



Using a Digital Elevation Model to Analyze Watersheds to Match Inlets with their Respective Outfalls



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Summary

San Antonio is a major city in Texas, drawing in many new residents, visitors, and development plans each year. With the cities rapid growth, it is essential to ensure that the health of all waterways are maintained. The San Antonio River Authority (SARA) has reached out to Pollution Solutions to implement a GIS to locate areas of high pollution production along Westside Creeks, located in Bexar county, Texas. Areas contributing to pollution were narrowed down by conducting a watershed analysis. The overall objective is to track down areas in San Antonio that are in need of better pollution management.

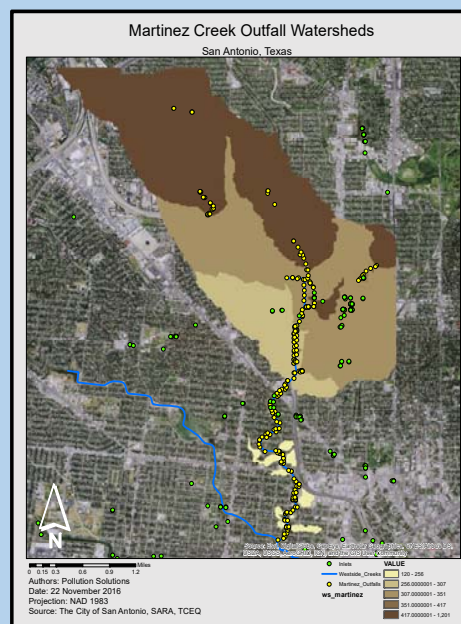
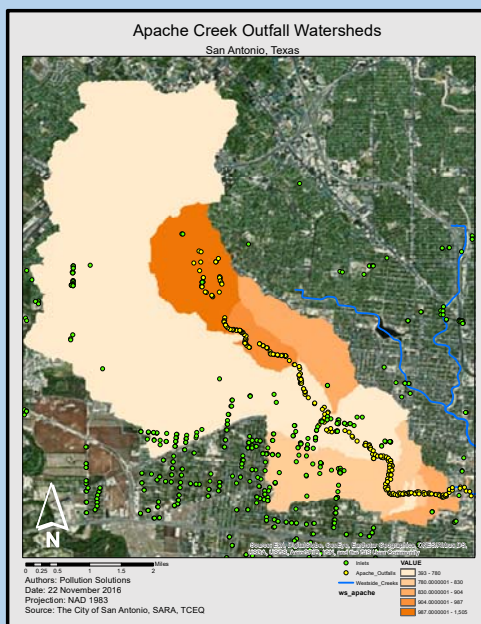
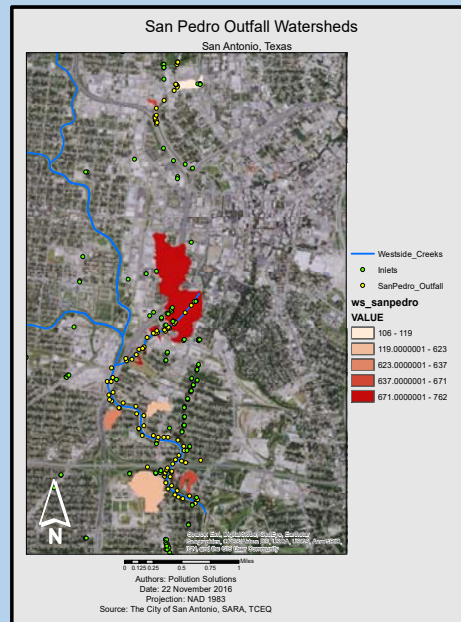
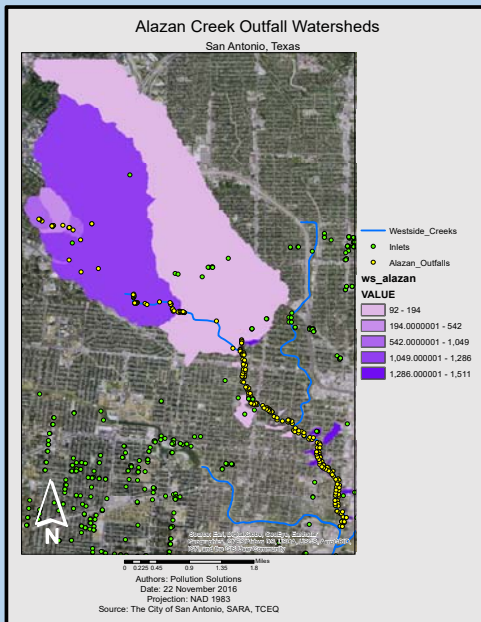
Methodology

Based on the provided data, Pollution Solutions determined the best way to pair inlets with their respective outfalls was to delineate the total area flowing into a given outlet based on the digital elevation model (DEM).

Task 1: Preparation of the provided, ensuring to remove data falling outside of the project boundary. Line data displaying all Westside Creeks was also essential to create, as it was the main area of focus.

Task 2: Delineation of a watershed was conducted for each outfall by running the fill, flow direction, flow accumulation, and snap pour point tools. Using the watershed tool, new polygon layers were created to represent the sub watershed boundaries that contribute to the Westside Creeks.

Task 3: Final maps were created to show which inlets contribute to a specified outfall. If The SARA wishes to expand this project to other areas in San Antonio, the created cartographic model can be used as a visual reference.



Results

- Watershed boundaries of the surface drainage areas were delineated, representing where inlets might lie within their respective outfall drainage network.
- Final results validate the interconnectedness between creeks and watersheds, showing how pollution in waterways can become a major issue.
- The maps generated from the watershed analysis display possible places where pollution might originate, and the further path in which it can travel.

Conclusion

Conducting a watershed analysis takes into account the natural flow of the landscape, as well as where water accumulates. Therefore, this analysis can help The San Antonio River Authority identify which inlets lie within a pollution source, as well as how far down that pollution source can travel. Doing so will improve the accessibility of waterways, not just for recreational use, but also for the natural ecology that exists.

Acknowledgements

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References

Lanfear, K. J. 2000. The Future of GIS and Water Resources. *Water Resources Impact*. American Water Resources Association, Vol. 2, Number 5, September 2000, 9-11.

Miller et al. 2002. Integrating landscape assessment and hydrologic modeling for land cover change analysis. *JAWRA* 38(4): 915-929.