East Branch North Fork Feather River Watershed Information

This presentation will look at the East Branch of the North Fork Feather River (EBNFFR) Watershed by starting at the confluence of the North Fork Feather River (NFFR) and the East Branch of the EBNFFR and working upstream.

The discharge data was obtained from the USGS web site and from the Pacific Gas and Electric Companies database. Three years of discharge data were analyzed using the months of July and August only. To try and give a broad view of the total picture, a wet year (1970), a normal year (1980), and a dry year (1992) were used in the analysis.

The flow data was analyzed by using data from three gauging stations, NF-51 on the EBNFFR (USGS 11403000), Spanish Creek (USGS 11402000), and Indian Creek (USGS 11401500). Flow data from the gauging station was used to calculate cfs/sq. mi. for the Spanish Creek and Indian Creek watersheds. By calculating the CFS mi.^{2} above the gauging stations, It was possible to calculate discharge from the area below the gauge to the "Y" for both Spanish and Indian Creek's

Temperature data was downloaded from the Plumas Corporations web site and the California Department of Water Resources archives thanks to Ralph Hinton. Temperature analysis methodologies were discussed with Gerald Rockwell, USGS, Ralph Hinton, Department of Water Resources (DWR), and Kent Karge, PG&E. There was very little continuous temperature data to analyze, the Plumas Corp. collected temperature data in 2001 and 2003. Because of a more complete record the 2001 temperature data from the Plumas Corp. was utilized. Also DWR supplied temperature data from a 1979 water quality study, this temperature data was collected weekly at six stations and covered Indian Creek from Antelope Reservoir to the EBNFFR at the confluence of Indian and Spanish Creek's.

East Branch North Fork Feather River

The elevation at the confluence of NFFR and EBNNR is 2267'. There is a gauging station, NF-51 approximately one half mile upstream of the confluence. The site was a United States Geological Survey (USGS) station from 1951-1982, at the present time the station is maintained by the Pacific Gas and Electric Company (PG&E). The main purpose for this gauging station is to record discharge (flow) from the EBNFFR watershed. The watershed area above the station is 1025 mi.^{2}. The watershed area between the confluence of the NFFR and the EBNFFR and the confluence of Spanish Creek and Indian Creek (the "Y") is 92 mi.^{2} and comprises 9% of total area above the NFFR and the "Y". The distance between the confluence of the NFFR and the "Y" is 18.3 miles with an elevation change of 646'. In the ENNFFR lies in a southwesterly aspect open to solar radiation, the geology in lower portion of the river is serpentine and supports very little plant and tree growth, so very little shading in the lower 8

miles of river. Shading from riparian trees and aspect protects some of the upper 10 miles of the EBNFFR from solar radiation.

Two major tributaries to the EBNFFR, Mill Creek 2 (there are 3 Mill Creeks in the Feather River Canyon) and Rush Creek, with Mill Creek being the larger of the two. There are eight other smaller perennial streams that are tributaries to this reach a river. There is a half-mile reach of the EBNFFR near Twain that has thermal activity.

Discharge data at NF-51 shows that the 92 mi.^{2} watershed contributes significantly to summer flows even though it only comprises 9% of the total EBNFFR watershed. The wet year, 1970, the 92 mi.^{2} watershed produced an average of 40.4% of the total flow, July (40%) and August (46%). The normal year was quite different, I'm not sure why, the average was 15% of the total flow (July 1%) and August (28%). The dry year, 1992, the small watershed produced an average of 64% of the total flow in the EBNFFR with, (July 59%), and August (68%).

Temperature data used in this analysis was collected by the Plumas Corporation at a permanent monitoring station just upstream from the confluence of the NFFR and EBNFFR. Hobo temps were used to record the data (see spreadsheet). There was no temperature recording station below the "Y"; so water temperature data was simulated by using temperature data from Plumas Corporation monitoring sites on Spanish and Indian Creeks. Each of the sites are above the "Y", the Indian Creek site is approximately 1.75 miles above the "Y", and the Spanish Creek site is approximately 3 miles above the "Y". These streams had very similar temperature readings. Spanish Creek at an average of 70.5° Fahrenheit for July and an average of 68.5° Fahrenheit for August. Indian Creek had an average of 70.2° Fahrenheit for July, and an average of 68.5° Fahrenheit for August.

(See spreadsheets for temperature data

Spanish Creek

He Spanish Creek watershed above the Blackhawk Gauging site near Keddie is approximately 184 mi.^{2}. The Spanish Creek watershed above the "Y" is 192 mi.^{2} and is 19% of the total EBNFFR watershed. The gauge site is at an elevation of 3130'. The confluence of Indian and Spanish Creek is at an elevation of 2893'. There are approximately 800 acre feet of storage in the five small reservoirs above the gauge site (1968). Approximately 4,600 acres are irrigated above the Blackhawk Gauging site (1968). The town of Quincy diverts approximately 450 acre feet of water for domestic use (1968).

The wet year, 1970, the 192 mi.^{2} watershed produced an average of 27% of the total flow, July (25%) and August (28%). The normal year average was 42% of the total flow (July 47%) and August (37%). The dry year, 1992, the l watershed produced an average of 24% of the total flow in the EBNFFR with, (July 27%), and August (21%).

(See spreadsheets for temperature data).

Indian Creek

The Indian Creek watershed above the confluence of Spanish and Indian Creeks is approximately 743 sq. miles. The Indian Creek watershed is 72% of the total EBNFFR watershed. The Indian Creek Stream Gauging Site near Crescent Mills (abandoned) is at an elevation of 3487'. The watershed area above that site is 739 mi.^{2}.

There are three reservoirs above the Crescent Mills Gauging site with a combined storage of 27,800 acre feet. There are approximately 11,800 acres that are irrigated above the Crescent Mills Gauging site.

In the wet year, 1970, the 743 mi.^{2} watershed produced an average of 30% of the total flow, July (35%) and August (24%). The normal year average was 43% of the total flow (July 52%) and August (34%). The dry year, 1992, the watershed produced an average of (24%) of the total flow in the EBNFFR with, (July 14%), and August (10%).

(See spreadsheets for temperature data).

Antelope Reservoir

The elevation of Indian Creek at Antelope Reservoir is approximately 4967'. The elevation of Indian Creek at the DWR weir is approximately 3750'; it is approximately 10.2 miles from the dam to the DWR weir. (See the DWR's water quality spreadsheet

Finish presentation with a description of watershed restoration work in the upper watershed and how that work will not affect water temperatures in the EBNFFR. Watershed restoration will benefit the immediate area and is a good idea, but any decrease in water temperature will be localized. If all of the upper watersheds (Red Clover & Last Chance) are restored, the water still has to travel approximately 40 miles to the "Y". July and August flows are very small, natural warming by ambient air temperature (there are good examples from all the temperature recording sites, and especially the 1979 DWR water quality study), cancel any water temperature decrease attributed to watershed restoration. If it were possible to get cold water attributed to watershed restoration as far as Taylorsville, the majority of the total flow is removed for irrigation. I am not trying to kill the watershed restoration project but it would be physically impossible to get 5-10°F colder water attributed to watershed restoration to the EBNFFR because most of the water is removed above Taylorsville and the distance it to great. If stream restoration were to be embraced by the landowners in Indian Valley (which they do not embrass) the benefits would still be localized. I have already discussed water temperature increases in the EBNFFR (see spreadsheets). I think it would be impossible to get enough cold water down the EBNFFR to affect water temperatures in the NFFR.

Indian Creek from the Taylorsville Bridge – Looking Upstream – 3-4 cfs?