Company Background

Walker Water is a technology services company founded in 2021 by John Walker, and built upon his strong passion for conservation, and a budding 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 continuation of the Walker Water project from last summer's Field Session. In that session the students were able to accomplish the modeling and visualization of water flowing down the mountain, filling reservoirs, and spilling from those reservoirs as it made its way down the mountain and into streams.

We provided the students a grid of elevation data, and they used that grid to compute a direction vector and an inertia value for each cell in the grid. They then traversed the grid by following each direction vector and considered the affect inertia would have on the direction the water would follow. They also included a "runoff" coefficient that allowed different amounts of water to be absorbed by the ground based on the coefficient. They did a fantastic job!

The image below illustrates a 3-dimensional mesh of elevations, and the accumulation of water as it works its way down the drainage system.
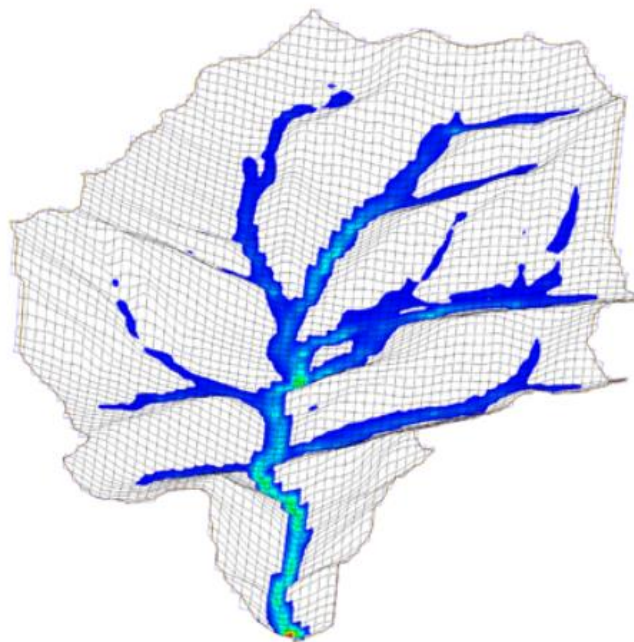
Work Description

While a lot was accomplished in last summer's session, there remains much to be done to complete this project. The goal is to map snow melt as it comes off the mountain and determine how much of that melt ends up in our reservoirs and ditches. Our plan is to animate these motions over a series of time steps and then incorporate the technology into our software system. The image below was taken from a python scripted movie the students developed to visualize the water flow off the mountain. The table on the right showed the reservoir fill levels. This visualization needs to be incorporated into Walker Water's 2D GIS basemap and the 3D globe.
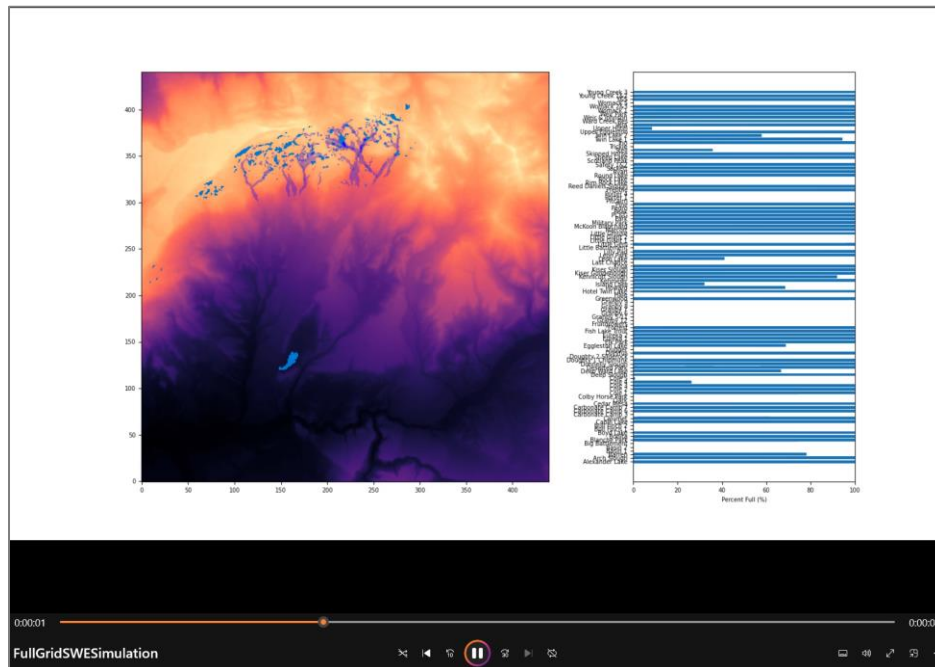
There are numerous variables that influence the quantity of water that is eventually stored in each reservoir. They include the type of geologic material over which the water flows, and, for example, the dryness of the ground since if it is very dry it will absorb water into the subsurface. While last summer's efforts included some of these variables, we will want to add more sophistication to simulate real-world conditions.

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

Student Skill Set

Our 3D software is written in C# in Windows .Net8 and WPF. The 3D environment uses OpenGL. The previous work was written in C++ and that is acceptable for us at this time.

Team Size

The team size should be a minimum of 3 but certainly could support 5 or 6 members.

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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. That may depend on how the students receive our project and the larger scope of what we do.

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. However, it would be advantageous for students to see how our valley operates since it is arguably the most complicated irrigation distribution systems in the U.S.

NDA

We will require an NDA for this project. The 3D software is proprietary and as such we want to protect our investment.

Intellectual Property

Walker Water will retain ownership of all code developed theretofore.