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TreeFlow: A comprehensive web resource for tree-ring reconstructions of streamflow

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By providing much longer (300-1000+ years) records of hydrologic variability than gaged records, tree-ring reconstructions of annual streamflow have proven valuable in water resources planning and management. Over the past decade, both the availability and use of tree-ring reconstructions in the western US have increased dramatically.

The TreeFlow web resource (<http://treeflow.info>) has been recently updated to reflect this expansion, and to facilitate further uses of tree-ring data. TreeFlow is now a truly comprehensive resource on tree-ring reconstructions of streamflow and climate for the western US, providing access to reconstruction data and information on how the data are developed and used. While the primary users of streamflow reconstructions are water resource professionals, people in many other sectors and disciplines may find the data useful.

The first TreeFlow web resource was developed in 2003 with NOAA funding, and was hosted by the NOAA Paleoclimatology Branch. It provided access to reconstruction data, but its scope was limited to Colorado. In 2006, a revised TreeFlow was developed and hosted by Western Water Assessment. The scope was expanded to most of the western US, but in most cases it linked to outside sites rather than providing direct access to data and metadata.

The newly updated TreeFlow site now archives the data for 70 streamflow reconstructions across the western US, organized by major hydrologic basin, with consistent descriptions and metadata for each reconstruction. Of the 70 reconstructions, 30 are gages in Colorado, 9 in Wyoming, and 5 in Utah. There are also two reconstructions for the Colorado River at Lees Ferry, AZ, a gage which reflects much of the runoff from all three states.

TreeFlow is intended to be a dynamic resource. The pages are designed to be expanded as reconstructions are generated for other basins, and as new applications of tree-ring are developed. We welcome the contributions of other researchers and water providers. In the future, we will include other hydrologic reconstruction resources, such as a network of Rocky Mountain snowpack reconstructions and North American monsoon reconstructions that are currently under development.

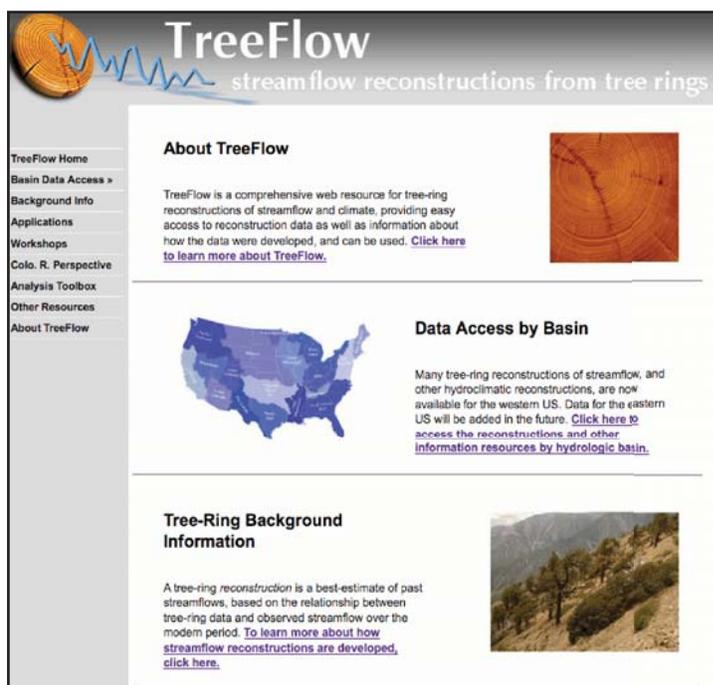


Figure 1: The TreeFlow Home Page (<http://treeflow.info>).

The updating of TreeFlow was a collaborative effort of researchers affiliated with three NOAA-funded Regional Integrated Sciences and Assessment (RISA) programs: Western Water Assessment, Climate Assessment for the Southwest (CLIMAS; University of Arizona), and the Climate Impacts Group (CIG; University of Washington). Funding was provided by the NOAA Climate Program Office, through WWA, CLIMAS, and a cross-RISA grant. Also, the development of TreeFlow would not have been possible without the efforts of many partners in the water resource management community, who have provided valuable data and guidance.

TreeFlow (Figure 1) has six main sections:

Basin Data Access - Links to the basin homepages, which provide easy map-based access to reconstruction data and metadata, and other information resources specific to each basin.

Background Info - Instructional materials that describe how streamflow reconstructions are developed, what they can tell us, and how they can be applied to planning.

Applications - Describes how water managers across the West can



use, and are using, tree-ring reconstructions, with summaries of specific applications from several basins.

Workshops - Reports and presentations from the workshops on tree-ring reconstructions presented by Connie Woodhouse and Jeff Lukas around the West from 2006-2008.

Colorado River Streamflow: A Paleo Perspective – A multi-part feature describing the development of tree-ring reconstructions of streamflow for the Colorado River and the broader perspective they provide.

Using TreeFlow to obtain streamflow reconstruction data

To see if reconstruction data is available for a specific river or gage, go to the Basin Data Access page, then click on the hydrologic basin of interest in the US map (e.g., Upper Colorado). When the Upper Colorado home page opens, look on the basin map (Figure 2) or the list below the map for the river or gage of interest (e.g., Animas River at Durango) and click on that gage to open the portal page for that reconstruction. Each reconstruction portal page tells you who developed the reconstruction, what methodology was used, and provides scatterplots and time-series graphs that show the reconstruction calibration (Figure 3) and the long-term reconstructed flows (Figure 4).

To access the data, click on “Data File” in the upper right hand of the reconstruction portal page. The data files are in ASCII text (.txt) format, with headers with basic information about the reconstruction, and three data columns: year, reconstructed flow, and observed flow. The data can then be copy-and-pasted into a spreadsheet or other program for graphing and analysis.

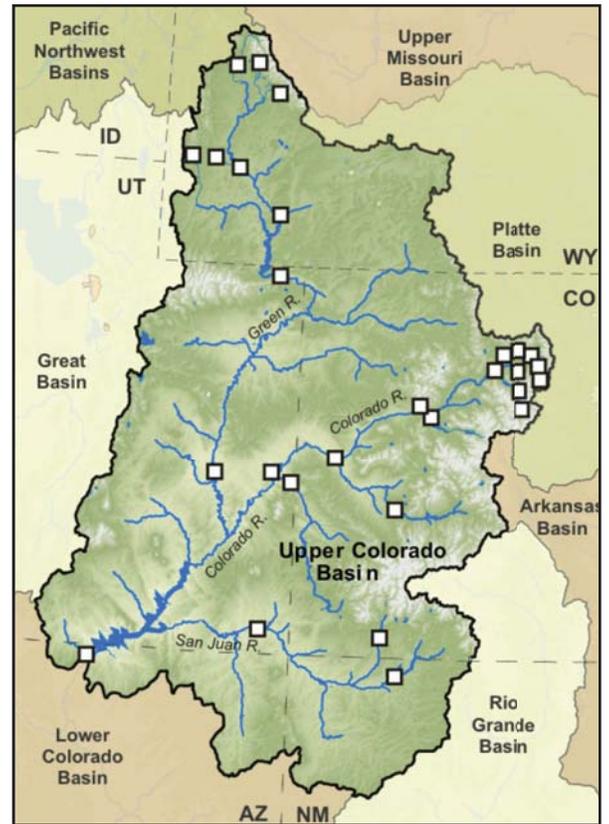


Figure 2: Map showing locations of the 30 gage reconstructions (white squares) for the Upper Colorado River Basin available through TreeFlow (<http://treeflow.info/upco/>). Other reconstructions for Colorado and Wyoming can be accessed via the home pages for the adjacent basins (Upper Missouri, Platte, Arkansas, Rio).

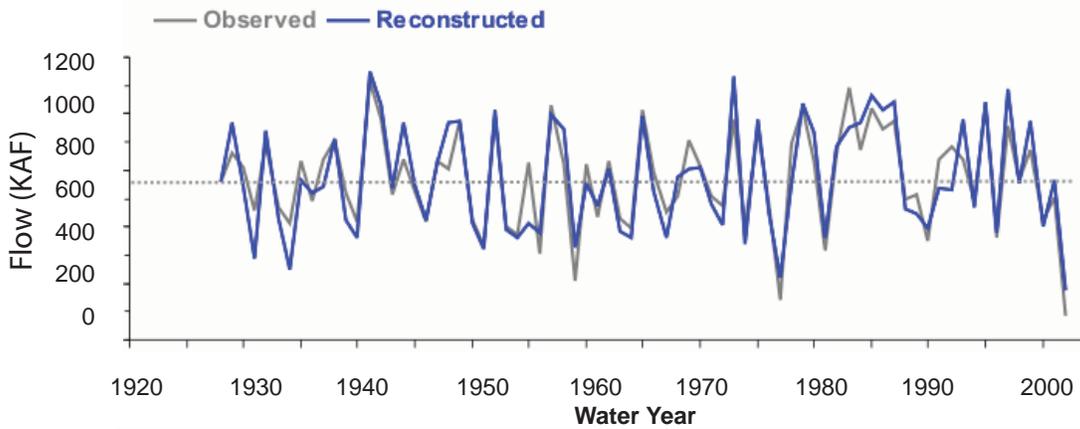


Figure 3: The calibration (fit) of the tree-ring reconstructed annual flows to the observed annual flows for the Animas River at Durango, CO, 1928-2002 (<http://treeflow.info/upco/animas.html>). This figure, and Figure 4, are available for all 70 reconstructions archived on TreeFlow on the respective reconstruction portal pages.

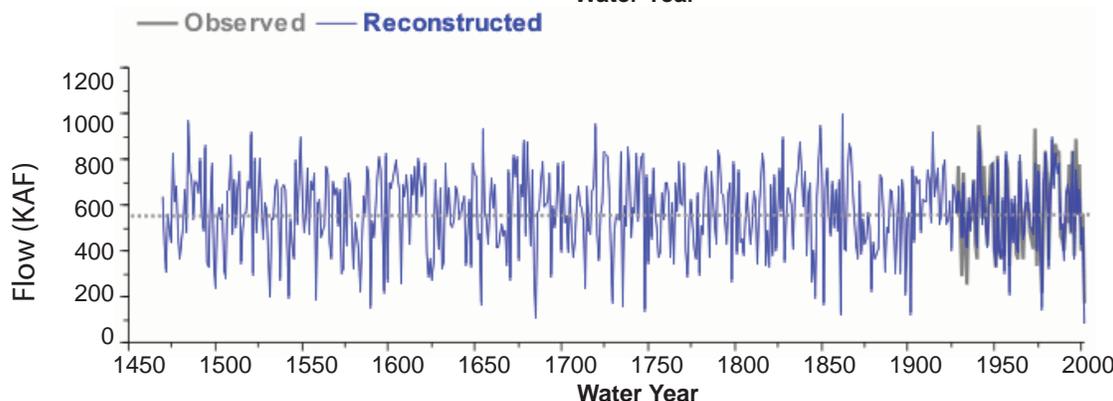


Figure 4: The full reconstruction (1470-2002) of annual streamflows for the Animas River at Durango, CO. These data can be downloaded at <http://treeflow.info/upco/animas.txt>. Data for the other reconstructions can be downloaded from the respective reconstruction portal pages.

