Building a Geodatabase of Depaved Sites for Depave.org

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Geog 575

Depave Background

- Non-profit organization that focuses on removing unwanted pavement from Portland Metro area
- Held numerous events in Portland removing over 60,000 sq ft of impervious surface since 2008
- Spaces created include greenspaces, community gardens, bioswales, rain gardens, etc.

What we are trying to represent

Figure 1: Aerial photo of Holy Redeemer Catholic Church and School captured using camera attached to kite.
Image courtesy of http://geoq-rafa.blogspot.com.

Design Objectives

- To Create a Geodatabase that is:
  - Representative of the many components of depaved sites
  - Organized in a logical manner
  - Visually appealing and easy to understand
  - Efficient to maintain and easy to update
  - Compatible with esri and opensource software
  - Free and open for public
  - Helpful for determining potential sites in the future
  - Helpful for determining and analyzing benefits of pavement removal for stormwater mitigation

Study Area

Figure 2: Map displaying locations of official depaved site hosts , where past depaving events have occurred, within the City of Portland boundary.

Database & Components

- Personal geodatabase
  - Original data format for ArcGIS geodatabases stored and managed in Microsoft Access data files. This is limited in size and tied to the Windows operating system.
  - All contents held in a single Access file (.mdb)
  - 2 GB limit in size, easily portable, single Access file, familiar format
  - Data can be maintained in Access
  - Single user @ Depave will maintain geodatabase

Database & Components cont.

- Officially sanctioned sites
- Sponsored sites
- Property owners (site hosts)
- Individual post-depaving features located within host sites
  - Community gardens, rain gardens, bioswales, etc.
- People who manage post-depaving features
  - Community groups, site hosts, nonprofits, etc.
- Area of features
- Stormwater Infiltration rates

Database Structure

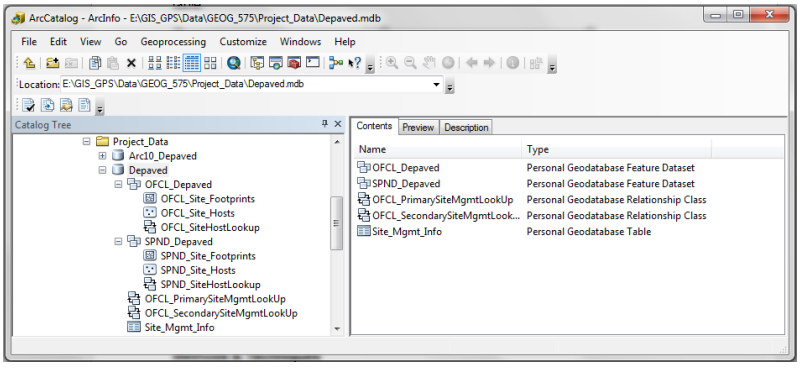

Figure 3: Screenshot of the Depaved personal geodatabase structure in ArcCatalog. The geodatabase consists of two feature datasets, Official Depaved sites and Sponsored Depaved sites; a site management information table; and four relationship classes which link the feature classes within the feature datasets, and site footprint feature classes with the site management information table.

Data Layers

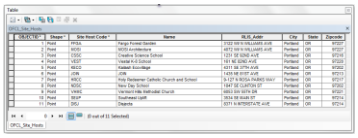

Figure 4: Depave official site hosts attribute table for "OFCL_Site_Hosts" point feature class.

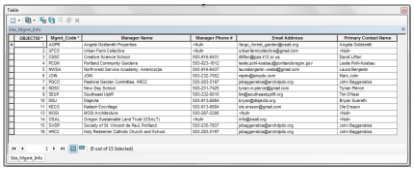

Figure 5: Site managers information table.

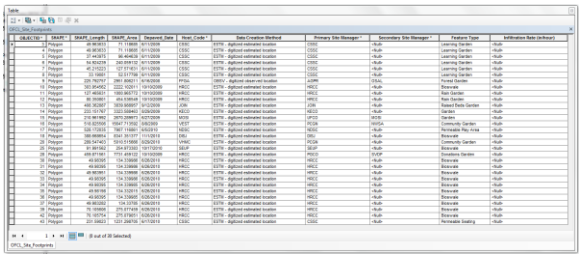

Figure 6: Depave official site footprints attribute table for "OFCL_Site_Footprints" polygon feature class.

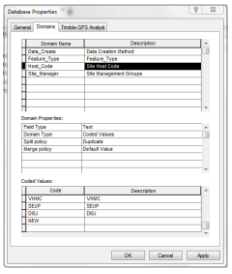

Figure 7: Database properties dialogue showing addition of new coded domain values.

Methods and Techniques

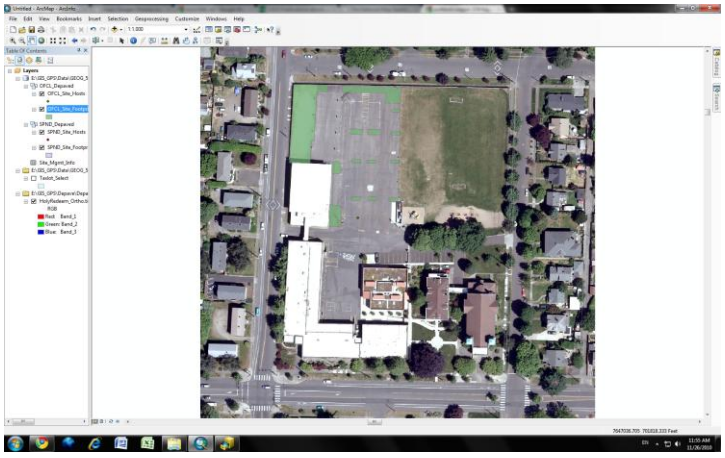

Figure 8: Screenshot displaying the Holy Redeemer Catholic Church and School site, which shows several site footprints over the site. Site footprints were digitized using 2008 USGS .5ft High Resolution Orthoimagery as the reference layer.

Intended Applications

- To manage a spatial inventory of the depaved features that have been created by the organization and/or its partners.
- To keep track of the progress of the organization including areal impact, dates of events, feature types, site host and feature manager information
- To provide data that could be used in conjunction with other datasets, such as data collected and provided by Metro, the City of Portland, Multnomah County etc. to determine potential depave sites, or neighborhoods in need of depaving
- Provide data that would be available for analyzing stormwater benefits from pavement removal throughout the Portland area

Spatial Data Inventory

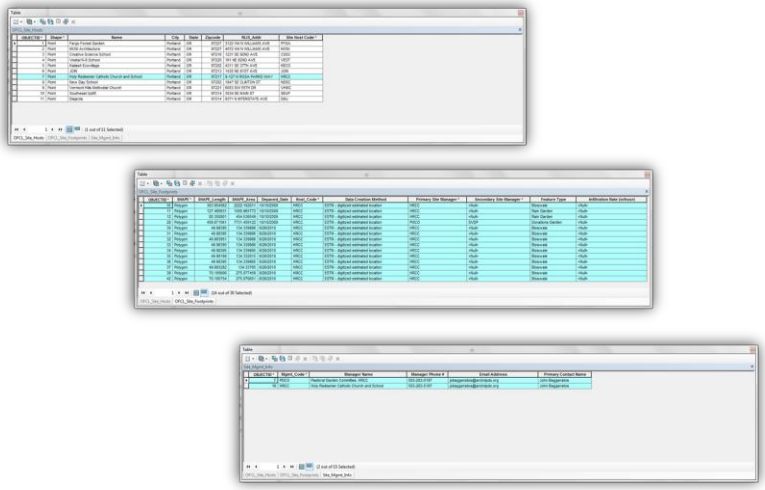

Figure 9: Displaying site footprint and site management info tables related to the Holy Redeemer Catholic Church and School site host. Relationship classes help to organize information related to the individual depaved site footprints.

Demonstration Application

Prioritizing Neighborhoods for Depaving using RLIS Vegetation Data and Depaved Data

Make Feature Layer to Set Split Policy for Erase Calculation

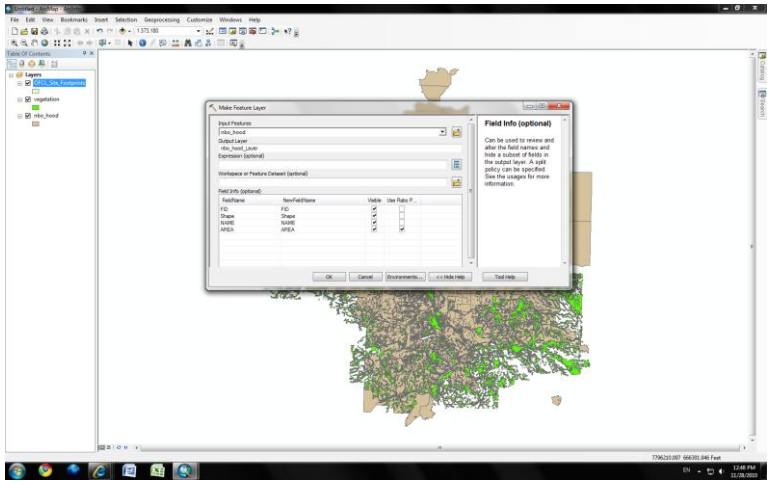

Figure 10: Creating a feature layer in ArcMap to calculate subtracted areas from neighboorhood polygons.

Erase Vegetation and Depave from Neighborhood layer

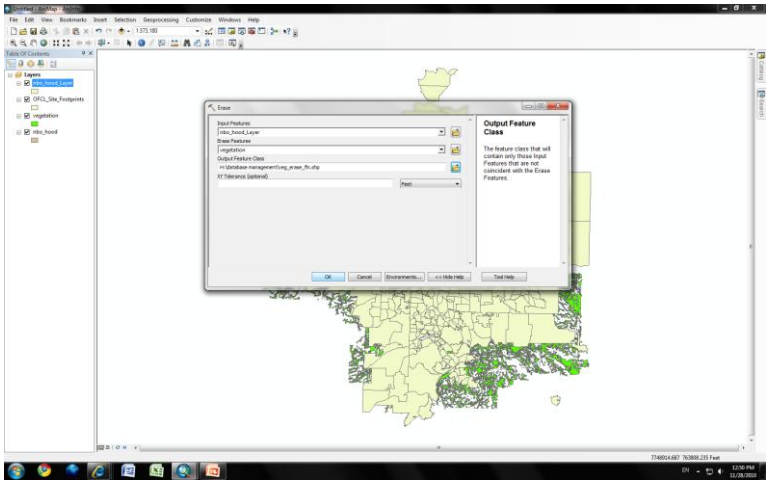

Figure 11: Using the erase tool to erase depaved footprint areas and vegetated areas from the neighborhood layer.

Spatial Join Between Neighborhood Layer and Erase Neighborhood Layer

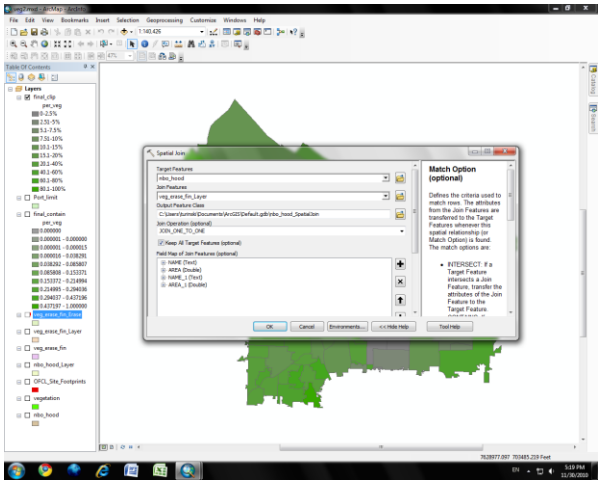

Figure 12: Applying a spatial join between the original neighborhood layer and the neighborhood layer with erased areas to prepare for new area calculations.

Erased Neighborhood Area subtracted from total Neighborhood Area

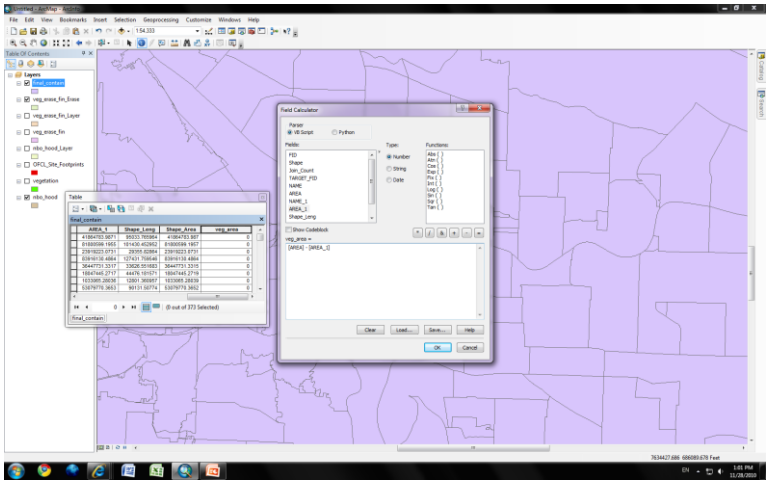

Figure 13: Using field calculator to find total area of vegetated surfaces within the neighborhood polygons.

Vegetation and Depave Area/Total Neighborhood Area

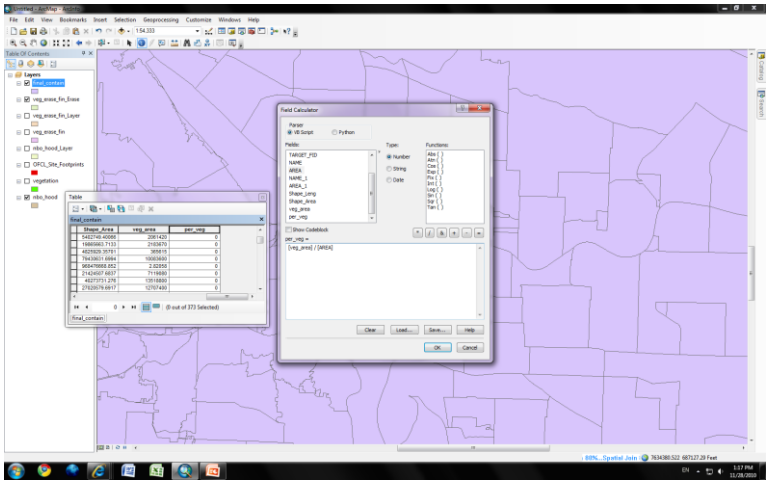

Figure 14: Using field calculator to calculate vegetated surfaces to nonvegetated surfaces ratios for each neighborhood polygon.

Vegetative Cover by Neighborhood

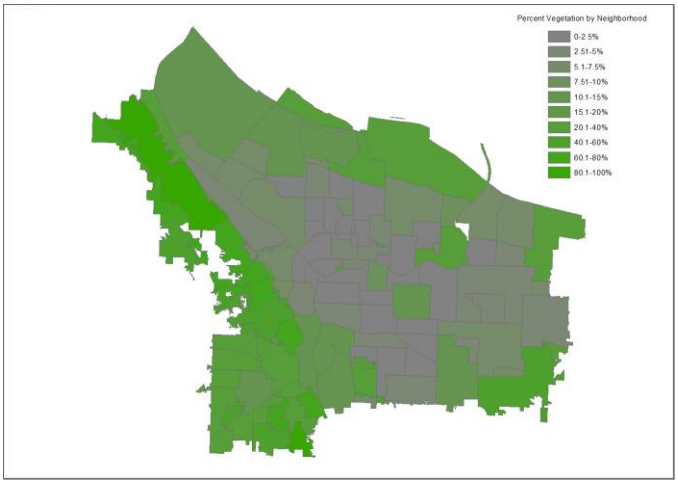

Figure 15: Map displaying the vegetated ratios for each neighborhood polygon within the City of Portland boundary.

Limitations and Quality Statements

- Up-to-date imagery is currently unavailable for nearly all depaved sites
- Potential for error in horizontal accuracy of up to 3 meters diagonally or 2.12 meters in either the x or y direction when using the USGS .5ft High Resolution Orthoimagery
- Unsure what attributes to provide in order to analyze stormwater benefits from depaving

Next Steps

- Connect with stormwater experts to determine attribute fields to add for future analyses
- Create web applications to display and disseminate data to those who want to utilize it
- Apply topology rules to data to fit within RLIS taxlot data
- Keep on depaving!

Questions?