Dan Mahr

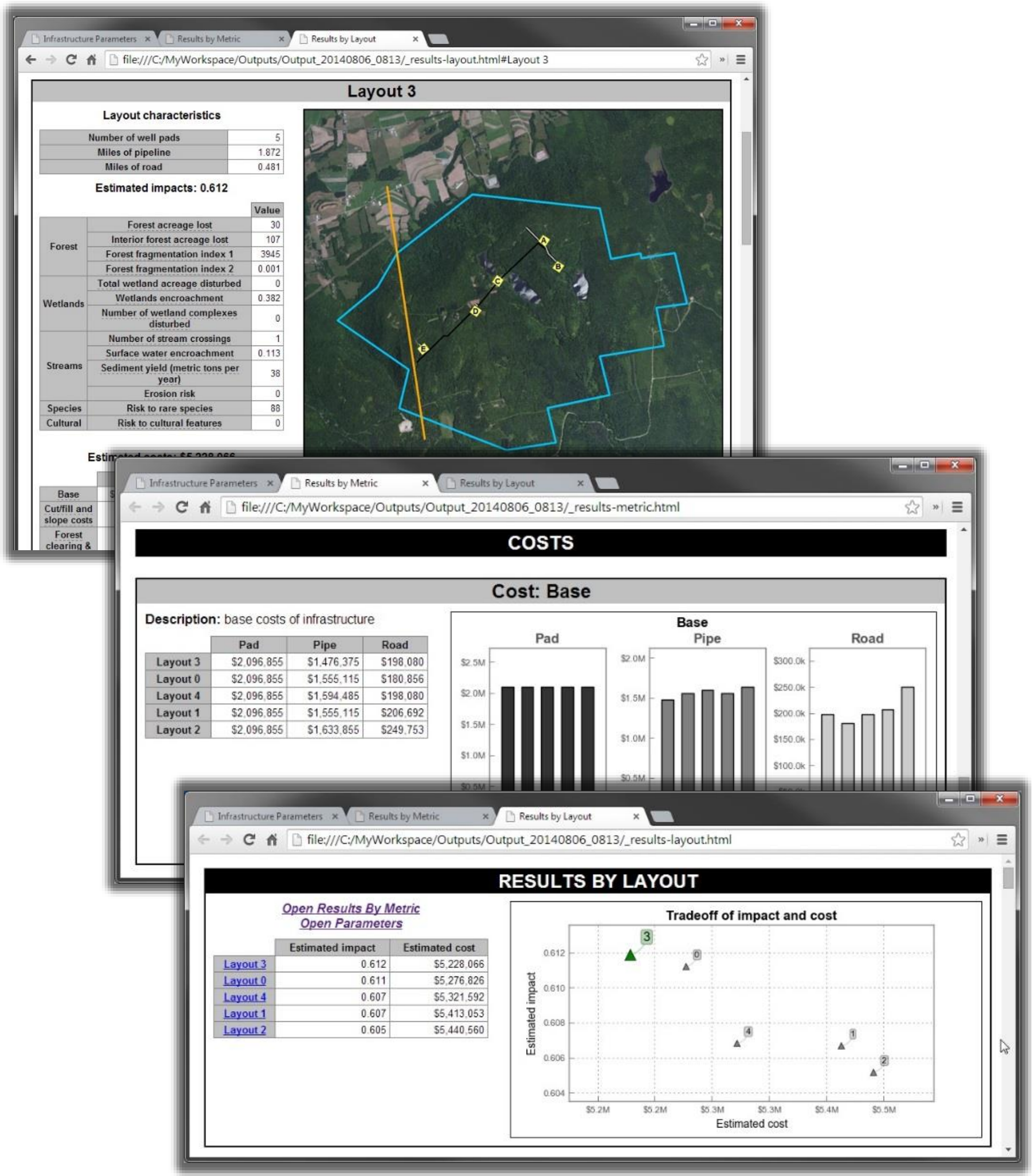
GIS and Remote Sensing Visual Portfolio

Shale gas siting tool results dashboard

Client: The Nature Conservancy

Goal: Interpret and visualize results from infrastructure siting tool in user-friendly outputs

Method: Created static maps of shale gas infrastructure layouts (pads, roads, pipelines) using spatial data outputs and preconfigured symbology with ArcPy. Generated HTML tables and matplotlib bar charts describing the costs and impacts associated with each layout. Embedded static maps, tables, and bar charts in HTML for rapid visualization of outputted layouts and numerical results. By client request, entire process is run without any 3rd-party Python libraries unavailable in default ArcGIS Python package and only ArcGIS for Desktop Basic license geoprocessing tools.



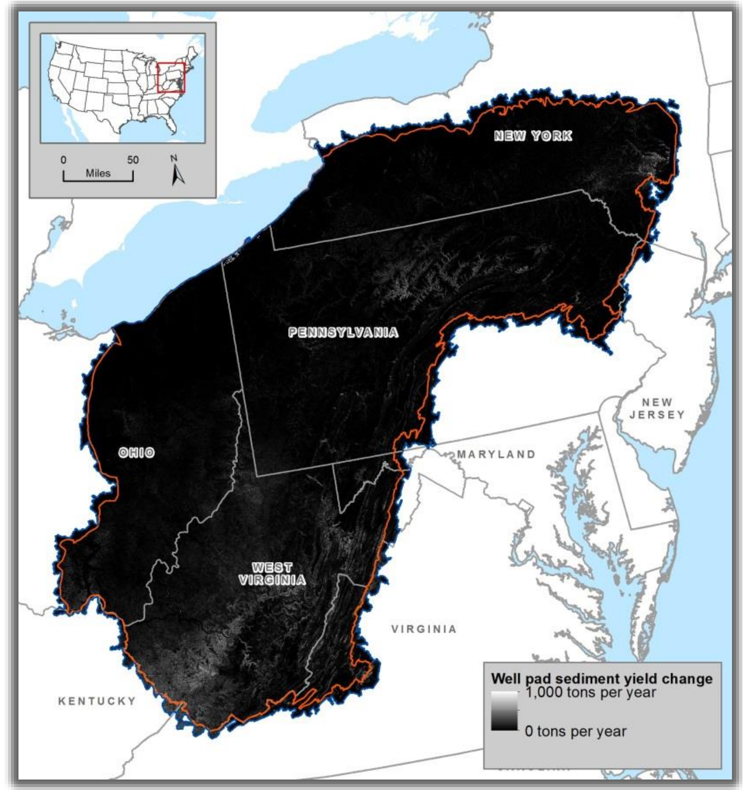
Shale gas sediment yield model

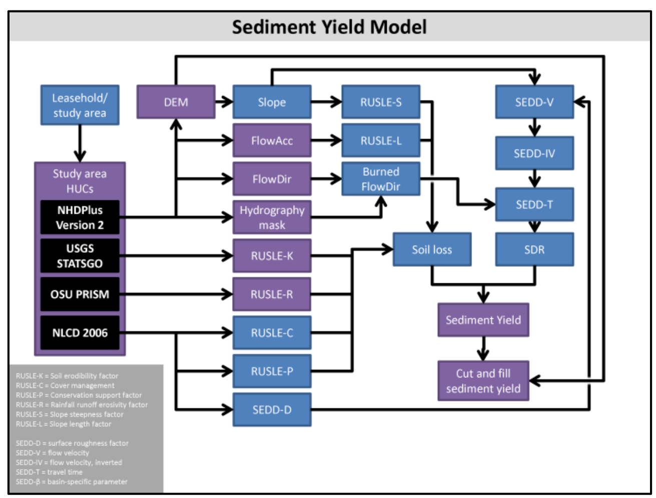
Client: The Nature Conservancy

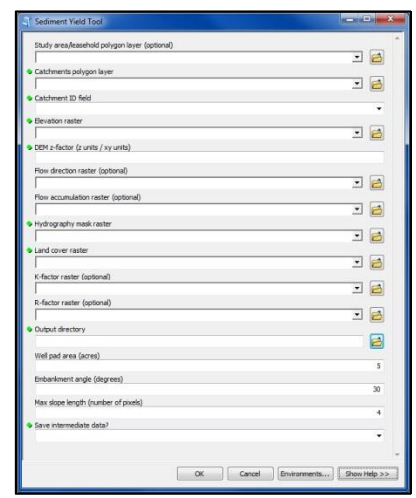
Goal: Model impacts of shale gas infrastructure on surface hydrology for the Marcellus Shale region.

Method: Drawing from literature, synthesized a sediment yield model (RUSLE) and sediment delivery model (SEDD) to estimate the amount of mobilized sediment that reaches surface streams based on land cover, topography, soil characteristics, and precipitation at 30 meter spatial resolution for a 100,000 square mile study area. Created user-friendly custom geoprocessing tool for on-demand processing in ArcGIS.

Presented at 2014 American Water Resources GIS conference.





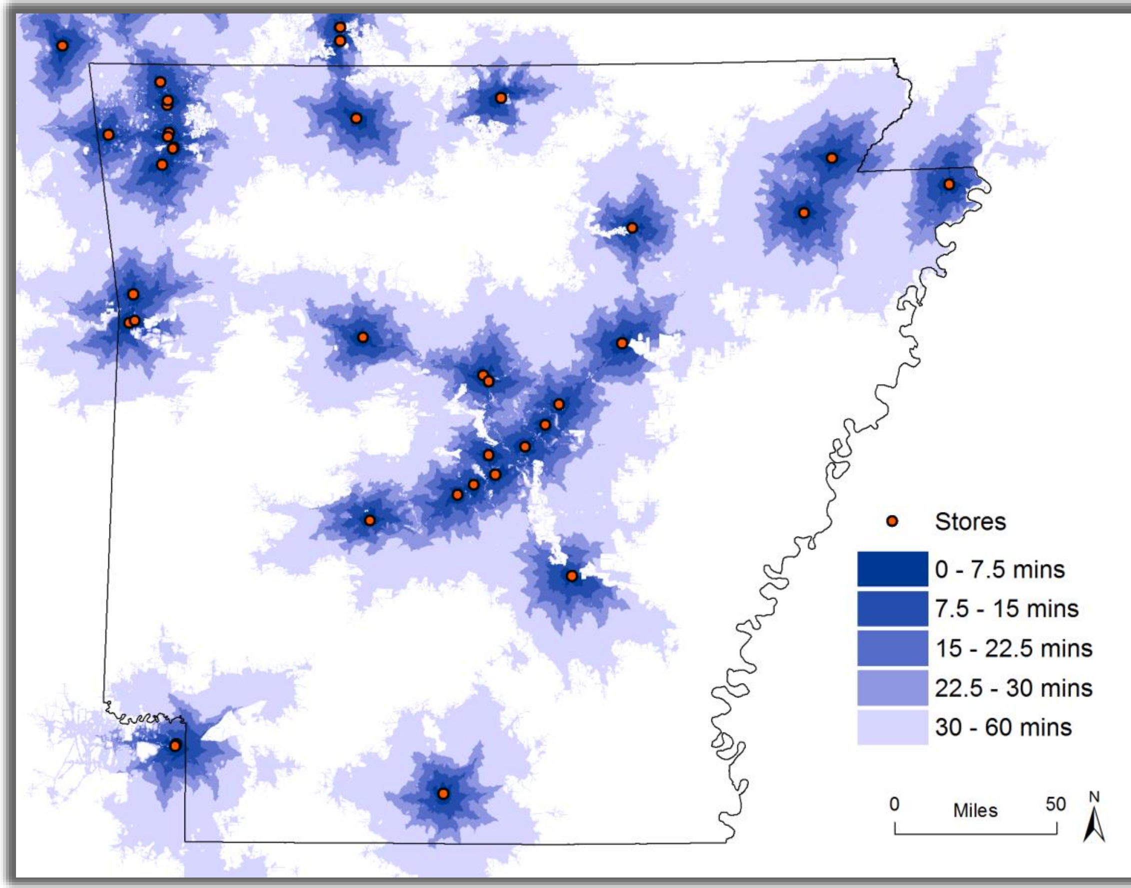


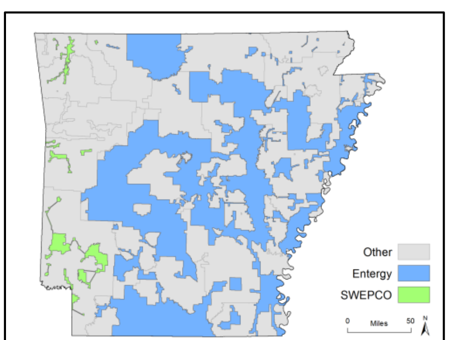
Estimation of CFL subsidy leakage

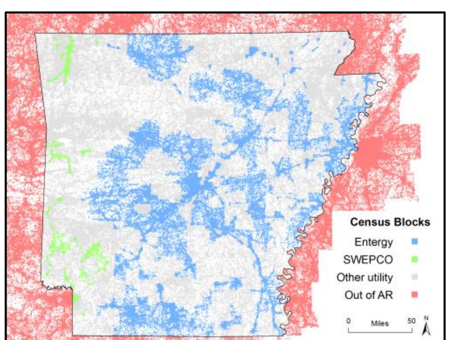
Client: Two electrical utilities in Arkansas: Entergy, SWEPCO.

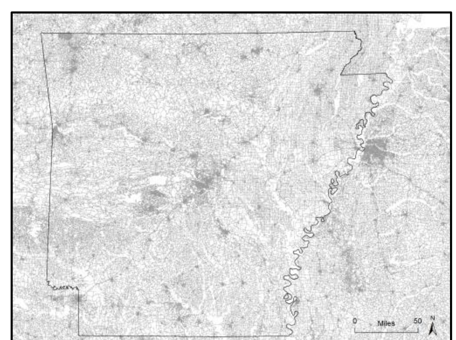
Goal: Estimated leakage of CFL subsidies to non-ratepayers.

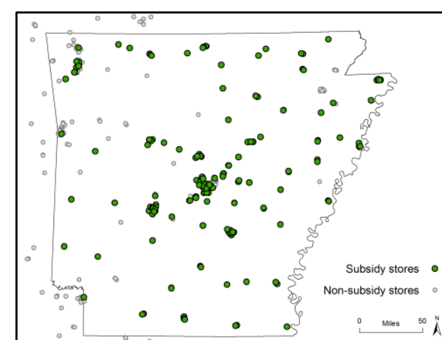
Method: Created polygons of store territories using drive time analysis in Network Analyst. Assigned centroids of Census blocks to store territories and utility service areas by intersection. Cross tabulation of blocks calculates % of population in each store's territory that is served by subsidy-paying utility.









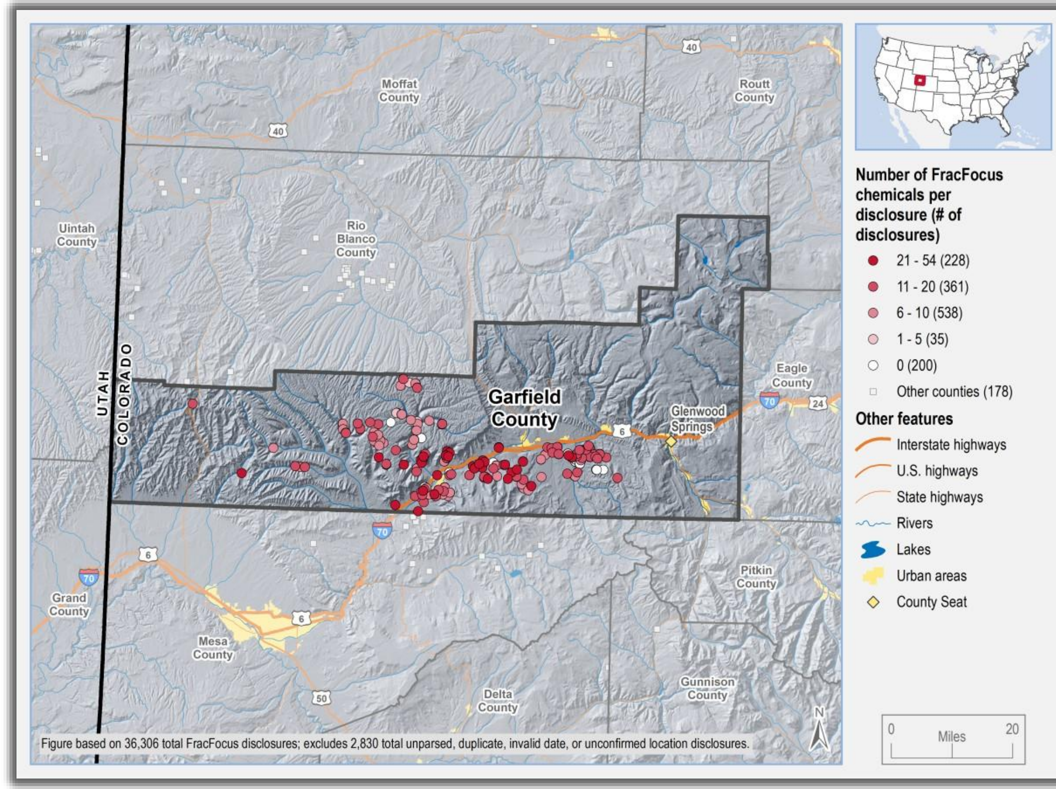


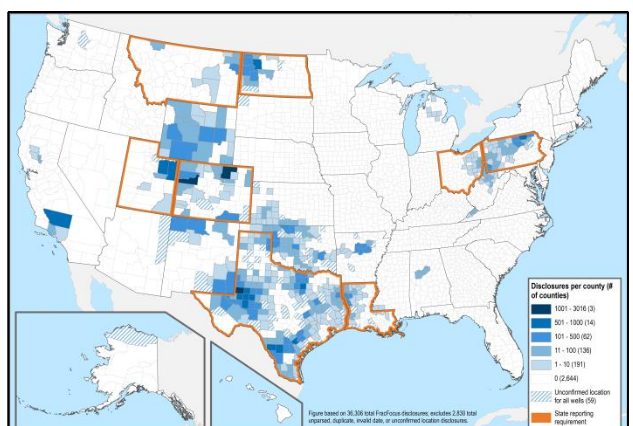
Hydraulic fracturing well disclosure database

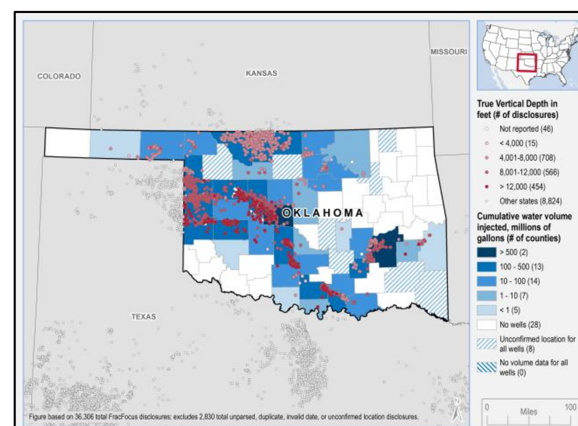
Client: US Environmental Protection Agency, Office of Research and Development

Goal: Parse and visualize 39,000 PDF well disclosures from FracFocus database.

Method: Implemented extremely thorough and rigorous data management and processing plan for total transparency and reproducibility for a politically sensitive topic. Visualized data from disclosures in series of national-, regional-, state-, and county-scale maps.





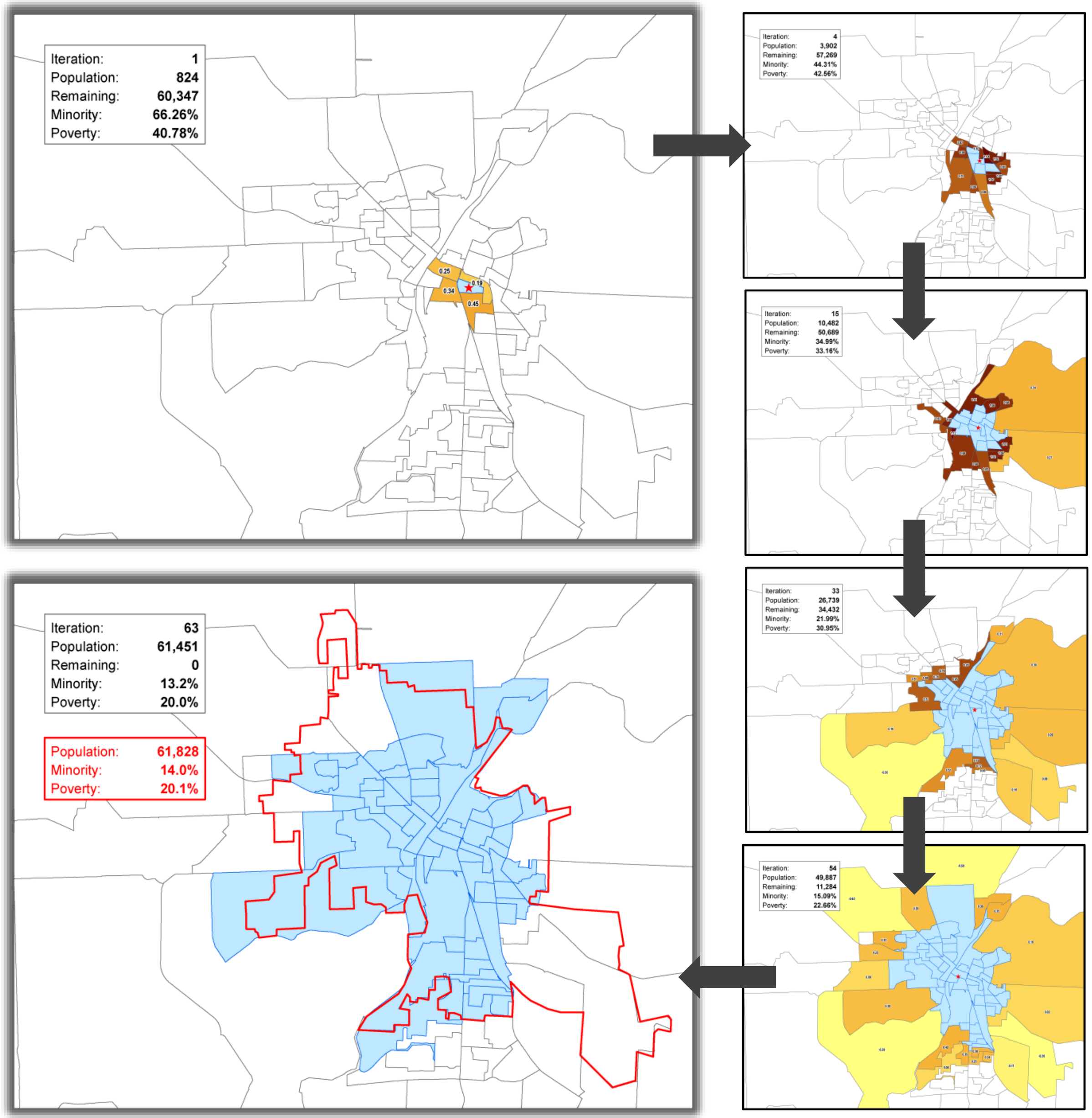


Drinking water utility service area model

Client: US Environmental Protection Agency, Office of Ground Water and Drinking Water.

Goal: Estimate demographics of 4,000+ drinking water utilities based on single address and population served.

Method: Created a demographic model that iteratively grows a utility's service area outwards from a starting block group based on a statistical scoring function. Growth ceases when the utility's population served value is reached. Used novel preprocessing routines to maximize performance. Comparison to ground-truth shows high degree of accuracy.



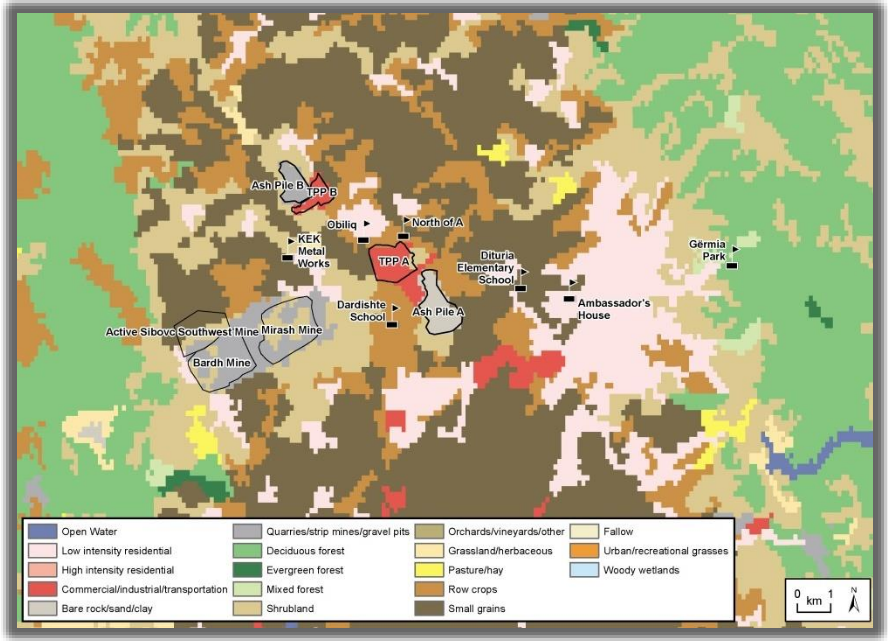
AERMOD modification and visualization

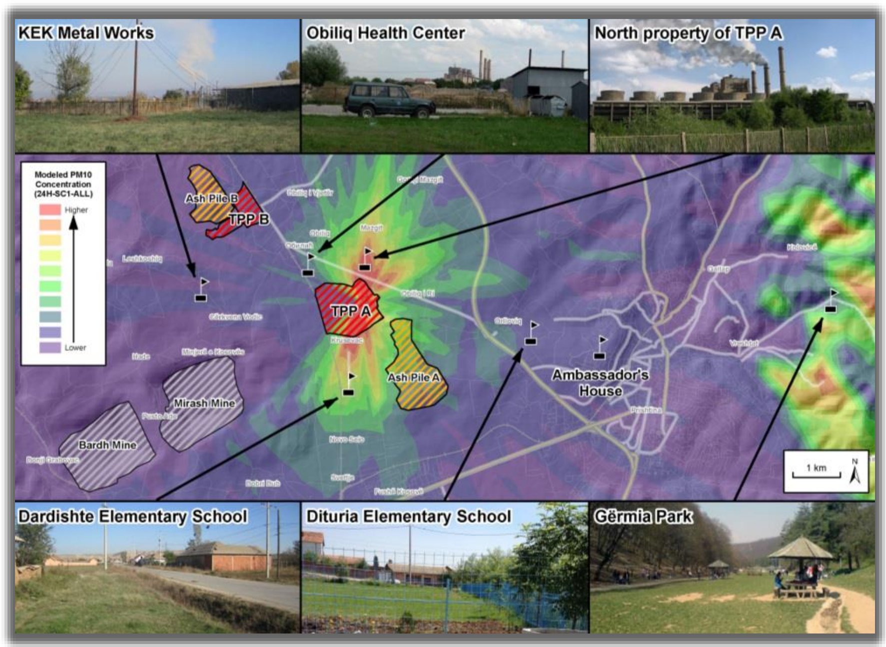
Client: US Agency for International Development

Goal: Modify AERMOD inputs to function outside of United States, visualize resulting model runs of vicinity of Pristina, Kosovo.

Method: Reclassified CORINE land cover data to NLCD2006 and transformed raster to custom projected coordinate system with origin and characteristics of a US state plane coordinate system in order to fit hardcoded extents in AERMOD preprocessing routines.

Visualized over 500 modeling runs of particulate matter dispersion in large map book using ArcPy.mapping.



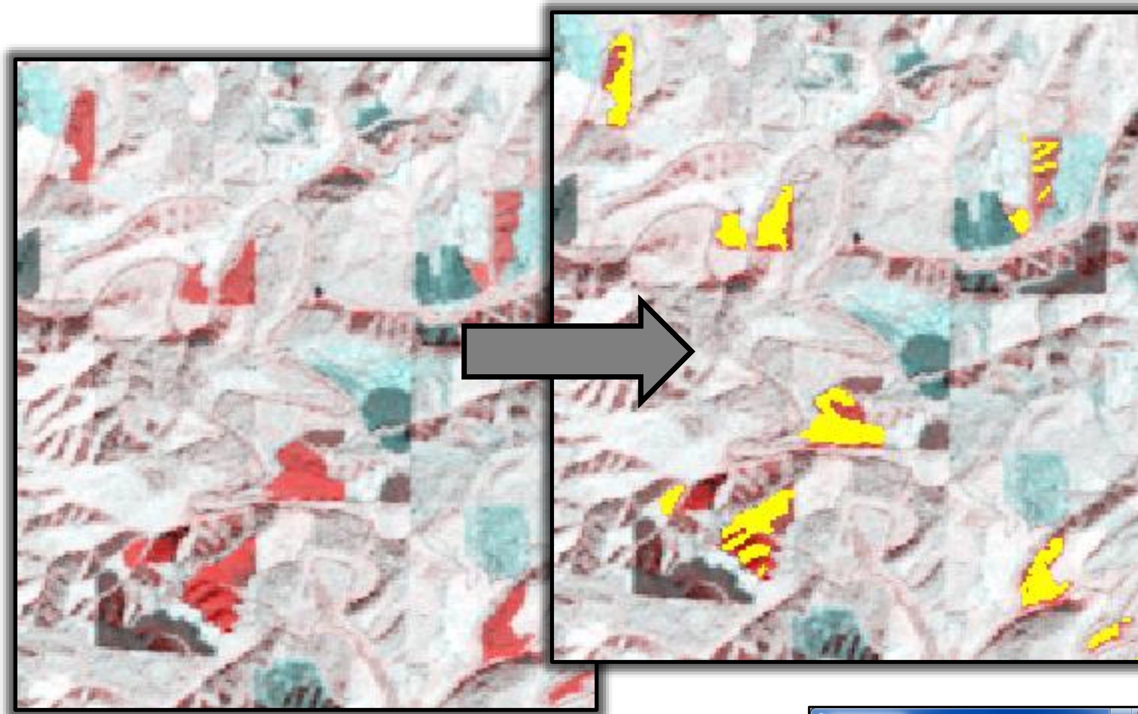


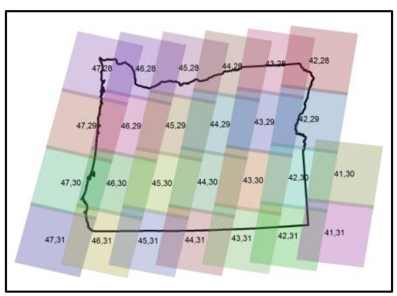
Clear cut classification tool

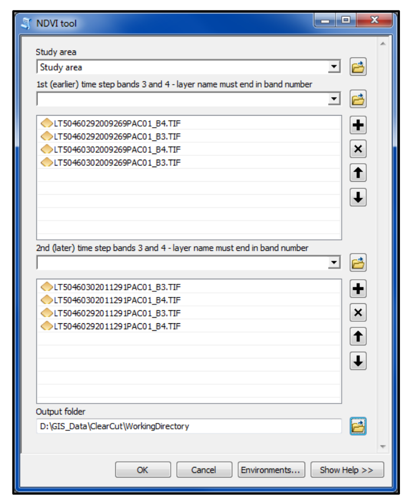
Client: Oregon Department of Environmental Quality

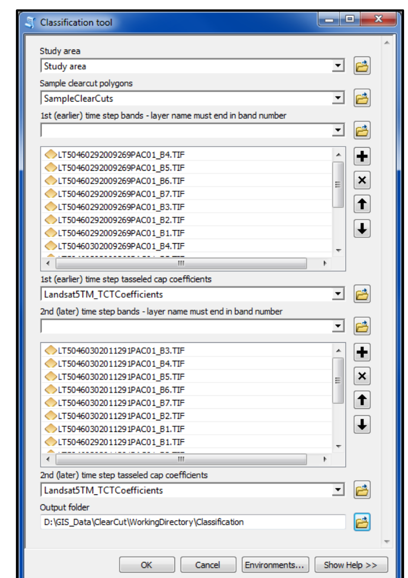
Goal: Create tool to rapidly identify forest clear cuts in Landsat imagery.

Method: Drawing from literature, implemented tool that performs “Tasseled Cap” principal component analysis, followed by an unsupervised classification. Custom geoprocessing tool can handle Landsat 5 TM and Landsat 7 ETM+ imagery, with simple addition of other sensors as needed. Tool handles all standard image processing internally, including calculation of NDVI, conversion of DN to radiance and radiance to reflectance.







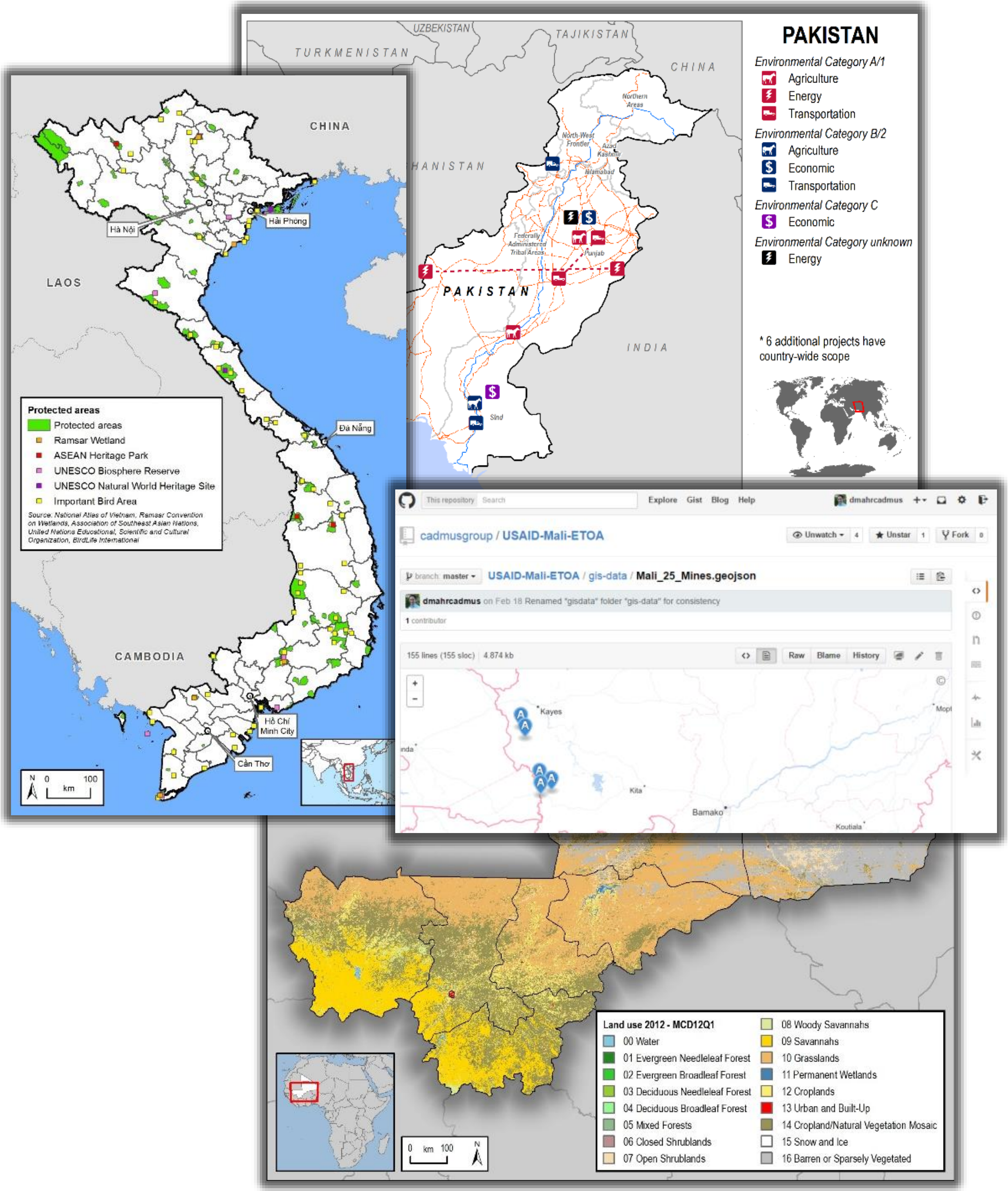


USAID environmental assessment data research and mapping

Client: US Agency for International Development (USAID) headquarters and missions in Kosovo, Mali, Vietnam

Goal: Identify and gather environmental GIS data from stakeholders and publicly available sources

Method: Collaboratively drafted a “wish list” of types of desired environmental GIS datasets with clients, and identified stakeholders who could provide data. Worked across language barriers, data poverty, and non-standard character encodings to compile data on physiography, ecology, hydrology, land use, and economic development for static mapping. Mali assessment included creation of public GitHub repository that allows for crowdsourced contributions to GeoJSON vector datasets via Git pull requests: cadmusgroup.github.io/USAID-Mali-ETOA/.

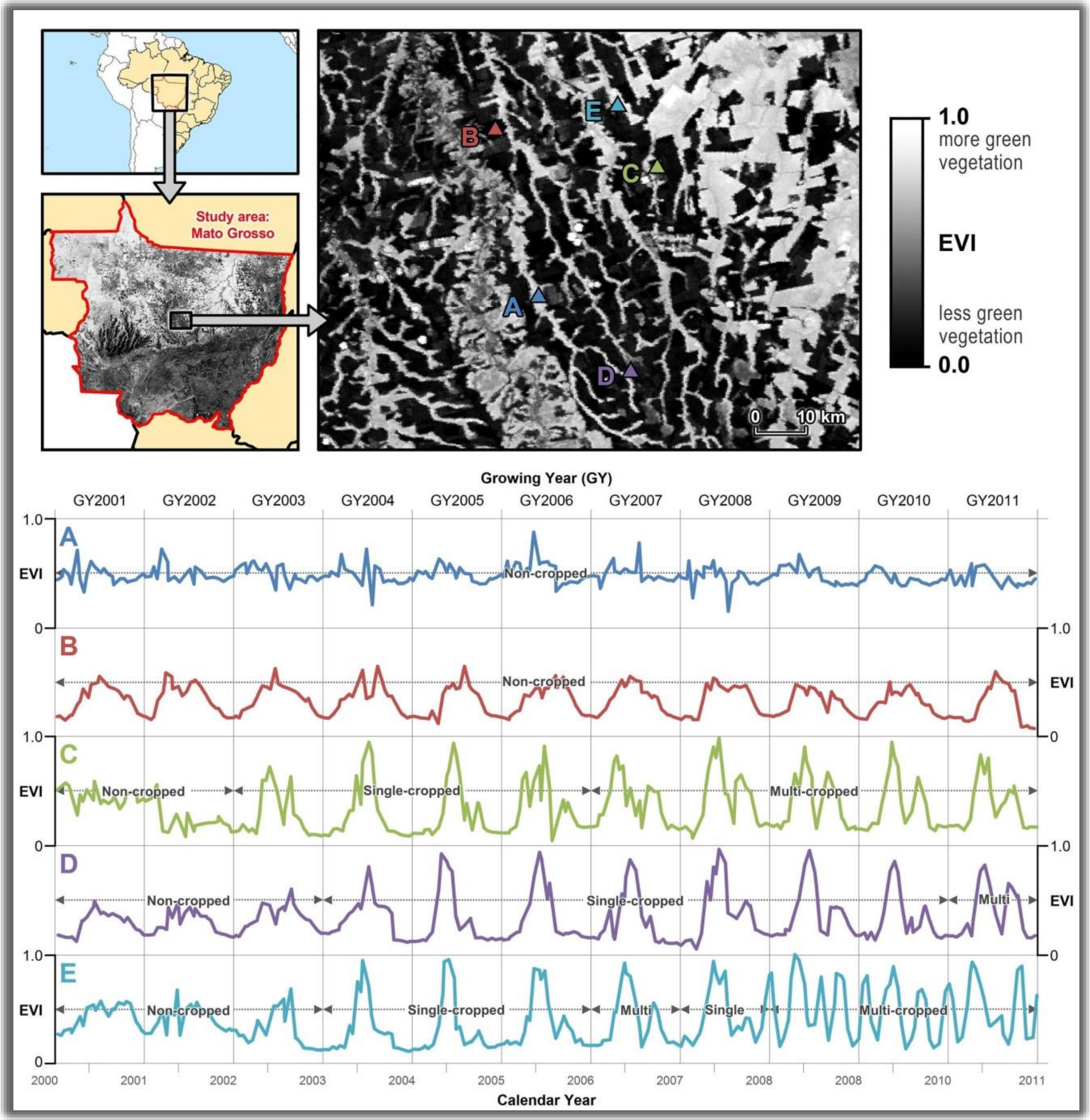


Phenology classification of agricultural intensification

Goal: Determine where crop cultivation is intensifying

Method: Using high temporal resolution MODIS data, an 11-year time series of vegetation index values was created for a 1 million km^2 study area around the Brazilian state of Mato Grosso. A decision tree classification algorithm was applied to separate uncultivated areas from single-cropping and double-cropping farms.

Published: *Philosophical Transactions of the Royal Society B: Biological Sciences*, 368(1619).

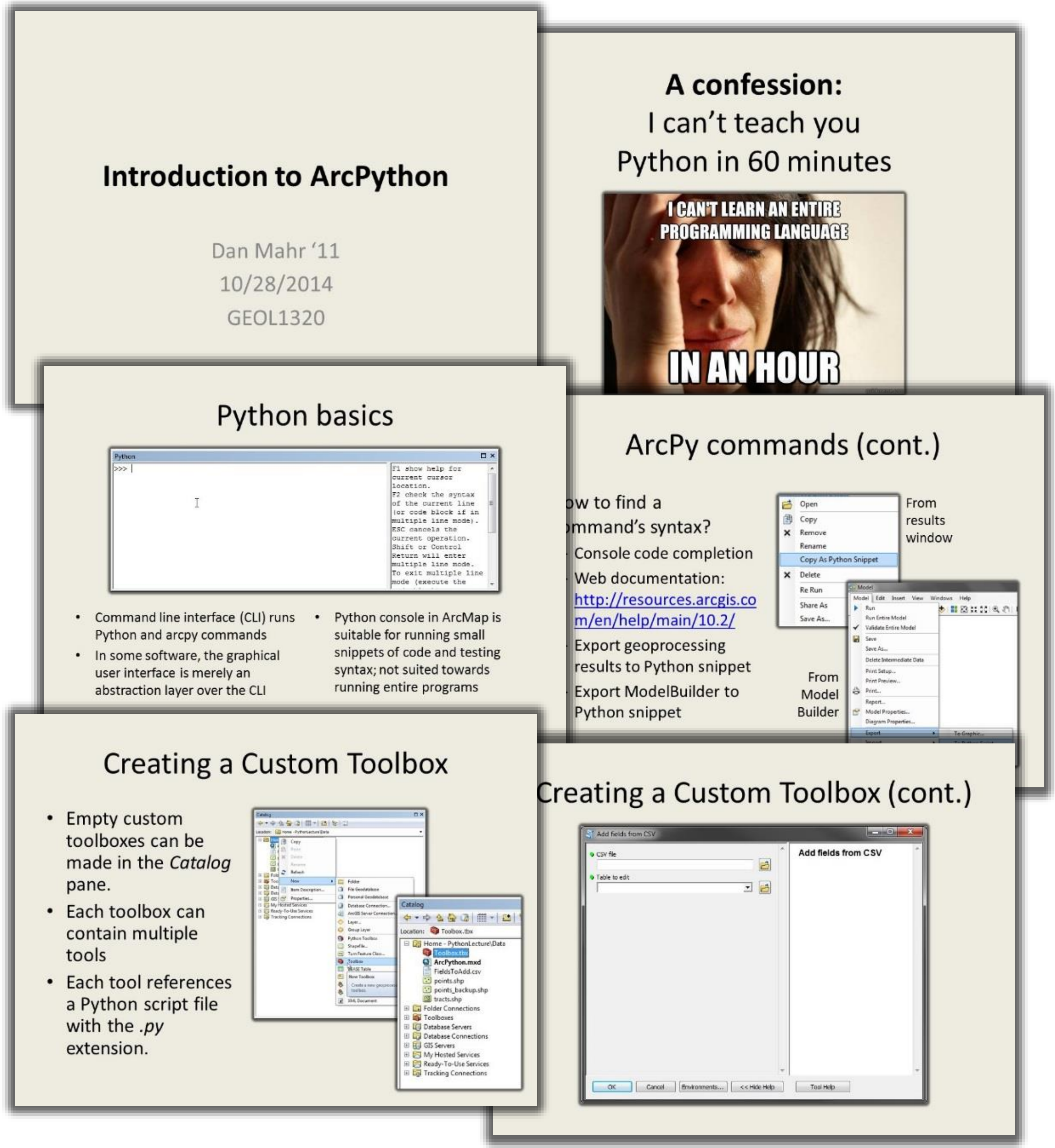


Introduction to ArcPython invited guest lecture

Audience: Undergrad intro GIS students at Brown University; fall semesters 2012, 2013, 2014.

Goal: Teach the basics of ArcPython to GIS novices lacking programming experience.

Method: Demonstrate the power and flexibility of ArcPython with a few examples of large-scale data processing, batch map creation, and integration with 3rd party Python modules. Contrast ArcPython with ArcMap and ModelBuilder-based approaches. Walk through a basic workflow, iteratively adding more complex Python syntax until the tool is packaged in a Custom Toolbox.



GIS.StackExchange Q&A website

Top 40 contributor to crowdsourced question and answer site about GIS, remote sensing, and related software.

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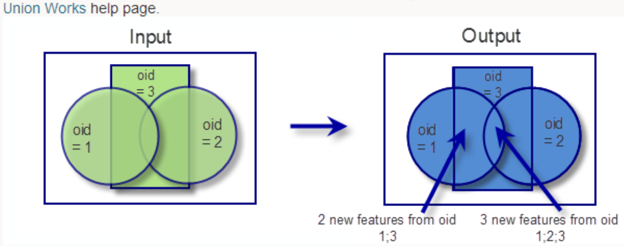
Geographic Information Systems

11

In ArcGIS, the easiest way to create a polygon layer with the count of overlapping features is as follows:

1. Run the Union tool on your source polygon layers. This will result in a layer with one feature for each area of overlap.
2. Add a new field to the layer created in Step 1, called `NewID` or something to that effect, and use Field Calculator to set it equal to the `FID` field.
3. Use the Merge tool to merge your source polygon layers into a single layer with overlapping features.
4. Run the Union tool on the layer created in step 3. This will result in a single layer with multiple features for each area of overlap (shown below). The Union tool behaves differently (creating multiple features for each area of overlap) when run with a single input, as explained in the How Union Works help page.



5. Run the Spatial Join tool. Your target features will be the result of Step 4. The join features will be the result of Step 2. The match option will be `ARE_IDENTICAL_TO`. All other values should be left as defaults. The result of this is the same as Step 4, except with new attributes added, including the `NewID`.
6. Run Summary Statistics on the output of Step 5. Choose whatever Statistic Field you want. Set your case field to `NewID`. The resulting table will have a column called `FREQUENCY` that shows how many times each `NewID` was found in the output of Step 5. This is equal to the number of overlapping features in the source data. You can join this table back to the output of Step 2 for visualization.

share edit delete flag edited Jan 23 at 12:24 answered Jan 23 at 5:24 dmahr 6,210 11 33

1 +1 great answer – Brad Nesom Jan 23 at 5:35

Nice and step by step explanation :) thanks dear :) – Sunil Jan 23 at 5:37

14

The Polyline class has a new method called "positionAlongLine" in ArcGIS 10.1. This will return a PointGeometry object with exactly one point at a specified distance from the starting end of the line, *or a fraction of the distance between the start and end*. To find the midpoint, you would just need to do `positionAlongLine(0.5,True)`. To find the midpoints for lines and add their coordinates to the attribute table, you could do Field Calculator on the following statement:

- `!Shape!.positionAlongLine(0.5,True).firstPoint.X`
- `!Shape!.positionAlongLine(0.5,True).firstPoint.Y`

Note that you need to be using the Python parser in field calculator for this to work.

If you wanted to access this point object in Python, you would just do the following:

```
Input_shp = "C:\Temp\Line.shp"
Cursor = arcpy.SearchCursor(Input_shp)
for Feature in Cursor:
    Midpoint = Feature.shape.positionAlongLine(0.50,True).firstPoint
    print Midpoint.X
    print Midpoint.Y
```

share edit delete flag edited Aug 21 '12 at 19:42 answered Aug 21 '12 at 18:41 dmahr 6,210 11 33

16

Maps of this era are sometimes called Portolan Charts. The lines to which you refer are intended to be Rhumb lines (i.e. lines of constant bearing). However, early Portolan charts predate the mathematical understanding of Rhumb lines and the Mercator Projection by centuries.

At the time, maps were exaggerated and erroneous along the x-axis because there was no accurate method for measuring longitude at sea. The multitude of compass roses with straight lines extending outwards across the map underscores how the maps were shaped by compiling observations from navigators who attempted to follow a constant bearing at sea.

share edit delete flag answered Aug 13 '12 at 13:11 dmahr 6,210 11 33

1 +1 Thank you for the consistently high quality of all your answers on our site. – whuber ♦ Aug 20 '12 at 21:43