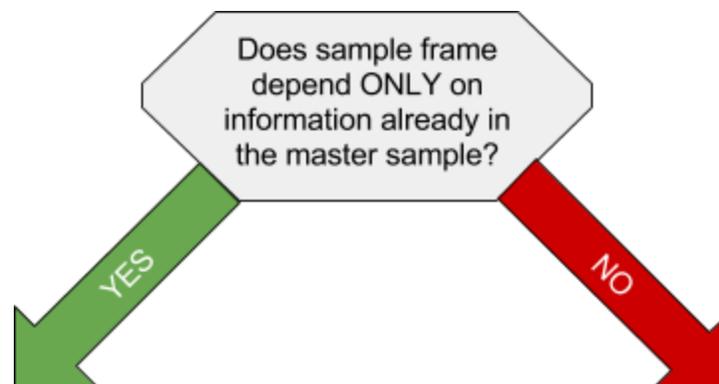


TERRESTRIAL AIM PROJECT DESIGN DATA REQUIREMENTS

UPDATED: November 2017

SAMPLE FRAME

The sample frame for the project is every part of the landscape where a point can be drawn and sampled. If a part of the landscape doesn't fall within the sample frame (and therefore could not have been sampled), then the data collected as part of the project can't be used to describe that area. However, data from the project can be used to help describe any of the landscape that falls within the sample frame. For Land Use Plan Designs the sample frame is commonly all BLM land within a Field Office or District Office boundary.



If the sample frame for the project is defined entirely by [attributes in the master sample](#) (including if it's defined as something like "a particular field office except these allotments"), then no shapefile is needed. Instead **describe the extent of the sample frame in the sample design worksheet**, e.g. "All BLM land within the Glassrock Land Use Plan area"

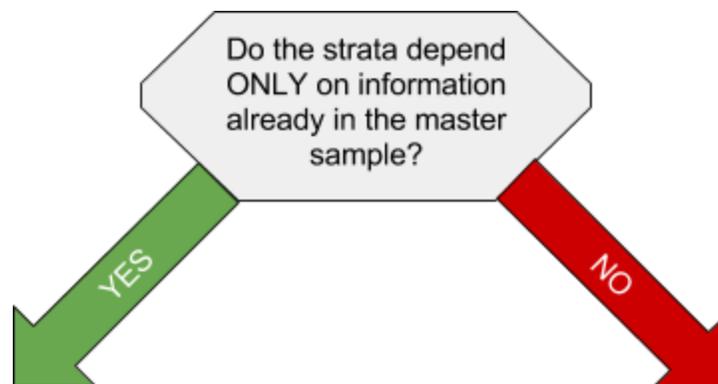
If a sample frame is defined—in part or whole—by any [properties not in the master sample](#) or that you suspect are unlikely to be accurate in the national geospatial data (e.g. recent fires, Priority Habitat Management Areas, or known boundary changes since 2015), then a [polygon shapefile of the sample frame](#) is required.

Polygon shapefile sample frame requirements

- The sample frame must be a single shapefile even if it is derived from multiple sources, e.g. if the sample frame is three different fires and a Grazing Management Area, they cannot be submitted as three separate shapefiles. See: [merging polygon shapefiles](#)
- The sample frame polygon must consist only of land that can be surveyed as part of the project, so it must be clipped to remove non-BLM land as well as any other areas that are being excluded from sampling, e.g. allotments that are impossible to access and are unmanaged by the office. See: [clipping polygon shapefiles](#)
- The attribute table must contain a field called "sf_id" with the name of the project in it. See: [adding a field to an attribute table](#), [changing multiple values at once in an attribute table](#)
- The shapefile must contain a single polygon in the attribute table, although that can be a multipart polygon if appropriate. See: [dissolving a polygon shapefile](#)
- The filename must follow the scheme of "[Project Name]_[Year of design submission]_sample_frame" where any spaces have been replaced with underscores, e.g. "Glassrock_District_2017_sample_frame.shp".
- When submitting any shapefile, remember that a shapefile is actually composed of multiple files with the same name but different file extensions. All of these files need to be included with the design because they contain critical information about the coordinate system and projection of the data.

STRATIFICATION

Strata are used to allocate sampling effort. This is particularly useful if there is an important type of landscape area, e.g. aspen groves, that makes up a small proportion of the sample frame and wouldn't be likely to be selected at all in a random draw without stratifying. Design strata *do not* need to be used for analysis and points can be analyzed using other properties, e.g. a point that fell in the design stratum of Sagebrush Steppe can be used in the analysis of a HUC 8 watershed that it falls within.



<p>If the strata for the project are defined entirely by attributes in the master sample—usually LANDFIRE Biophysical Settings (BpS) or BpS Groups—then no GIS files are needed. Submit only a lookup table defining the strata.</p>	<p>If the stratification is defined—in part or whole—by any properties not in the master sample, then submit a lookup table and a polygon shapefile (or raster) defining the strata. * Ecological sites are commonly used strata not in the Master Sample.</p>
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Lookup (Crosswalk) table requirements

Typically, when using BpS or BpS Groups (or any other master sample attribute or even ecological sites) for stratification, there will be far too many for each to be its own stratum without exploding the sampling requirements. The solution is to group them into coarser strata, each composed of multiple BpSs or BpS Groups. The lookup table (sometimes called a crosswalk table) classifies each BPS or BPS group into the coarser stratum it belongs to. To make that possible, it at minimum must contain the following columns, but may include additional columns for local project use. Note that the column names are case sensitive.

BPS_NAME

This name can actually vary based on the components your strata are composed of. If your strata are defined by LANDFIRE BpSes, then it should be called BPS_NAME, if you're using BpS Groups, then this would be GROUPNAME. If you are also submitting a polygon shapefile or raster of the strata, then this column name must be the same as the stratum component field name in that attribute table, e.g. ESD for ecological sites or DRG for disturbance response groups (see: [stratification GIS files](#)). Every possible stratum component that occurs within the sample frame should appear in this column once and only once.

stratum

This is where the names of the strata are entered. Every row that corresponds to a stratum should have the same stratum name entered here, e.g. if the BpS group entries on rows 2, 3, 10, and 12 all belong in the stratum called Grassland then those rows should have Grassland in this column. If you are also submitting a polygon shapefile or raster of the strata, then these values must be the same as the values in the "stratum" field in the attribute table (see: [stratification GIS files](#)). Most strata will appear more than once in this column.

stratum.abbreviation

These are the values used to name points by stratum once they're drawn. They should be two to four characters and distinct for each stratum, e.g. every row that has Sagebrush Steppe in the "Stratum" column should have SBS in the "stratum.abbreviation" column, which will mean that every point in those stratum components will have a name like SBS-007 or SBS-098.

stratum.type

This is where the type of stratum is entered. For example, the most common two are "Grouped LANDFIRE Biophysical Settings" and "Grouped LANDFIRE Biophysical Setting Groups", but other values are possible.

stratum.description

This is where a description of the stratum is entered, e.g. for all rows where the stratum is Sagebrush Steppe this might be "LANDFIRE Biophysical Settings grouped by similarity in vegetation and potential" and rows where the stratum is Other might be "LANDFIRE Biophysical Settings grouped due to very small areas or low management concern for the project"

Stratification GIS file requirements

If the original data set you're using to define the strata is in raster format, *do not convert it to polygons*. The conversion process can dramatically inflate the filesize and tends to introduce artifacts and errors. Trust that rasters are rasters for a reason.

- If a sample frame shapefile is also submitted, the strata must be clipped to the sample frame so that none of them extend beyond the boundary of the sample frame *and* they

collectively cover the entirety of the sample frame. See: [clipping polygon shapefiles](#), [restricting raster values to a polygon](#)

- The attribute table must contain only two fields: the stratum and stratum components. If there is an FID field displayed as well, that's acceptable. **Remove any extraneous fields.**
 - If the file is a raster, an additional field for the cell value must also be present and called "VALUE".
- The stratum component field in the attribute table must have a descriptive name, *e.g.* if the components of the strata are ecological sites then the attribute table would include a field named "ESD" holding the ecological site identities.
 - If the file is a polygon shapefile, there must be no more than one entry/row in the attribute table for each stratum component. See: [dissolving a polygon shapefile](#)
 - If the file is a raster, it is possible that the attribute table may have multiple cell values that correspond to a unique pair of stratum and stratum component.
- The attribute table must contain a field called "stratum" which contains the stratum identity for each polygon or cell value. Because strata are almost always composed of more than one stratum component, stratum names will be repeated in each row that belongs to one of their components.
- A description of the stratification data source needs to be included in the sample design sheet. This should include where the data were obtained and transformations done to the data, *e.g.* "Soil map unit polygons downloaded from SSURGO and assigned to ecological site using the most common expected ecological site within each polygon. Ecological sites were grouped into strata based on similar ecological potential."
- The filename must follow the scheme of "[Project Name]_[Year of design submission]_strata" where any spaces have been replaced with underscores, *e.g.* "Glassrock_District_2017_strata.shp".
- When submitting GIS data, remember that there are often multiple files involved.
 - A shapefile is actually composed of multiple files with the same name but different file extensions. All of these files need to be included with the design because they contain critical information about the coordinate system and projection of the data.
 - A raster with an attribute table will appear as a file folder containing multiple files. Please submit the folder and its contents, not the individual files.

HOW TO DO COMMON GIS TASKS FOR SAMPLE DESIGN

Merging polygon shapefiles in ArcMap

1. Open the geoprocessing menu and select the Merge tool.
2. Select the appropriate polygon shapefiles as the input features.
 - 2.1. If any rows in these features' attribute table are currently selected, they will be the only parts of the features taken into account.
3. Select an appropriate filepath and filename for the the combined shapefile output. The output will be a shapefile with all the geometry and attribute fields from the input features.
4. Click the "OK" button to create the new shapefile from the inputs.

Clipping polygon shapefiles in ArcMap

1. Open the geoprocessing menu and select the Clip tool.
2. Select the appropriate polygon shapefile as the input feature.
 - 2.1. If any rows in this feature's attribute table are currently selected, they will be the only parts of the feature taken into account.
3. Select the appropriate polygon shapefile as the clip feature.
 - 3.1. If any rows in this feature's attribute table are currently selected, they will be the only parts of the feature taken into account.
4. Select an appropriate filepath and filename for the the combined shapefile output. The output will be only the parts of the input feature *overlapped* by the clip feature.
5. Click the "OK" button to create the new shapefile from the clipped input.

Adding a field to an attribute table in ArcMap

1. Open the shapefile or raster attribute table.
2. Open the menu in the top left of the attribute table window to select "Add Field..."
 - 2.1. If you are currently editing the raster or shapefile, this option will be unavailable. You will need to first select "Stop editing" from the Editor toolbar.
3. Enter the name of the field and select "Text" as the type. A minimum length of 50 characters is recommended.
4. Click the "OK" button to create the field.

Changing multiple values in an attribute table field at once in ArcMap

1. Open the shapefile or raster attribute table.
2. Select the rows you want to make changes in. If you want to change all rows, you can either select all rows or leave none selected.
3. Right click on the header for the field and click "Field Calculator..."
4. If you are not in edit mode, you will need to confirm that you acknowledge that these changes will not be reversible.
 - 4.1. If you want to be able to undo changes, you can right click on the layer you're changing in the Table of Contents and under "Edit Features" select "Start Editing." This will require that you select "Save edits" in the Editor Toolbar later in order to save any changes.
5. In the bottom text box, type the value you want to change the attribute to in quotation marks.
6. Click the "OK" button to update the field with the new value.

Dissolving a polygon shapefile by a field in ArcMap

1. Open the Geoprocessing menu and select the Dissolve tool.
2. Add the polygon shapefile as the input feature.
 - 2.1. If any rows in this feature's attribute table are currently selected, they will be the only parts of the feature taken into account.
3. Make sure that the output feature class is a correctly named shapefile in the correct folder.
4. Under "Dissolve_Fields(s)" select the relevant field to combine polygons by.
5. Click the "OK" button to create the shapefile.

Restricting raster values to a polygon in ArcMap

1. In the ArcToolbox under Spatial Analyst open the Extract by Mask tool.
2. Select the appropriate input raster either from the drop down list or through the file explorer button.
3. Select the appropriate polygon(s) for the feature mask data either from the drop down list or through the file explorer button.
 - 3.1. If any rows in this feature's attribute table are currently selected, they will be the only parts of the feature taken into account.
4. Provide an output filepath and filename in an appropriate folder.

5. Click the “OK” button to create a raster with values only in cells that fell within the polygon(s).

Determining areas of a raster with an attribute table by value in ArcMap

1. Open the raster attribute table.
2. Add a field called “AREA_ACRES” of the type “float.”
3. Right click the header for “AREA_ACRES” and select “Field Calculator...”
 - 3.1. If you want to be able to undo changes, you can right click on the layer you’re changing in the Table of Contents and under “Edit Features” select “Start Editing.” This will require that you select “Save edits” in the Editor Toolbar later in order to save any changes.
4. In the bottom text box, enter the formula to multiply the cell count field by the area of a single cell by the conversion factor to acres, e.g. if each cell is 30 m x 30 m then the formula would be entered as $[COUNT] * 30 * 30 * (1/4047)$ because there are 4047 m² in an acre.
5. Click the “OK” button to update the values in the field.

MASTER SAMPLE ATTRIBUTES

The master sample is a collection of randomly located, spatially balanced points that were drawn across all BLM land at a density of 1 point every 85 acres in 2015. The National Operations Center attributed the points with the most common and broadly useful attributes available to them at the time.

Working from the master sample using its attributes dramatically streamlines and speeds up the process of creating a sample design, in part because the points can simply be screened and selected by the attributes they already have without the need for exchanging and applying GIS files.

The following are attributes available in the master sample and were last updated in 2015 using the national GIS data at the NOC. Commonly-used attributes are bolded.

- Administrative state
- **Administrating district name***
- **Administrating field office name***
- **LANDFIRE Biophysical Setting name**
- LANDFIRE Biophysical Setting code
- **LANDFIRE Biophysical Setting Group name**
- LANDFIRE Biophysical Setting Group ID
- LANDFIRE Biophysical Setting Zone
- SSURGO Map Unit Key
- Grazing allotment name
- Grazing allotment number
- Wild Horse & Burro management area
- Sagebrush Focal Area[†]
- Proposed Greater Sage-grouse General Habitat[†]
- Proposed Greater Sage-grouse Priority Habitat[†]
- Environmental Impact Statement Boundary
- Land Use Plan/Resource Management Plan
- Solar Energy Zone
- Hydrological Unit Codes (levels 6, 8, 10, and 12)
- Hydrological Unit Names (levels 6, 8, 10, and 12)
- Elevation (m)

*NOC records were accurate in 2015. If changes have occurred, please provide additional information or GIS data with the project design submission.

[†]NOC records were incomplete, so supplementary GIS information from local offices is likely needed, especially if changes have occurred since 2015