Progress Report

Inferno Analytics

COA Fire Dept

Travis County Watershed Vulnerability Indexing

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Table of Contents

1. **Introduction**

1.1 Summary

Inferno Analytics wanted to update you on the status of our project to create a vulnerability index for watersheds that influence Travis county that can have the water quality degraded from wildfires. The project is moving along smoothly, and we expect to finish the project on time with all the deliverables completed.

1.2 Purpose

The purpose of the project is to develop a vulnerability index for watersheds that effect water quality where wildfires began. Water quality of the city of Austin can be contaminated by post wildfire events. Having a vulnerability index for the watersheds will allow the City of Austin Fire Department to more easily determine areas of high risk of contamination. For this project we will perform a cost distance analysis and a site suitability index. This analysis will aid the viewer to distinguish the watersheds that are not only hard to get to but are also highly vulnerable to water quality degradation.

1.3 Scope

Inferno Analytics is still focusing on the watersheds that are within or influence Travis County shown in (Figure 1). The main tasks will be to show our works completed, present work, and work scheduled.

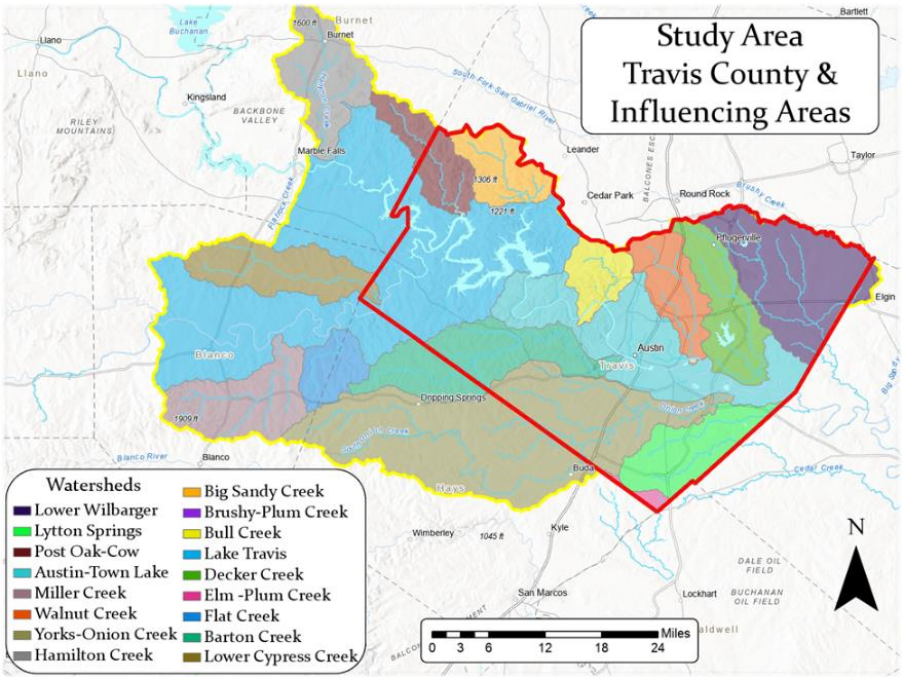


Figure 1 Map of the study area with Travis County outlined in red and influencing areas outlined in yellow

Our plan to create a cost distance analysis and site suitability index for the watersheds is still going as planned with no changes being made.

2. **Tasks**

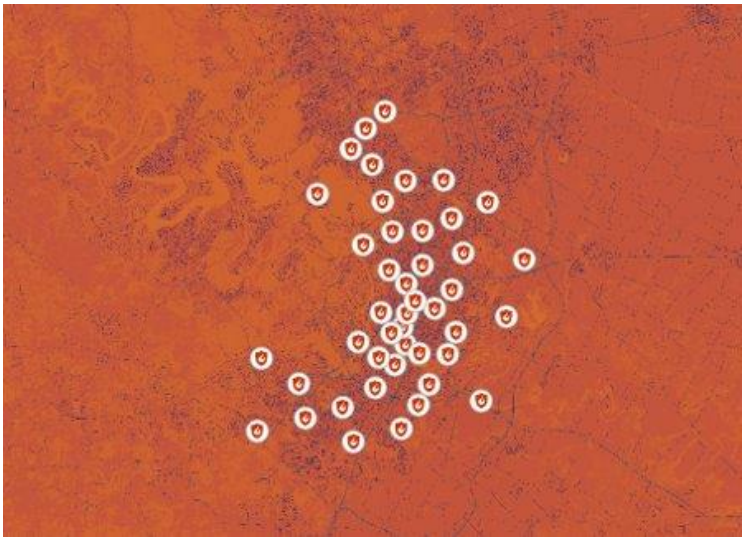
2.1 Work Completed

We first completed the soil classification table to join with our soil layer. We deemed that this was an important first task because we would need the table done before we could work with the soil layer. We created the table based off the three digit code each soil type had in Travis county and then add attributes like: the name of the soil, average grain size for the top 24 inches of soil, Ksat (which is how fast water can move through the soil), and how deep it is to the water table as shown in (Table 1) below.

Table 1. Shows an example of the format of the soil classification we created in excel

FID	Name	Grain_size_mm	Ksat_inches/hr	Water_table_depth_inches
AgB	Altoga silty clay	0.003	0.13	>80
AgC2	Altoga silty clay	0.011	1.275	>80
AID	Altoga soils and Urban land	0.011	1.275	>80
AsB	Austin silty clay	0.003	0.1	>80
AsC2	Austin silty clay	0.003	0.1	>80
AtC2	Austin whitewright complex	0.003	0.315	>80
AtD2	Austin whitewright complex	0.003	0.315	>80
BeA	Bergstrom silt loam	0.011	1.275	>80
BeB	Bergstrom silt loam	0.02	1.275	>80
BgA	Bergstrom silty clay loam	0.004	1.275	>80

We also have most of our cost distance analysis done as shown below in (Figure 2). We have gone through and classified the different land cover types to values that represent the difficulty of traversing them. We then ran our cost distance analysis to see what areas would be harder to get to if leaving from one of the fire stations around Travis county. All that is left to do with this data is to reclassify the output and make some additional



changes.

Figure 2. This is our preliminary cost distance analysis where the dark red areas are hard to traverse and blue areas are easy to traverse.

Watersheds and streams have been further delineated for view at various scales. Stream begin with 1,000 cells of flow accumulation at all scales, with any tributary less than a quarter of a mile being excluded; this is purely for aesthetic purposes and has no impact on the analysis. Above a 250K-scale, only the major watersheds in the study area are delineated, with the mainstem of these watersheds being displayed (Figure 1). For scales between 250K and 150K, watersheds with an area greater than 14,000 acres are delineated and the mainstem for those watersheds are displayed, along with any tributary that has accumulated 25,000 cells of flow at the mouth of stream where it reaches one of these mainstem. Between a scale of 150K and 75k, the process is further repeated with watersheds greater than 7,000 acres and streams with flow accumulations greater than 10,000 cells. Below 75k-scale, all watersheds greater than 4,000 acres are visible along with all streams.

2.2 Present Work

Our team is currently working on cost distance analysis. To finish up our analysis we are looking to add more fire stations into our original station map because the original did not include all the fire stations in Travis county. After that we will re-run our analysis, and we will reclassify our final output to give us a range of 1-15, 1 being easy to traverse and 15 being very hard/time consuming to traverse.

We are also in the process of creating a raster that represents the distance to the closest downstream municipal water supply inlet. Once all accumulated flows are calculated from all inlets, a final raster will be produced based on the minimum values from all the flow accumulation raster's and will be ready for use in the site-suitability analysis.

2.3 Work Scheduled

The next task we plan to work on after completing the cost distance analysis is to begin working on our watershed vulnerability analysis. To do this we are planning on conducting a suitability model for the watersheds that are more likely to have water quality degradation from wildfires. We are factoring in areas that are at higher risk to having wildfires, the area facing the prevailing summer wind, and looking at factors like slope and soil and how they affect how well they transport materials into the watersheds.

January					
Mon.	Tues.	Wed.	Thur.	Fri.	Week-end
27	28	29	30	31	

Process	Weeks
Data Collection	1-4
Pre-Processing	5-8
Data Analysis	9-12
Data Interpreta	13-14

Feburary					
Mon.	Tues.	Wed.	Thur.	Fri.	Week-end
3	4	5	6	7	8/9
10	11	12	13	14	15/16
17	18	19	20	21	22/23
24	25	**26**	27	28	29/1

Proposal Presentation
Due 25th of Feburary

March					
Mon.	Tues.	Wed.	Thur.	Fri.	Week-end
2	3	4	5	6	7/8
9	10	11	12	13	14/15
16	17	18	19	20	21/22
23	24	25	26	27	28/29
30	31				

April					
Mon.	Tues.	Wed.	Thur.	Fri.	Week-end
		1	2	3	4/5
6	7	8	9	10	11/12
13	14	15	16	**17**	18/19
20	21	22	23	24	25/26
27	28	**29**	30		

Progressive Report
Due 1st of April

Final Report
Due 29th April

Figure 3. Adjusted timeline.

3. **Problems**

One potential problem our team's faces are objectively assigning weights to the land cover attributes. This requires reflecting back to the literature review done in the project proposal. It is obvious that roads and rivers would be assigned a lower weight, while dense vegetation should be assigned a higher weight. However, it becomes difficult when evaluating various types of vegetation. A solution to this problem would be consulting our client.

Another problem is majority of the data that is available for Wind is current wind not prevailing for the various parts of Travis county, or when I did find data it only had 4 locations. Which with trying to predict which areas can contribute to polluting the water ways we would need to be aware of the usual patterns. Though hopefully we can set it up to be able to also input easily current, which at a time of a fire could change the results.

4. **Conclusion**

The group project is going well and so far, there are no delays. However, there might be a period of adjustment as our group moves to online and attempting to coordinate everyone's schedules. Our focus in the coming week will be completing the site-suitability analysis and creating a watershed vulnerability index based on these results. After this is complete, priority will be given to the production of final deliverables for the client and web maps for end users.