) - On-Site		
Plant Groups Deep-rooted perennial grasses (DRPR) potentially dominant in shallow to deep soils >10 in. Sandberg bluegrass (POSE) potentially dominant in very shallow soils <10 in. Perennial forbs (PF) Invasive annual grasses (IAG)	**0 =** DRPG and POSE scarce to severely depleted (DRPG < 2-3/m^2) and less than 5% foliar cover **3 =** DRPG on soils >10 in. scarce, but POSE or PF >50% foliar cover **6 =** DRPG on soils >10 in. depleted (2-3/m^2 or about 5-10% foliar cover) and/or co-dominant with IAG, **or** on soils < 10 in. POSE and PF 5-15% foliar cover and co-dominant with IAG. **9 =** DRPG and PF dominant on soils > 10 in. **or** POSE and PF dominant on soils < 10 in.	
	TOTAL:	
R & R RATING (circle one)	**Very low** < 10; **Low** = 10-14; **Moderate** = 15-20; **High** > 20	

Guide to Soil Temperature Regime

	Hot-Mesic	Warm-Mesic	Cool-Mesic	Warm-Frigid	Cool-Frigid	Warm-Cryic	Cool-Cryic
PPT (in)	<4	4-8	8-12	12-14	14+	16+	18+
Moisture Regime	Dry Aridic	Typic Aridic	Aridic bordering Xeric	Xeric bordering Aridic	Typic Xeric	Typic Xeric	Typic Xeric
Indicator Plants	PIDE4, ATCO, SABA14, SAVE4, ACHY, LYSH, PLJA	PIDE4, ATCO, KRLA2, HECO26, ACHY	ARNO4, ARTRW8, JUOS, JUOC, ACTH7	ARNO4, ARAR8, ARTRV, ARTRW8, JUOS, JUOC, PIMO, ACTH7	ARTRV, SYMPH, AMAL2, PIMO, JUOS, JUOC, FEID, ACNE10, POTR5	ARTRV, ARSP8, ARAR8, SYMPH, AMAL2, CELE3, ABCO, POTR5	PIEN2, PIAR, PIFL2
Ecological Zones	Salt Desert Scrub	Desert Basin	Sagebrush Semi-Arid	Upland Sagebrush, Juniper/ Pinon	Upland Mountain Sagebrush, Pinon/ Juniper	Mountain Sagebrush	High Mountain

**Derive from NRCS Official Soil Series Description (OSDs) based on Soil Web Survey's Map Unit Descriptions*

Example of Cool-Mesic (Doowak series): The Doowak series consists of very deep, excessively drained soils

TAXONOMIC CLASS: Sandy-skeletal, mixed, mesic Xeric Torriorthents

or

TYPICAL PEDON: Doowak very gravelly loamy sand--rangeland.

The mean annual precipitation is 200 to 250 mm;

The present vegetation is mainly Wyoming big sagebrush, spiny hopsage, Thurber needlegrass, and Indian ricegrass.

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APPENDIX 12. ABILITY TO CONTROL WILDFIRE SCORECARD

Ability to Control Wildfire Scorecard

Map Unit Name/Number:	**Ecological Site Name/Number:**	**Date:**
Acreage of Map Unit/Ecosite:	**UTMs:**	
SITE CHARACTERISTICS	**SITE CONDITION (select one)**	**SITE SCORE**
Topography/ Access/ Response Time - Desktop		
Average percent slope in project area (GIS)	**1 =** 0-10% **3 =** 11-25% **5 =** greater than 25%	
Access to project area for suppression resources	**1 =** paved road **2 =** improved dirt road **4 =** unimproved two-track **5 =** hike or aircraft	
Response Time of Fire Suppression Resources for Initial Attack	**1 =** Less than 1 hour **3 =** 1-2 hours **5 =** greater than 2 hours	
Average aspect of project site (GIS)	**1 =** N,NE **2 =** NW, E **3 =** W. SE **4 =** S, SW, Flat	
Road Distance to Available Water Sources	**0 =** <1 mile **3 =** 1 to 3 miles **5 =** >3 miles	
Vegetation/Fuel Type/Ignition Risk – On-Site		
Dominant fuel type in project area (Fire Behavior Fuel Models based on USDA Forest Service Gen. Tech. Rep. RMRS-GTR-153. 2005)	**0 =** Irrigated pasture (NB3) **1 =** Riparian wet meadow (GR3) **3 =** Perennial Grass (GR1, GR2, GR4) **5 =** Shrub (SH1, SH2) **7 =** Grass/Shrub (GS1, GS2) **8 =** Heavy Shrub/Grass (SH5, SH7) **10 =** Pinyon/Juniper (TU1, TU4, TU5)	
Dominant fuel type adjacent to the project area (w/in 1 mile)	**0 =** Irrigated (NB3) / Riparian (GR3) **1 =** Perennial Grass (GR1, GR2, GR4) **5 =** Shrub (SH1, SH2) **7 =** Shrub/Grass (GS1, GS2) **8 =** Heavy Shrub/Grass (SH5, SH7) **10 =** Pinyon/Juniper (TU1, TU4, TU5)	
Invasive Annual Grass Cover (Based on HQT data)	**0 =** 0% **5 =** 1-5% **10 =** >5	
Vegetation Condition Class VCC (departure from historic conditions) LANDFIRE Map	**1 =** Low **2 =** Moderate **3 =** High	
	TOTAL:	
WILDFIRE RATING (circle one)	**High** < 21; **Moderate** = 21-35; **Low =** >35	

Dominant fuel type adjacent to the project area https://www.fs.fed.us/rm/pubs/rmrs_gtr153

1. Nearly pure grass and/or forb type (Grass)

a. Arid to semiarid climate (rainfall deficient in summer).

i. GR1 Grass is short, patchy, and possibly heavily grazed. Spread rate moderate; flame length low.

ii. GR2 Moderately coarse continuous grass, average depth about 1 foot. Spread rate high; flame length moderate.

iii. GR4 Moderately coarse continuous grass, average depth about 2 feet. Spread rate very high; flame length high.

b. Subhumid to humid climate (water adequate in all seasons; riparian areas).

i. GR1 Grass is short, patchy, and possibly heavily grazed. Spread rate moderate; flame length low.

ii. GR3 Very coarse grass, average depth about 2 feet. Spread rate high; flame length moderate.

2. Mixture of grass and shrub, up to about 50 percent shrub coverage (GrassShrub)

a. Arid to semiarid climate (rainfall deficient in summer).

i. GS1 Shrubs are about 1 foot high, low grass load. Spread rate moderate; flame length low.

ii. GS2 Shrubs are 1 to 3 feet high, moderate grass load. Spread rate high; flame length moderate.

3. Shrubs cover at least 50 percent of the site; grass sparse to nonexistent (Shrub)

a. Arid to semiarid climate (rainfall deficient in summer).

i. SH1 Low shrub fuel load, fuelbed depth about 1 foot; some grass may be present. Spread rate very low; flame length very low.

ii. SH2 Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuel present. Spread rate low; flame length low.

iii. SH5 Heavy shrub load, depth 4 to 6 feet. Spread rate very high; flame length very high.

iv. SH7 Very heavy shrub load, depth 4 to 6 feet. Spread rate lower than SH5, but flame length similar. Spread rate high; flame length very high.

4. Grass or shrubs mixed with litter from forest canopy (Timber-Understory)

a. Semiarid to subhumid climate.

i. TU1 Fuelbed is low load of grass and/or shrub with litter. Spread rate low; flame length low.

ii. TU4 Fuelbed is short conifer trees with grass or moss understory. Spread rate moderate; flame length moderate.

iii. TU5 Fuelbed is high load conifer litter with shrub understory. Spread rate moderate; flame length moderate.

7. Insufficient wildland fuel to carry wildland fire under any condition (Nonburnable)

c. NB3 Agricultural field, maintained in nonburnable condition.

e. NB9 Bare ground.

Vegetation Condition Class http://landfire.cr.usgs.gov/viewer/viewer.html

If multiple categories exist across the map unit, list the weighted average of the conditions.

Click the Globe -> View Data or Download Data (as ArcGrid)

LF(Latest Year) -> Fire Regime -> Vegetation Condition Class

Condition Category	**Vegetation Condition Class**
VCC Ia: Very Low, VDEP 0 - 16	VCC I: Low departure, VDEP 0 - 33
VCC Ib: Low, VDEP 17 - 33	
VCC IIa: Moderate to Low, VDEP 34 - 50	VCC II: Moderate departure, VDEP 34 - 66
VCC IIb: Moderate to High, VDEP 51 - 66	
VCC IIIa: High, VDEP 67 - 83	VCC III: High departure, VDEP 67 - 100
VCC IIIb: Very High, VDEP 84 - 100	

APPENDIX 13. PHOTO TRANSECT DATASHEET

Project site:

Date:

Transect ID:

Bearing:

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APPENDIX 14. TRANSECT DATASHEET

NEVADA CONSERVATION CREDIT SYSTEM HABITAT QUANTIFICATION TOOL

Site-Scale (4th Order) Attribute Measurements

Site Name:			
Date:	Observers:	Start time:	End time:
Transect name:	Transect UTM E:	Transect UTM N:	
Transect Sample Bearing:	GIS/Camera / Photo #'s:		
Is transect located within what would generally be called a meadow? Yes No			
What sagebrush species is the transect dominated by? Big Low/Black N/A			

DISTANCE TO SUITABLE SAGEBRUSH COVER (10% PER 30M X 30M AREA)

Distance from 30m mark: _____ *if transect within suitable cover, distance = 0

LINE INTERCEPT (SHRUB COVER)

Low/Big Sagebrush/ Other	Start	Stop	Sagebrush Height (cm)		Low/Big Sagebrush/ Other	Start	Stop	Sagebrush Height (cm)

Shrub species encountered along transect:	**Notes for Line Intercept:**

DAUBENMIRE PLOTS (HERBACEOUS COVER)

Record percent cover using the following coverage classes: 0 = 0%, 1 = >0-5%, 2 = 6-25%, 3 = 26-50%, 4 = 51-75%, 5 = 76-95%, 6 = >96%

PF = Perennial Forbs; PG = Perennial Graminoids; IAG = Invasive Annual Grasses
(State Listed Noxious Weeds are not Counted)

Plot #	Functional Group	Cover Class
1	PF	
	PG	
	IAG	

Plot #	Functional Group	Cover Class
2	PF	
	PG	
	IAG	

Plot #	Functional Group	Cover Class
3	PF	
	PG	
	IAG	

Plot #	Functional Group	Cover Class
4	PF	
	PG	
	IAG	

Plot #	Functional Group	Cover Class
5	PF	
	PG	
	IAG	

UNIQUE PERENNIAL & ANNUAL FORBS IN DAUBENMIRE FRAMES:

List all unique forb species found across all plots within this transect: **Total Count: _____**

(State Listed Noxious Weeds are not Counted)

ALL SPECIES LIST:

Graminoid and other Forb species encountered on plot:	All invasive and noxious (*) weeds encountered on plot and a rough cover estimate of each:	Notes for Daubenmire plots:

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APPENDIX 15. PROJECT CHECKLIST

Project Checklist

Project Name _____

▪Project Proponent _____

***Verifier** _____

Date Completed

☐	Attend Verifier Training for the Current Year*	Typically January
☐	Site Validation Checklist▪ (Credit Projects Only)	Submit to SETT PRIOR TO Pre-Field Due by February 1
☐	Pre-Field Work Submittal Checklist*▪ Conflict of Interest Disclosure Form Proof of Ownership and Rights (Credit Projects Only) Debit Project Review Form Part 1 (Debit Projects Only) Pre-Field Credit System Calculator Valid CCS Shapefiles with Map Units Valid CCS Shapefiles of PFC Reaches for Surveying (Credit Projects Only)	Submit to SETT Two Weeks Prior to Fieldwork Start Due by March 15
☐	SETT Approval of Pre-Field Work Submittal Packet* Will Provide the Transects Upon Final Approval	Expect two weeks post submission
☐	Conduct Fieldwork* Anthropogenic Features Review Form Map Unit Datasheets Resistance & Resilience Scorecards (Credit Projects Only) Ability to Control Wildfire Scorecards (Credit Projects Only) Transect Datasheets [Project Site]-[MU#]-[T##] PFC Datasheets (Credit Projects Only) [Project Site]-PFC-[ReachName] Other _____	April 15th – June 30th (Variable per Year)
☐	Enter Data into Calculator*	
☐	Name Photos* [Project Site]_[MU#]_[T##]_[{Descriptor} or {Unknown Code_#}]_YYYYMMDD; [Project Site]_PFC_[ReachName]_[##]_YYYYMMDD	
☐	Scan Datasheets* [Project Site]_[{MU#} or {PFC} or {Anthro}]_Datasheets_YYYYMMDD.pdf	
☐	Verifier Project Assessment Submission Form* Project Geodatabase and Map (.mxd) Final Credit System Calculator Anthropogenic Features Review Form Map Unit Datasheets Resistance & Resilience Scorecards (Credit Projects Only) Ability to Control Wildfire Scorecards (Credit Projects Only) Transect Datasheets PFC Datasheets (Credit Projects Only) PFC Summary (Credit Projects Only) Transect Photographs	Submit to SETT By October 31st Project may be subject to a new Version if not finalized 90 days after a new version is released

☐ Receive QA Results from SETT* — Expect one month post submission

☐ Complete and Sign Debit Project Review Form Part 2▪ (Debit Projects Only)
If not purchased or transferred within 5 years from signing of Debit Project Review Form Part 2, then the Debits must be rerun under the newest Version

☐ Draft Management Plan▪* (Credit Projects Only) — Submit to SETT

☐ Finalize and Sign Management Plan Section A▪ (Credit Projects Only) — Submit to SETT
If not completed within 90 days from approval of a new Version, then the Credits will be subject to the new Version

☐ Credits Eligible for Sale▪ (Credit Projects Only)

☐ Pre-Sale Annual Management and Monitoring Report▪ (Credit Projects Only) — Submit to SETT By July 31st

Year HQT is Completed (Year 0) _____

Year 1 Year 2 Year 3 Year 4

If Credits are Not Sold by Year 5 (Credit Projects Only)

☐ Conduct 5-Year Qualitative Assessment▪ (Maintains Credits for another 5 years) — Re-start Pre-Sale Annual Monitoring Cycle

Or

☐ Remove Project from CCS▪

When an Arrangement is Made to Sell/Transfer Credits, Completed with Each Credit Sale/Transfer

☐ Finalize Financial Assurance Plan▪ (Credit Projects Only) — Submit to SETT

☐ Participant Contract▪ (Credit Projects Only) — Submit to SETT

☐ Set up Financial Assurance Account▪ (Credit Projects Only)

☐ Finalize and Sign Management Plan Section B▪ (Credit Projects Only) — Submit to SETT

☐ Credit Purchase / Transfer Agreement▪ — Submit to SETT

☐ Credit Purchase / Transfer Form▪ (Credit Projects Only) — Submit to SETT

☐ Debit Project Review Form Part 3▪ (Debit Projects Only) — Submit to SETT

☐ Annual Management and Monitoring Report▪ / **15-Year Verification*** (Credit Projects Only) — Submit to SETT By July 31st / **By October 31st**

Year HQT is Completed (Year 0) _____ Term of Project _____ Years

Year 1	Year 6	Year 11	Year 16	Year 21	Year 26
Year 2	Year 7	Year 12	Year 17	Year 22	Year 27
Year 3	Year 8	Year 13	Year 18	Year 23	Year 28
Year 4	Year 9	Year 14	Year 19	Year 24	Year 29
Year 5	Year 10	**Year 15**	Year 20	Year 25	**Year 30…**

APPENDIX 16. BIENNIALS AND SUBSHRUBS GUIDE

When in doubt, look it up on USDA plants. All plants should be correctly identified to species as much as possible.
If plant can't be identified to species, identify to Perennial Forb (PF01, etc.), Annual Forb (AF01, etc.), or Shrub (SH01, etc.). If that cannot be figured out, classify it as "Unknown Other"

Succulents should be categorized as "Other" Sedges and Rushes should be categorized as "Grass"

All "Annual/Biennial" and "Biennial/Perennial", ignore the Biennial and go with the other. All "Biennial" and "Annual/Biennial/Perennial" should be Annuals. Exceptions below.

All "Shrub/Subshrub" and Forb/Herb/Subshrub", ignore the Subshrub and go with the other. All "Subshrub" and "Forb/Herb/Shrub/Subshrub" should be Shrubs. Exceptions below.

If you come across a specific plant that is a sage grouse preferred forb (verified by literature), but not on the list below, let us know.

Biennials Categorized as Perennials
Astragalus lentiginosus
Erigeron colomexicanus
Erigeron divergens
Erigeron flagellaris
Erigeron lobatus
Grindelia squarrosa
Hackelia nervosa
Lepidium virginicum
Machaeranthera canescens
Melilotus officinalis
Mentzelia leucophylla
Mentzelia pumila
Mentzelia torreyi
Oenothera biennis
Phacelia mutabilis
Potentilla newberryi
Potentilla norvegica
Tragopogon porrifolius
Tragopogon pratensis
Vicia villosa

Subshrubs Categorized as Forbs
Agoseris glauca
Astragalus lentiginosus
Chimaphila menziesii
Chimaphila umbellata
Orthilia secunda
Penstemon petiolatus
Petrophytum caespitosum
Phlox stansburyi
Phlox viridis
Pyrola asarifolia
Pyrola chlorantha
Pyrola minor
Pyrola picta
Sphaeromeria cana
Tiquilia canescens

For information and questions about the Nevada Conservation Credit System, please contact:

Sagebrush Ecosystem Technical Team (SETT)
(775) 687-2000