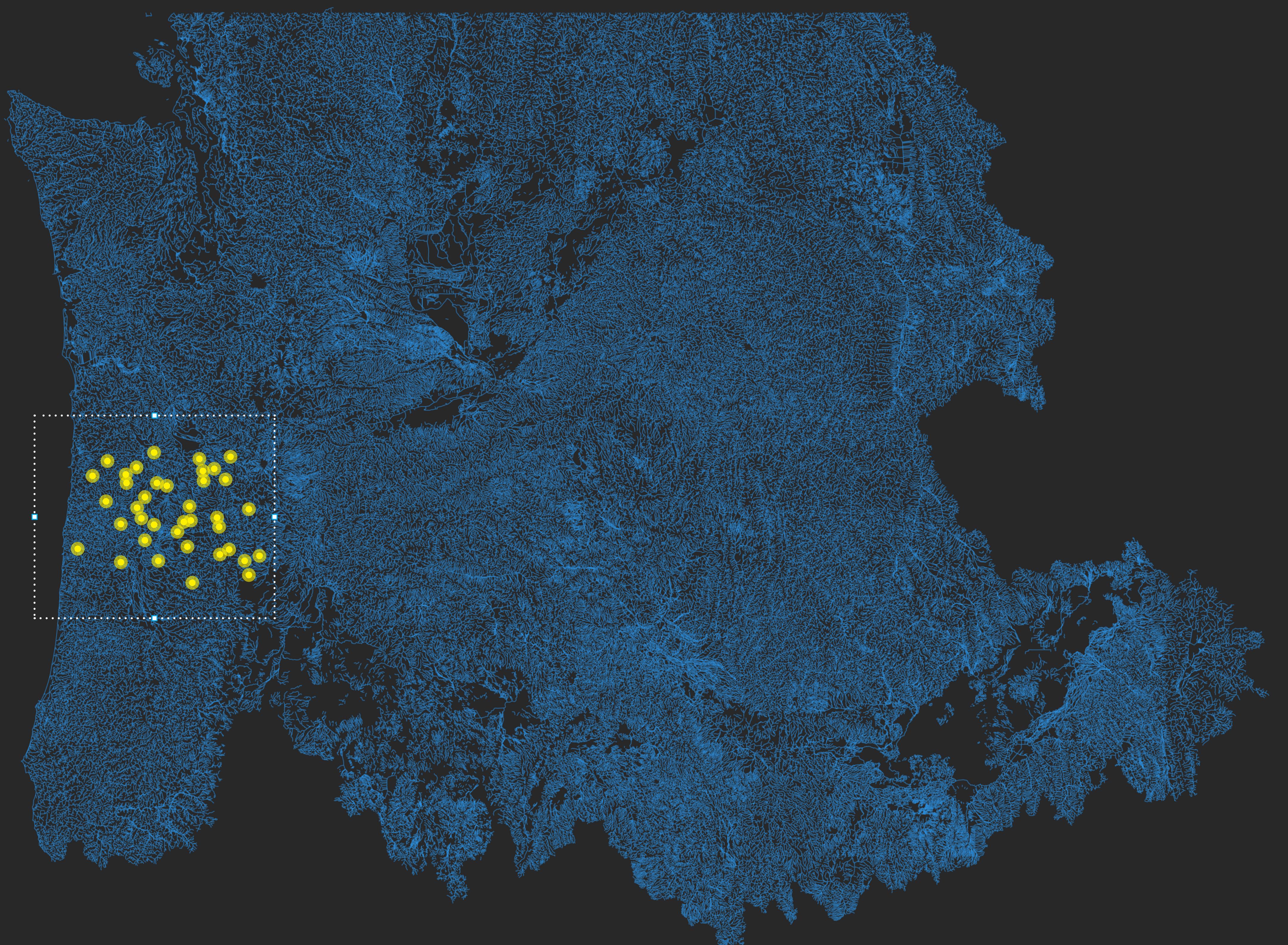
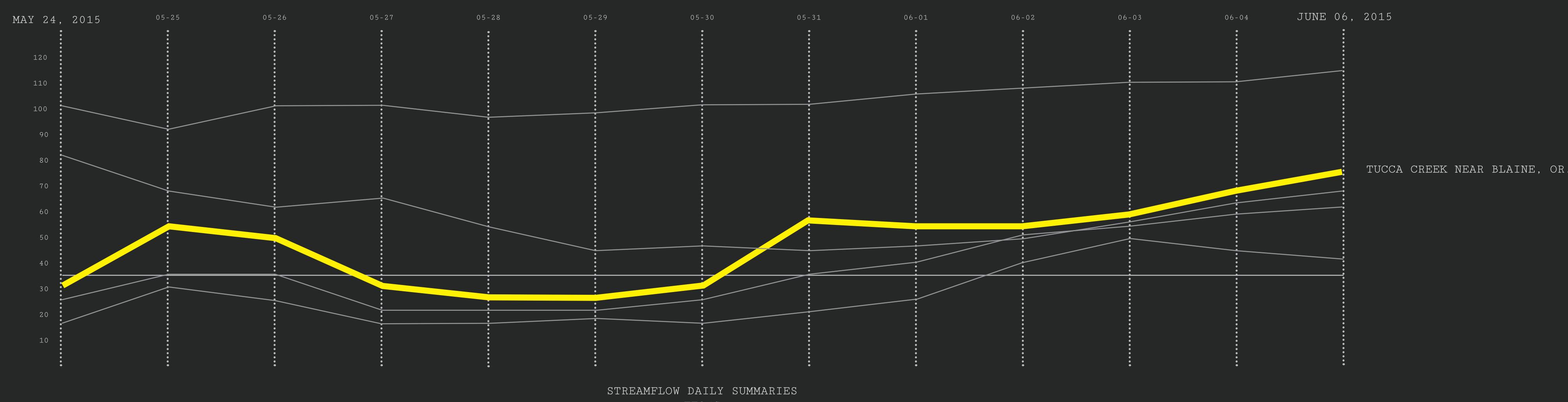


STREAMFLOW

Discharge over time, set in the geospatial context.



Hydrologic Unit Code 17 - PNW



PURPOSE

Despite the free availability of rich, granular data showing the geometry of America's river networks, and values from a system of sensors numbering in the thousands which measure the volume of water passing by them in 15 minute increments, a fast, open, interactive visualization of flow nationwide does not exist.

MOTIVATION

are increasing every day. Cities grow ever larger and more dense. Industry ages and expands. The demands of agriculture on our natural resources compound with every season. Despite the success of policies which safeguard the quality of our water supply, we are increasingly finding that scarcity is the problem of today. Awareness and education are critical tasks for stewardship. It is my hope that providing a holistic view, combining the where and the how much over time, which can be explored and shared, will offer some small contribution to these efforts.

TECHNIQUE

A regional overview gives the viewer a sense of patterns at the highest level, while a linked brush presents a magnified view of user-selected areas for closer study. The brush dynamically selects streamgage sites by projected latitude and longitude, linking them not only to the loupe, but also to a line graph showing their streamflow values in a given time range, which defaults to 1 month, but can be adjusted for broader or more narrow comparison. Initial responses to the graphic have been positive, but it remains incomplete.

DATA

The data used in this project comes from many sources, in many formats. Tremendous work has been done to collect and curate the data in these sources. The National Hydrography Dataset Plus contains geometries and attributes for every waterbody in the contiguous United States, Hawaii and Puerto Rico. Produced and published by the EPA and USGS, the data is packaged into Hydrologic Units covering major drainage regions.

The National Water Information System supports the processing, storage and dissemination of information about water quantity and quality collected at over 1.5 million sites around the country. Water is one of six core missions for the USGS, water's focus being to collect and publish reliable, impartial and timely data to facilitate understanding of water resources.

The NHDPlus data is stored in shapefile and .dbf file formats which I processed with a toolchain informed by the vibrant open-geo community. The streamflow values are retrieved from a USGS web service, with data available in 15 minutes increments dating back to 2007. I opted to use summary daily values for the sake of brevity. Views of the data are built with a combination of D3 and Mapbox, a robust open source mapping library.

FUTURE WORK

The opportunities to continue this project forward are many. Open source mapping and geospatial software is being developed rapidly and will have profound implications for the construction of next generation visualizations. I had originally hoped to join streamflow data with the NHDPlus data, locating streamgages in their respective water bodies on a map and using their values to dynamically alter the color or shape of the river segment to which they belonged. This remains a highly promising approach. Additional means of comparison between specific sites, or across specified spans of time would be valuable to the work, as would the ability to export a created view. I suggest a simple line graph of daily summary values, but developing solutions for the instantaneous (15min) data, which is updating live and could be, "plugged in", may be a fruitful prospect. Finally, this work was scoped to HUC 17, the Pacific Northwest, but with the performance advantages offered by WebGL over SVG, a true national view is feasible, if beyond my current capabilities, and would make for an informative, richly detailed, visually impressive description of the data.

