

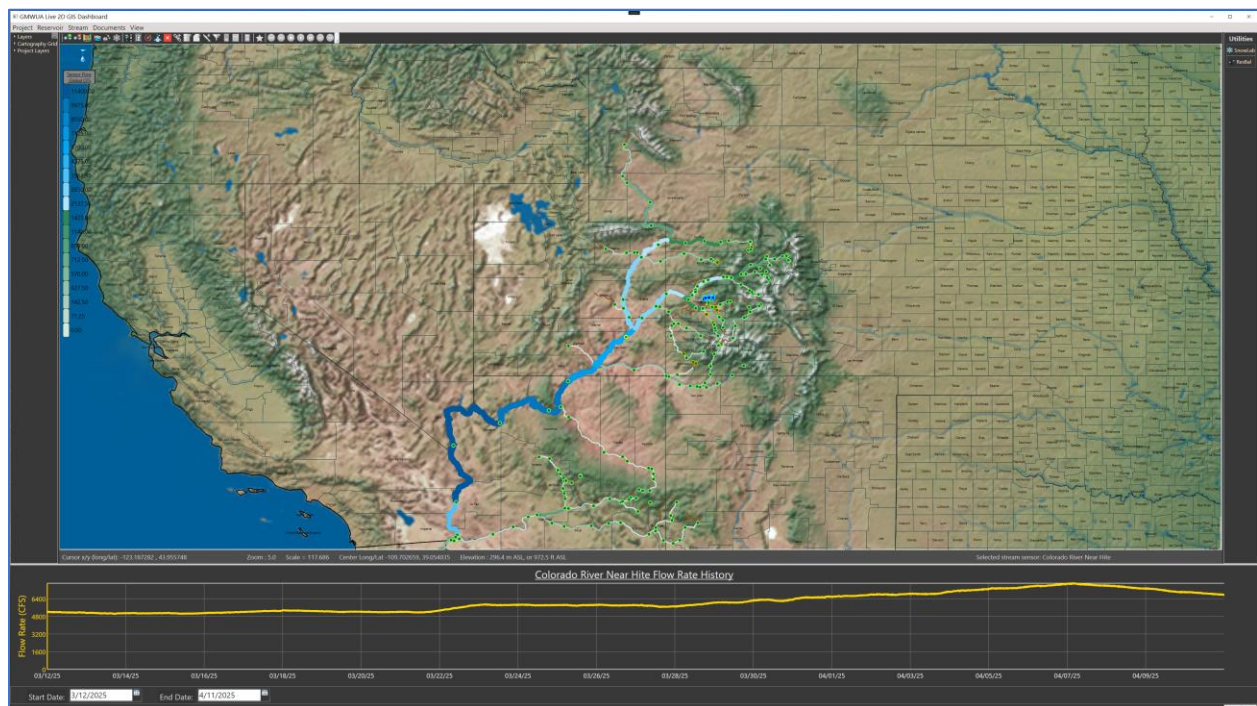
## Company Background

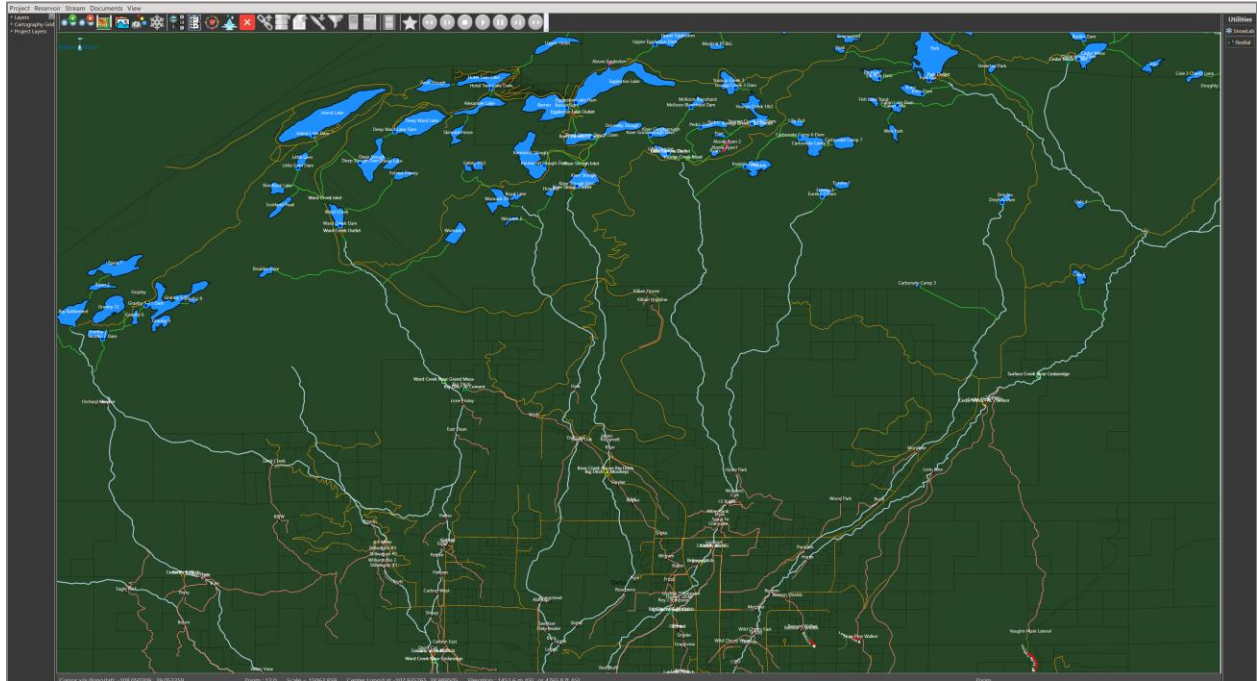
Walker Water is a technology services company founded in 2021 by John Walker, and built upon his strong passion for conservation, and knowledge of how the complex irrigation system in the Surface Creek Valley of Western Colorado works. The development of our technologies is based upon what we learned as irrigators and water users ourselves within this valley.

We are a software development and irrigation system consultation services company whose charge is to build administrative tools that help the water administrator to ensure the accurate and timely delivery of their water to the rightful user and allow ditch companies or even individual users to know what water is flowing in their ditch.

## Introduction

This project is a built upon the existing 2D GIS and 3D visualization software developed by Walker Water that shows water flows in rivers, streams and ditches throughout the globe. The illustration below shows stream flows read from sensors in the Colorado River Basin in the 2D GIS system. The map of the United States is a simple low-resolution image loaded into the canvas. However, once the user zooms further the image becomes pixilated and no longer useful, and the program removes the image and simply displays a solid background color for each state.





## Work Description

The main challenge here is the efficient use of the elevation data (and even perhaps images). The 2D GIS system loads the image of the world at startup. Once the zoom level increases, the image becomes unusable as it is too low a resolution and so becomes blurry at higher zoom levels. Could we find higher resolution images that we could use as the zoom increases? Or should we use the elevation data and create a shaded contour display? In either case, there will need to be an elevation and/or image tile manager that loads only the appropriate portions of the data based upon the size of viewport.

The CSM team from the last Summer Field Session implemented PMTiles (also known as Pyramid tiles) in conjunction with NASA imagery datasets to provide fast tile-based access to worldwide imagery. This project was not completed and as such there is much yet to be done. Below is a list of what the team felt should be addressed with the next team:

*\* Most of this code is not tested, there will be bugs to fix.*

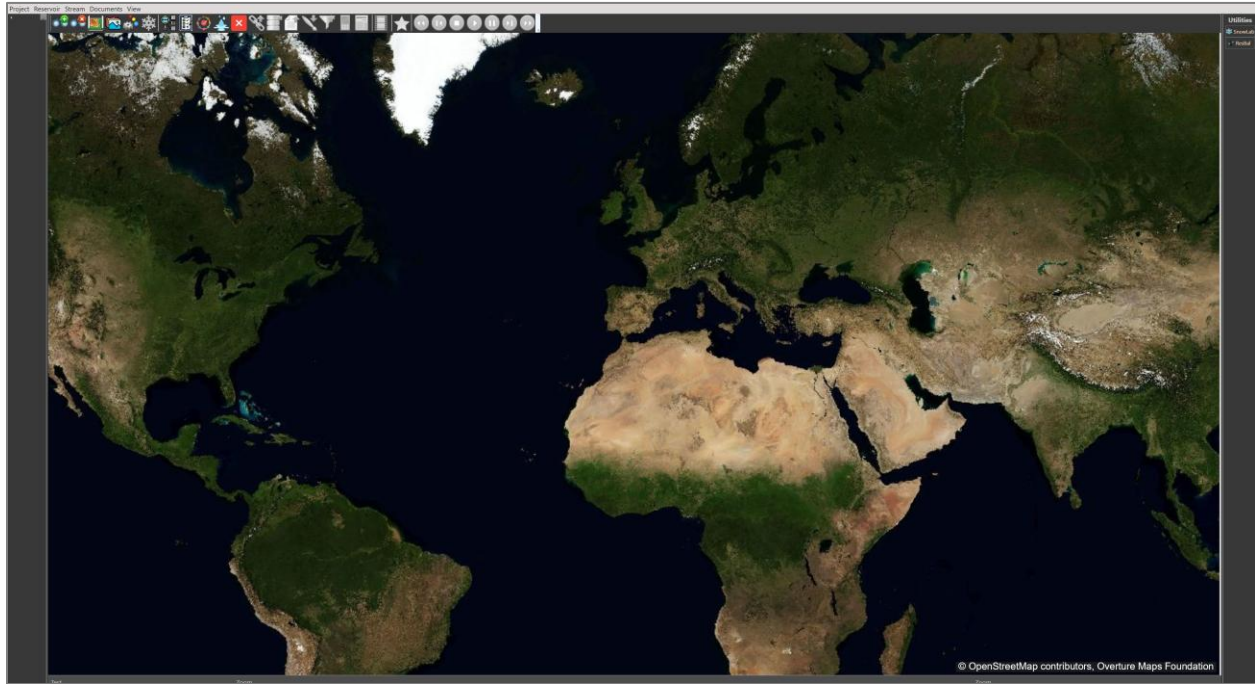
*\* Sometimes text will disappear or appear at random LODs. This is quite rare, so it has evaded being fixed.*

*\* More polish: text fading in and out and not just popping. Tiles that are seen should maybe fade in too, instead of popping in after loading.*

*\* This is one of the big ones: interaction, being able to hover over and click features in the PMTiles. How to implement this is up to interpretation. Though, making bounding boxes of every element, then checking if the mouse is over one, and if it is, rendering it through the `OnRender` function as a raw vector element instead of the tile is one way.*

*\* Shapefile renderer: extending [LayerRenderer.cs](Renderer/LayerRenderer.cs) and rendering a shapefile as tiles, making sure it is only tiled if the camera view intersects with the shapefile. Also, adding it to the theme file.*

*\* Another really big one is hooking into the existing systems: being able to get sensor data when interacting with a feature and splitting up the feature into different flows. Also, showing dots where the sensors are, this one is going to be pretty hard.*



The last item is most important from our perspective. And of course, the team suggested this will be “pretty hard”. So, therein lies the main challenge of this project. Take this code from alpha to production. When I ran the program today and attempted to zoom in to street level, the street maps were not coming up, so obviously something has changed from a few months ago to today (I did not modify any code).

The team will work closely with Walker Water developers to implement this within our system.

## **Student Skill Set**

Our 3D software is written in C# in Windows .Net8 and WPF. The 3D environment uses OpenGL. The students will be working directly within the Walker Water system.

## **Team Size**

The team size should be a minimum of 2 but certainly could support 5 or 6 members.

## **Internship Possibilities**

Walker Water would be delighted to offer internships. This would be a function of our financial condition at the time, and we anticipate this may be a possibility.

## **Work Location**

Work can be performed remotely. We deploy a git repository that supports collaboration amongst team members who can be located anywhere. Since we live in Cedaredge, we would not ask nor require anyone to visit our office.

## **NDA**

We will require an NDA for this project. The Walker Water software is proprietary and as such we want to protect our investment.

## **Intellectual Property**

Walker Water will retain ownership of all code developed theretofore.