Ecological Archives M078-009-A1

Mary E. Power, Michael S. Parker, and William E. Dietrich. 2008. Seasonal reassembly of a river food web: floods, droughts, and impacts of fish. *Ecological Monographs* 78:263–282.

Appendix A. Hydrologic monitoring.

We have monitored stage to estimate discharge and stream temperature at hourly intervals at this site since 4 April 1990. In 1990, we repaired and re-instrumented the retired USGS stilling well at the upstream end of our study reach (USGS 11475500, "South Fork Eel near Branscomb"), where river discharge had been monitored by the United States Geological Survey (USGS) from 1947–1977 (peak flows only from 1971 to 1977). We used a USGS generated rating curve for the Branscomb station to estimate discharge (Q, m^3/s) from stage readings from the Branscomb gaging station. For lower flows, (stage, S (m) < 0.5528), $Q = 57.397\ S^{4.4285}$, $r^2 = 0.97494$. For higher stages, $Q = 16.180\ S^{2.2924}$, $r^2 = 0.99944$. A flood frequency analysis indicated that the 1.5-yr recurrence event was ca. 120 m^3/s (Fig. A1).

To estimate discharge when records from the re-activated Branscomb gaging station were not available (before April 1990, or during gaps due to our instrument's failure), we developed regressions between the USGS Branscomb record and discharge at the USGS Elder Creek gaging station (USGS 11475560) during three years (1967–1979) when both were monitored by the USGS: Branscomb discharge (m^3/s) = 0.0886 (Elder discharge, m^3/s)$^{1.16}$, $r = 0.98$, $n = 1096$. Elder Creek is a tributary of the South Fork Eel in our study area, and is gaged at a station 4 km from the Branscomb gaging station (Fig. 1b). We also developed regressions with a downstream monitoring site on the South Fork Eel at Leggett (USGS 11475800), which has been monitored by the USGS since 1965. We selected the regression with Elder Creek for our synthetic hydrograph for South Fork at Branscomb during gaps in our record, as it gave better predictions of Branscomb low flow discharge than did the regression with mean daily discharge at Leggett, which dropped less rapidly than at Branscomb during low flow. Instantaneous peak discharges, however, were better correlated between Branscomb and Leggett than Branscomb and Elder, so we used the following regression to estimate peak discharges for gaps in our record: Discharge (m^3/s) at Branscomb = 0.0043 (Discharge at Leggett)$^{1.05}$, $r^2 = 0.97$, $n = 6$). The peak discharge in 1997 had to be estimated by regression with Elder Creek, however, as the Leggett gage was not recording during that event. This regression was: Discharge (cfs) at Branscomb = 4.5375 (Discharge at Elder)$^{0.58}$, $r^2 = 0.79$, $n = 6$).

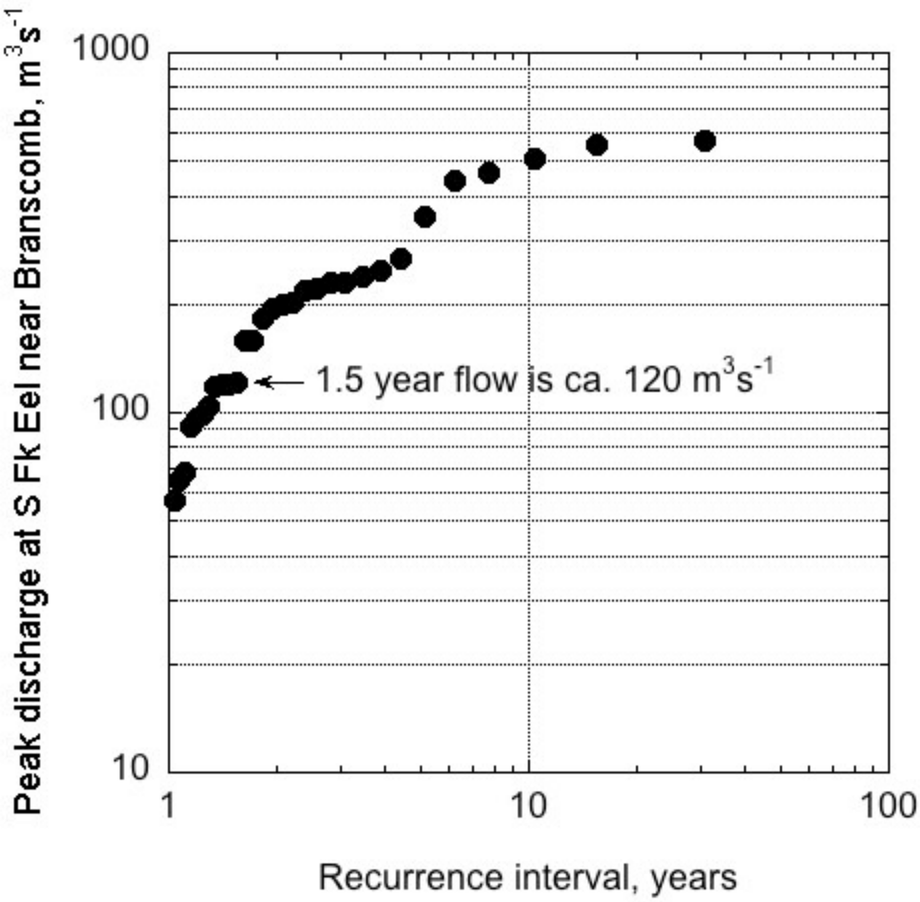

FIG. A1. Flood frequency analysis of a 30-yr record when the Branscomb gaging station was operated by the USGS to estimate bankfull discgarge (120 m^3/s) by its recurrence interval of 1.5 yr (Dunne and Leopold 1978).

LITERATURE CITED

Dunne, T., and L. B. Leopold. 1978. Water in environmental planning. W. H. Freeman, San Francisco, California, USA.

[Back to M078-009]