

The Use of GPS Treatment Data and ArcGIS tools to Evaluate Herbicide Treatment Effectiveness on a Reclaimed Coal Mine¹

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Abstract: A coal mine located in the southwestern United States has been reclaimed and is working towards final bond release. Noxious weed management has been performed at various levels of intensity during the life of the mine. Since 2010 the mine has contracted noxious weed herbicide treatments, with emphasis on larger, higher density infestations. In 2017 mine management and the SMCRA regulatory agencies called for a quantitative evaluation of the effectiveness of herbicide treatments. Herbicide treatments have been recorded with environmental grade GPS units. Precipitation records and herbicide treatment data were used to quantitatively evaluate treatment effectiveness. This evaluation used Fishnets from ArcToolbox to perform a Grid Pattern Analysis to characterize treatment data. Mining area boundaries were used to establish Fishnet grids. Fishnets were sized at 929 square meters. A join was completed between Fishnets and herbicide data using the Spatial Join geoprocessing tool that resulted in a summary attribute field in a new Fishnet layer. This attribute field summarized the number of Herbicide Treatment Locations within each Fishnet. Fishnets with “0” treatment locations were deleted. The remaining Fishnets each contained one or more recorded herbicide treatment locations. Fishnets were then symbolized using quantitative values into three classes (low, medium and high) to graphically display density of noxious weed herbicide treatments. Data was exported to Excel for quantitative analyses. This process was repeated for each treatment year and mining area used in the comparison analyses. This GIS modeling resulted in an efficient method for quantitatively characterizing and graphically visualizing the effectiveness of noxious weed herbicide treatments. The analyses indicate that herbicide treatment of noxious weed infestations has been effective.

Additional Key Words: Southwest United States, Invasive Species, Fishnets, MS Excel.

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