



Conservation Credit System

USER'S GUIDE

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Version 2.0

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INTRODUCTION

The User's Guide describes the detailed steps necessary to calculate credits and credit obligations for Credit and Debit Projects, respectively. Debit Projects must use the Conservation Credit System if they are located in or within 6km of Greater Sage-grouse (*Centrocercus urophasianus*; hereafter GRSg) habitat in Nevada.

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 Greater Sage-grouse biology and extensive experience with field data collection methods, including identification of Great Basin plant species. Additionally, specific software requirements must be met (as defined at the beginning of each section), including an ESRI ArcGIS Pro 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 the sequence listed—unless the user has extensive experience and a deep understanding of the process—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) it pre-screens credit project sites to ensure that they meet the credit site eligibility requirements (see the *Conservation 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, such as the map units and the anthropogenic features, have been finalized and verified. Useful information related to the Desktop Analysis is included in appendices of this User's Guide—please review the appendices carefully if 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 may 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 both the Desktop Analysis and Field Data Collection Methods have been completed. However, it is possible to generate partial estimates of the credit/credit obligation calculation for specific situations (e.g., projected local-scale function, site-scale function) once required data for those elements are available.

DESKTOP ANALYSIS

TOOLS REQUIRED

To complete the Desktop Analysis, the following tools are required:

- ESRI ArcGIS Pro version 3.1 or later
- Spatial Analyst extension license
- Python 3.9 or later (automatically installed with ArcGIS Pro)
- Microsoft Excel (2007 or higher)
- Credit or Debit Project Calculator Version 2.0
- Management Plan and Validation Checklist (Credit Projects only)
- Recommended: Nevada Conservation Credit System Manual and HQT Scientific Methods Document for reference

DATA REQUIRED

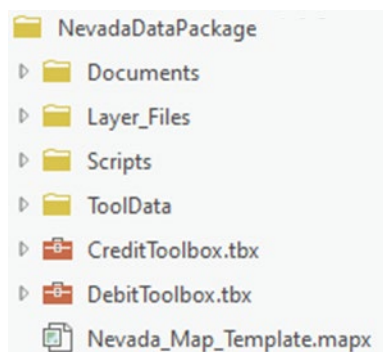
The following data should be acquired before beginning the Desktop Analysis:

1. Download and extract the compressed file **NevadaDataPackage.zip** to a location on the computer's hard drive. Save the Nevada Data Package locally, opposed to an external server, for improved 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 below.



- A helpful starting point in delineating wet meadows for 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 **Nevada_Map_Template**, 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 <https://heritage.nv.gov/documents/a-synthesis-of-vegetation-maps-for-nevada-initiating-a-living-vegetation-map>. Download the 'Vegetation

Index GIS data' 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 in ArcGIS:
 - Install the following ArcGIS Server: Select the Insert tab > Connections > Server > > New WMTS Server. Enter <http://map.sagegrouseinitiative.com/wmts.xml> into the internet server box then click Ok.
 - Use the data from the above server: In the Catalog pane, navigate to Servers > WMTSGate on map.sagegrouseinitiative.com > WMTSGate > 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
 - **USGS Topographic Maps:** Use to assist with delineating map units. In ArcGIS, go to Map > Layer > Add Data > Data > Portal > 'ArcGIS Online'. Search for USA Topo. Click "Add" for the 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 '**Project Boundary**' shapefile or feature class. This is the geographic area being proposed as the debit or credit project and should be provided by the project proponent. If the proposed surface disturbance or project boundary shapefile or feature class is not provided, follow the steps below to create it. Ensure sufficient information is acquired 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 when done.
 - b. [For Debit Projects:](#)
 - i. Proceed with the Desktop Analysis, a template feature class will be created.
 5. Acquire the '**Abundance and Space Use Index**' (ASUI) layer from the Nevada Department of Wildlife (NDOW) by submitting a Data Request Form, available from the NDOW website at <https://www.ndow.org/blog/gis-data/>. During the Desktop Analysis a prompt to request this information will appear and a required shapefile will be generated. 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 with assigned weights and distances

TYPE	SUBTYPE	TYPE CODE ^{t,t2}	SUBTYPE CODE ^{t,t2}	WEIGHT (%)	DISTANCE (Meters)
Towers	Communications ¹	Towers	Communications	75%	6,000 m
	Meteorological	Towers	Meteorological	75%	6,000 m
Powerlines²	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 Development³	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 Exploration⁴	Mineral Exploration	Exploration	Exploration	100%	0 m
Other Disturbance	Other -High ⁵	Other	Other_High	75%	6,000 m
	Other – Medium ⁶	Other	Other_Medium	50%	3,000 m
	Other – Low ⁷	Other	Other_Low	25%	1,000 m
	No Indirect Disturbance	Other	No_Indirect_Dist	100%	0 m

¹This category includes satellites, large telescopes, and other antennas for communication or broadcasting.

²The 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.

³The Urban Low classification includes landfills.

⁴Mineral exploration is a special case of impact type and includes exploration associated with CCS defined disturbance within Table 1, including mining, oil and gas, geothermal, etc. Additional information is provided throughout this guide for this type of impact.

⁵Examples 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.

⁶Examples include: Disturbances that are minimized using measurable methodologies; intermittent or less continuous noise and activity.

⁷Examples 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.

⁴When 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.

¹²All above-ground facilities associated with the anthropogenic feature are classified as the type and subtype of the feature it is associated with. 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.

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. The tools provided in the Debit Toolbox are intended to facilitate the assessment of Debit Projects, but user input is required. **Please read each step carefully.** User tips are provided for each step, some of which may be essential for successfully completing certain tasks. 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 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 map units and/or current anthropogenic features are already delineated, the layers can be used in this process. There is no need to recreate those layers. If map units are already delineated, the subsequent steps are provided in step D11. If current anthropogenic features are already digitized, the subsequent steps are provided in Step D7.

For a description of the tools and the calculations performed by the automated tools, refer to [Appendix 5. Debit Tool Overview](#).

D1. OPEN THE MAP TEMPLATE & SAVE AS A NEW PROJECT

D1.1 In the NevadaDataPackage folder, double-click the Nevada_Map_Template to open it in ArcGIS Pro.

D1.2 Save the project (Project > Save Project As): use the naming convention **ProjectName_YYYYMMDD**. ArcGIS Pro will typically create a project folder and default Geodatabase to store the analysis. If it does not create a project folder and Geodatabase prior to beginning This Project Folder and the Geodatabase is submitted to Credit System Administrator along with the Project Calculator as zipped folder (.zip).

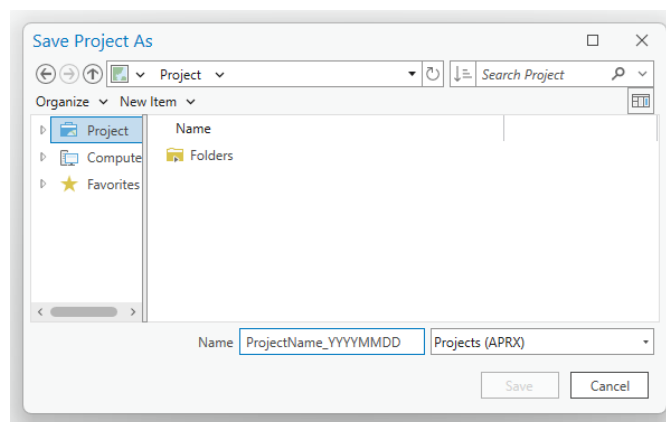



Figure 1. Name of the project folder

D1.3 Add the Debit Toolbox to the project by right-clicking on the parent Toolboxes () in the Catalog window and selecting 'Add Toolbox'. Navigate to the Toolbox saved in the Nevada Data Package (see [Data Required](#) Section) and select 'OK'. The toolbox should now be available in the list of toolboxes.

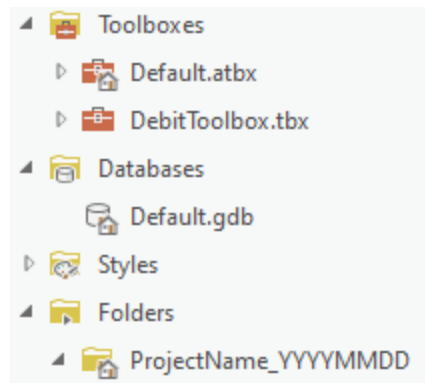


Figure 2. Project and file geodatabase structure

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. Some tools may not run properly if the file name is too long. If the tool is not completing, the file name may be too long.

D2. RUN DEBIT TOOL 1

[Toolboxes > DebitTools > Debit Tool 1]

- **Project Geodatabase** = the default project geodatabase located in the project folder. Use the 'default.gdb' in the project folder or create a new geodatabase. Right click on the project folder and select 'New File Geodatabase' to create a new file geodatabase. Make sure to follow the same naming convention mentioned above in D1.2.
- **Proposed Surface Disturbance** = a shapefile or feature class of the proposed surface disturbance area. If no feature class or shapefile is provided, a template will be created. Note: for exploration projects, 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.
- **Proposed Modified Features (optional)** = a shapefile or feature class that outlines the specific anthropogenic features to be modified or removed. If no shapefile is provided, a template will be created. If the project is expanding or upgrading an existing feature, leave this blank.

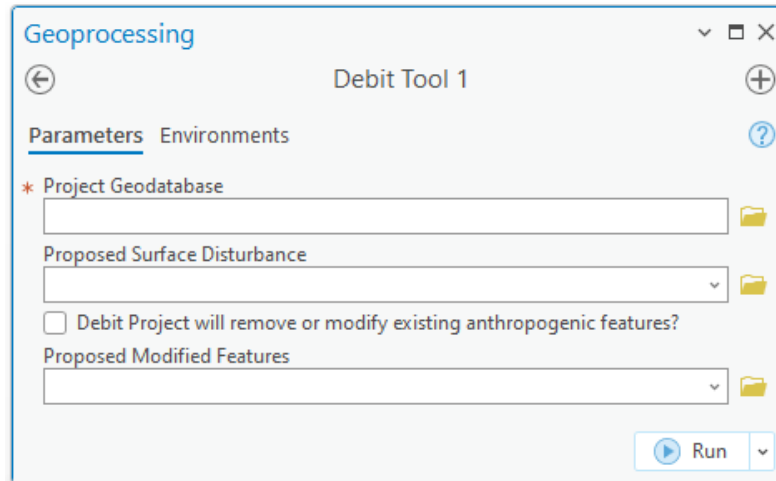


Figure 3. Debit Tool 1 interface

DEBIT TOOL 1 OUTPUT

- Proposed_Surface_Disturbance_Debits Layer
- Proposed_Modified_Features (Optional Proposed Modified Features Output)

TIPS


- **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 the actual disturbance that will be put on the ground. See Mineral Exploration in [Appendix 1](#) for when an exception may be in order.
- If the ‘**Proposed Surface Disturbance**’ provided by the project proponent is represented by multiple shapefiles, use the Merge tool to combine the shapefiles into a single feature class. Ensure the shapefile of the footprint for the proposed disturbance is being used.

[Geoprocessing > Toolboxes > Data Management Tools > 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 before running Debit Tool 1. Use the Intersect tool to determine if the layer contains overlapping polygons.

[Geoprocessing > Toolboxes > Analysis > Overlay > Intersect]

- **Input Features** = ‘Proposed Surface Disturbance’
 - **Output Feature Class** = append ‘_Merged’ to feature class name
 - **Attributes To Join** = ALL
 - **Output Type** = INPUT
- If overlapping polygons are present, remove any areas of overlap. Select an overlapping polygon. Select the Clip tool in the Editor toolbar (Edit > Tools > Clip). A dialog box will pop up. Leave the Buffer Distance = 0.0 and select ‘Discard the area that intersects’, then select ‘Clip’. 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.

- Ensure snapping is enabled (add the Snapping Toolbar if necessary). Also ensure 'Snap to Sketch' is enabled once in an editing session, this will allow creation of map units that are fully contained within one other map unit.
- 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 Split tool () in the Edit toolbar.

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_Debits**' layer and open the Attribute Table.
- D3.2** Double-click the cells in the Attribute Table to edit the cells. 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 the shapefile of the footprint for the proposed disturbance is being used (remember, do NOT use a Plan of Operations (PoO), full Plan Boundary, or full construction ROW widths for disturbance shapefile).
- D3.3** Populate the 'Type' and 'Subtype' fields for each feature exactly as in **Table 1** (see [Appendix 1](#) for definitions). If 'Type' and 'Subtype' are input incorrectly, it will drastically alter the debit estimate. 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 with correct 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.
- **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 (e.g., a new Low Use road).
 - **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).
 - **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).
 - **Permanent:** a feature permitted for disturbance in perpetuity (e.g., a new High Use road).
- D3.5** If a 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** Ensure all edits are saved by clicking 'Save' on the editing toolbar once all editing is complete.

	OBJECTID *	Shape *	Layer	Descrip...	Type	Subtype	Surface_Disturbance	Reclassified_Subtype	Acres	FSMap	T
1	1	Polygon ZM	Dark S...	WRDF	Mines	Active_Large	Term_Reclaimed	<Null>	130.714725		M
2	2	Polygon ZM	Dark S...	Pit	Mines	Active_Large	Term_Retired	<Null>	126.422232		M

Figure 4. Example 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 & 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** Review previously delineated features and edit as needed. Ensure that the outer extents of all anthropogenic features proposed for modification are digitized correctly. Delineate additional features as needed.
- D4.3** 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

[Catalog > Toolboxes > 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 Tool 2 output, '**Debit_Project_Area**', will be saved as a shapefile to this folder. Provide this layer as the 'Project Extent' to NDOW to request the '**ASUI**' layer.

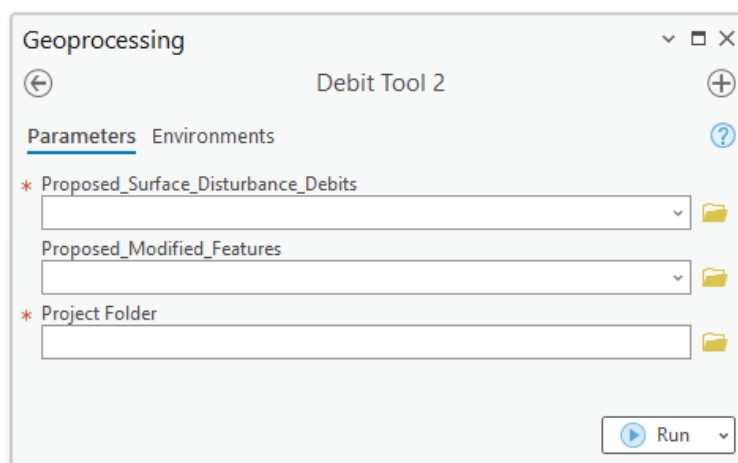


Figure 5. Debit Tool 2 interface

DEBIT TOOL 2 OUTPUT

- Proposed_Surface_Disturbance_Eligible Layer
- Analysis_Area Layer

D6. ACQUIRE THE ASUI LAYER FROM THE NEVADA DEPARTMENT OF WILDLIFE (NDOW)

D6.1 Submit a Data Request Form, available from the NDOW website at <https://www.ndow.org/blog/gis-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 the 'ASUI' layer is being requested for the purpose of assessing a Debit Project site for the Conservation Credit System.

TIPS

- The Data Request Process takes time. We anticipate approximately 1 month turn around due to the volume of projects NDOW receives and processes on a weekly basis. Larger projects take additional processing time. Plan accordingly.
- The ASUI layer is not necessary until the final stages of estimating debits. If wanting to proceed to the next steps of delineating Anthro Features or Map Units, use a blank raster as a place holder while waiting for the Data Request to be fulfilled.

D7. IDENTIFY & DELINEATE ANTHROPOGENIC FEATURES


Note: you may delineate anthropogenic features at this step if you are absolutely certain of the accuracy of the features. If not, you may wait until after Debit Tool 3 to delineate 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. Additional guidance is provided in [Appendix 1](#). If historical or recent mineral exploration is within the analysis area, please refer to [Appendix 1](#).





If anthropogenic features are already digitized, 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' must be included in the Current_Anthro_Features feature class. See step D9 for additional guidance.

To modify or digitize an anthropogenic feature within the Anthro_Feature groups:

- D7.1** Left click on the layer in the Table of Contents, navigate to Edit > Features. 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 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.
 - Select the Select tool () in the Selection section on the Map toolbar
 - Select the feature to copy. To select multiple features at once, hold down the SHIFT key while selecting the additional features.
 - Select the Copy button () in the Clipboard section on the Map or Edit toolbar.
 - Select the down arrow below the Paste button () and click Paste Special.
 - Select the '**Anthro_*feature type***' layer in which to store the pasted feature.
 - Select 'OK'. The feature is pasted into the appropriate layer.
- Ensure that all features have been captured. It is recommended to set the map scale, located in the bottom-left corner of the map, to 1:3,000 and scan the imagery systematically to ensure that all features have been digitized properly. To increase accuracy and efficiency in identifying new Anthro features create a grid across the 'Analysis Area' for systematic searching.

[Geoprocessing > Toolboxes > Cartography Tools > Map Series > 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

D8. RUN DEBIT TOOL 3

[Catalog > Toolboxes > 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 geodatabase.

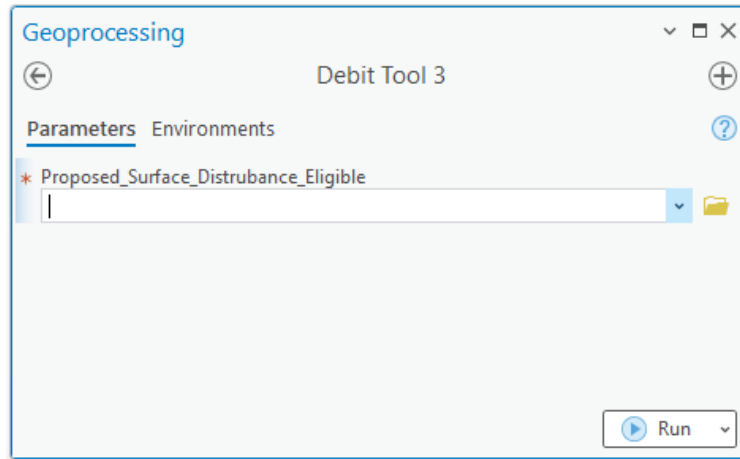


Figure 6. Debit Tool 3 interface

DEBIT TOOL 3 OUTPUT

- Anthro_**feature type**_Clip Layer

D9. CATEGORIZE EXISTING FEATURES THAT OVERLAP WITH PROPOSED DISTURBANCE

Debit Tool 3 will identify and isolate existing anthropogenic features that overlap with eligible (i.e., located on public land) proposed surface disturbance. These overlapping features require additional categorization 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 within the Attribute Table, 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 – Active_Large).

D9.1 Update the 'Overlap Status' field for existing features that overlap with the Debit Project. This is important and often overlooked, especially when rerunning analyses. 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.

- **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.
- **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.

D9.2 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' = True by default. Refer to field code definitions below.

- **True:** features that will return to their current subtype classification after the permitted term of the Debit Project.
- **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) may use this code.

D9.3 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 after 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, ensure 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

[Catalog > Toolboxes > DebitTools > Debit Tool 4]

- Analysis_Area = the 'Analysis_Area' layer created by Debit Tool 2. This layer **MUST** be located within the project's geodatabase
- Current_Anthro_Features (optional) = leave blank, unless existing anthropogenic features were not delineated within each 'Anthro_*feature type*_Clip' layer in step D7, then provide the feature class or shapefile with delineated anthropogenic features. 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**.
- Abundance and Space Use Index (ASUI) = the 'Abundance and Space Use Index' raster 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.

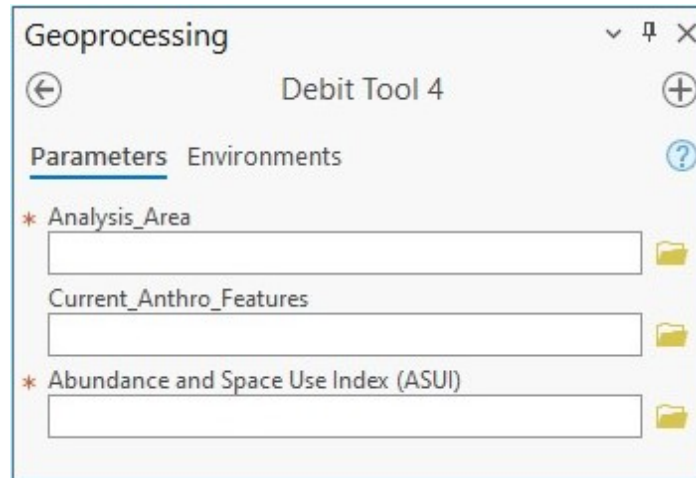


Figure 7. Debit Tool 4 interface


DEBIT TOOL 4 OUTPUT

- Map Units Layer
- Current_Anthro_Features Layer
- Current_Anthro_Disturbance Layer
- Projected_Anthro_Features Layer
- Projected_Anthro_Disturbance Layer
- Permanent_Anthro_Features Layer
- Permanent_Anthro_Disturbance Layer


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 GRSG 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. Create a new geodatabase so original results and files are not overwritten.

D11. DIVIDE MAP_UNITS LAYER INTO DISCRETE MAP UNITS & POPULATE ATTRIBUTE TABLE

Previously digitized map units can be combined with the '**Map_Units**' layer created by Debit Tool 4. Under Table Options () , uncheck 'Show Field Aliases'. Review the instructions below to ensure the attribute table is populated correctly (Be sure to edit based on its field name, not alias). In step D12, provide the feature layer created as the '**Map_Units**' parameter. Note this layer **MUST** be located within the project geodatabase.

D11.1 Left click the '**Map_Units**' layer in the Contents window.

D11.2 Using the Split tool () in the Edit Toolbar, delineate map units in the '**Map_Units**' layer. See [Appendix 3](#). Guidance for Delineating Map Units for detailed information. Use any other geoprocessing tools desired 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**'.

- The minimum map unit size should 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.

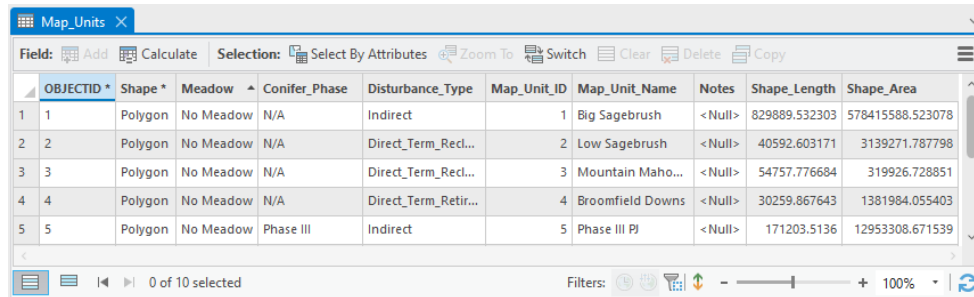
- Clusters of willow or other dense patches of woody riparian vegetation within meadows should not be delineated as separate map units. **Transects should not be run through long stretches (> 5m) of dense (closed shrub, 70 - 100% canopy cover) impassible willow patches.**
- For Debit Projects, delineate map units based on the indirect disturbance area, proposed surface disturbance, and already existing disturbance areas respectively. Subdivide the indirect and proposed disturbance areas according to the standard guidelines. Existing disturbance areas do not require further subdivision, as no sampling will occur in these areas. These map units will be assigned a site scale score of zero, and no transects will be generated within them.
- For Debit Projects, term features should be separate map units from permanent features.
- Run the Intersect tool to ensure there are no overlapping polygons.
- Meadows should be digitized as distinct map units. Meadows are important resources for GRSg and so take care in identifying and delineating all meadows within the project area.

D11.3 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 HQT, which has further detail in the attribute table that might aid in refining delineations. It should be noted that this layer is a coarse delineation and irrigated areas that meet the program definitions of meadow system 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' meadow is the default description so 'Altered' meadow should be recategorized appropriately. For non-meadow map units, populate the 'Meadow' attribute with 'No_Meadow'.

- **Unaltered meadows** are defined as naturally occurring wetland complexes, dominated by wetland vegetation and soils (e.g., stringer meadows, springs, seeps) where the hydrology has not been 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.

D11.4 Map units automatically labeled as 'Phase III' due to greater canopy cover in the 'Conifer_Phase' column that overlap with the proposed direct disturbance should not be removed as non-habitat (this includes exploration projects). Any proposed direct disturbance area will be sampled in the field to verify GRSg habitat function. Instead, running field transects will indicate whether or not a depauperate understory does indeed occur or whether GRSg 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. However, in the indirect disturbance area, areas labeled 'Phase III', 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.

- D11.5** Numerically ID each map unit in the 'Map_Unit_ID' field. Ecologically similar map units that are not geographically adjacent can receive the same numerical ID and be considered a single map unit. In the field, a visual walk-through should confirm this is the case.
- D11.6** 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.*
- D11.7** 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.
- D11.8** Run the Intersect tool (Geoprocessing > Toolboxes > Analysis Tools > Overlay > Intersect) to ensure there are no intersects or overlap 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.
- D11.9** Save the edits when done.



OBJECTID	Shape	Meadow	Conifer_Phase	Disturbance_Type	Map_Unit_ID	Map_Unit_Name	Notes	Shape_Length	Shape_Area
1	Polygon	No Meadow	N/A	Indirect	1	Big Sagebrush	< Null>	829889.532303	578415588.523078
2	Polygon	No Meadow	N/A	Direct_Term_Recl...	2	Low Sagebrush	< Null>	40592.603171	3139271.787798
3	Polygon	No Meadow	N/A	Direct_Term_Recl...	3	Mountain Maho...	< Null>	54757.776684	319926.728851
4	Polygon	No Meadow	N/A	Direct_Term_Retir...	4	Broomfield Downs	< Null>	30259.867643	1381984.055403
5	Polygon	No Meadow	Phase III	Indirect	5	Phase III PJ	< Null>	171203.5136	12953308.671539

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 an editing session, this will allow creation of map units that are fully contained within one other map unit.

D12. RUN DEBIT TOOL 5

[Catalog > Toolboxes > 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 geodatabase.
- **Project Folder** = the unique folder for this project. Excel files containing the outputs from this process will be saved to this folder.

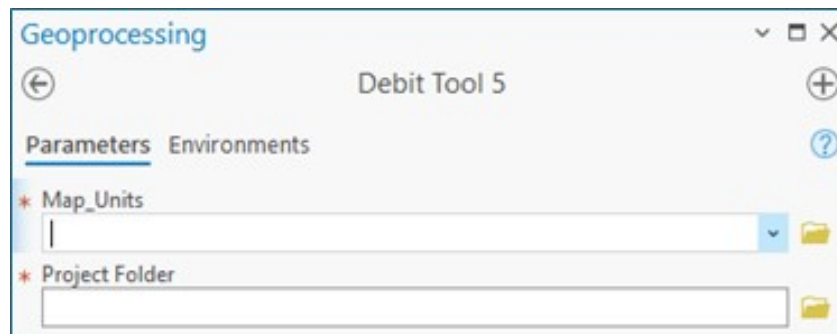


Figure 9. Debit Tool 5 interface

DEBIT TOOL 5 OUTPUT

- Map_Units_Dissolve Layer
- Five Excel Files for Calculator Entry

TIPS

- If a feature class named 'Map_Units_Dissolve' already exists in the project geodatabase (which may be the case if map units were delineated through a separate process), that feature class will be overwritten by Debit Tool 4. To prevent overwriting change the layer name (e.g., 'Map_Units_Copy') or save a copy outside of the project geodatabase.
- Tool 5 may not complete if the file name is too long. A good hint that this is the issue, is if it creates a 'Map_Unit_Dissolve' layer, but cannot output into the project folder.

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 unit where field data will not be collected, input '0'.

D13.3 Save edits when done.

TIPS

- The 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. The SETT will generate spatially balanced transects pre-screened for hazards, including steep slopes, for each project. Additionally, they will ensure that each transect is no more than 2 miles from any road (e.g., two-track, gravel road, or main road). If aware of any hazards, such as unstable slopes near a mine pit, please inform the SETT so they can coordinate transects within the hazard map units.

D15. RUN DEBIT TOOL 6

[Catalog > Toolboxes > DebitTools > Debit Tool 6]

- **Map_Units_Dissolve** = the 'Map_Units_Dissolve' layer created by Debit Tool 5. 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.

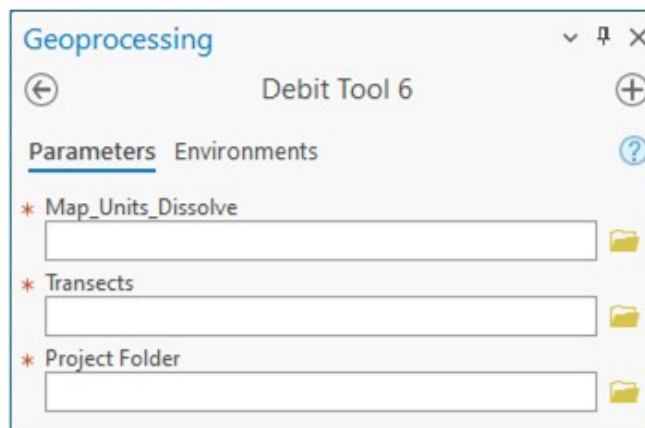


Figure 10. Debit Tool 6 interface

DEBIT TOOL 6 OUTPUT

- Transect SpatialJoin Excel File

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 Excel file, Debit_Project_Calculator. Strict copy and paste can lead to cell formatting changes, 'paste values only' is best practice. See **Table 2** for a list of data generated during the Desktop Analysis that must be inputted into the Project HQT Calculator.

Table 2. Excel files exported and their corresponding Calculator worksheets

EXPORT TABLE	CALCULATOR WORKSHEET
<input type="checkbox"/> Map_Units_Dissolve	1.1 Enter Map Unit Data
<input type="checkbox"/> Current_Mgmt_Cat	1.3 Enter Mgmt Cats Data
<input type="checkbox"/> Current_WMZ	1.3 Enter Mgmt Cats Data
<input type="checkbox"/> Current_PMU	1.3 Enter Mgmt Cats Data
<input type="checkbox"/> Current_Precip	1.3 Enter Mgmt Cats Data
<input type="checkbox"/> Transects_SpatialJoin	1.2 Enter Transects Data

EXPLORATION SPECIAL INSTRUCTIONS

- If an exploration project is being analyzed, replace the acreage summarized during the In the desktop analysis (sheet 1.1, column K), input the actual acreage planned for exploration within the direct disturbance map units. Since a larger spatial area may have been analyzed to allow flexibility in drill sites and roads, the correct acreage needs to replace the acreage of the Plan of Operations (PoO) Project Area or an equivalent spatial area. If multiple map units exist for the direct disturbance, apply the proportion of each map unit's acreage within the PoO Project Area to the proposed exploration acreage to calculate the appropriate acreage. Use the Map Unit Adjustment Calculator to determine the correct debit amount. Exploration projects can either use 100% site-scale function or collect field data by following standard HQT protocol.
- If any portion of the Proposed Area of Operation falls within mapped GRS habitat, the entirety of the proposed exploration acreage will be used in the project analysis.
- **Phase III conifer is not removed as a map unit when analyzing exploration.**
- Meadows must be delineated as map units within the 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, [Section 2: Field Data Collection Methods](#) can be completed. The field crew will confirm the boundaries of map units, add or remove transect locations, and confirm the location of anthropogenic features. Once field work is complete, make any necessary revisions to the 'Map_Units_Dissolve' layer, 'Transects' layer, and 'Current_Anthro_Features' layer.
- If the field crew recommends 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 *Sheet 2.6 of the Calculator*, under "Access to Map Unit for Field Sampling", enter "yes" in areas of non-habitat, such as Phase III P/J that was not sampled in the field. This will count the acreage but will not assign any debits to those areas.
- If the Credit Buyer has decided to use 100% site-scale function instead of field sampling, change the '**Current Average Seasonal HSI**' for Spring, Summer, and Winter to 100% in *Sheet 1.1 Enter Map Unit Data* of 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 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 map units and anthropogenic features are already delineated, those layers can be used in this process. There is no need to recreate those layers. If map units have already been delineated, instructions will be provided in step C3. If existing anthropogenic features have already been digitized, 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. OPEN THE MAP TEMPLATE & SAVE AS A NEW PROJECT

- C1.1** In the NevadaDataPackage folder, double-click the '**Nevada_Map_Template**' to open it in ArcGIS Pro. Submit this Project Folder as a zipped folder (.zip) to the Credit System Administrator along with the Project Calculator.
- C1.2** Save the project (Project > Save Project As): use the naming convention **ProjectName_YYYYMMDD**. ArcGIS Pro will typically create a project folder and default Geodatabase to store the analysis. If it does not then create a project folder and Geodatabase prior to beginning. **This Project Folder and the Geodatabase is submitted to Credit System Administrator along with the Project Calculator as zipped folder (.zip).**

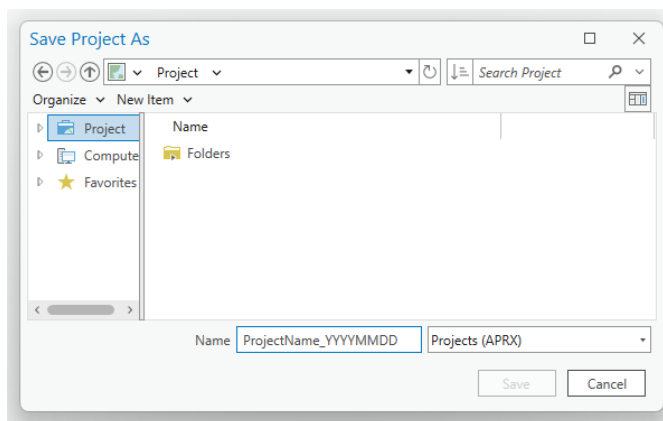


Figure 11. Name of the project folder

- C1.3** Add the Credit Toolbox to the project by right-clicking on the parent Toolboxes (📁) in the Catalog 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.

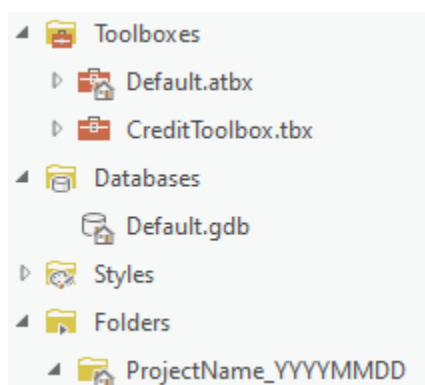


Figure 12. Project and file geodatabase structure

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 map units are already delineated, review step C3. That feature class or shapefile will be used as the 'Credit_Project_Boundary' parameter in Credit Tool 1. After running Credit Tool 1, populate the attribute table appropriately.

[Catalog > Toolboxes > CreditTools > Credit Tool 1]

- Project Geodatabase** = the default project geodatabase, located in the project folder.
- 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 when

the credit project proposes to remove or modify existing anthropogenic features, but 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)** = if the project will remove or modify existing anthropogenic features, 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, provided the box described above is checked.

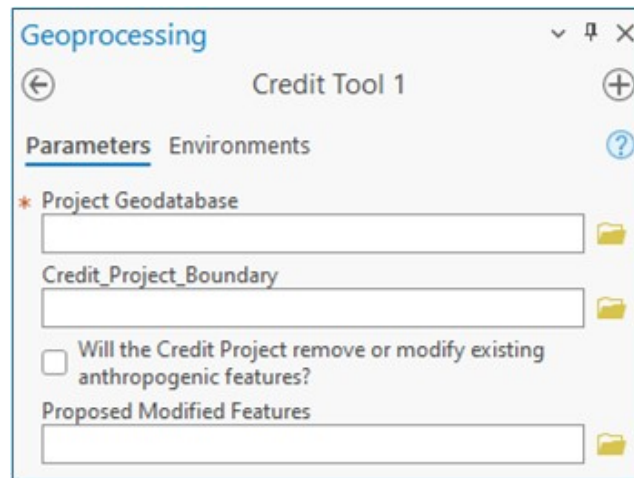


Figure 13. Credit Tool 1 interface

CREDIT TOOL 1 OUTPUT

- Map_Units Layer
- Proposed_Modified_Features Layer (optional proposed modified feature output)

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.

[Geoprocessing > Toolboxes > Data Management Tools > 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.

[Geoprocessing > Toolboxes > Analysis Tools > Overlay > Intersect]


- Input Features = 'Credit_Project_Boundary'
 - Output Feature Class = append '_Merged' to feature class name
 - Join Attributes = ALL
 - XY Tolerance = blankOutput 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 '*Credit Project will remove or modify existing anthropogenic features?*' MUST be checked if the project proposes to modify or remove existing anthropogenic features.

C3. DIVIDE MAP_UNITS LAYER INTO DISCRETE MAP UNITS & POPULATE ATTRIBUTE TABLE

C3.1 Left click the '**Map_Units**' layer in the Contents window.

C3.2 Using the Split tool () in the Edit Toolbar, delineate map units in the '**Map_Units**' layer. See [Appendix 3. Guidance for Delineating Map Units](#) for detailed information. Use any other geoprocessing tools desired 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**'.

- The minimum map unit size should 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.
- Clusters of willow or other dense catches of woody riparian vegetation within meadows should not be delineated as separate map units. **Transects should not be run through long stretches (> 5m) of dense (closed shrub, 70 - 100% canopy cover) impassible willow patches.**
- For Credit Projects, uplift/restoration areas should be delineated as separate map units (even if they are currently similar in vegetation to other areas, but a change is not expected in those areas).
- Run the Intersect tool to ensure there are no overlapping polygons.
- Meadows should be digitized as distinct map units. Meadows are important resources for GRSG and so take care in identifying and delineating all meadows within the project area.

C3.3 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 data package, which has further detail in the attribute table that might aid in refining delineations. It should be noted that this layer is a coarse delineation, and irrigated areas that meet definitions of meadow 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 as naturally occurring wetland complexes, dominated by wetland vegetation and soils (e.g., stringer meadows, springs, seeps) where the hydrology has not been 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.

C3.4 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 P/J 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.
- Phase III P/J polygons should be left as-is

C3.5 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.

C3.6 Name each map unit by providing a short description, typically associated with the major vegetation type, in the 'Map_Unit_Name' field.

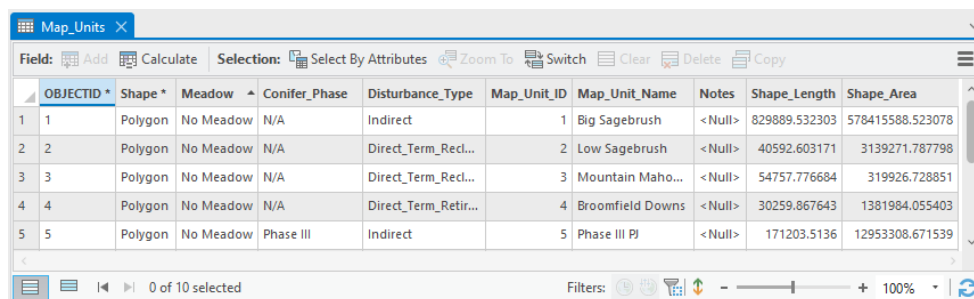
Note: Ensure that each unique map unit has its own ID and name. Ensure that each individual polygon of multi-polygon map units are ID'd and named identically to one another (they will be merged later on in the HQT).

C3.7 Optional – Capture additional information related to each map unit in the 'Notes' field. The 'Notes' field does not need to be identical for each individual polygon of multi-polygon map units. The 'Notes' field for each map unit will be concatenated when dissolving the Map_Units features by ID and name. The concatenated notes will be truncated if greater than 255 characters in length.

C3.8 Run the Intersect tool (Geoprocessing > Toolboxes > Analysis Tools > 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 when done.


NOTE: If changes to the P/J 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	Meadow	Conifer_Phase	Disturbance_Type	Map_Unit_ID	Map_Unit_Name	Notes	Shape_Length	Shape_Area
1	Polygon	No Meadow	N/A	Indirect	1	Big Sagebrush	< Null >	829889.532303	578415588.523078
2	Polygon	No Meadow	N/A	Direct_Term_Recl...	2	Low Sagebrush	< Null >	40592.603171	3139271.787798
3	Polygon	No Meadow	N/A	Direct_Term_Recl...	3	Mountain Maho...	< Null >	54757.776684	319926.728851
4	Polygon	No Meadow	N/A	Direct_Term_Retir...	4	Broomfield Downs	< Null >	30259.867643	1381984.055403
5	Polygon	No Meadow	Phase III	Indirect	5	Phase III PJ	< Null >	171203.5136	12953308.671539

Figure 14. Example completed Map_Unit attribute table

TIPS

- Before beginning to delineate map units, we recommend referencing the ESD layer and grouping the ecological sites into the identified ESD 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 be confirmed in the field.
- Ensure snapping is enabled (add the Snapping Toolbar if necessary). Also ensure ‘Snap to Sketch’ is enabled once in an editing session, this will allow creation of map units that are fully contained within one other map unit.
- Meadows should be digitized as distinct map units. Meadows are important resources for GRSG so take care in correctly 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 Edit Vertices tool () to delete the vertices that segment the small map unit from the surrounding map unit. That small map unit will be incorporated into the surrounding map unit.

C4. OPTIONAL - IDENTIFY & 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** 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.
- C4.3** Populate the ‘Type’ and ‘Subtype’ fields for each entry. Be sure to save edits 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.

C5. RUN CREDIT TOOL 2

[Catalog > Toolboxes > CreditTools > Credit Tool 2]

- **Map_Units** = the ‘**Map_Units**’ layer edited in step C3. The provided feature class MUST be located within the project's geodatabase. Leave blank if only Modifying or Removing Anthro Features
- **Proposed_Modified_Features (optional)** = the ‘**Proposed_Modified_Features**’ layer edited in step C4. The provided feature class MUST be located within the project's 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 ‘**ASUI**’ layer.

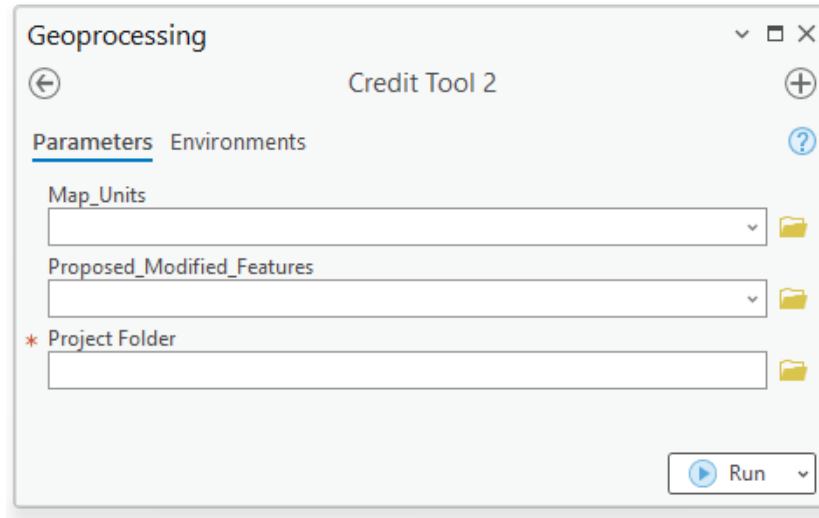


Figure 15. Credit Tool 2 interface

CREDIT TOOL 2 OUTPUT

- Analysis_Area Layer
- Anthro_**feature type**_Clip Layers

C6. ACQUIRE THE ASUI LAYER FROM THE NEVADA DEPARTMENT OF WILDLIFE (NDOW)

- C6.1** Submit a Data Request Form, available from the NDOW website at <https://www.ndow.org/blog/gis-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 the 'ASUI' layer is being requested for the purpose of assessing a Credit Project site for the Conservation Credit System.

C7. IDENTIFY AND DELINEATE ANTHROPOGENIC FEATURES

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

If anthropogenic features have already been digitized 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**.



For each '**Anthro_**feature type**_Clip**' layer in the '**project.gdb**' that requires modification, edit as follows:

- C7.1** Use the 'Create Features' tool to add features to the appropriate '**Anthro_**feature type**_Clip**' layer. 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 when done.

C7.2 For Credit Projects that propose to remove or modify existing anthropogenic features, populate the 'Subtype_As_Modified' field with the subtype that the feature will be modified to. If the feature is to be removed, select N/A. Populate 'Overlap_Status' with Removed and 'Returned' with False. If the project will not remove or modify existing anthropogenic features, these attribute fields will not be present.

C7.3 Save features.

TIPS

- Do not add new anthro features to an existing '**Current_Anthro_Features**'. Add them to the '**Anthro_*feature type*_Clip**' 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.
 - Select the feature to copy. Hold down SHIFT while clicking features to select additional features.
 - Select the Copy button () on the Standard toolbar.
 - Select Paste Special button () on the Standard toolbar.
 - Select the '**Anthro_*feature type*_Clip**' layer in which to store the pasted feature.
 - Select 'OK'. The feature is pasted into the appropriate layer.
- Ensure that all features have been captured. It is recommended to set the map scale, located in the bottom-left corner of the map, to 1:3,000 and scan the imagery systematically to ensure that all features have been digitized properly.

[Geoprocessing > Toolboxes > Cartography Tools > Map Series > 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

C8. RUN CREDIT TOOL 3

[Catalog > Toolboxes > CreditTools > Credit Tool 3]

- **Analysis_Area** = the '**Analysis_Area**' layer created by Credit Tool 2. This layer MUST be located within the project's geodatabase.
- **Abundance and Space Use Index (ASUI)** = the **Abundance and Space Use Index (ASUI)** 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.

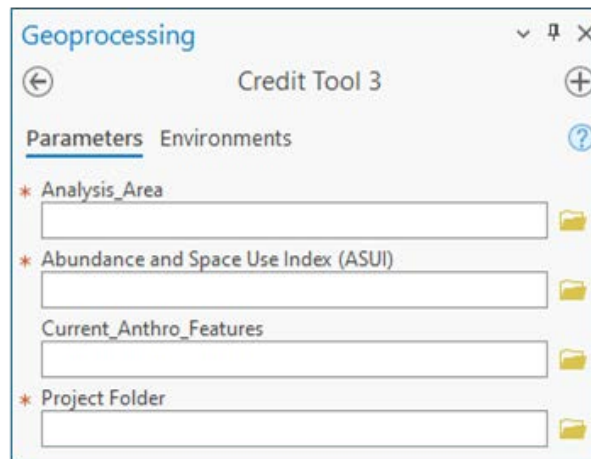


Figure 16. Credit Tool 3 interface

CREDIT TOOL 3 OUTPUT

- Current_Anthro_Features Layer
- Current_Anthro_Disturbance Raster
- Seasonal GRSG HSI Rasters
- Credit_Quality Raster
- Map_Units_Dissolve Layer
- Excel files for Calculator input

TIPS

- If a feature class named '**Map_Units_Dissolve**' already exists in the project geodatabase (which may be the case if these steps were not followed and map units were delineated through a separate process), that feature class will be overwritten by Credit Tool 3. Change the layer 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 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 GRSG habitat quality of the project. Consider changing the credit project design if local-scale GRSG habitat quality is poor. Re-run the Desktop Analysis to evaluate changes to the project design. 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, as well as distance from roads, for each project.

C11. RUN CREDIT TOOL 4

[Catalog > Toolboxes > 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.

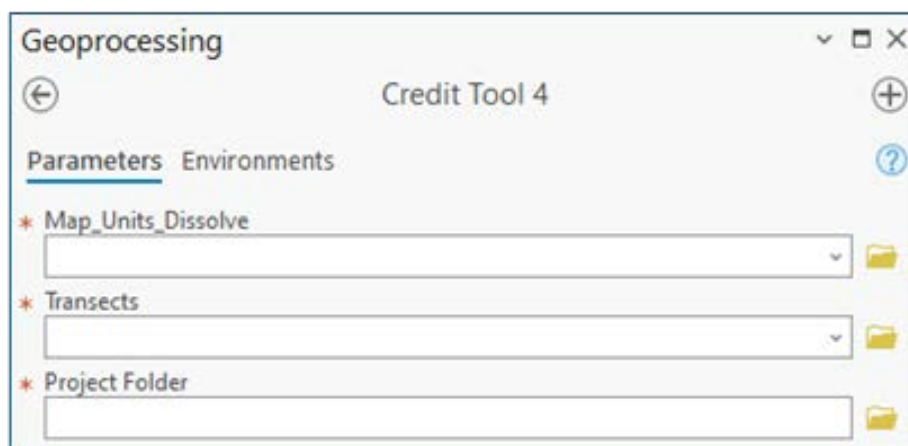


Figure 17. Credit Tool 4 interface

CREDIT TOOL 4 OUTPUT

- Transect_SpatialJoin Excel file

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 **Table 3** for a list of data generated during the Desktop Analysis that must be inputted into the Project HQT Calculator.

Table 3. Excel files exported and their corresponding Calculator worksheets

EXPORT TABLE		CALCULATOR WORKSHEET
<input type="checkbox"/>	Map_Units_Dissolve	1.1 Enter Map Unit Data
<input type="checkbox"/>	Current_Mgmt_Cat	1.3 Enter Mgmt Cats Data
<input type="checkbox"/>	Current_WMZ	1.3 Enter Mgmt Cats Data
<input type="checkbox"/>	Current_PMU	1.3 Enter Mgmt Cats Data
<input type="checkbox"/>	Current_Precip	1.3 Enter Mgmt Cats Data

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, field collection can be completed (see [Section 2. Field Data Collection Methods](#)). 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, 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' sheet 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 GRSG habitat quality for each map unit.

FIELD DATA COLLECTION METHODS

The methods outlined below must be used for field data collection of attributes associated with the site-scale, which defines GRSG habitat conditions at the site of proposed activities. **Table 4** describes the attributes measured to calculate site-scale functional-acres for specified seasonal GRSG 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 GRSG habitat attributes must be conducted during the peak of the growing season. In northern Nevada rangeland, the peak growing season generally occurs between April 15th and June 30th. These dates may vary annually due to temperature and precipitation. The peak of the growing season differs among sites based on elevation, latitude, and winter and spring precipitation. Consider annual and site-specific variations when approximating the peak of the growing season within the permissible window for the site. The peak growing season is indicated when the culms of cool-season grasses have fully elongated and seed heads have emerged (though 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 for functional acre scores to be official and approved by the Administrator. However, shrub data may be collected at any time of the 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 that site.

FIELD MATERIALS REQUIRED

The following materials should be collected before the field visit:

1. Credit or Debit Project Calculator (unnecessary in the field)
2. Hand-held GPS unit (1 – 5-meter accuracy), preloaded with transect start points
3. Field maps, using aerial photos as background
4. Datasheets
5. Camera
6. 50-meter tape (3 recommended)
7. Chaining pins
8. Compass for transect bearing
9. 1-meter tape or wooden ruler
10. PVC or wooden Daubenmire frame (20 X 50 cm)
11. White board for photo of transects or photo transect datasheets
12. Rangefinder or 100-meter tape for distance to sagebrush
13. Plant field guides for the area
14. A User's Guide to Assessing Proper Functioning Condition for both Lentic and Lotic Areas and the Supporting Science and Checklists, available at:
https://sagebrushco.nv.gov/CCS/Program_Documents/
15. 1.5-meter PVC pole with carabiner for threading transect tape through vegetation

Table 4. Attributes measured and summary of data collection methods

ATTRIBUTE	RESOURCE	SAGE-GROUSE SEASON	DATA COLLECTION SUMMARY
Sagebrush canopy cover	Cover Cover and Foraging	<ul style="list-style-type: none"> • BREEDING • LATE BROOD-REARING • WINTER 	The percent canopy cover is estimated with line intercept (% of sagebrush canopy intersecting transect line).
Total shrub canopy cover (including sagebrush)	Cover	<ul style="list-style-type: none"> • BREEDING 	The percent canopy cover is estimated with line intercept (% of total shrub canopy intersecting transect line).
Sagebrush height	Cover and Foraging	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. If nearest cover is farther than 300m, record distance as 300m.
Perennial forb canopy cover	Foraging	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 Cover	<ul style="list-style-type: none"> • BREEDING • LATE BROOD-REARING 	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).
Invasive annual grass canopy cover	Modifier	<ul style="list-style-type: none"> • BREEDING • LATE BROOD-REARING 	Percent cover of invasive 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 arriving at the site, field crews should conduct a preliminary inspection of the map unit delineations by walking or driving around together. It is important to note that map units, especially in agricultural and meadow areas, can change from year to year and may not accurately reflect recent aerial photography. Some changes in vegetation communities, such as understory composition, may not be visible on aerial photographs. If the desktop analysis map indicates the presence of pinyon-juniper, the relevant areas should be verified in the field to confirm if these species are actually present. There may be occasional misclassifications of other species like mahogany that need to be verified on the ground.

Crews should be prepared to adjust map unit boundaries -both further sub-dividing maps units and conglomerating existing maps units- as well as potentially adjusting the pinyon-juniper layer based on observations in the field. It is crucial for crews to come to a common understanding of the plants present, and the protocol that follows. Additionally, any changes to map units must be documented, and relevant GIS data files must be corrected after the field work is completed. If there is high variability at the site that cannot be addressed through changes in map unit delineations, additional transects should be added based on the verifier's judgement.

While checking map units, crews should also assess the terrain and identify the presence of roads to determine if alternate routes are needed. It is essential to confirm the placement and type of anthropogenic features, especially powerlines, and fill out the Anthropogenic Features Datasheet with any changes or additions to the anthropogenic layer.

If a transect falls on private property that is inaccessible, the area should be delineated as a separate map unit. Additionally, in sheet 2.6 (Review Site Scale Quality) of the Calculator, ensure that "No" is entered into the column labeled "Access to Map Unit for Field Sampling?" for the inaccessible map unit.

F2. DOCUMENT ANTHROPOGENIC FEATURES

F2.1 The anthropogenic features map developed in the pre-field desktop analysis should be ground-truthed. Any additional features identified should be marked on the map and digitized in ArcGIS; similarly, GPS coordinates collected and recorded in the field should be added to ArcGIS

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 the 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. **Make sure to specify which coordinate system is used.**

F3. [REPEAT STEPS F4 - F12 FOR EACH MAP UNIT]

F4. COMPLETE MAP UNIT DATASHEET

The map unit datasheet should be the first form completed upon arrival at the site and should continue to be filled out as the sampling is completed (see [Map Unit Packet](#)). For each map unit,

record the date, map unit description, and other mandatory information. After all map units have been sampled, count and record the total number of map units sampled within the project site.

F5. COMPLETE RESISTANCE & RESILIENCE SCORECARD

Ensure completion of the Resistance and Resilience Score Sheet for each ecological site or map unit within the project area. The Resistance & Resilience Scorecard is partially completed during the Desktop Analysis (see Field Materials Required). Make sure to refer to the accompanying field guide (Miller et al. 2014) for assistance. Some information will require consultation with the project proponent (e.g., response time of fire suppression resources for initial attack). Once the score cards are complete, calculate the total score for the project site and enter it into the Calculator on the Baseline and Reserve Account tab.

F6. COMPLETE ABILITY TO CONTROL WILDFIRE SCORECARD

Complete a Wildfire Score Sheet for each ecological site or map unit within the project area. The Wildfire Scorecard is partially completed during the Desktop Analysis (see [Field Materials Required](#)). Refer to the accompanying field guide (Miller et al. 2014) to complete the score sheets. Once the score cards are complete, calculate the total score for the project site and enter it 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 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'

- 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 PDF and labeled

'XXX_PFC_Datasheets_YYMMDD.pdf'. Ensure that all portions of datasheets are filled out completely, including the plant list.

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 & BEGIN DATA COLLECTION

F9.1 Establishing a Transect

F9.1(a) Navigate to the transect start point using a hand-held GPS. Insert a chaining pin in the ground and lay out or thread a 50-meter transect in the direction specified by the randomly generated bearing, using magnetic north on a compass. **Ensure that the transect tape is threaded through the base of all vegetation, not laid**

on top of it. Pull the tape taut and anchor the 50-meter end with another chaining pin. Populate all fields at the top of transect datasheet (see [Map Unit Packet](#)), with the following information: date, observer initials, site name, map unit number, the transect number and UTM's (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, as well as the reasons for these changes, on the datasheet if deviation from the general methods or rejection of a transect occurs. Photograph the changes if necessary to provide justification. Additionally, make a note of any rejections and include these notes with the post-field submissions.**

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

- **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.
- E.g., DBR-001-001

IMPORTANT TRANSECT CONSIDERATIONS

- For data collection: Always stand on the right side of the transect. Field data should be collected on the left side of the transect.
- **Rejections should be made sparingly and logically, with reasons always noted on the datasheets and accompanied by photos if necessary.** Acceptable reasons for rejecting a transect include, but are not limited to, safety hazards (e.g., slopes greater than 50%, large unsafe rock outcrops, talus slopes, or unsafe hiking routes), unsuitable pre-established bearings, or if the transect falls on or within a barrier (e.g., a thicket or body of water) and cannot be moved ≤ 5 meters to avoid it. **Factors such as inclusions, grazing, or non- or over-representation of the landscape or map unit are NOT valid reasons for moving or rejecting a transect.** If rejection is necessary, choose the next backup point in sequential order and document reasoning.
- 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.
- If a transect will require more than 3 reflections, you may use a backup bearing or backup transect if no backup bearings work.
- If a transect passes through a thicket that is too dense to sample properly (e.g., willow, serviceberry, mahogany, or desert peach with dense, closed shrub, 70 - 100% canopy cover) and the thicket extends along the entire length of the transect (rather than being an issue for only a few meters), reflect the transect 90 degrees to the right at the point of contact. If that is not possible, reflect 90 degrees to the left. If reflecting does not resolve the issue for all provided bearings, select the next randomly generated point for that map unit. If the transect falls on or within a barrier (e.g., a thicket or body of water) and can be moved ≤ 5 meters to avoid it, then move and sample. If moving is not possible, select the next randomly generated point for that map unit.



Figure 18. Transect reflection examples (a. map unit boundary, b. stream, c. moving the transect 3 meters out of dense shrubs, reflecting other dense shrubs, and sampling through less-dense shrubs)

- If, upon arriving at the assigned transect, it is found that the map unit was mapped incorrectly and the transect now falls outside of the designated map unit, please follow the procedure below:
 1. **If the correct map unit is visible and within a reasonable distance:**
 - Starting with North, then moving to East, South, and finally West if the previous directions do not work, determine the direction that will navigate to the correct map unit using the shortest route.
 - At the border of the map unit, measure 50 meters in the determined cardinal direction. The end of this 50-meter measurement is where the new transect should be located.
 - If moving 50 meters places you outside the desired map unit, move as far as possible while remaining within the map unit. This will be the location of the new transect.
 - Proceed with sampling as normal, adjusting the bearings if needed and reflecting the transect if required. Record the new UTM's, make note of the transect relocation and the chosen direction, and adjust Map Unit delineation.
 2. **If the map unit is not visible or it 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 the map unit that was originally intended for sampling.
 - Record the change in transect and adjust Map Unit delineation.
- When sampling a very small or narrow map unit (e.g., upland spring or seep, stringer meadow, etc.) where a transect might reflect multiple times and potentially overlap onto itself, follow one of the two procedures based on what will be most effective for the site-specific conditions:
 1. **For seeps or springs:** Reflect the transect off the boundary of the map unit using an angle that prevents the transect from overlapping itself. This can be pre-screened in GIS to assess the applicability of this method.
 2. **For thin, linear map units:** Pre-screen transect points before field collection to ensure that each point falls in an area where a full 50 meters can be sampled. The

goal is to capture a representative portion of the map unit. Start at the transect location and choose initial and subsequent bearings that minimize the number of reflections.

3. **Always record the methods and bearings used and note the reasons for any deviations from or rejections of the general methods on the datasheet. Photograph any justifications if necessary.**

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.

- If the photo board is obstructed at the chaining pin, either move the photo board to make it visible or move the vegetation aside. If someone needs to hold the photo board, ensure they hide their face and crouch low to minimize their visibility.

F9.2(b) Stand away from the start of the transect and align camera in the direction of the transect so that the bottom of the white board is at the photo's bottom center (Figure 19) and the camera is in **landscape** (not portrait) format.

F9.2(c) Take photo.

F9.2(d) Name photos as follows: '**XXX_MU#_T##_[Descriptor]_YYYYMMDD.jpg**'

- **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.
- E.g., 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



Figure 19. 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 genus can be identified, 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 genus cannot be identified, 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-meter mark of the transect and record the distance in meters on the datasheet. 'Sagebrush mixed shrub community' means that 20% of the shrubs in the community are sagebrush.

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

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

F10.2(c) If the nearest sagebrush cover is greater than 300 meters away from the transect, record the distance as 300 meters.

F11. LINE INTERCEPT

F11.1 Shrub Canopy Cover

F11.1(a) Data collection can begin at the 0-meter or the 50-meter 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 intercept recording. Resume intercept upon reaching 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.

- 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) For multiple sagebrush that overlap, record each shrub individually by adhering to the following procedure: From above looking down at the transect, record the width of each individual shrub based on the top layer of vegetation. Note: this means that if a shrub falls completely underneath another along the transect line, you will not measure its width or height.

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

F11.1(g) For multiple sagebrush and non-sagebrush shrubs that overlap, adhere to the procedure outlined in F11.1(e). Always measure sagebrush as individual shrubs. “Other” shrubs can be measured as either individual shrubs or lumped into sections when appropriate (see F11.1(f)).

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

IMPORTANT LINE INTERCEPT CONSIDERATIONS

- The total lengths of shrubs will be added together over the 50 meters to calculate the percent canopy cover of sagebrush and total shrubs.
- The following sagebrush species (Low and Big) are the species of sagebrush in Nevada that the CCS recognizes. No other species should be counted as sagebrush (e.g., *Picrothamnus desertorum* is a “sage” species, but should not count as sagebrush and should be considered “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 the tallest vegetative portion, to the nearest cm, once per individual shrub (even if it intercepts the transect multiple times). Do not include the inflorescence of sagebrush as height.

- “Other” species do not need height recorded.

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 20). 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-meters, for a total of 5 plots along the 50 m transect.

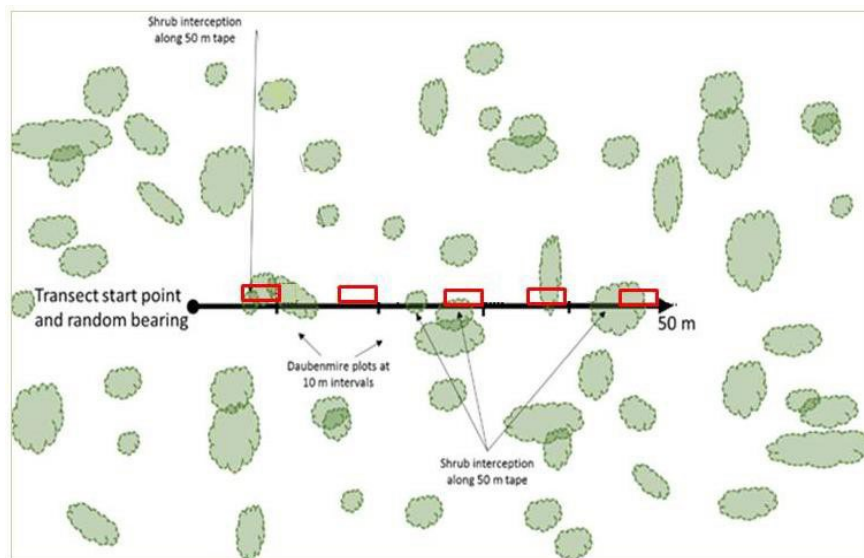


Figure 20. Diagram of transect and plots

NOTE: If a transect reflection disrupts Daubenmire frame placement, reasonable adjustments are allowed to ensure the frame remains entirely along the transect tape. **Record any changes on the datasheet.**

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 5. Cover classes for use when estimating cover in Daubenmire frames

COVER CLASS	RANGE OF COVER (%)	MID-POINT OF CLASS (%)
0	0	0
1	>0-5	2.5
2	6-25	15.0
3	26-50	37.5
4	51-75	62.5
5	76-95	85.0
6	96-100	97.5

NOTE: The estimate of annual invasive grass cover should include (but is not limited to) the following invasive annual grass species:

- 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 is rooted within the plot, annual and perennial, in the 'Unique Perennial & Annual Forbs in Daubenmire Frames' section. 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 a total forb species count per transect.

F12.3(b) Record all plant species encountered along the transect, within 2m on each side, in the notes section of the datasheet, whether or not they fall along the transect tape or within the Daubenmire plot.

F12.3(c) State listed noxious weeds should not be counted in Daubenmire counts or forb species counts. The Nevada Noxious Weeds List can be found at https://agri.nv.gov/Plant/Noxious_Weeds/Noxious_Weed_List/.

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 6** for a list of field datasheets completed during the field data collection that must be inputted into the Calculator.

Table 6. Field Datasheets completed during field data collection and corresponding Calculator Worksheets

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

NOTES

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

F14. SCAN DATASHEETS

F14.1 Scan All Datasheets and Create:

- One PDF per Map Unit with all associated datasheets
 - [Project Site]_[MU#]_Datasheets_YYYYMMDD.pdf
- One PDF with all PFC Datasheets (if credit project)
 - [Project Site]_PFC_Datasheets_YYYYMMDD.pdf
- One PDF with Anthro Disturbance Datasheets
 - [Project Site]_Anthro_Datasheets_YYYYMMDD.pdf
- **XXX** is three letter abbreviations for project site and **MU#** is the map unit number.

F14.2 The order of scanned sheets per Map Unit pdf will be as follows: Map Unit Datasheet, Resistance & Resilience Scorecard (credit projects), Ability to Control Wildfire Scorecard (credit projects), 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 pdf..

- E.g.: You would submit the following files for a credit project with three MUs:
 - TRY_001_Datasheets_20180621.pdf
 - TRY_002_Datasheets_20180621.pdf
 - TRY_003_Datasheets_20180621.pdf
 - TRY_PFC_Datasheets_20180621.pdf
 - TRY_Anthro_Datasheets_20180621.pdf

F15. POST-FIELD SUBMITTAL

The lead verifier is responsible for submitting final project materials to the SETT. After entering all collected field data into the Calculator and performing an internal quality assessment, zip all documents listed in the **Verifier Project Assessment Submission Form** and below into a final package. Ensure that all forms are signed by the appropriate parties. Upload all the required information to the Credit System Verifier FTP site (<https://dcnrfp.ndep.nv.gov/login>) in a folder labeled with the project name. Notify the SETT point of contact via email that all the information has been uploaded. The SETT will confirm all information is accessible and correct before removing the information from the FTP site to ensure privacy compliance.

The SETT will conduct a Post-Field Quality Assessment and return the form to the verifier with any necessary corrections. Allow one-month post-submission for the final Quality Assessment (QA) results.

REQUIRED FILES FOR POST-FIELD SUBMITTAL

- Verifier Project Assessment Submission Form
- Project Geodatabase and Map
- Credit System Calculator
- Anthropogenic Features Review Form
- Map Unit Datasheets
- Resistance & Resilience Scorecard (one per map unit; Credit Projects only)
- Ability to Control Wildfire Scorecard (one per map unit; Credit Projects only)
- Transect Datasheets/Final GIS Points Layer
- PFC Datasheets/Summary Table (Credit Projects only)
- Transect Photographs

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](#).

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

TOOL PREREQUISITES

1. Credit or Debit Project Calculator (NOTE: [Section 1: Desktop Analysis](#) and [Section 2: Field Data Collection Methods](#) contain critical information on completing the Calculator.)
2. Credit Projects
 - a. Pre-Field Work Submittal Checklist (completed) and required submissions
 - b. Post-Field Verifier Project Assessment Submission Packet
 - c. Quality Assessment
 - d. Management Plan
 - i. Once the QA is approved and signed, the management plan can be submitted.
Please note that if the management plan is not completed within 90 days of the approval of a new version, the credits will be subject to the updated version and must be recalculated accordingly. Credits are only eligible for sale once the management plan is signed.
 - e. Participant Contract
 - f. Financial Assurances
 - g. Credit Purchase Agreement (optional to submit to the SETT)
 - h. Credit Transfer Form
 - i. Annual Monitoring Form
 - j. Notice of Validation
3. Debit Projects:
 - a. Pre-Field Work Submittal Checklist (completed) and required submissions
 - b. Post-Field Verifier Project Assessment Submission Packet
 - c. Quality Assessment
 - i. Once the QA is approved and signed, then credits may be purchased to offset the locked-in debit amount.
 - ii. If a HQT version change occurs prior to the final QA, then the proponent may choose to switch to the latest HQT version.
 - d. Debit Project Review Forms 2 and 3
 - e. Credit Purchase Agreement
4. Recommended: Current versions of the Nevada CCS Manual and HQT Methods document for reference.

STEPS TO CALCULATE CREDITS

The User's Guide discusses verification of conditions and determination of credit need for regulatory offset by credit Buyers only (covered in more detail in *Section 3 of the CCS Manual*). Before beginning, ensure the project has been planned in a way that avoids and minimizes residual impact to the maximum practical extent.

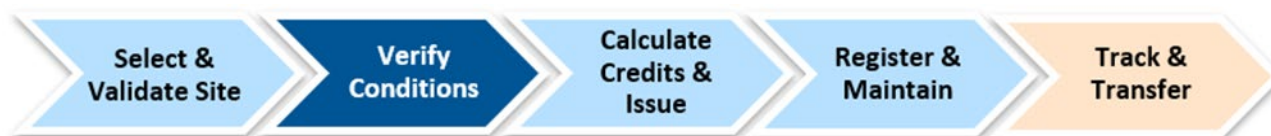


Figure 21. Overview of the process steps to generate credits



Figure 22. Overview of the process to calculate credit obligation and acquire credits

STEP 1: SUBMIT PROJECT VALIDATION CHECKLIST

The Project Proponent initiates an eligibility screening process, providing details about the potential project and completing preliminary paperwork. This step is typically supported by a knowledgeable Technical Support Provider, Verifier, or Aggregator, who helps the Project Proponent in completing the site validation. This includes a Validation Checklist (credit projects) or the Debit Project Review Form (debit projects, if applicable), and valid shapefiles of the project site.

The checklist captures proposed management actions, timeline, and the location of a proposed project site. It also confirms that the project meets minimum eligibility criteria, including basic information related to ownership, site history, and land protection.

If everything is in order, the Administrator coordinates approval from relevant validation leads, such as regulatory agencies, and issues a notice of validation to the Project Proponent. This notice signifies that the project is eligible to generate credits, or that the project will generate debits, provided all submitted information is accurate and complete. However, it does not specify the number of credits or debits that will be issued.

If the criteria are not met, the Administrator will outline the reasons for ineligibility, detailing the aspects that disqualify the project from participating in the Credit Conservation System (CCS).

STEP 2: SUBMIT PRE-FIELD WORK PACKET

The Lead Verifier for the project submits the Pre-Field Work Submittal Packet to the Administrator, who then reviews the submission to ensure that all criteria are met. This packet includes a cover page, completed Conflict of Interest Disclosure Form, Debit Project Review Form (for Debit Projects only, if not completed during step 1), and a geodatabase with GIS shapefiles identified by the appropriate naming conventions for the applicable project area, analysis area boundaries, habitat categories, Map_Units_Dissolve, Current Anthro, debit impact raster, proposed PFC reaches, and transect numbers.

Once approved, transect locations will be generated by the SETT and provided to the lead project verifier.

STEP 3: PROJECT VERIFICATION

Once a notice of validation is issued, the Lead Verifier, in collaboration with the Project Proponent, can initiate the field verification process. Verifiers follow a defined protocol that is the focus of the Verifier certification training conducted by the Credit System Administrator.

The Lead Verifier first reviews all relevant forms and documentation, scheduling a site visit with the Project Proponent to determine the most logical division of the site for verification. Before any project verification can begin, the pre-field ArcGIS work must be completed and approved by the Administrator.

The Lead Verifier adheres to the Habitat Quantification Tool (HQT) process to delineate the credit project boundaries and calculate pre-project conditions. After map units and sampling locations are approved,

field verification of these pre-project conditions can commence. It's important to note that this approval does not specify the number of credits or obligations associated with the project.

For Credit Projects, the baseline GRS habitat function is calculated using site-scale and regional standards. While the pre-project condition assessment helps the Credit Project Proponent estimate and align with performance standards for post-project GRS habitat function, for Debit Projects, the baseline is defined as the site's condition prior to any new or expanded anthropogenic disturbance. Debit Projects require a field assessment to verify pre-project conditions, and baseline functional acres must be verified before implementing any disturbances.

Complete the Competing Land Use assessment, and input contribution percentage from **Table 7** for projects on private land into the Calculator.

Table 7. 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 <u>and</u> Conservation Easement <u>and</u> Ownership of Subsurface Rights	0%
Participant Contract <u>and</u> Conservation Easement	1%
Participant Contract <u>and</u> Ownership of Subsurface Rights	3%
Participant Contract	4%

The Verifier is responsible for compiling the pre-project field inventory data and completing the necessary calculations using the Habitat Quantification Tool (HQT). They submit this information to the Administrator as part of the Verifier Project Assessment Submission Packet. This packet must include:

- All GIS data within a geodatabase, adhering to specified naming conventions
- Completed transect and map unit datasheets
- Transect photographs and field maps
- Detailed notes, including meaningful observations or assumptions
- Anthropogenic disturbance review forms
- Proper Functioning Condition (PFC) checklists for each riparian area
- Resistance & Resilience (R&R) and wildfire scorecards for each map unit
- A completed HQT Calculator showing the estimated credits
- The Verifier Project Assessment Submission Form
- Any notes on assumptions, discrepancies, or potential issues

Following the submission, the Verifier works with the Administrator through a Quality Assessment Process (QA). This process ensures accuracy and completeness and must be signed off by the Administrator before the final credit amount can be established.

Once the QA process is approved, the Credit Project Proponent can draft the Management Plan and begin moving the project forward. Detailed guidelines for all pre-field and post-field steps are available in *Sections 3.1 and 3.2 of the CCS Manual* or outlined in the [Project Checklist](#).

APPENDICES

Appendix 1. Guidance for Delineating Anthropogenic Features

Appendix 2. Guidance on Classifying Overlapping & 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 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 manual searching of the Analysis Area 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 polygons. If preferred, linear features like transmission lines can be digitized as line features, then buffered to create polygons. Follow these steps:

1. **Digitizing Linear Features:** Use the buffer tool to convert linear features (e.g., roads, transmission lines) into polygons.
 - a. General buffer distances for linear features with unknown widths:
 - i. Powerlines: 5 meters
 - ii. Roads: 5 meters
 - iii. Distribution lines: 3 meters
 - iv. General underground LROW: 0.5 meter
 - v. Railway: 4 meters
 - b. Apply the buffer using the value from the Buff_Dist field to create the polygon feature class.
2. **Assigning Features:** Once digitized, copy the new anthropogenic polygons to the appropriate, pre-generated layer.
3. **Mining or Renewable Energy Facilities:**
 - a. For infrastructure like roads and powerlines within or adjacent to active mining/renewable energy operations, categorize them under "Mining" or "Renewable Energy."
 - b. Roads or powerlines outside the project footprint (e.g., connecting the project to existing infrastructure) should be categorized as roads or powerlines, not part of the main operation.
 - c. Active roads or powerlines in inactive operation areas should be weighted and buffered according to their respective types, not included in the inactive footprint.
4. **Non-Habitat Features:** Features such as homesteads, feedlots, or clearings that don't fit standard classification can be assigned:
 - a. **Type:** "Other"
 - b. **Subtype:** "No_Indirect_Dist" This indicates they are direct disturbances without an indirect buffer.
5. **Exploration Features:** Exploration features are categorized as "Exploration" in both the Type and Subtype attributes. These features don't require indirect buffers in the Analysis Area, as they won't impact HQT calculations.

NOTE

- **Existing disturbances that have not mitigated through the CCS:** use aerial imagery to delineate disturbance boundaries.

- **Disturbances that have mitigated through the CCS:** use the authorized boundary (that was used in the HQT analysis for the project) to delineate disturbance boundaries. Contact the SETT to confirm CCS mitigated disturbances are included within a new HQT analysis.

TOWERS

- **Communication Towers** (Communications): Tall structures designed to support antennas for telecommunications and broadcasting and any associated above-ground facilities. This includes satellites or large telescopes.
- **Meteorological Towers** (Meteorological): Tall structures designed to support meteorological measuring instruments, including those installed to test the feasibility of wind farms and any associated above-ground facilities.

When searching for towers at the end of winding mountain roads, follow these guidelines:

1. **Identify Dead-End Roads:** Look for roads that lead up into mountainous terrain, especially those that appear to stop without connecting to other routes.
2. **Topography and Elevation:** The roads will often lead to higher elevations, where cell towers, radio towers, or fire lookout towers are commonly placed to maximize coverage.
3. **Key Indicators:**
 - a. Use satellite imagery or maps to trace these roads. Towers are often located on peaks or ridges.
 - b. Look for clearings at the end of roads, as these areas might be used for tower infrastructure.
4. **Utility Lines or Fencing:** These may indicate the presence of electrical infrastructure, suggesting a tower or communication station nearby.
5. **Aerial Views or Drones:** In remote areas, aerial imagery might provide the best confirmation of tower locations if ground access is unclear or blocked.

This approach is helpful for identifying and confirming tower locations in rugged or less accessible terrain.

POWERLINES

The Powerlines layer contains some powerlines. However, this layer only includes larger transmission lines and does not include majority of the smaller distribution and other transmission lines. This layer serves 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, and any associated above-ground facilities. 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, and any associated above-ground facilities. 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 mine as an anthropogenic disturbance. Delineate the individual existing or authorized features of mining sites, 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** (Active_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), production 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 those that are no longer removing material from the ground and exhibit minimal associated human activity. This includes mines undergoing reclamation, where the entire footprint during reclamation is considered inactive. If a mine is not actively being reclaimed but still has significant infrastructure, hard structures, or facilities, it may be categorized as “NA” in the subtype. This classification accounts for direct disturbance from existing features, but no indirect impacts assigned.

For mines considered reclaimed, the delineation and classification process should focus on specific permanent features and follow these guidelines:

- **Reclaimed Mines:** Only the permanent feature, such as the pit, should be delineated and classified as an **inactive mine**.
- No need to include temporary infrastructure or areas that have been restored or revegetated as part of reclamation.
- **Non-Reclaimed Mines:** If a mine lacks infrastructure but hasn't been formally reclaimed, only the permanent pit should be delineated and classified as **inactive**.
- All other areas without visible ongoing disturbance can be excluded unless they represent significant, un-reclaimed features.
- **Historic and Inactive Underground Mines:** For these sites, focus on **visible surface disturbances** such as entrances, shafts, or other signs of the underground mine. Delineate only these visible disturbances, and classify them as 'NA' in the subtype field to distinguish them from active or more recently closed operations.

This process helps ensure that reclamation and disturbance status are accurately reflected in mapping and classification efforts.

URBAN

The Urban layer should be used as it is, based on specific criteria used to delineate areas qualifying as low or high urban areas. **Do not digitize houses, ranches, ranching or agricultural infrastructure as Urban.** If these features are within the project area, they should be delineated as a non-habitat map unit and excluded from the HQT analysis.

OIL & GAS

The Oil and Gas layer is a point feature shapefile that identifies the location of current oil and gas operations and their 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 Oil and Gas anthropogenic disturbances.

- **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 it is unless there is justification for adding or removing roads. Given the subjectivity in delineating roads-particularly smaller secondary roads and two-tracks consistently across projects is crucial to avoid bias. Changes in road classification (e.g., Low_Use to High_Use) may be necessary when increased activity is anticipated or planned, such as road access to a mine or other industrial/commercial development.

Some roads authorized for mine use or other commercial/industrial purposes may not be included in the Roads layer. In such cases, roads should be reclassified from Low-Use to High_Use if they will experience increased traffic due to mine operations or similar commercial activities. Similarly, new roads related to these commercial purposes should also be classified as High_Use. Coordinate with the SETT to include any authorized roads for project use in a mine or other operation.

For mining or renewable energy facilities, infrastructure such as roads and powerlines located within or immediately adjacent to anthropogenic features should be categorized as mining or renewable energy features. Roads or powerlines that fall outside of the project footprint, including those that connect 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. Use the Railways layer as it is, unless there is clear justification for removing or adding railways. Note that some railways authorized for mine use may not be included in the Railways layer.

Please coordinate with the SETT to add any railways that are authorized by the project proponent in a mine or other operation.

RENEWABLE

The Renewable layer is a polygon feature shapefile that identifies the location of current renewable energy operations at various stages of activity. It is the verifier's responsibility to obtain accurate information, including the footprint, status, and other relevant detail, from the BLM or other sources to properly delineate a renewable energy-related anthropogenic disturbances.

- **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 serve as a rough guideline to identify areas that could have renewable energy development. It is essential to conduct further research to confirm the current status of these areas. Transmission lines connecting to the main grid should be excluded from this layer and categorized as "Powerlines."

LINEAR RIGHTS OF WAY

Linear Rights of Way (LROW) encompass linear features that do not fall under the classification of Roads, Railways, or Powerlines. 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. LROW is divided into 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 associated with a LROW feature should be classified based on the height and width criteria that determine whether the feature falls within the Low or High LROW category. If a substation includes a communications tower, it should be classified as a Tower rather than a LROW feature.

MINERAL EXPLORATION

Mineral exploration encompasses activities associated with CCS-defined disturbances, including mining, oil and gas, and geothermal energy.

For calculating debits that require mitigation for an exploration Debit Project:

If the precise locations of drill sites or roads are uncertain, the Plan of Operations Project Area (or its equivalent) may be used as the proposed disturbance boundary. This approach allows for the calculation of an average local-scale GRSG habitat functional score, which, along with the HQT analysis, will apply to the actual planned disturbance acreage. By analyzing a broader area than the anticipated disturbance,

the proposed boundary does not need to be spatially explicit, providing greater flexibility in exploration project analysis. If the exact disturbance footprint is known, the SETT will collaborate with the project proponent to define an appropriate and sufficiently large area, allowing for the proper placement of transects within the project boundary.

For delineating exploration as part of the analysis of other Debit Projects:

Recent exploration that has undergone mitigation can be classified as 'Exploration' in the Type and Subtype fields within the '**Current_Anthro_Features**' layer, covering both the direct and indirect impact areas of Debit Projects. The exception is in areas where permanent disturbance is planned, as there is often a significant disparity between the terms of impact for short-term and permanent disturbances. Exploration cannot be delineated in these areas.

If mitigated exploration has not yet been implemented and the exact location of plans remains uncertain, contact the SETT to determine if it can be accounted for. In landscapes that remain largely denuded of vegetation and unrestored, likely due to historical exploration activities, these areas can be delineated as separate map units and sampled. Recent exploration that occurred prior to mitigation requirements may also be treated similarly, though ongoing reclamation efforts should aim to restore these disturbances to a more naturalized state in the near future.

OTHER DISTURBANCE

For disturbances that do not fit within an existing 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), these will default to the **Other Disturbance** category. The SETT will provide guidance on the most appropriate subtype for the proposed disturbance. The following criteria will 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**: Proposed disturbance will be of low impact and will exhibit one or more of the following impacts:
 - Does not exhibit significant indirect impacts as listed above. General presence of infrastructure, direct GRSG 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:** Proposed disturbance will be of no indirect impact and will exhibit one or more of the following impacts:
 - Does not exhibit indirect impacts. Direct GRS habitat loss will be the primary impacts expected from a No Indirect Disturbance category.

A ranking of disturbance criteria and a comparative analysis will be conducted using established anthropogenic disturbances and emerging scientific research to determine the most appropriate category for each disturbance.

EXCLUDED FEATURES

Anthropogenic features not described in **Table 1** are considered ‘**de minimus**’ and should not be digitized. These include:

- Fences
- Agricultural or ranching-related activities or infrastructure

ANTHROPOGENIC FEATURE REVIEW

When changes are made that deviate from the provided layers or when classifying the status of mines or other anthropogenic features, the SETT will require a brief synopsis outlining the justification and rationale behind these decisions. This ensures that changes (i.e., adding or removing roads) are applied consistently across credit and Debit Projects. It also helps maintain records to enhance transparency during the HQT process. Please refer to the [Anthropogenic Disturbance Review Form](#).

APPENDIX 2. GUIDANCE ON CLASSIFYING OVERLAPPING & EXISTING ANTHROPOGENIC FEATURES

Version 1.6 of the Habitat Quantification Tool (HQT) introduced two new attributes - '**Overlap_Status**' and '**Returned**'-which are required for classifying existing anthropogenic features. These fields may need to be edited for two specific scenarios:

1. Debit Projects where the proposed surface disturbance overlaps existing anthropogenic features.
2. Debit Projects that propose to permanently remove or reduce the impact of existing anthropogenic features.

These new attributes provide greater control over how existing anthropogenic features are handled 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 geographic point, they are considered **overlapping**. These existing features may be either retained or removed, depending on the specifics of the Debit Project. For example, an existing powerline co-located with a proposed roadway would be **retained** and should be classified as '**Retained**' in the '**Overlap_Status**' field in the attribute table.

When a Debit Project involves upgrading an existing feature from one subtype to another, the existing feature should be classified as '**Removed**'. For example, if a **low-use road** is upgraded to a **high-use-road** from a mine project during the permit term, it should be marked as '**Removed**'. The portion of the road that will be upgraded must be included in the shapefile representing the proposed surface disturbance. Similarly, if a **low-use road** is overlapped by the **mine site**, it should also be classified as '**Removed**,' and the overlapping portion would be upgraded to the "**Mine**" classification.

For temporary Debit Projects, the '**Returned**' field for all existing anthropogenic features must be classified as '**True**,' as it is assumed that the landscape will be returned to its original condition after the project concludes.

For existing features overlapping permanent impacts -i.e., when the '**Surface_Disturbance**' field in the '**Proposed_Surface_Disturbance_Debits**' feature class is classified as '**Permanent**'- the '**Returned**' field should be classified as '**False**' in the attribute table.

FOR DEBIT PROJECTS THAT PROPOSE TO REMOVE OR REDUCE THE IMPACT OF EXISTING FEATURES

Debit Projects proposing to **remove or reduce the impact** of existing anthropogenic features should select the "**Debit Project will remove or modify existing anthropogenic features (optional)**" checkbox in **Debit Tool 1** and follow the steps outlined in the **User's Guide** to properly account for the removal or modification of these features.

Update the '**Subtype_As_Modified**' field to reflect the subtype that best represents the feature's status 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 it 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 (UG), new column headers have been added in each 'Anthro_Feature Type' layer:

- **Overlap_Status** options are: *Retained* or *Removed*.
- **Returned** options are: *True* or *False*.
- The **Subtype_As_Modified** field is not new, but it now includes additional options to reflect modification more accurately.

IMPORTANT: In general, changes from the default settings will occur when an existing feature overlaps with, and has a greater impact (weight, distance) than the proposed disturbance. In these cases, the **Overlap_Status** should be changed from the default setting of *Removed* to *Retained*. The flowchart provided below should guide the classification process in most scenarios. However, some situations may not align with the pathways outlined below. For unique or complex conditions in a Debit Project, be sure to consult with the SETT for guidance.

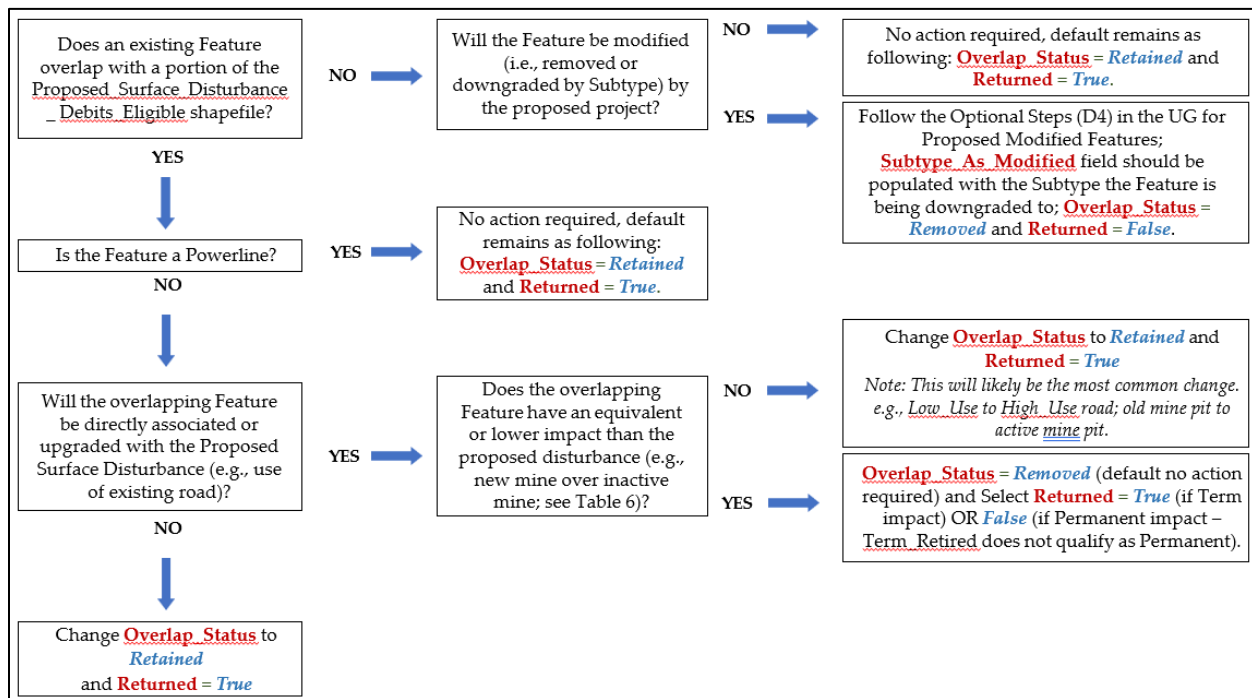


Figure 23. Decision tree for overlapping anthropogenic features in a Debit Project

Table 8. General descriptions for new column headings in the 'Anthro_Feature_Clip' layers

<i>New or edited Category</i>	<i>Description</i>
<i>Overlap_Status = Retained</i>	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 used in the project's permit or operation. (e.g. Road in analysis area, existing powerline overlapping a proposed mine site).
<i>Overlap_Status = Removed</i>	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.
<i>Returned = True</i>	Existing features that will be returned to their current subtype. If feature is classified as <i>Removed</i> , select <i>True</i> for a Term impact. If the feature is classified as <i>Retained</i> , <i>Returned</i> field should always be <i>True</i> .
<i>Returned = False</i>	Existing features that will not be returned to their current subtype. If feature is classified as <i>Removed</i> , select <i>False</i> for a Permanent impact. Not applicable for <i>Retained</i> features. Projects that propose to modify features will select <i>False</i> as the feature will be removed or downgraded.
<i>Subtype_As_Modified</i>	If <i>Retained</i> , 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: <i>Overlap_Status</i> = <i>Removed</i> and <i>Returned</i> = <i>False</i>

Table 9. 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

APPENDIX 3. GUIDANCE FOR DELINEATING MAP UNITS

GENERAL GUIDANCE

Project Area: The project area refers to the entire area being evaluated, encompassing all ecotypes within the defined boundaries. For Credit Projects, the project area represents the full extent of the obligation undertaken by the credit developers. For Debit Projects, it includes both the proposed surface disturbance, and the area affected by indirect impacts.

Map Units: Map units are subdivisions of the project area, defined based on unique vegetation communities, structural characteristics, and site potential (Figure 24). These divisions are necessary to capture differences at the site-scale GRSG habitat attributes, which are crucial for accurately determining the functional acre scores. For a complete list of assessed attributes, refer to the [Field Data Collection Methods](#). When delineating map units, it is important to consider the attributes that drive GRSG habitat function scores. For example, variations in sagebrush canopy cover and proximity to sagebrush should guide delineation. Other factors like elevation, slope, aspect, and soil type must also be considered, as they influence vegetation distribution.

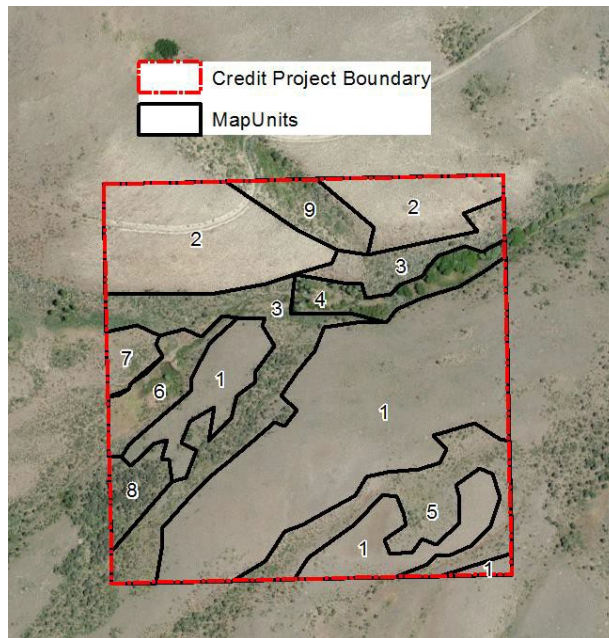


Figure 24. Map unit delineation within a Credit Project boundary

Ensure map units are divided by WAFWA zone. No map unit should cross a WAFWA boundary.

Although **map units** can be somewhat subjective, they should encompass areas with relatively homogeneous vegetation. The delineation of map units should also consider the site's potential to support a specific vegetation community, ensuring the relevance of boundaries over time. Map units should be based on **ecological sites**, recent **aerial photography**, and **ground verification**.

Major distinctions, such as changes in vegetation community, species abundance, water versus terrestrial areas, shrubland versus meadow, and roads versus undeveloped spaces, can be identified through aerial photography. Supplementary **GIS data layers** can further aid in distinguishing features like topography (elevation, slope, aspect) or soil changes that affect vegetation composition.

Defining map units requires a strong understanding of **GRSG habitats** and local site conditions. A site visit is highly encouraged to inform the map unit delineation process before starting the **Desktop Analysis**. Map unit boundaries may be modified based on conditions identified during field data

collection. If field crews recommend changes to the 'Map_Units_Dissolve' layer, update this layer and repeat steps **D12/C8** and **D16/C12**. Ensure to 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 dominated by obligate or facultative wetland forbs and grasses and typically free of upland shrubs. These areas are usually wet for most of an average water year and remain green (NDVI > 0.3) through late summer, often serving as late brood-rearing habitat. Dry meadows—upland patches of non-riparian grasses—are not considered meadows.

Meadows that have dried to the point where they are unlikely to function as late brood-rearing habitat in the future (e.g., upland shrub encroachment or loss of riparian vegetation) should not be classified as meadows. However, meadows dried due to drought but with the potential to function normally when water conditions return to average should still be considered.

Map units automatically delineated as **meadows** due to their inclusion in the 'NV_Wet_Meadows' layer (Saito 2020; <https://www.dri.edu/project/wetland-mapnvnew/>) should be confirmed using aerial imagery and other relevant sources, and refined as needed. The 'NV_Wet_Meadows' layer, available in the HQT, provides additional detail in the attribute table, which can assist with refinement. It's important to note that this layer is a rough delineation, and irrigated areas that meet meadow habitat system definitions may have been excluded. These areas often require delineation, with the exception of **center pivot agriculture**, which should be excluded entirely from all projects as **non-habitat**. **Unaltered meadows** are naturally occurring wetland complexes dominated by wetland vegetation and soils (e.g., stringer meadows, springs, seeps), where hydrology has not been altered or is not actively managed. **Altered meadows** are those receiving controlled irrigation or where hydrology is currently altered or managed (e.g., diversions/water piped off-site, spreaders,), or where the landscape has been functionally altered.

If an area appears to potentially be a meadow, err on the side of classifying it as a meadow. If reconnaissance or field sampling later determines that it is not a meadow or falls within the exceptions noted above, it is simpler to merge the polygon into a larger upland map unit rather than having to separate it out as a small meadow later. Ensure that all potential meadows are visually confirmed in the field from the ground.

Additional Sources to Use in Delineation of Meadow Map Units:

1. Aerial Imagery within GIS and compared to other sources (i.e., Google Earth, or OnX).
 - a. Begin to define general meadow areas, which may appear as low-lying green areas along named or unnamed streams. Compare the topographic layers to see flood plains and valley bottoms or flat areas near perennial streams and springs.
 - b. Compare previous years' imagery (Various layers or the Google Earth Timeline).
2. SGI Mesic Resources Layer (Detailed 30-year NDVI average during the brood-rearing season).
 - a. See [Data Required](#) Section for access instructions.
 - b. 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, use the online interactive map to get an average NDVI that reflects current management for the appropriate period of time.
 - c. This layer only helps fine-tune delineation of large meadows and lotic systems and will generally not pick up smaller riparian systems.

3. Ensure that all features have been captured. It is recommended to set the map scale, located in the bottom-left corner of the map, to 1:3,000 and scan the imagery systematically to ensure that all features have been digitized properly.
4. 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. 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.
 - b. Clip, then Union the DRG layer with the Map Units Layer.
 - c. Visually inspect, and if more detail is needed, use the ESD layer for smaller scale delineation.
 - d. These layers only help delineate general ecosite boundaries. 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. 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, P/J, Annual Grass, Topography, etc.
 - a. 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. The minimum map unit size should 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 patches of woody riparian vegetation within meadows should not be delineated as separate map units. **Transects should not be run through long stretches (> 5m) of dense (closed shrub, 70 - 100% canopy cover) impassible willow patches.**
3. For Debit Projects, delineate map units based on the indirect disturbance area, proposed surface disturbance, and already existing disturbance areas respectively. Subdivide the indirect and proposed disturbance areas according to the standards guidelines. Existing disturbance areas do not require further subdivision, as no sampling will occur in these areas. These map units will be assigned a site scale score of zero, and no transects will be generated within them.
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, uplift/restoration areas should be delineated as separate map units (Even if they are currently 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.

8. While pinyon-juniper is mapped automatically, if changes to the P/J 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 of the pinyon-juniper layer. Photo documentation of the ground-truthed area will be required to support these changes. This updated 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 is 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 to maximize area while minimizing variability within each unit, the next step is to determine the number of transects required for assessment. This section outlines the minimum number of transects needed per map unit, taking into account area, vegetation type (meadow vs. upland), and project type. Guidance is provided on when it might be necessary to sample additional transects beyond the minimum requirements. These requirements aim to clarify SETT expectations for both pre-field and post-field submissions, reflecting the variability in GRS habitat value and how the collected data will be used. Additional transects are required for meadows, uplift areas, and heterogeneous uplands due to the following reasons:

- **Meadows:** Meadows are typically smaller in size and are highly valued within the CCS framework (with an 8x multiplier). They present significant opportunities for habitat uplift and can exhibit considerable variability, particularly in highly naturalized states such as stringer meadows. Transects in meadows generally require less time to sample, making it feasible to increase their number for more accurate assessment.
- **Uplift Areas:** Uplift areas require additional transects to compare pre-project conditions with post-improvement conditions for quantifying uplift credits. Even in projects where pre- and post-project comparisons are not required, such as pinyon-juniper projects, capturing the variation in habitat vegetation between areas with pinyon-juniper and the surrounding regions is important.
- **Heterogeneous Uplands:** Map units consisting of heterogeneous uplands require more transects to accurately characterize the variability in habitat vegetation. This ensures that all ecological conditions within these diverse areas are represented in the assessment.

For **Debit Projects**, there is a distinct category for uplands. Transects are generated based on debit project impacts, which use a decay curve where impacts decrease with distance from the disturbance. Field data collection focuses on areas closer to the impact, with further removed areas representing lower impacts and resulting in fewer debits. The following table (**Table 10**) indicates the minimum number of transects required within map units of different types based on acreage.

Table 10. The minimum transects required for sampling various map unit types on a power trend

Acres	Meadows, Uplift Areas, Heterogeneous Uplands on Credit Projects		
		Homogeneous Uplands on Credit Projects	Uplands on Debit Projects
0 - 9*	2-4	2	2
10 - 24	4	2	2
25 - 99	5	3	3
100 - 199	6	4	4
200 - 249	7	5	5
250 - 299	7	5	5
300 - 349	8	5	5
350 - 399	8	6	6
400 - 449	9	6	6
450 - 499	9	7	7
500 - 549	10	7	7
550 - 999	10	8	8
1000 - 1249	11	9	9
1250 - 1499	11	9	9
1500 - 1749	12	10	9
1750 - 1999	12	10	9
2000 - 2499	13	11	10
2500 - 2749	13	11	10
2750 - 2999	14	12	10
3000 - 3249	14	12	10
3250 - 3499	14	12	11
3500 - 3999	15	13	11
4000 - 4249	15	13	11
4250 - 4499	16	14	11
4500 - 4999	16	14	12
5000 - 5499	17	15	12
5500 - 5999	17	15	12
6000 - 6499	17	15	12
6500 - 6999	18	15	13
7000 - 7499	18	15	13
7500 - 7999	18	16	13
8000 - 8499	19	16	14
8500 - 8999	19	16	14
9000 - 9499	19	17	14
9500 - 9999	20	17	14
10000 - 10499	20	17	15
10500 - 10999	20	18	15
11000 - 11499	21	18	15

11500 – 11999	21	18	15
12000 – 12499	21	19	15
12500 – 12999	22	19	16
13000 – 13499	22	19	16
13500 – 13999	22	20	16
14000 – 14499	23	20	16
14500 – 14999	23	20	17
15000 – 15999	23	21	17
16000 – 16999	24	21	17
17000 – 17999	24	21	17
18000 – 18999	24	21	17
19000 – 19999	24	22	18
20000 – 20999	25	22	18
21000 – 21999	25	22	18
22000 – 22999	25	23	18
23000 – 23999	25	23	18
24000 – 24999	26	23	19
25000 – 25999	26	23	19
26000 – 26999	26	24	19
27000 – 27999	26	24	19
28000 – 28999	27	25	19
29000 – 29999	27	25	20
30000	27	25	20

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

CONSIDERATIONS FOR TRANSECT NUMBERS

- **Variability and Map Unit Size:** The variability of the ecosystem within the map unit should be considered when determining whether additional transects are needed. Sampling additional transects to ensure the minimum number of transects is maintained is strongly encouraged (e.g., transects may be reclassified into different Map Units after field verification of boundaries). The figures provided should be viewed as absolute minimums. Map Unit acreage should be rounded to the nearest whole number. **For Credit Projects, map units should be no larger than 6,000 acres. For Debit Projects, map units should not exceed 30,000 acres.** If aerial imagery and other observations reveal a mosaic of vegetation or patchiness within a map unit, increasing the sampling intensity as per the guidance for heterogeneous uplands may be necessary to adequately capture the map unit's characteristics.
- **Adjustment Based on Observations:** Should the technician determine that more transects are needed to accurately represent the landscape, they should increase the number of transects as appropriate. Additional transects can be completed in sequential order from backup batches if initial results do not seem to adequately represent the landscape.

ADDITIONAL GUIDANCE FOR GENERATING RANDOM TRANSECT LOCATIONS & BEARINGS:

- When transects are covered by clusters of willow or other dense (closed shrub, 70 - 100% canopy cover) patches of riparian woody vegetation within meadows, adjustments should be made to ensure accurate sampling:

- **Alternate Bearing:** If possible, choose one of the alternate bearings provided or reflect the transect off the shrubs to ensure coverage outside the dense vegetation.
- **Movement of Transects:** If the transect falls within the thicket but can be moved less than 5 meters to be outside the dense area, or if the thicket is only a few meters in length, relocate and sample accordingly.
- **Alternative Sampling Point:** If the transect cannot be moved effectively or the dense vegetation persists over a significant distance, select an alternative random sample point for assessment (from the backup transects provided, in sequential order).
- Small clusters of willows or other riparian woody vegetation (inclusions) will receive the habitat function score of the map unit in which they are contained. This approach ensures that these areas are appropriately represented in the assessment without incentivizing unnecessary modifications.
- If a transect crosses a map unit boundary into another map unit or extends outside the project area, the field crew should reflect the transect back into the original map unit at the point of contact and continue sampling. This ensures that transects are not discarded near map unit boundaries, which could bias the results. If a transect encounters obstacles such as fences, bodies of water, or roads, it should be reflected back into the map unit at the point of contact and continued. Transects should not be discarded due to these obstacles, as this could lead to incomplete or biased data. Transects located in areas with steep slopes (> 50%), large unsafe rock outcrops, talus slopes, or unsafe hiking routes can be rejected. In such cases, select an alternative random sample point in sequence. The SETT will perform an initial pre-screening to exclude these unsafe or inaccessible areas. If a transect must be rejected in the field, document all rejected points along with the justification for each rejection. This ensures transparency and maintains the integrity of the sampling process. The pre-field submission Calculator must include the number of transects planned for each map unit. Include a roads layer, to the best of the Verifier's knowledge, and identify roads accessible by vehicle, ATV, or UTV that will be used during fieldwork.
- **Do not sample transects that originate in or cross existing surface disturbance.** Reject these transects and select the appropriate backup sample point.

APPENDIX 5. DEBIT TOOL OVERVIEW

This appendix provides an overview of the underlying processes and calculations performed by each Debit Tool. Understanding these details helps users gain a clearer insight into how the Debit Tools operate and how they contribute to the overall assessment and analysis.

DEBIT TOOL 1

Debit Tool 1 prepares the user for the digitization and categorization of the proposed surface disturbance of a debit project. If a feature class or **'Proposed_Surface_Disturbance'** shapefile is provided, the tool performs the following steps:

1. Projects provided layer to the standard coordinate system used in the Desktop Analysis.
2. Adds a layer named **'Proposed_Surface_Disturbance_Debits'** to the map document.
3. Adds fields for Type, Subtype, Surface Disturbance, and Reclassified Subtype.
4. Applies domains to these fields to ensure that data entry is restricted to valid inputs.

If a feature class or shapefile is not provided, the tool creates an empty feature class with the same projection, fields, and domains, and adds it to the map document. The map document is then saved before the tool completes its process.

DEBIT TOOL 2

Debit Tool 2 processes the **'Proposed_Surface_Disturbance_Debits'** feature class edited by the user to generate the **'Proposed_Surface_Disturbance_Eligible'** feature class. The tool performs the following steps:

1. Clips out any impact areas located on private lands from the **'Proposed_Surface_Disturbance_Debits'** layer.
2. Adds a new field named **Disturbance_Type** to the **'Proposed_Surface_Disturbance_Eligible'** feature class to indicate whether the features represent direct disturbance (as opposed to indirect disturbance).
3. Buffers the **'Proposed_Surface_Disturbance_Eligible'** feature class by the distance effect associated with each feature type, creating the **'Debit Project Area'**. The **'Subtype'** field is used to lookup the appropriate buffering distance for each feature, as specified in **Table 1**. It is crucial that the **'Subtype'** field values are exact matches with those listed in **Table 1**.
4. The Analysis Area creation uses the buffered **'Proposed_Surface_Disturbance_Eligible'** feature class to define the **'Analysis_Area'** by applying the specified buffering distances.
5. All existing anthropogenic features within the **'Analysis_Area'** should be digitized within the **Anthro_Feature** classes of the **Nevada Data Package** before proceeding to Debit Tool 3.
6. The **'Debit Project Area'** is saved as a shapefile in the project's folder so that the ASUI layer from NDOW can be acquired from its extent.
7. The map document is saved before the tool finishes.

DEBIT TOOL 3

Debit Tool 3 processes the **Proposed_Surface_Disturbance_Eligible** feature class to identify potential overlaps with existing anthropogenic features. The tool performs the following steps:

1. Detects overlapping areas between the **'Proposed_Surface_Disturbance_Eligible'** and existing anthropogenic features.

2. Introduces new fields to the overlapping features to record:
 - a. **Overlap_Status**: Indicates the status of the existing feature during and after the proposed project.
 - b. **Returned**: Indicates whether the feature is expected to return to its original condition post-project.
 - c. **Overlap_Type**: Records the type of disturbance from the **Proposed_Surface_Disturbance_Eligible** feature class that overlaps the existing feature.
 - d. **Overlap_Subtype**: Records the subtype of the overlapping feature.
3. Clips the existing anthropogenic features to the **Analysis_Area** to focus on relevant impacts.
4. After running Debit Tool 3, the user must review and update the **Overlap_Status** and **Returned** fields for overlapping features within the '**Anthro_*feature type*_Clip**' feature classes if the default classifications do not apply.
5. The map document is saved before the tool finishes.

DEBIT TOOL 4

Debit Tool 4 completes most 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 performs the following tasks:

1. It takes the '**Analysis_Area**' as input from Debit Tool 2, which must be located within the project's geodatabase. Then it accepts a folder to save the output Excel files. It can optionally accept a feature class or shapefile containing current anthropogenic features within the '**Analysis_Area**'. If provided, this layer is copied to the project's geodatabase (overwriting any existing feature class named '**Current_Anthro_Features**') and used in place of merging individual anthropogenic feature layers. **Note**: It is recommended to populate the Subtype field appropriately if using this option.
2. Merges all anthropogenic feature layers to create '**Current_Anthro_Features**'. Calculates indirect anthropogenic disturbance by using the Subtype field to lookup the weight and distance associated with each feature (as provided in **Table 1**) and creates the '**Current_Anthro_Disturbance**' raster. Merges proposed surface disturbance with current anthropogenic features (excluding those classified as '**Removed**') to create '**Projected_Anthro_Features**', updating Subtype field with the **Subtype_as_Modified** value for features classified as '**Modified**'. Creates '**Permanent_Anthro_Features**' by merging proposed surface disturbance classified as '**Permanent**' or '**Term_Reclassified**' with existing features classified as '**Returned**' equals **True** or where the **Subtype_As_Modified** field differs from the **Subtype** field and **Returned** equals **False**. Updates the **Subtype** field with the **Subtype_as_Modified** value.
3. Calculates seasonal local-scale modifiers for each term by multiplying the rasters created above by the appropriate seasonal modifiers. Refer to the HQT Methods Document for information on

which modifiers apply to which seasons. Creates a visual depiction of project impacts by selecting the maximum per season impact from each seasonal local-scale GRSG habitat raster.

4. Creates map units for areas overlapping existing surface disturbance and areas categorized as 'de minimus' GRSG habitat quality based on pinyon-juniper and invasive annual grass cover. Includes proposed surface disturbance in map units. Adds fields for '**Map_Unit_ID**', '**Map_Unit_Name**', and '**Meadow**', and assigns domains to them.
5. The map document is saved before the tool completes its process.

DEBIT TOOL 5

Debit Tool 5 is executed after the user has delineated map units based on vegetation types. It performs the following tasks:

1. Creates a new set of unique map units from the delineated vegetation types. Dissolves all multi-part map units to produce the '**Map_Units_Dissolve**' layer.
2. Calculates the area in acres for each map unit.
 - a. Determines the proportion of each map unit within various categories:
 - i. Management Category
 - ii. WAFWA management zone
 - iii. Priority Management Unit
 - iv. Precipitation zone
 - b. Exports these proportions to Excel files stored in the project's folder.
3. Computes the average Habitat Suitability Index (HSI) value for each season. Calculates the average local-scale modifier for each season.
4. Adds a '**Transects**' field to the '**Map_Units_Dissolve**' layer to enable users to specify the number of transects per map unit.
5. Saves the map document before the tool completes its process.

DEBIT TOOL 6

Debit Tool 6 performs a spatial join of the '**Transects**' feature class provided by the SETT with the '**Map_Units_Dissolve**' layer. It 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**’, ‘**Map_Unit_Name**’, 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 most of the geoprocessing necessary to evaluate the Credit Project area. 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 GRSG habitat raster, subtracting the regional average site-scale GRSG habitat quality and multiplying by the management importance factor. This visualization is intended as an aid only, site-scale GRSG 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. This is from Saito 2020 MVRN shapefile delineates wet meadows from existing geospatial and remote sensing data
- Distance to Brood-Rearing Habitat ('**Dist_Brood**'): This raster represents function associated with distance to GRSG 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**'; Stringham et al. 2016): 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.
- 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.

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

REFERENCES

- Miller, R. F., J. C. Chambers, and M. Pellant. 2014. A field guide for selecting the most appropriate treatment in sagebrush and pinon-juniper ecosystems in the Great Basin: Evaluating resilience to disturbance and resistance to invasive annual grasses, and predicting vegetation response. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station 322.
- Stringham, T. K., P. Novak-Echenique, D. K. Snyder, S. Peterson, and K. A. Snyder. 2016. Disturbance response grouping of ecological sites increases utility of ecological sites and state-and-transition models for landscape scale planning in the Great Basin. *Rangelands* 38:371–378.



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