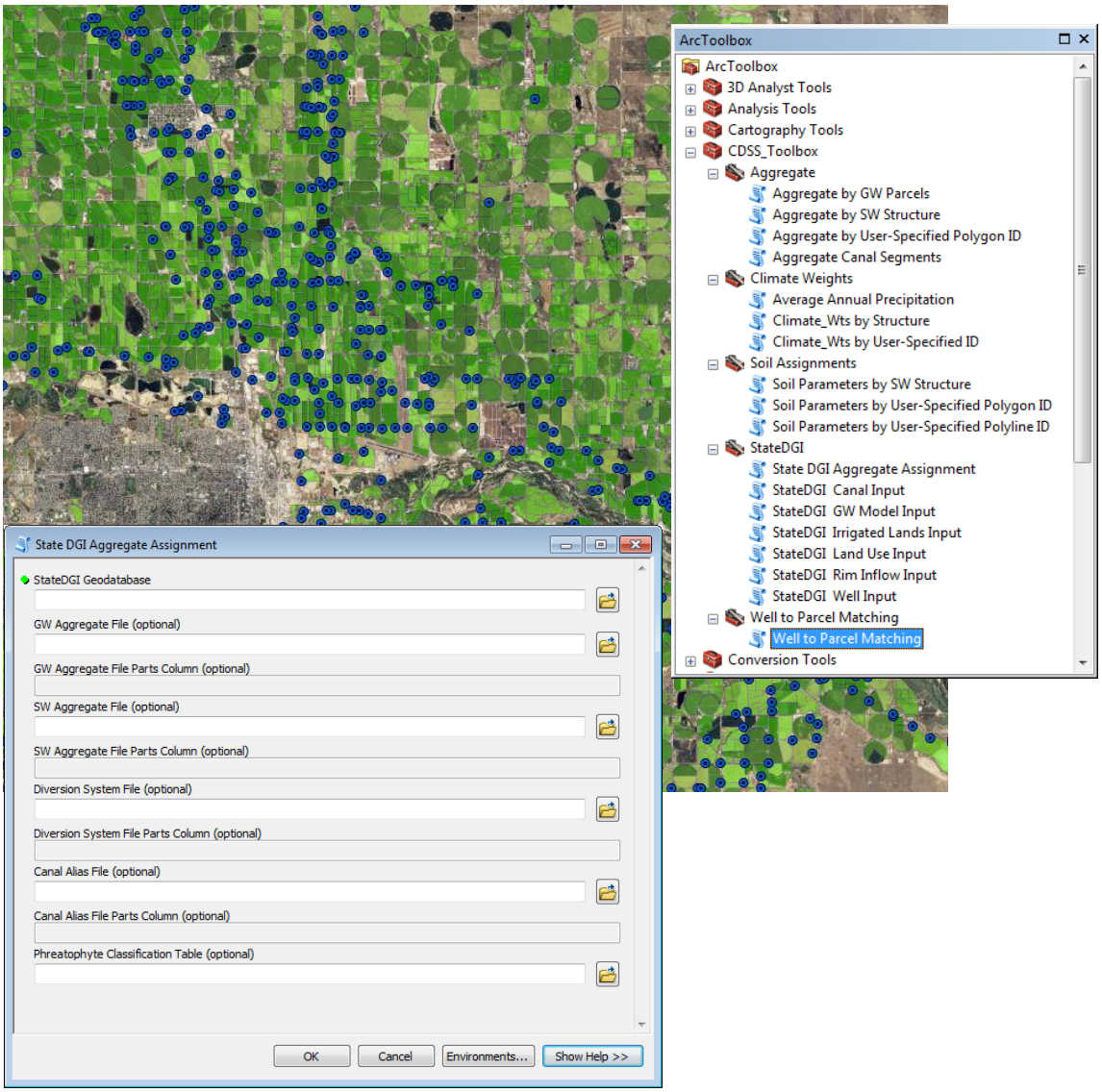
Appendix B: CDSS Toolbox Manual Update

CDSS Toolbox Manual Update



April 2017

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Section 1

Introduction

The CDSS Toolbox is a set of GIS data management interfaces (DMIs) implemented using Python scripts that provide users with a graphical interface for each tool within Esri's ArcToolbox™ software environment. The CDSS Toolbox DMIs perform operations to process GIS data sets for use with other CDSS tools and DMIs, notably StateDGI, StateCU, StateMod, and StatePP. The CDSS Toolbox is intended to provide consistent, automated, and reproducible methods of developing the input files required for other CDSS tools.

The CDSS Toolbox was updated to allow the Python scripts to operate within ArcGIS version 10.1 (or higher), with additional objectives of reading both geodatabase feature classes and shapefiles as input, removing any redundant code, checking the logic of geoprocessing operations, checking for consistent input data schema requirements, and ensuring that the scripts process data correctly. Additionally, the Python scripts have been updated to use the newer ArcPy Python syntax rather the original arcgisscripting Python syntax because of the likelihood that in the future Esri will depreciate and remove the older arcgisscripting from ArcGIS. The user of the CDSS Toolbox should be familiar with the operation of ArcGIS Desktop software, particularly ArcMap and ArcToolbox.

The CDSS Toolbox is composed of five toolsets:

- Aggregate
- Climate Weights
- Soil Parameters
- StateDGI
- Well to Parcel Matching

The Aggregate, Climate Weights, and Soil Parameters toolsets are designed to be primarily used to generate input files for StateCU and StateMod. The StateDGI and Well to Parcel Matching toolsets are designed to be used primarily used to generate input files for StateDGI and StatePP to ultimately build model input files for MODFLOW-based groundwater models. Each of these toolsets contains one or more individual tools.

Each individual tool consists of an ArcPy script and an ArcToolbox graphical user interface (GUI) for the user to enter the appropriate information and spatial data sets to be processed by the script. The GUIs include embedded help information describing the overall intent of the tools, as well as descriptions of the appropriate inputs to the tools and the expected outputs. The GUIs also help guide the user to not use inappropriate inputs in three ways. First, the ArcToolbox interfaces will not allow the user to enter inappropriate types of data inputs through restrictions on the types of data allowed to be entered. For example, a user cannot specify a raster data set where a feature layer data set is the necessary data type, nor can a user specify a text field from an attribute table where an integer or numeric field is the necessary data type. Second, for each tool most inputs are required while some are optional. The GUI will return an error message if required inputs have not been entered by the user, and will return the user to the GUI with previous inputs intact such that the user does not have to start from the beginning. Third, the ArcToolbox GUIs have additional internal "validation" Python scripts that are executed before the main ArcPy scripts are executed. These validation scripts further check the specified input data sets to ensure that they are appropriate inputs to the ArcPy scripts. For example, the tools that use CDSS Irrigation Snapshot feature layers

as inputs are validated to check that they have the appropriate standard attribute fields (e.g., SW_WDID1, SW_WDID2,..., SW_WDID9 and GW_ID1, GW_ID2,... ,GW_ID20). If any of the input data sets return an error from the validation script, the user is informed of the issues with the specified input and returned to the GUI to correct them. Not all input data sets can be fully checked for potential errors before execution of the ArcPy script, so each tool generates a log file that lists the progress of the tool and information about errors if they occur so the user can perform any necessary corrections.

1.1 Installing and Loading the CDSS Toolbox

The CDSS Toolbox is contained in a single directory that includes the ArcToolbox file (CDSS_Toolbox.tbx) and the ArcPy scripts (*.py). The CDSS_Toolbox.tbx file contains the GUIs and help information for each individual tool, and the references to the location of the ArcPy scripts. The default location of the CDSS Toolbox is C:\CDSS\bin\Toolbox, and CDSS_Toolbox.tbx contains references to the ArcPy scripts in this location. This default location may be changed by the user, but the user will need to manually update the CDSS_Toolbox.tbx file's locations of the ArcPy scripts because ArcToolbox files do not retain relative paths to ArcPy scripts. It is recommended to use the default location.

Once the CDSS Toolbox is installed, the user can add the toolbox to the ArcToolbox interface within ArcMap. Begin by opening ArcToolbox by selecting **Geoprocessing** from the main menu, and then selecting **ArcToolbox** from the dropdown menu, or by selecting the red toolbox icon from the ArcMap standard toolbar. 

Now that the ArcToolbox interface window is open, right-click on the main ArcToolbox icon and select **Add Toolbox** from the popup menu. In the dialog window that appears, browse to the C:\CDSS\bin\Toolbox location, click once on CDSS_Toolbox.tbx, and select **Open**. (Note: do not double-click on CDSS_Toolbox.tbx because the dialog window will browse to the list of toolsets inside the CDSS Toolbox rather than adding the toolbox.)

CDSS_Toolbox should now appear as an entry within the main ArcToolbox interface. You can now enter the CDSS Toolbox and browse through the toolsets.

1.2 Overview of Using the CDSS Toolbox

Double-click on the CDSS_Toolbox icon to expand the list of toolsets contained within, and then double-click on each toolset's icon to expand the list of individual tools contained within each toolset. Double-click on a tool to open the GUI for the tool. The GUI allows the user to browse to the locations of input data sets, use dropdown menus to specify the appropriate attribute table fields as inputs, etc. If the help information for a tool is hidden, click the **Show Help** button in the lower left of the tool's GUI. The overview help information for the tool will be displayed to the right of the area for entering tool input, and if you click on an individual input element, the specific help for that input will appear instead of the overview information. To display the entire help information for a tool, click the **Tool Help** button in the lower left. To hide the help again, click the **Hide Help** button.

The following section and its subsections describe the usage of each individual tool organized by the five toolsets.

Section 2

Aggregate Toolset

Aggregate by GW Parcels

Summary

Note that this tool will be superseded by the StateDGI Aggregate Assignment tool in which groundwater aggregates are assigned through lists of WDIDs and Aggregate IDs rather than an intersection of aggregate area polygons with irrigated area feature layers. This tool remains for back-compatibility with previous modeling if needed.

The Aggregate by GW Parcels tool is used to combine parcels irrigated by groundwater well structures into user-defined aggregate areas. These groundwater well structures and their irrigated land are combined and given a unique Aggregate ID. The Aggregate ID is typically made up of nine characters identifying the river basin, Water District, and use of surface water. For example, 01ADP001 indicates the first area of diversion structures in the South Platte Basin (ADP) in Water District 1.

Usage

- Please use the StateDGI Aggregate Assignment tool instead; this tool remains for back-compatibility with previous modeling if needed
- Please use the StateDGI Aggregate Assignment tool instead; this tool remains for back-compatibility with previous modeling if needed

Parameter	Explanation	Data Type
Irrigated_Acreage_Feature_Layer	The attribute table for this polygon feature layer must be in the standard CDSS format, including fields for the parcel ID (PARCEL_ID), surface water IDs (SW_WDID1, SW_WDID2,....SW_WDID9), and groundwater IDs (GW_ID1, GW_ID2,...GW_ID20). Each parcel ID occupies one row in the attribute table, and multiple surface water or groundwater structures can be assigned to the parcel through numerated SW_WDID and GW_ID fields. Irrigated acreage feature layers have been created by river basin in support of CDSS modeling efforts and are available on the CDSS website (cdss.state.co.us).	Feature Layer
Aggregate_Areas__Polygon_Feature_ Layer	A polygon feature layer that defines the areas in which the groundwater parcels will be grouped.	Feature Layer
Aggregate_Attribute	The attribute field name in the Aggregate Areas feature layer that contains the Aggregate IDs that the groundwater parcels will be assigned to in the output table. This attribute can also be added to the Irrigated Acreage feature layer to create a new Irrigated Acreage feature class.	Field
Output_CSV_File	The output file is a comma-delimited text (CSV) file that contains the Aggregate ID, the groundwater WDID and structure acres. Note that this tool recomputes parcel areas based on the appropriate map units, then converts the area to acres and aggregates according to the Aggregate Area polygon coverage. Date and input parameters will be included in the header.	File
Add_Results_to_New_Feature_Class	If the "Add Results to New Feature Class" checkbox is selected, the Aggregate ID (if any) assigned to the structure in GW_ID1 will be appended as a new field in a copy of the Irrigated Acreage Feature Layer and saved as the new feature class.	Boolean

Parameter	Explanation	Data Type
New_Irrigated_Parcel_Feature_Class (Optional)	The output irrigated parcel feature class to be created if the "Add Results to New Feature Class" checkbox is selected.	Feature Class

Aggregate by SW Structure

Summary

Note that this tool has been superseded by the StateDGI Aggregate Assignment tool in which surface water aggregates are assigned through lists of WDIDs and Aggregate IDs rather than an intersection of aggregate area polygons with irrigated area feature layers. This tool remains for back-compatibility with previous modeling if needed.

The Aggregate by SW Structure tool is used to combine parcels irrigated by "non-key" surface water structures into user-defined aggregate areas. Non-key structures are generally defined in the CDSS modeling efforts as those surface water structures with sparse or no diversion records, structures diverting from a tributary not expected to be included in the water resources planning model, or structures irrigating a relatively small amount of land. These non-key structures and their irrigated land are combined and given a unique Aggregate ID. The Aggregate ID is typically made up of nine characters identifying the river basin, Water District, and use of surface water. For example, 01ADP001 indicates the first area of diversion structures in the South Platte Basin (ADP) in Water District 1. When non-key structures have irrigated lands in more than one aggregate polygon, the structure will be assigned to the aggregate containing the greatest structure area. Only those parcels that have an associated surface water ID not included in the "key" structure list will be aggregated and included in an Aggregate ID in the newly created Output Table.

Usage

- Please use the StateDGI Aggregate Assignment tool instead; this tool remains for back-compatibility with previous modeling if needed

Parameter	Explanation	Data Type
Irrigated_Acreage_Feature_Layer	The attribute table for this polygon feature layer must be in the standard CDSS format, including fields for the parcel ID (PARCEL_ID), surface water IDs (SW_WDID1, SW_WDID2,….SW_WDID9), and groundwater IDs (GW_ID1, GW_ID2,…GW_ID20). Each parcel ID occupies one row in the attribute table, and multiple surface water or groundwater structures can be assigned to the parcel through numerated SW_WDID and GW_ID fields. Irrigated acreage feature layers have been created by river basin in support of CDSS modeling efforts and are available on the CDSS website (cdss.state.co.us).	Feature Layer
Aggregate_Areas__Polygon_Feature_ Layer	A polygon feature layer that defines the areas in which the non-key surface water parcels will be grouped.	Feature Layer
Aggregate_Attribute	The attribute field name in the Aggregate Areas feature layer that contains the Aggregate IDs that the non-key surface water parcels will be assigned to in the output table. This attribute can also be added to the Irrigated Acreage feature layer to create a new Irrigated Acreage feature class.	Field

Parameter	Explanation	Data Type
Key_Structure_List__CSV (Optional)	This input file is optional—if no Key Structure List is provided, the tool will aggregate all parcels with an associated surface water WDID. The list file is a comma-delimited (CSV) file with one structure surface water WDID per line, with additional information about the structure separated by columns. These structure WDIDs will be excluded from the aggregation output CSV file. The surface water ID (SW_WDID) format in this file must match the 7-digit "text" format in the Irrigated Acreage Feature Layer. For example, if the structure is 503 in Water District 1, the SW_WDID must be "0100503."	File
Key_Structure_Column (Optional)	Column number of the SW_WDID in the Key Structure List. This column number must be specified if a Key Structure List is input.	Long
Output_CSV_File	The output file is a comma-delimited text (CSV) file that contains the Aggregate ID, the surface water WDID and structure acres. Note that this tool recomputes parcel areas based on the appropriate map units, then converts the area to acres and aggregates according to the Aggregate Area polygon coverage. Date and input parameters will be included in the header.	File
Add_Results_to_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the Aggregate ID (if any) assigned to the structure in SW_WDID1 will be appended as a new field in a copy of the Irrigated Acreage Feature Layer and saved as the new feature class. Note that because each irrigated parcel can be served by more than one structure (as defined by SW_WDIDx) it is also possible that a single parcel could be included in more than one aggregate. Only the Aggregate ID associated with SW_WDID1 will be appended in the new feature class.	Boolean
Output_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the Aggregate ID (if any) assigned to the structure in SW_WDID1 will be appended as a new field in a copy of the Irrigated Acreage Feature Layer and saved as the new feature class. Note that because each irrigated parcel can be served by more than one structure (as defined by SW_WDIDx) it is also possible that a single parcel could be included in more than one aggregate. Only the Aggregate ID associated with SW_WDID1 will be appended in the new feature class.	Feature Class

Aggregate by User-Specified Polygon ID

Summary

The Aggregate by User-Specified ID tool is used to combine any user-defined polygons into user-defined aggregate areas. As other tools specified that parcels served by groundwater or surface water were to be aggregated, this tool allows the user to spatially assign polygons from a feature layer to a user-defined set of aggregated areas. A standard formatted CDSS Irrigated Acreage feature layer is not required as an input for this tool. For example, if the polygon feature layer depicts alfalfa coverage and the aggregate area coverage is counties, this tool would provide the user with the area of alfalfa in each county. In this example, if the alfalfa polygon coverage overlaps county boundaries, the alfalfa parcels will be assigned to the county that contains the greatest alfalfa polygon boundary.

Usage

- The portions of user-defined polygons outside of the user-defined aggregate areas will not be retained
- The user may save the spatial result of this tool in the Output Feature Class

Parameter	Explanation	Data Type
Polygon_Feature_Layer	A feature layer of polygons to spatially assign to Aggregate Areas (e.g., alfalfa parcels).	Feature Layer
Polygon_Attribute	The attribute field name in the Polygon Feature Layer attribute table that contains the Polygon IDs to be used in the aggregation assessment.	Field
Aggregate_Areas__Polygon_Feature_ Layer	A polygon feature layer that defines the areas in which the polygons will be grouped (e.g., counties).	Feature Layer
Aggregate_Attribute	The attribute field name in the Aggregate Areas Feature Layer that contains the Aggregate IDs the polygons will be assigned to in the output CSV file. This attribute can also be added to the original polygon feature layer to create a new feature class.	Field
Output_CSV_File	The output file is a comma-delimited text (CSV) file that contains the Aggregate ID, the Polygon ID, and total acres. Note that this tool re-computes the user-defined polygon areas based on the appropriate map units, then converts the area to acres and aggregates according to the Aggregate Area polygon coverage. Date and input parameters will be included in the header.	File
Add_Results_to_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the Aggregate ID will be appended as a new field to a copy of the original Polygon feature layer input and saved as the new feature class.	Boolean
Output_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the Aggregate ID will be appended as a new field to a copy of the original Polygon feature layer input and saved as the new feature class.	Feature Class

Aggregate Canal Segments

Summary

This tool summarizes the polyline segments of a feature layer of canals by surface water ID (SW_WDID) attribute. The feature layer of canals must have the fields in its attribute table be in the standard CDSS canal format.

Usage

- The resulting CSV file from this tool can be uploaded to StateDGI using the StateDGI Aggregate Assignment tool

Parameter	Explanation	Data Type
Canals_Feature_Layer	A feature layer of canals where the attribute table for this polyline feature layer must be in the standard CDSS format. The polyline segments will be summarized by the surface water ID (SW_WDID) attribute.	Feature Layer
WDID_Attribute_Field	Field in the Canals Feature Layer containing the SW_WDID values.	Field
Output_CSV_File	The output file is a comma-delimited text (CSV) file that contains the Surface Water ID (WDID) and total length in feet of the canals. Note that polyline segment lengths are not recomputed but are based on the "Length" field and units in the Canal feature layer. Date and input parameters will be included in the header.	File

Section 3

Climate Weights Toolset

Average Annual Precipitation

Summary

The Average Annual Precipitation tool spatially computes the average annual precipitation, as defined by the Average Annual Precipitation Raster, for a user-defined set of polygons, generally representing drainage basins. This tool is generally used to define average annual precipitation drainages above StateMod baseflow nodes. Average annual precipitation and drainage area are used to distribute natural streamflow gains to baseflow nodes on ungaged tributaries.

Usage

- This tool requires the Spatial Analyst extension to ArcMap

Parameter	Explanation	Data Type
Polygon_Feature_Layer	Feature layer of user-defined polygons in which average annual precipitation will be calculated.	Feature Layer
Polygon_Attribute	The attribute field name in the Polygon Feature Layer that contains the Polygon IDs to be used in the summarization assessment.	Field
Average_Annual_Precipitation_Raster	Average Annual Precipitation Raster data set.	Raster Layer
Output_CSV_File	Output comma-delimited file of spatially averaged annual precipitation for each Polygon ID in the Polygon Feature Layer.	File
Append_to_Feature_Class	If the "Append to Feature Class" checkbox is selected, the average annual precipitation for each Polygon ID will be appended as a new field in a copy of the Polygon Feature Layer and saved as the new feature class.	Boolean
New_Output_Feature_Class (Optional)	If the "Append to Feature Class" checkbox is selected, the average annual precipitation for each Polygon ID will be appended as a new field in a copy of the Polygon Feature Layer and saved as the new feature class.	Feature Class

Climate_Wts by Structure

Summary

The Climate Weight by Structure Tool assigns weights for CDSS standard irrigated acreage polygon feature layers based on the features' distances from local NOAA climate stations. This tool uses the Zonal Statistics tool of Spatial Analyst. The tool requires input of four parameters: the Assignment Layer, the ID Field, the Climate Weight Rasters, and a threshold weight below which a weight for a climate station will not be assigned. Optionally, a workspace of Orographic Correction rasters may be specified.

Irrigated Acreage Feature Layer

The irrigated acreage feature layer must be a polygon feature layer in the standard CDSS format with fields for PARCEL_ID, SW_WDID1, GW_ID1, etc.

Climate Weight Rasters

The Climate Weight Rasters are applied to the Assignment Layer in the process of assigning climate station weights to the specified shapefile. The grid was developed through Linear Interpolation of NOAA Climate Station locations. The general process for development of the Climate Weight Rasters was:

- Varying weights are applied, based on the distance from each station, ranging from 1.0 at the station itself to 0.0 at each adjacent station.
- A Triangular Irregular Network (TIN) is created by joining the location of each climate station into a series of triangles that cover the entire region of interest. The triangular network defined around each climate station can be adjusted, if necessary, to reflect engineering judgment (elevation consideration, topographic influences, extrapolation, etc.).
- At the selected climate station, each triangle vertex is assigned a value of one while all other vertices are assigned a value of zero.
- A grid is then created for each climate station as a linear interpolation of each triangle in the TIN. This automated process is then repeated for each climate station.

The final product is a spline interpolation with linear basis functions. This ensures that the sum of the weights at any point equal 1 and that at a particular climate station, the weight for that climate station is equal to 1. It also ensures that all weights are greater than zero, which is not always guaranteed by other interpolation methods. By using Spatial Analyst extension, the weights are stored as separate rasters and can be combined easily for a point location or summarized for any polygon area.

Usage

- This tool requires the Spatial Analyst extension to ArcMap

Parameter	Explanation	Data Type
Irrigated_Acreage_Feature_Layer	The attribute table for this polygon feature layer must be in the standard CDSS format, including the parcel ID (PARCEL_ID), surface water ID (SW_WDID1, SW_WDID2,...,SW_WDID9), and groundwater ID (GW_ID1, GW_ID2,...,GW_ID20). Each parcel ID occupies one row in the attribute table, and multiple surface water or groundwater structures can be assigned to the parcel through numerated SW_WDID and GW_ID fields. Irrigated acreage feature layers have been created by river basin in support of CDSS modeling efforts and are available on the CDSS website (cdss.state.co.us).	Feature Layer

Parameter	Explanation	Data Type
Climate_Station_Weighting_Rasters	The series of climate station weighting rasters with computed weights based on the distance to the nearest climate station to be used in the analysis. To add rasters click on the "open-folder" icon to navigate to the climate station weight rasters. Select any number of climate station weight rasters for use in the analysis, holding down the Ctrl key to select more than one climate station weight raster at a time. Each selected climate station weight raster will populate the area below the Climate Station Weight Raster navigation box. (Note that the top navigation box next to the "open-folder" icon will remain empty.) The controls next to the populated area are basic Esri tools and although the up and down arrows are functional, the order of the climate station grids does not matter. Use the "X" icon to delete climate station grids. Climate station weighting rasters for the SPDSS study area have been created in support of SPDSS modeling efforts, as described in the SPDSS Technical Memorandum *Task 53.3: Assign Key Climate Information to Irrigated Acreage and Reservoirs*, February 1, 2006. The SPDSS Climate Station Weighting Rasters are available on the CDSS website (cdss.state.co.us).	Multiple Value
Precipitation_Orographic_Correction_ Raster_Directory (Optional)	The directory of grids that contains computed orographic weights based on the ratio of average annual precipitation at a climate station to the average annual precipitation at the structure location. Orographic adjustments are applied to precipitation data typically when irrigated parcels are at an elevation higher than nearby climate stations. To add orographic correction grids click on the "open-folder" icon to navigate to the folder containing the grids. Orographic corrections will be assigned only to their respective climate stations if the climate station was selected as a "weighted" station. For example, if the "2220" climate station grid was the only one selected, then the tool will use only the 2220 orographic correction grid when determining orographic adjustments. This is an optional input; if no orographic correction grid is provided then no orographic adjustments will be assigned for the ID field in the Output CSV File. The SPDSS Orographic Adjustment grids are available on the CDSS website (cdss.state.co.us).	Workspace
Threshold_Weight	Minimum weight assigned to a climate station. The default is 0.05 or 5%. If the minimum weight assigned to any climate station is less than the Threshold Weight, the weights assigned to the other stations will be adjusted to ensure that all the weights sum to 1.0 for each structure.	Double
Output_CSV_File	The output file is a comma-delimited (.csv) file that contains the Polygon IDs, Climate Station IDs, weights, and orographic correction factors. An orographic factor is provided for each assigned climate station if the Precipitation Orographic Correction Grid Directory is provided by the user. If the minimum weight assigned to any climate station is less than the Threshold Weight, the weights assigned to the other stations will be adjusted to ensure that all the weights sum to 1.0 for each unique value in the ID Field. Date and input parameters will be included in the header.	File

Climate_Wts by User-Specified ID

Summary

The Climate Weight by User-Specified ID Tool assigns weights for a polygon or point feature layer based on the features' distances from local NOAA climate stations. This tool uses the Zonal Statistics and Extract Values to Points tools of Spatial Analyst. The tool requires input of four parameters: the Assignment Layer, the ID Field, the Climate Weight Rasters, and a threshold weight below which a weight for a climate station will not be assigned. Optionally, a workspace of Orographic Correction

rasters may be specified, and the user may also opt to have weights assigned for the centroids of input polygon features rather than averaged over the areas of the polygons.

- Assignment Layer

  The assignment layer may be any Polygon Feature Layer (e.g., Water District boundaries or groundwater model grid cells) or a Point Feature Layer (e.g., groundwater model grid nodes). If using polygons, the user may opt to have the tool internally calculate the polygon centroids and assign weights based on the centroid points. The feature layer must include an attribute field that identifies each polygon or point to be linked to the Climate Weight Grid during the operation.

- ID Field

  The ID Field is the attribute table field of the Assignment Layer that climate weights will be applied to. For example, if a feature layer of irrigated acreage within Division 1 is selected as the Assignment Layer, then the climate station weights that represent each parcel of irrigated land in the shapefile can be obtained by selecting the Parcel ID field as the ID Field parameter.

- Climate Weight Rasters

  The Climate Weight Rasters are applied to the Assignment Layer in the process of assigning climate station weights to the specified shapefile. The grid was developed through Linear Interpolation of NOAA Climate Station locations. The general process for development of the Climate Weight Rasters was:

  - Varying weights are applied, based on the distance from each station, ranging from 1.0 at the station itself to 0.0 at each adjacent station.
  - A triangular irregular network (TIN) is created by joining the location of each climate station into a series of triangles that cover the entire region of interest. The triangular network defined around each climate station can be adjusted, if necessary, to reflect engineering judgment (elevation consideration, topographic influences, extrapolation, etc.).
  - At the selected climate station, each triangle vertex is assigned a value of 1 while all other vertices are assigned a value of zero.
  - A grid is then created for each climate station as a linear interpolation of each triangle in the TIN. This automated process is then repeated for each climate station.

The final product is a spline interpolation with linear basis functions. This ensures that the sum of the weights at any point equal 1 and that at a particular climate station, the weight for that climate station is equal to 1. It also ensures that all weights are greater than zero, which is not always guaranteed by other interpolation methods. By using Spatial Analyst extension, the weights are stored as separate rasters and can be combined easily for a point location or summarized for any polygon area.

Usage

- This tool requires the Spatial Analyst extension to ArcMap

Parameter	Explanation	Data Type
Assignment_Layer	A feature layer of polygons (e.g., Surface Water Aggregate Areas) or points (e.g., groundwater model grid nodes) to which the tool will assign spatially averaged climate station weights.	Feature Layer

Parameter	Explanation	Data Type
ID_Field	The attribute field name in the Assignment Layer that contains the IDs on which to summarize for the weight assignment analysis (e.g., Aggregate ID).	Field
Climate_Station_Weight_Rasters	The series of climate station weighting rasters with computed weights based on the distance to the nearest climate station to be used in the analysis. To add rasters click on the "open-folder" icon to navigate to the climate station weight rasters. Select any number of climate station weight rasters for use in the analysis, holding down the Ctrl key to select more than one climate station weight raster at a time. Each selected climate station weight raster will populate the area below the Climate Station Weight Raster navigation box. (Note that the top navigation box next to the "open-folder" icon will remain empty.) The controls next to the populated area are basic Esri tools and although the up and down arrows are functional, the order of the climate station grids does not matter. Use the "X" icon to delete climate station grids. Climate station weighting rasters for the SPDSS study area have been created in support of SPDSS modeling efforts, as described in the SPDSS Technical Memorandum *Task 53.3: Assign Key Climate Information to Irrigated Acreage and Reservoirs*, February 1, 2006. The SPDSS Climate Station Weighting Rasters are available on the CDSS website (cdss.state.co.us).	Multiple Value
Precipitation_Orographic_Correction_ Raster_Directory (Optional)	The directory of grids that contains computed orographic weights based on the ratio of average annual precipitation at a climate station to the average annual precipitation at the structure location. Orographic adjustments are applied to precipitation data typically when irrigated parcels are at an elevation higher than nearby climate stations. To add orographic correction grids click on the "open-folder" icon to navigate to the folder containing the grids. Orographic corrections will be assigned only to their respective climate stations if the climate station was selected as a "weighted" station. For example, if the "2220" climate station grid was the only one selected, then the tool will use only the 2220 orographic correction grid when determining orographic adjustments. This is an optional input; if no orographic correction grid is provided then no orographic adjustments will be assigned for the ID field in the Output CSV File. The SPDSS Orographic Adjustment grids are available on the CDSS website (cdss.state.co.us).	Workspace
Threshold_Weight	Minimum weight assigned to a climate station. The default is 0.05 or 5%. If the minimum weight assigned to any climate station is less than the Threshold Weight, the weights assigned to the other stations will be adjusted to ensure that all the weights sum to 1.0 for each structure.	Double
Centroid_Analysis	Check this box to perform a centroid-based climate station weight analysis. The default for this tool is to perform an area-weighted climate weight station analysis. In the centroid-based assignment, the set of climate station weights determined at the centroid of the polygon will be assigned to the entire polygon. The centroid-based analysis is typically used for very small polygons (e.g., model cells) where the climate station weights would not vary greatly over the polygon area. This option is recommended when assigned climate weights to a groundwater model grid to enhance the tool performance.	Boolean
Output_File	The output file is a comma-delimited (.csv) file that contains the unique values from the Assignment Layer's ID Field, Climate Station IDs, weights, and orographic correction factors. An orographic factor is provided for each assigned climate station if the Precipitation Orographic Correction Grid Directory is provided by the user. If the minimum weight assigned to any climate station is less than the Threshold Weight, the weights assigned to the other stations will be adjusted to ensure that all the weights sum to 1.0 for each unique value in the ID Field. Date and input parameters will be included in the header.	File

Section 4

Soil Assignments Toolset

Soil Parameters by SW Structure

Summary

The Soil Parameters by SW Structure tool allows the user to spatially assign soil parameters to structures in the Irrigated Acreage Feature Layer. The Soil Parameter Feature Layer will typically reflect available water content or permeability. This tool prorates the soil parameters for each parcel, as defined by the Soil Parameter Feature Layer, and then summarizes the soil parameters for the parcels by structure. Only parcels with a surface water ID (SW_WDID) in the Irrigated Acreage Feature Layer will be assigned soil parameters. The SPDSS Technical Memorandum *Task 57: Assign Soil Moisture Water Holding Capacity to Structures*, March 2008, describes the process of assigning available water content values to surface water structures in the South Platte Basin modeling efforts.

Usage

- The portions of irrigated acreage polygons outside of the soil parameter polygon areas will not be retained
- The user may save the spatial result of this tool in the Output Feature Class

Parameter	Explanation	Data Type
Irrigated_Acreage_Feature_Layer	The attribute table for this polygon feature layer must be in the standard CDSS format, including the parcel ID (PARCEL_ID), surface water ID (SW_WDID1, SW_WDID2,...,SW_WDID9), and groundwater ID (GW_ID1, GW_ID2,...,GW_ID20). Each parcel ID occupies one row in the attribute table, and multiple surface water or groundwater structures can be assigned to the parcel through numerated SW_WDID and GW_ID fields. Irrigated acreage feature layers have been created by river basin in support of CDSS modeling efforts and are available on the CDSS website (cdss.state.co.us). Only parcels with a surface water ID will be assigned soil parameters.	Feature Layer
Soil_Parameter_Feature_Layer	Polygon feature layer of soil parameters. For CDSS, Statewide soil permeability and available water content coverages were derived from the Natural Resources Conservation Service (NRCS) STATSGO database. The coverages are available on the CDSS website (cdss.state.co.us).	Feature Layer
Soil_Parameter_Attribute	The attribute field name in the Soil Parameter feature layer that contains the soil parameter ID that will be assigned to the surface water structures (e.g., AWC for available water capacity).	Field
Output_CSV_File	Output comma-delimited (.csv) file that contains the SW_WDIDs and soil parameter values.	File
Add_Results_to_New_Feature_Class	If the "Add Results to New Feature Class" checkbox is selected, the Soil Parameter ID will be appended as a new field to a copy of the original Irrigated Acreage feature layer input and saved as the new feature class.	Boolean
New_Output_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the Soil Parameter ID will be appended as a new field to a copy of the original Irrigated Acreage feature layer input and saved as the new feature class.	Feature Class

Soil Parameters by User-Specified Polygon ID

Summary

The Soil Parameters by User-Specified Polygon ID tool allows the user to spatially assign soil parameters, as defined in the Soil Parameter Feature Layer, to a user-defined attribute in the Polygon Feature Layer. The Soil Parameter Feature Layer will typically reflect available water content or permeability. This tool calculates an area-weighted average soil parameter for each of the polygons in the Polygon Feature Layer. For example, in CDSS analyses the Polygon Feature Layer typically represents Aggregate Areas for surface water structures and this tool will assign area-weighted soil parameters to each Aggregate Area. The SPDSS Technical Memorandum *Task 57: Assign Soil Moisture Water Holding Capacity to Structures*, March 2008, describes the process of assigning available water content to aggregate surface water structures in the South Platte Basin modeling efforts.

Usage

- The portions of soil parameter areas outside of the user-defined polygons will not be retained
- The user may save the spatial result of this tool in the Output Feature Class

Parameter	Explanation	Data Type
Polygon_Feature_Layer	A feature layer of polygons to spatially assign soil parameters to (e.g., SW Aggregate Areas developed by the Aggregate Tool).	Feature Layer
Polygon_Attribute	The attribute field name in the Polygon Feature Layer that contains the Polygon IDs used in the weight assignment analysis (e.g., Aggregate ID).	Field
Soil_Parameter_Feature_Layer	Polygon feature layer of soil parameters. For CDSS, Statewide soil permeability and available water content coverages were derived from the Natural Resources Conservation Service (NRCS) STATSGO database. The coverages are available on the CDSS website (cdss.state.co.us).	Feature Layer
Soil_Parameter_Attribute	The attribute field name in the Soil Parameter feature layer that contains the soil parameter ID that will be assigned to the user-specified polygons (e.g., AWC for available water capacity)	Field
Output_CSV_File	The output file is a comma-delimited text file (.csv) that contains the Polygon ID and the average area-weighted soil parameter. Date and input parameters will be included in the header.	File
Add_Results_to_New_Feature_ Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the Soil Parameter ID will be appended as a new field to a copy of the original Polygon feature layer input and saved as the new feature class.	Boolean
Output_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the Soil Parameter ID will be appended as a new field to a copy of the original Polygon feature layer input and saved as the new feature class.	Feature Class

Soil Parameters by User-Specified Polyline ID

Summary

The Soil Parameters by User-Specified Polyline ID tool allows the user to spatially assign soil parameters, as defined in the Soil Parameter Feature Layer, to a user-defined attribute in the

Polyline Feature Layer. The Soil Parameter Feature Layer will typically reflect available water content or permeability. This tool calculates a length-weighted average soil parameter for each of the polylines in the Polyline Feature Layer. The output table will include one Soil Parameter value for each Polyline ID. For example, in CDSS analyses, the Polyline Feature Layer typically represents canals, whereby the tool will assign length-weighted permeability to each canal for use in estimating canal efficiencies. The SPDSS Technical Memorandum *Task 56: Conveyance and Application Efficiencies*, March 2008, describes the process of using weighted permeability to estimate canal efficiencies in the South Platte Basin modeling efforts.

Usage

- The information from soil parameter areas outside of the user-defined polylines will not be retained
- The user may save the spatial result of this tool in the Output Feature Class

Parameter	Explanation	Data Type
Polyline_Feature_Layer	A feature layer of polylines to spatially assign soil parameters to (e.g., canals).	Feature Layer
Polyline_Attribute	The attribute field name in the Polyline Feature Layer used that contains the Polyline IDs in the weight assignment analysis (e.g., SW_WDID).	Field
Soil_Parameter_Feature_Layer	Polygon feature layer of soil parameters. For CDSS, Statewide soil permeability and available water content coverages were derived from the Natural Resources Conservation Service (NRCS) STATSGO database. The coverages are available on the CDSS website (cdss.state.co.us).	Feature Layer
Soil_Parameter_Attribute	The attribute field name in the Soil Parameter feature layer that contains the soil parameter ID that will be assigned to the user-specified polylines (e.g., AWC for available water capacity).	Field
Output_CSV_File	The output file is a comma-delimited text (.csv) file that contains the Polyline ID and the average length-weighted soil parameter. Date and input parameters will be included in the header.	File
Add_Results_to_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the Soil Parameter ID will be appended as a new field to a copy of the original Polyline feature layer input and saved as the new feature class.	Boolean
Output_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the Soil Parameter ID will be appended as a new field to a copy of the original Polyline feature layer input and saved as the new feature class.	Feature Class

Section 5

StateDGI Toolset

State DGI Aggregate Assignment

Summary

The required inputs for this analysis are the StateDGI Geodatabase and one or more of the Groundwater Aggregate IDs, Surface Water Aggregate IDs, Diversion System List, Canal Alias List, or the Phreatophyte Classification Table. The StateDGI Aggregate Assignment tool must be run only after all other pertinent StateDGI tools have been run and inputs have been loaded into the database. If any other StateDGI tool is rerun the Aggregate Assignment tool must be rerun afterward.

Usage

This tool loads the Groundwater Aggregate IDs, Surface Water Aggregate IDs, Diversion System List and Canal Alias List and the Phreatophyte Classification Table into the StateDGI Access database.

Parameter	Explanation	Data Type
StateDGI_Geodatabase	The StateDGI database that will be used for storing and processing the information of a specific groundwater model simulation.	Workspace
GW_Aggregate_File (Optional)	A comma-delimited list of parcels served by groundwater only that will be modeled as aggregates and the Aggregate ID to which each parcel is assigned. The format of this file must be in column with the Aggregate ID in the first column and the Parcel ID in the second column. The output file from the superseded Aggregate by GW Parcels tool is in the correct format and can be used for this input. The output file from the superseded Aggregate by GW Parcel tool is also in the correct format and can be used for this input. This input is optional only if all irrigated acreage is assigned to surface water sources.	File
GW_Aggregate_File_Parts_Column (Optional)	Column number of the GW_IDs assigned to an Aggregate ID in the Groundwater Aggregate List. This column number must be specified if a Groundwater List is input. The Aggregate by Groundwater Parcel Tool default is column 2.	Long
SW_Aggregate_File (Optional)	A comma-delimited list of surface water structures that will be modeled as aggregates and the Aggregate ID to which each surface water structure ID is assigned. The output file from the superseded Aggregate by SW Parcel can also be used for this input. The Aggregate ID must be in the first column of this list.	File
SW_Aggregate_File_Parts_Column (Optional)	Column number of the SW_WDIDs assigned to an Aggregate ID in the Surface Water Aggregate List. This column number must be specified if a Surface Water Aggregate List is input.	Long
Diversion_System_File (Optional)	A comma-delimited list of surface water structures that will be modeled as diversion systems and the primary SW_WDID each surface water structure ID is assigned to. The Diversion System ID must be in the first column of this list.	File
Diversion_System_File_Parts_Column (Optional)	Column number starting each list of the SW_WDIDs assigned to a diversion system in the Diversion System List. This column number must be specified if a Diversion System List is input.	Long
Canal_Alias_File (Optional)	A comma-delimited list of canal structures that will be reassigned a canal alias ID to represent a modeling difference between two portions of a canal. The Canal Alias ID must be in the first column of this list.	File

Parameter	Explanation	Data Type
Canal_Alias_File_Parts_Column (Optional)	Column number starting each list of the SW_WDIDs reassigned by the Canal Alias List. This column number must be specified if a Canal Alias List is input.	Long
Phreatophyte_Classification_Table (Optional)	A comma-delimited file containing the list of Land Use Types, as provided in the Land Use GIS Coverage, to be included in the StatePP Phreatophyte (.etz) file and the name of the land use types that will ultimately be shown in the StatePP Phreatophyte (.etz) file. The two columns can show the same name if no renaming is necessary. If a Phreatophyte Classification Table is not provided, the StatePP Phreatophyte (.etz) file will be empty.	File

StateDGI Canal Input

Summary

The StateDGI Canal Input tool loads a user-specified feature layer for canals into the user-specified StateDGI Personal Geodatabase (.mdb). If a CDSS Groundwater Model Grid feature layer has been previously loaded into the StateDGI geodatabase using the StateDGI GW Model Input tool, the canals and groundwater model grid feature layers will be intersected. The tool assigns standard feature class and table names in the State DGI geodatabase based on existing queries stored in the database.

The output feature layer names that are loaded into the geodatabase are listed below. These names are consistent with the names used in existing database queries:

- canals
- canal_cells

Usage

- The intersection command used in the tool is executed as a Feature Identifier (FID)-only intersection. Therefore, the attribute fields from the original feature layers will not appear in the output feature layers.
- Files created from previous model runs are overwritten with each execution of the tool.

Parameter	Explanation	Data Type
StateDGI_Geodatabase	This database will be used for storing and processing the information of a specific StateDGI model simulation.	Workspace
Canal_Feature_Layer	The canal feature layer must be in the standard CDSS format for canal feature layers.	Feature Layer
Default_Recharge_Weight	Default single value of recharge weighting if variable weighting not to be supplied from an attribute in the canal feature layer or from another feature layer.	Double
Apply_Variable_Recharge_Weighting	Check this box to specify variable recharge weights either through an attribute field in the canal feature layer or a separate feature layer containing the recharge weights.	Boolean

Parameter	Explanation	Data Type
Canal_Weight_Attribute (Optional)	The relative value of canal seepage recharge into the groundwater model can be adjusted by specifying a weight value. This weight value can be specified in one of two methods, the Canal Weight Attribute or Recharge Weight Feature Layer. The default of the tool is for all canal segments to receive the same relative weight of 1 if neither a Canal Weight Attribute field nor a Recharge Weight Feature Layer/Attribute pair is selected below. If a Canal Weight Attribute field is selected, any information in the Recharge Weight Feature Layer/Attribute parameters below will be ignored. If a field named "Weight" is present in the Canal Feature Layer, but the "Weight" field is not selected as the Canal Weight Attribute field, the values from the Canal Weight Attribute field will overwrite the values in the "Weight" field in the final Canal Feature Layer in the geodatabase.	Field
Use_Weights_from_Recharge _Weight_Feature_Layer	The relative value of canal seepage recharge into the groundwater model can be adjusted by specifying weight values from polygons in the specified Recharge Weight Feature Layer. This feature layer must have a Recharge Weight Attribute field selected below with values between 0 and 1 for each polygon (e.g., based on soil type). These weights will be spatially assigned to the canals through an intersection method. If a field named "Weight" is present in the Recharge Weight Feature Layer, but the "Weight" field is not selected as the Recharge Weight Attribute field, the values from the Recharge Weight Attribute field will overwrite the values in the "Weight" field in the final Canal Feature Layer in the geodatabase. Note that if a Canal Weight Attribute is selected above, any information in the Recharge Weight Feature Layer/Attribute parameters below will be ignored.	Boolean
Recharge_Weight_Feature_Layer (Optional)	The relative value of canal seepage recharge into the groundwater model can be adjusted by specifying weight values from polygons in the specified Recharge Weight Feature Layer. This feature layer must have a Recharge Weight Attribute field selected below with values between 0 and 1 for each polygon (e.g., based on soil type). These weights will be spatially assigned to the canals through an intersection method. If a field named "Weight" is present in the Recharge Weight Feature Layer, but the "Weight" field is not selected as the Recharge Weight Attribute field, the values from the Recharge Weight Attribute field will overwrite the values in the "Weight" field in the final Canal Feature Layer in the geodatabase. Note that if a Canal Weight Attribute is selected above, any information in the Recharge Weight Feature Layer/Attribute parameters below will be ignored.	Feature Layer
Recharge_Weight_Attribute (Optional)	The relative value of canal seepage recharge into the groundwater model can be adjusted by specifying weight values from polygons in the Recharge Weight Feature Layer selected above. This feature layer must have a Recharge Weight Attribute field selected here with values between 0 and 1 for each polygon (e.g., based on soil type). These weights will be spatially assigned to the canals through an intersection method. If a field named "Weight" is present in the Recharge Weight Feature Layer, but the "Weight" field is not selected as the Recharge Weight Attribute field, the values from the Recharge Weight Attribute field will overwrite the values in the "Weight" field in the final Canal Feature Layer in the geodatabase. Note that if a Canal Weight Attribute is selected above, any information in the Recharge Weight Feature Layer/Attribute parameters below will be ignored.	Field

StateDGI GW Model Input

Summary

The StateDGI GW Model Input tool loads a user-specified CDSS Groundwater Model grid feature layer into the user-specified StateDGI personal (.mdb) geodatabase. If feature layers representing Canals,

Ground Cover, Irrigated Parcels, Rim Inflow, or Wells feature layers have been previously loaded into the StateDGI geodatabase using the StateDGI GW Model Input tool, the groundwater model grid feature layer will be intersected with these feature layers. The tool assigns standard feature class and table names in the State DGI geodatabase based on existing queries stored in the database. The output feature layer names that are loaded into the geodatabase are listed below. These names are consistent with the names used in existing database queries:

- model
- model_layer
- canal_cells
- ground_cover_cells
- parcel_cells
- parcel_center_cells
- riminflow_cells
- wells_cells

Usage

- The intersection command used in the tool is executed as an FID-only intersection. Therefore, the attribute fields from the original feature layers will not appear in the output feature layers.
- Files created from previous model runs are overwritten with each execution of the tool.

Parameter	Explanation	Data Type
StateDGI_Geodatabase	This StateDGI personal geodatabase (.mdb) will be used for storing and processing the information of a specific StateDGI model simulation.	Workspace
Ground_Water_Model_Grid_ Feature_Layer_Input	The groundwater model grid polygon feature layer must be in the standard format for model feature layers with the following fields for each model cell: • ROW: model row of cell • COL: model column of cell • GND_ELEV: ground surface elevation at cell • BOT_LYRn: bottom elevation of model cell for layer n; e.g., for a model with 3 layers the feature layer attribute table should contain BOT_LYR1, BOT_LYR2, and BOT_LYR3 This feature layer will be intersected with other feature layers as they are loaded into the database.	Feature Layer

StateDGI Irrigated Lands Input

Summary

The StateDGI Irrigated Land Input tool loads a user-specified Irrigated Parcels snapshot feature layer into the user-specified StateDGI personal geodatabase (.mdb). The centroids of each irrigated parcel are created and added to the geodatabase. If a CDSS Groundwater Model Grid feature layer has been previously loaded into the StateDGI geodatabase using the StateDGI GW Model Input tool, the irrigated lands and groundwater model grid feature layers will be intersected. The tool assigns standard feature class and table names in the State DGI geodatabase based on existing queries stored in the database.

The output feature layer names that are loaded into the geodatabase are listed below. These names are consistent with the names used in existing database queries:

- ground_cover
- ground_cover_cells
- parcels
- parcel_cells
- parcel_center_cells

Usage

- The intersection command used in the tool is executed as an FID-only intersection. Therefore, the attribute fields from the original source feature layers will not appear in the output feature layers in the StateDGI database.
- Files created from previous model runs are overwritten with each execution of the tool.

Parameter	Explanation	Data Type
StateDGI_Geodatabase	This database will be used for storing and processing the information of a specific StateDGI model simulation.	Workspace
Irrigated_Acreage_Feature_Layer	A polygon feature layer that contains irrigated parcels, crop type, irrigation method, and water supply data. The feature layer must be provided in the standard CDSS format. Irrigated acreage feature layers have been created by river basin in support of CDSS modeling efforts and are available on the CDSS website (cdss.state.co.us). The feature layer must include the final surface water and well assignments by parcel. This feature layer will be loaded into the specified database and is then processed for use by StateDGI.	Feature Layer
Default_Recharge_Weight	Default single value of recharge weights (0.0–1.0) to apply to the irrigated parcels.	Double
Apply_Variable_Recharge_Weighting	Check this box to select either an attribute field in the specified Irrigated Acreage Feature Layer or a separate Recharge Weight Feature layer to supply variable recharge weights.	Boolean
Irrigated_Acreage_Weight_Attribute (Optional)	The attribute field with the recharge weights (0.0–1.0) in the specified Irrigated Acreage Feature Layer.	Field
Use_Weights_from_Recharge_ Weight_Feature_Layer (Optional)	Check this box to select a feature layer to supply recharge weights.	Boolean
Recharge_Weight_Feature_Layer (Optional)	An optional input feature layer with relative weights defined by polygon, for instance based on soil type. This feature layer must have a "Weight" field with values between 0 and 1 for each polygon. The relative weights of inefficient irrigation recharge into the groundwater model will be spatially assigned to the irrigated acreage. For example, a parcel with a relative weight of "0.5" will receive an assignment of half the amount of available recharge as compared to a parcel with a relative weight of "1.0."	Feature Layer
Recharge_Weight_Attribute (Optional)	The attribute field with the recharge weights in the specified Recharge Weight Feature Layer.	Field

StateDGI Land Use Input

Summary

The StateDGI Irrigated Land Use Input tool loads a user-specified Land Use feature layer into the user-specified StateDGI personal geodatabase (.mdb). If a CDSS Groundwater Model Grid feature layer has been previously loaded into the StateDGI geodatabase using the StateDGI GW Model Input tool, the land use and groundwater model grid feature layers will be intersected. The tool assigns standard feature class and table names in the State DGI geodatabase based on existing queries stored in the database.

The output feature layer names that are loaded into the geodatabase are listed below. These names are consistent with the names used in existing database queries:

- ground_cover
- ground_cover_cells

Usage

- The intersection command used in the tool is executed as an FID-only intersection. Therefore, the attribute fields from the original shapefiles will not appear in the output shapefiles.
- Files created from previous model runs are overwritten with each execution of the tool.

Parameter	Explanation	Data Type
StateDGI_Geodatabase	This database will be used for storing and processing the information of a specific StateDGI model simulation.	Workspace
Land_Use_Feature_Layer	A polygon feature layer that contains land use/land cover information.	Feature Layer
Land_Use_Attribute	The field in the Land Use Feature Layer containing the identifier for the land use/land cover type	Field
Default_Recharge_Weight	Default single value of recharge weights (0.0–1.0) to apply to the irrigated parcels.	Double
Apply_Variable_Recharge_Weighting	Check this box to select either an attribute field in the specified Land Use Feature Layer or a separate Recharge Weight Feature layer to supply variable recharge weights.	Boolean
Land_Use_Weight_Attribute (Optional)	The attribute field with the recharge weights (0.0–1.0) in the specified Land Use Feature Layer.	Field
Use_Weights_from_Recharge_ Weight_Feature_Layer	Check this box to select a feature layer to supply recharge weights.	Boolean
Recharge_Weight_Feature_Layer (Optional)	An optional input feature layer with relative weights defined by polygon, for instance based on soil type. This feature layer must have a "Weight" field with values between 0 and 1 for each polygon. The relative weights of inefficient irrigation recharge into the groundwater model will be spatially assigned to the irrigated acreage. For example, a parcel with a relative weight of "0.5" will receive an assignment of half the amount of available recharge as compared to a parcel with a relative weight of "1.0."	Feature Layer
Recharge_Weight_Attribute (Optional)	The attribute field with the recharge weights in the specified Recharge Weight Feature Layer.	Field

StateDGI Rim Inflow Input

Summary

The StateDGI Rim Inflow tool loads a user-specified feature layer for rim inflow recharge into the user-specified StateDGI Personal Geodatabase (.mdb). If a CDSS Groundwater Model Grid feature layer has been previously loaded into the StateDGI geodatabase using the StateDGI GW Model Input tool, the rim inflow recharge and groundwater model grid feature layers will be intersected. The tool assigns standard feature class and table names in the State DGI geodatabase based on existing queries stored in the database.

The output feature layer names that are loaded into the geodatabase are listed below. These names are consistent with the names used in existing database queries:

- riminflow
- riminflow_cells

Usage

- The intersection command used in the tool is executed as an FID-only intersection. Therefore, the attribute fields from the original feature layers will not appear in the output feature layers.
- Files created from previous model runs are overwritten with each execution of the tool.

Parameter	Explanation	Data Type
StateDGI_Geodatabase	This database will be used for storing and processing the information of a specific StateDGI model simulation.	Workspace
Rim_Inflow_Feature_Layer	The rim inflow feature layer defines the spatial extent of rim inflow. The feature layer must be in the standard CDSS format for rim inflow feature layers including attribute table fields for ID, Name, Weight, DIV (Water Division), WD (Water District), SW_WDID, and include the rim inflow IDs appropriate for the model.	Feature Layer
Default_Recharge_Weight	Default single value of recharge weights (0.0–1.0) to apply to the rim inflows.	Double
Apply_Variable_Recharge_Weighting	Check this box to select either an attribute field in the specified Rim Inflow Feature Layer or a separate Recharge Weight Feature layer to supply variable recharge weights.	Boolean
Rim_Inflow_Weight_Attribute (Optional)	The attribute field with the recharge weights (0.0–1.0) in the specified Rim Inflow Feature Layer.	Field
Use_Variable_Recharge_Weight_ Feature_Layer	Check this box to select a feature layer to supply recharge weights.	Boolean
Recharge_Weight_Feature_Layer (Optional)	An optional input feature layer with relative weights defined by polygon, for instance based on soil type. This feature layer must have a "Weight" field with values between 0 and 1 for each polygon. The relative weights of inefficient irrigation recharge into the groundwater model will be spatially assigned to the irrigated acreage. For example, a parcel with a relative weight of "0.5" will receive an assignment of half the amount of available recharge as compared to a parcel with a relative weight of "1.0."	Feature Layer
Recharge_Weight_Attribute (Optional)	The attribute field with the recharge weights in the specified Recharge Weight Feature Layer.	Field
Default_Rim_Inflow_Layer_Value	Default single value of the groundwater model layer to which rim inflow recharge will be assigned.	Long

Parameter	Explanation	Data Type
Specify_Multiple_Model_Layers	Check this box to select either an attribute field in the specified Rim Inflow Feature Layer or a separate Recharge Model Layer Feature layer to assign multiple groundwater model layers.	Boolean
Model_Layer_Attribute (Optional)	The attribute field with the groundwater model layer assignments in the specified Rim Inflow Feature Layer.	Field
Use_Feature_Layer_for_Multiple_ Model_Layers (Optional)	Check this box to select a feature layer to supply rim inflow groundwater model layer assignments.	Boolean
Recharge_Model_Layer_Feature_Layer (Optional)	An optional input feature layer with groundwater model layer assignments for rim inflow recharge.	Feature Layer
Recharge_Model_Layer_Attribute (Optional)	The attribute field with the model layer assignments in the specified Recharge Model Layer Feature Layer.	Field

StateDGI Well Input

Summary

The StateDGI Well Input tool loads a user-specified feature layer for wells into the user-specified StateDGI Personal Geodatabase (.mdb). If a CDSS Groundwater Model Grid feature layer has been previously loaded into the StateDGI geodatabase using the StateDGI GW Model Input tool, the wells and groundwater model grid feature layers will be intersected. The tool assigns standard feature class and table names in the State DGI geodatabase based on existing queries stored in the database.

The output feature layer names that are loaded into the geodatabase are listed below. These names are consistent with the names used in existing database queries:

- wells
- wells_cells

Usage

- The intersection command used in the tool is executed as an FID-only intersection. Therefore, the attribute fields from the original feature layers will not appear in the output feature layers.
- Files created from previous model runs are overwritten with each execution of the tool.

Parameter	Explanation	Data Type
StateDGI_Geodatabase	This database will be used for storing and processing the information of a specific StateDGI model simulation.	Workspace
Well_Feature_Layer	A point feature layer that contains irrigation well locations. The feature layer must be provided in the standard CDSS format. Irrigation well feature layers have been created by river basin in support of CDSS modeling efforts and are available on the CDSS website (cdss.state.co.us). This feature layer will be loaded into the specified database and is then processed for use by StateDGI.	Feature Layer

Section 6

Well to Parcel Matching Tool

Well to Parcel Matching

Summary

The Well to Parcel tool uses several geoprocessing tasks to assign irrigation wells to the parcels that they irrigate. Irrigated parcels served by groundwater are determined based on IRRIG_TYPE attribute field values being "Sprinkler" or SW_WDID1 attribute field values being blank. This tool creates a Personal Geodatabase named "well_parcel.mdb" in the path to the output file to use as a geoprocessing workspace.

The wells are assigned to parcels in one of three types (Type I, II, or IV) based on the following geoprocessing logic:

- Type I wells are those that lie within the parcel that it irrigates. These wells are assigned by intersecting the wells feature layer with the irrigated parcels feature layer.
- Type II wells are identified as those wells that do not lie within the parcel that they irrigate, but are within 0.25 mile of the parcel. These wells are assigned by querying and performing a buffer operation on a layer feature class created once the input feature layers have been copied into the geodatabase.
- Type IV wells are identified as those wells that are more than 0.25 miles from—but still within 5 miles of—an irrigation parcel and have not been identified as either Type I or Type II wells. The feature layer created above is again queried to determine these wells and copy them into the geodatabase.

(Note that Type III wells are not currently used for either of the RGDSS or SPDSS groundwater modeling efforts.)

Usage

- The user may save the spatial result of this tool in the Output Feature Class

Parameter	Explanation	Data Type
Well_Feature_Layer	The Well Feature Layer is a point coverage of wells that will be matched to parcels in the Irrigated Acreage Feature Layer. The Well Feature Layer should include wells permitted for irrigation.	Feature Layer
Well_ID_Attribute	The attribute field name in the Well Feature Layer that contains the unique Well ID that the parcels will be matched to in the output table.	Field
Irrigated_Acreage_Feature_Layer	The attribute table for this polygon feature layer must be in the standard CDSS format. Irrigated acreage feature layers have been created by river basin in support of CDSS modeling efforts and are available on the CDSS website (cdss.state.co.us).	Feature Layer
Output_File	The output file is a comma-delimited (.csv) file that contains the irrigated parcel ID, well ID, type of match, and distance between the parcel and the well. Date and input parameters will be included in the header.	File

Parameter	Explanation	Data Type
Add_Results_to_New_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the well ID, type of match and distance between the parcel and the well will be exported as a new feature class in the standard CDSS format.	Boolean
New_Output_Feature_Class (Optional)	If the "Add Results to New Feature Class" checkbox is selected, the well ID, type of match and distance between the parcel and the well will be exported as a new feature class in the standard CDSS format.	Feature Class