Trash Site Frequency in Stillwater Creek Watershed

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INTRODUCTION

Oklahoma's Blue Thumb Program is a non-profit organization ran out of Oklahoma City. They are tasked with eliciting volunteers that monitor waterways in the state for water quality, biodiversity, and environmental stability. Volunteers are assigned a survey location where they test water quality and also describe the physicality of the waterway. They fill out a Blue Thumb report and data is passed through quality assurance. Approved data is archived.

Stillwater Creek is listed on the 303(d) list, or impaired waterways list. According to Oklahoma's Nonpoint Source Management Program for years 2019 through 2029, which was drafted by the Oklahoma Conservation Commission Water Quality Programs, approximately 38% of stream miles of Stillwater Creek do not meet water quality standards. There are several listed factors attributing to the rating and several sources that are suspected to be the cause of impairment.

PURPOSE

The goals for this project included:

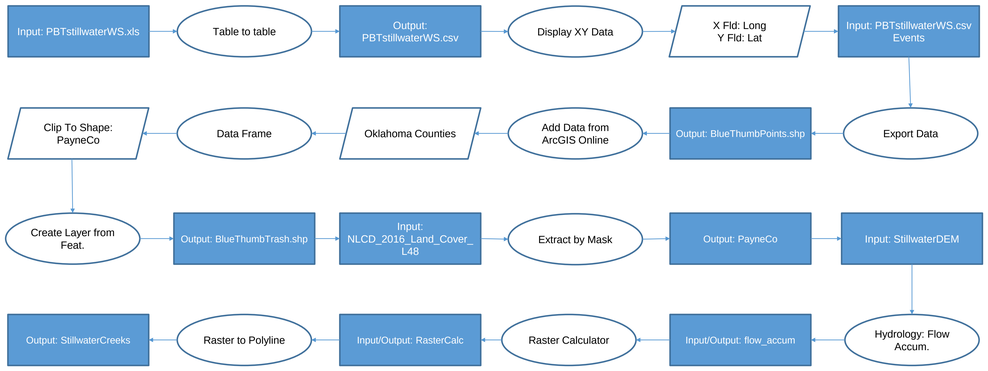
- Utilize data gathered from citizen science volunteers.
- Create a visualization of table data for decision making.
- Provide a contribution to a non-profit organization.

OBJECTIVES

For this project, quantification of survey data was conducted to allow for more appropriate decision making. Information was provided by the Blue Thumb Program for survey sites in Payne County, Oklahoma. The concepts that are reviewed are the land use in the city of Stillwater and the indication of the presence of "trash" in the Stillwater Creek watershed. This GIS project aims to answer the following question: Is there a connection between urban development and trash frequency?

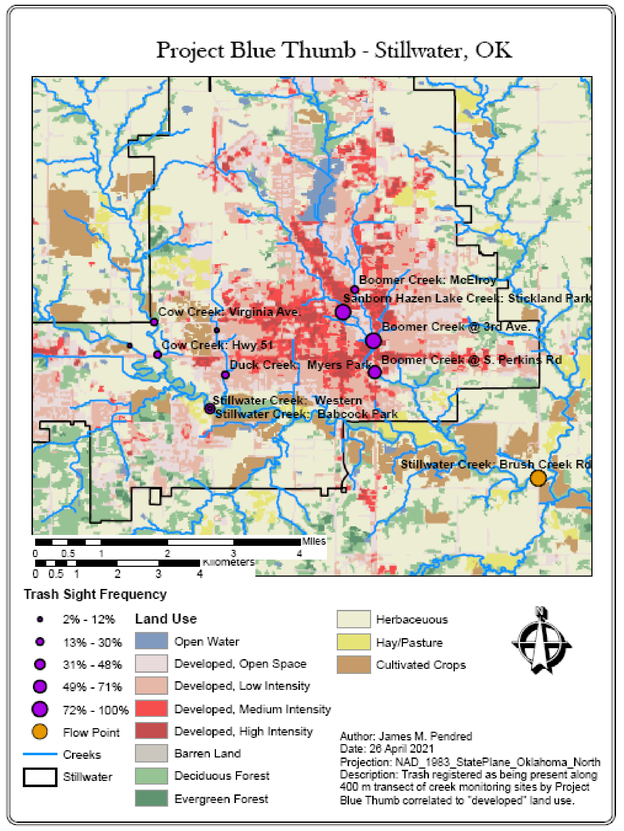
DESIGN METHODOLOGY

The design and development of the map was achieved using ArcGIS software and Blue Thumb Program data. Survey sites from Blue Thumb were loaded into ArcGIS, then land cover data was loaded in to show urban development. Trash frequency percentages were generated from survey site data.



Spatial Analysis

The right figure shows a quantified view of trash sight frequency and flow point. Site size shows the percentage of sight frequency in intervals best fit to the data exported from Microsoft Excel to Arc Map. The flow point is a visualization point showing a single potential point for which trash could collect. The bottom map shows the potential impacts of trash migration from source-to-sink. If trash is not properly captured, disposed of, and/or contained, then its release into the Gulf of Mexico can result in potential dispersion into the world's oceans via wind and water circulation.



Visit Blue Thumb App Map to view ongoing volunteer data:
https://okconservation.maps.arcgis.com/apps/webappviewer/index.html?id=1654493dccdd42c29d170785c6b242bf

DISCUSSION

Every survey site had trash sighted at least once during visitation by volunteers. Percent visibility indicates frequency of visibility to the total number of site visitations. Initially, trash was rated as visible or 'TRUE'. Absent data indicated there was no visible trash. There was no narration for where trash ended up between visitations. The aim of the investigation was to quantify frequency so advanced efforts could be considered for site management.

There was correlation between trash sight frequency and urban development. There is additional correlation of 100% trash frequency at the downstream flow point. This is believed to be a possible catchment area of areas upstream to which trash may have migrated. Trash pollution around streams is classified as a nonpoint source pollution through this investigation. With respect to source-to-sink, trash can end up in the marine environment.

Future Recommendations

There is encouragement for decision making to closer track the source of trash and to implement and document cleanup efforts.

Furthermore, the following questions should be considered:

Best management practice: Was trash collected at the time of study?

At sites where trash was seen then not, was there a removal event (e.g. flood)?

Data accuracy: Take an inventory on types and amount of trash.

References

MRLC. (2016). NLCD 2016 Land Cover. Retrieved April 25, 2021, from https://mrlc.gov/data?f]=category:Land Cover

Blue Thumb. (2015). About Us. Retrieved October 12, 2021, from https://www.bluethumbok.com/

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