Texas Stream Team Water Dashboard and Watershed Filtration Eligibility

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Client: Meadows Center for the Water and the Environment

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1. Introduction

1.1 Summary

Assembled by Streamline Spatial Solutions for the Meadow Center, this report outlines tasks we have completed and an outline of work to be completed as we progress in the project.

1.2 Purpose

The purpose of this project is to streamline a tool into an Arc GIS Dashboard that will enable filtering of eligible watersheds across Texas. This will be based on criteria for the Texas Stream Team, as well as their provided Survey 123 and water quality (WQ) datasets. To do this, we are first focusing on making sure the data provided is ready to be implemented onto the dashboard. This includes implementing a one-to-many relation between the WQ sample data and the site status feature layer. This way, the data can now be transferred onto the web map for further analysis. The creation of the web map is crucial before a dashboard can be made.

1.3 Scope

The scope remains the same as shown in the original proposal. Shown below is our scope map that encompasses the entire state of Texas with river basins shown.

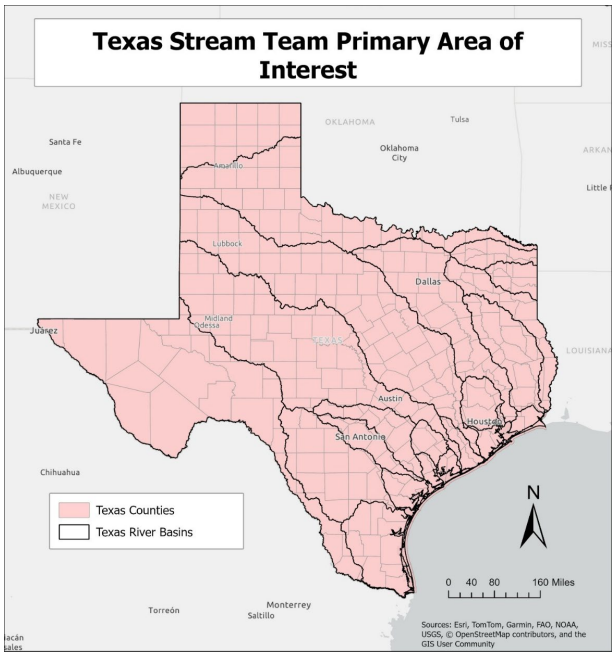

Figure 1: Area of Interest

2. Tasks

2.1 Work Completed

After familiarizing ourselves with the WQ sample and Site Status point layers provided by the Texas Stream Team, the focus on current work shifted to procuring the datasets in ArcGIS Pro for web map publishing and use in the future filtration Dashboard tool. This consisted of integrating the various point layers together with a separate location relation point layer as well as inputting the layers to be used in filtration and/or eligibility criteria such as Texas river basins and Hydrological Unit Code (HUC) 8 and 10 (subbasin and watershed) shapefiles.

For the Texas Stream Team to be able to continually update the WQ sample and Status datasets on their end, it was requested that each respective site layer remain separate from the other. With this being the case, along with the differing structure of each feature layer (site status being a single point per site with attribute fields and the WQ sample consisting of new rows for each

testing sample submitted for each site), a locational reference table was created with a coordinate field as well as a site ID join field. With this table, a relationship class was created with a one-to-many join for the WQ sample and site status feature layers to enable those datasets to remain independent while using the location table to function as a xy-table-to-point spatial reference in the web map and future Dashboard.

After the relationship class was established between the Texas Stream Team datasets and the location feature layer, pop-ups were configured for the location points to show the related datasets on the web map/dashboard. Once pop-up visualization was completed and all the feature layers within the map were properly projected and related if needed, the project was published as a web map to Arc Online. Figure 2 shows the preliminary pop-up relation functionality of a given site at Spring Lake on the published web map with "show all" linking to each individual sample entry for site 81142 along with a separate table showing the active or inactive status of the site.

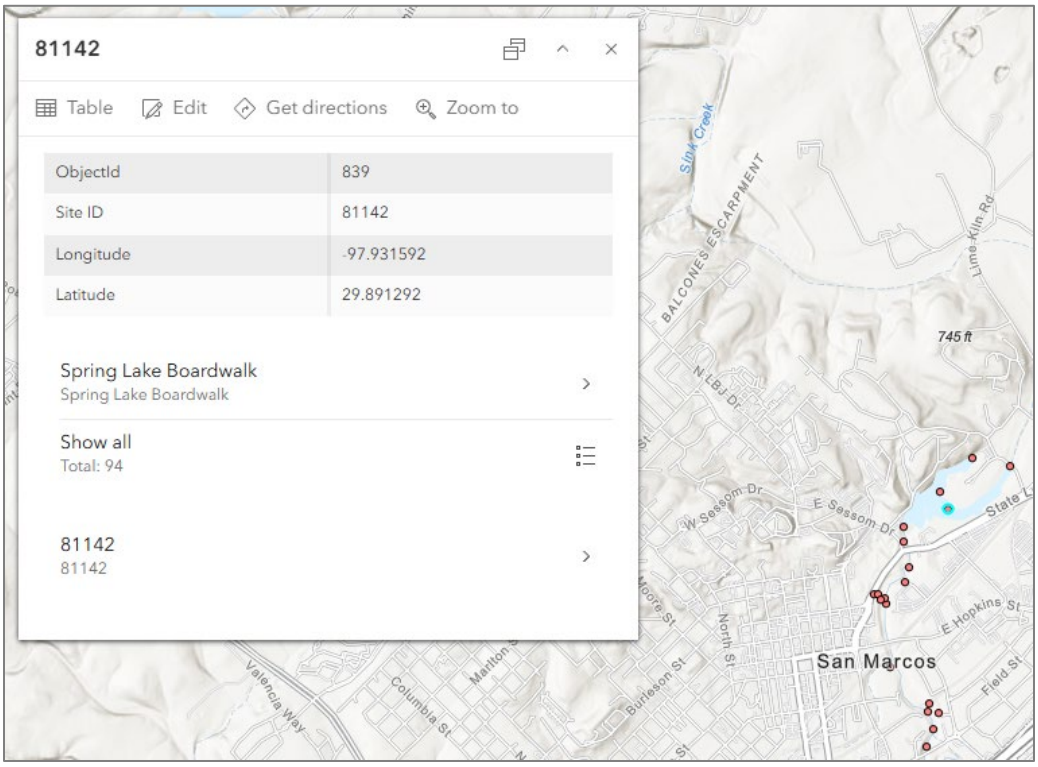

Figure 2: Web map pop-up functionality showing the WQ sample entries and site status relationship

In addition to the data preparation and web map development, we started working on developing the filtering pseudocode logic for potential functions in Arcade. Despite running into several challenges over the logic behind the functions, the main goal for this first draft was not to have something perfect or final, but rather to figure out what fields were needed for these possible functions so we can look at our data and determine what spatial operations and joins need to be done immediately. Figure 3 shows our first basic pseudocode draft of our coding logic. Some key fields that are needed for our possible arcade functions include a field that includes how many records are in a site and a field that totals the number of active sites at the watershed level. In addition, other fields that will be needed include one totaling the number of valid water quality records across all sites in a watershed, a field that indicates the last sample date at the watershed level as well as a field that indicates the date of the watersheds last official water quality report.

```
if (site count in each watershed is 3+, with 10+ valid WQ records,
and hasn't been reported on in 5+ years) {
        watershed = eligible
} else {
        watershed = not eligible
}
```

Figure 3. First pseudocode draft to show coding logic

Figure 4 is our second draft of pseudocode and will be later refined to match our client's expectations such as which criteria is more important and what score to give them if in the use case that they did not meet the criteria but were just under the requirement. The process starts with initializing each criteria's weight, which will add up to 100. Then, to determine the overall score

of each criteria it goes through a series of if-else statements, assigning the highest score if the criteria is met or exceeded, a moderate score if the criteria is slightly below the threshold, and then a low score if the criteria was significantly lacking. That process will then be repeated for the remaining criteria, and then each criteria will be added together to output a final score for the watershed.

```
Weights Example
Criteria 1 = 30
Criteria 2 = 30
Criteria 3 = 40

If (criteria is met or is exceeded) {
   Assign highest score possible
} else if (criteria is slightly below threshold) {
   Assign moderate score
} else {
   Assign lowest score
}

Repeat for each criteria
Criteria 1 Score + Criteria 2 Score + Criteria 3 Score  = final score
```

Figure 4. Second pseudocode draft showcasing coding logic with added weights

We also currently have a rough draft of the dashboard that showcases a rudimentary layout of our features. For the filters, we were able to create a sidebar that lists the three different filters with those being: minimum number of active sites, watershed reported in the last five years, and ten samples per site. These three filters are all shown in the sidebar, but only one of them is working

at the moment, which is the minimum number of active sites. The next part of the dashboard is the actual map itself which shows the watersheds (HUC 10) and the total amount of sites around Texas with the green dots representing active and red being inactive. Finally, there have been some summary statistics added showing the totals for all sites, active sites, inactive sites, and the number of eligible watersheds based on the current working filters.

2.2 Present Work

Following the completion of phase three, our group was able to complete extensive work on creating our web map, layers, and dashboard. Presently, our group is focusing on completing our in-progress tasks. Currently, there is work being done on the dashboard that includes adding the two missing filters of if watershed was reported in the last five years and if there are at least ten water samples per site. We are also working towards creating a ranking system in ArcGIS Arcade which will have weights set to each criteria and then implemented into the dashboard for visualization.

2.3 Work Scheduled

Between March 28th and April 17th, our fourth phase of automating, validating, and visualizing desired dashboard elements will take place. During this time, we will focus on automating and integrating the pop-ups that will be implemented into our dashboard and become visible when selecting different sites on the web map. Information included in these will be the factors that have contributed to this being a highly weighted watershed, such as the number of recent reports and data within those. In addition, time will also be spent on validating such processes and allowing for possible errors or obstacles to be overcome and readjusted using different tools or formatting within our dashboard. Lastly, our fifth and final phase will be focused on validating our entire

dashboard, including all front and back-end elements, ensuring that everything is working as intended. As well as time dedicated to completing our final deliverables of a poster, presentation, and final report document.

Additionally, we will be adding a new function to our water quality dashboard. We will start to draft and design a function for data quality checking immediately and then between March 28th and April 18th we will be implementing the function with our dashboard. Our client discussed that part of their job was performing several manual data quality checks to address some data inconsistences we had seen, and the opportunity to automate this process to significantly cut down on processing time was identified by our team. Rather than requiring users to manually search through datasets or rely on trial and error, this new function will directly flag missing, incomplete, or invalid data and provide meaningful information on how it impacts filtering results.

2.4 Problems

During our familiarization of data, we came across several inconsistencies that would pose issues later down the road. We found that there were several null data and data that said “N/A”, missing site status information, and incomplete attribute fields such as missing county names.

When starting the first pseudocode draft for our arcade functions, some limitations were immediately identified regarding the logic behind our functions. Our first draft was too simple and too binary and did not account for certain use cases. While we found that this was useful for determining what our actual inputs should be, it is very inflexible and logically strict, which causes a lack of information about the watershed, such as which category was not met. Not to mention that we realized that this also assumed all criteria are all equally important, which led to the need for a more flexible scoring-based approach.

2.5 Updated Timeline

Figure 5 shows our updated timetable for our project. Summarizing the work completed in each section. Due to challenges experienced with the development of our layers and dashboards, regarding which data would be visible in certain layers and be included on the dashboard. For adequate time devoted to this phase of our project, we extended our timeline to include another week dedicated to working on our dashboard, layer, and tools for the project. Our phase for automation, validation, and visualization was therefore subsequently pushed back one week and to fully complete the phase before moving onto, automation, validation, and visualization phase. Phase 4 has been pushed back but contains the same amount of time committed to working on completing the needed automation, validation, and visualization of our data within the dashboard. Through this we have shortened our time to validate our work and data, ensuring that all tools are working thoroughly by five days. But still have optimal time to complete what is needed and ensure all systems are working as intended before being accessible to the client for their intended use.

Figure 2: Project Timeline and Phases

Timeline	
Familiarization with Dashboards, Arcade, and Survey123	01/21/2026 – 02/13/2026
Method Research and Data Prep	02/16/2026 – 02/27/2026
Creation of Layers, Dashboards, and Tools	03/2/2026 – 03/27/2026
Automation, Validation, & Visualization	03/28/2026 – 04/17/2026
Validation	04/18/2026 – 04/29/2026

3. Conclusion

Although an extra week was added to our third phase of the project, we were able to schedule a meeting that provided some much-needed clarification, and now we are steadily making progress again. Within the next month our group should have ample time to complete the tasks needed to create a finished product, and even possibly create additional features to help our client manage the data.