

Bear River – Unimpaired Flows

Contemporary flows in the Bear River are supported by a mixture of in-basin runoff, imports from portions of the Middle Yuba, South Yuba, and North Fork American, and releases from reservoir storage. Over the period 1929-1994, unimpaired (unmanaged) flows in the lower Bear River were estimated to average approximately 303,000 AF per year, while impaired (actual or measured) flows averaged 285,800 AF per year. *(Measured flows are based on values reported by USGS for the Bear River near Wheatland, site #11424000, 1929-2002. Unimpaired flows at the same location were developed by the California Department of Water Resources (1994, pp. 15-17, (PDF, 2.4 MB)) for the period 1921-1992 and, subsequently, 1993-94.)*

From these data, the combined effects of in-basin runoff, imports, storage, and diversions result in an estimated net decrease in flows of approximately 17,200 AF per year, on average, over the common period of record 1929-1994. This relatively small difference is somewhat surprising given the magnitude and extent of upstream changes over time. The result may simply reflect the overarching importance of imported supplies to the Bear River system, or it might also be explained in part by the uncertainties in the unimpaired flow estimates themselves.

It should be noted that measured flows near Wheatland can be greater or less than the comparable estimates of unimpaired flows in any given year. The biggest differences occur mainly during higher-flow seasons and years; in fact, there appears to be little difference between unimpaired and measured flows during low-flow periods (i.e. June-November) irrespective of water year type. These differences are illustrated in [chart], comparing monthly impaired vs. unimpaired flows by quartile group (driest 25% of all years, etc.) See [flows at wheatland](#) (PDF, 14 KB) and [bear monthly flow quartiles](#) (PDF, 65 KB) for supporting data and analysis.

Efforts to estimate unimpaired flows are always difficult but perhaps especially so in the Bear River watershed as there are no records of observed unimpaired flows and because, once observations began to be made, the hydrologic regime had been radically altered. Although the first European exploration of the Bear occurred in 1806 – the Spaniards named the Bear the *Rio de los Osos* and the Yuba the *Rio de las Uva* in 1822¹ - there were no official survey parties until 1849 when Lt George Derby established Camp Far West on the lower Bear. Derby's observations were limited to the lower Bear and other than commenting on the remarkably high quality of the water, he made no record of flows. He did, however, note that "In the summer it [the Bear] has but little water, but is never entirely dry; in the winter it becomes a deep and rapid stream, overflowing its banks to a very considerable extent...."²

¹ History of Nevada County, Thompson and West, 1880, p.47

² Derby, George, "Topographical Reports of Lieutenant George H. Derby, Sacramento Valley in 1849" Quarterly of the California Historical Society, Vol XI No 2, June 1932 pp 101-104.

Indeed, virtually all information about pre-development flows in the Bear River is anecdotal: “The Bear River, from its source southwesterly to the southwest corner of Placer County, is a wild, torrential stream, like the forks of the American, during the rainy season, but quiets down during the dry season to a modest little river....”³ In 1851, the first permanent diversion – the Bear River canal – occurred near Colfax. The Little York Ditch, running from Bear Valley 18 miles to the mining camp of Little York, was started in February, 1852, by General A.M. Winn⁴ and the massive hydraulic mining began in earnest which, between 1849 and 1909, processed an estimated 254,000,000 cubic yards of gravel and debris in the Bear River (Gilbert, 1917). The mining operations left deposits of up to 100 foot depth in some parts of the channel and “The bottomlands along the Yuba and Bear rivers have been covered to a depth of five to ten feet, extending, in some places, one and one-half miles back from the streams.”⁵

The impacts of the mining, diversions, dams, altered land practices (the Nisenan had managed the foothill watershed by burning every year)⁶, the development of roads and towns, and the introduction of cattle grazing were all profound. As a consequence, the natural river and stream flows, springs, pools, vegetation and other factors which had formed the pre-historic hydrograph are unknown. All that is known for certain is that pre-development conditions were such that “the Bear, Yuba and Feather rivers were full of salmon, and the Indians speared them by the hundred in the clear water.”⁷

³ History of Placer County, W.B. Lardner and M.J. Brock, Historic Record Company, Los Angeles, 1924 page 3

⁴ Ibid. p. 323

⁵ Yoshiyama, Ronald et al, “Historical Distribution of Chinook Salmon in the Central Valley Drainage of California, Fish Bulletin 179 Vol I, CDF&G, 2001, p 122 Citing Chamberlain and Wells (1879) p 86

⁶ Matson, R.G., “Aspects of Nisenan Ecology” Center for Archaeological Research at Davis, Publication Number 3, 1972, p.43

⁷ Yoshiyama, op cit. p 121