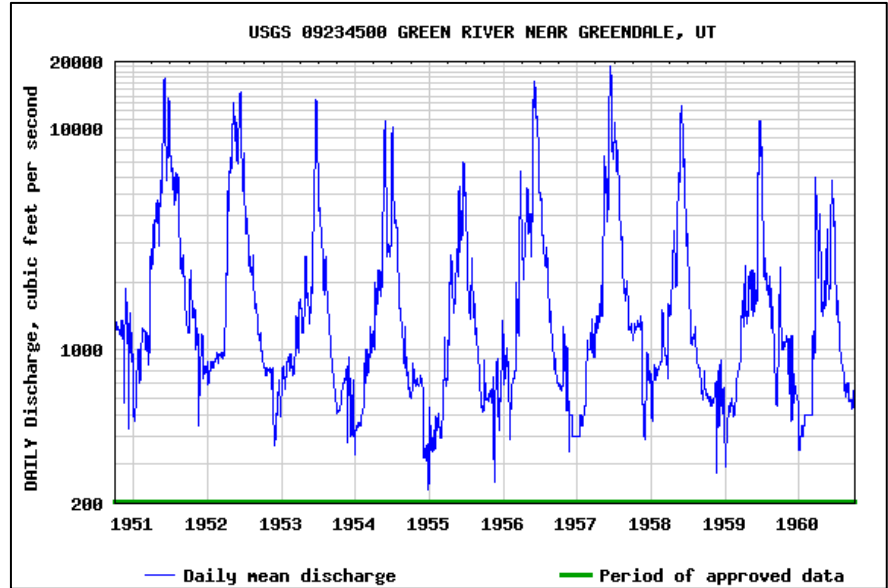


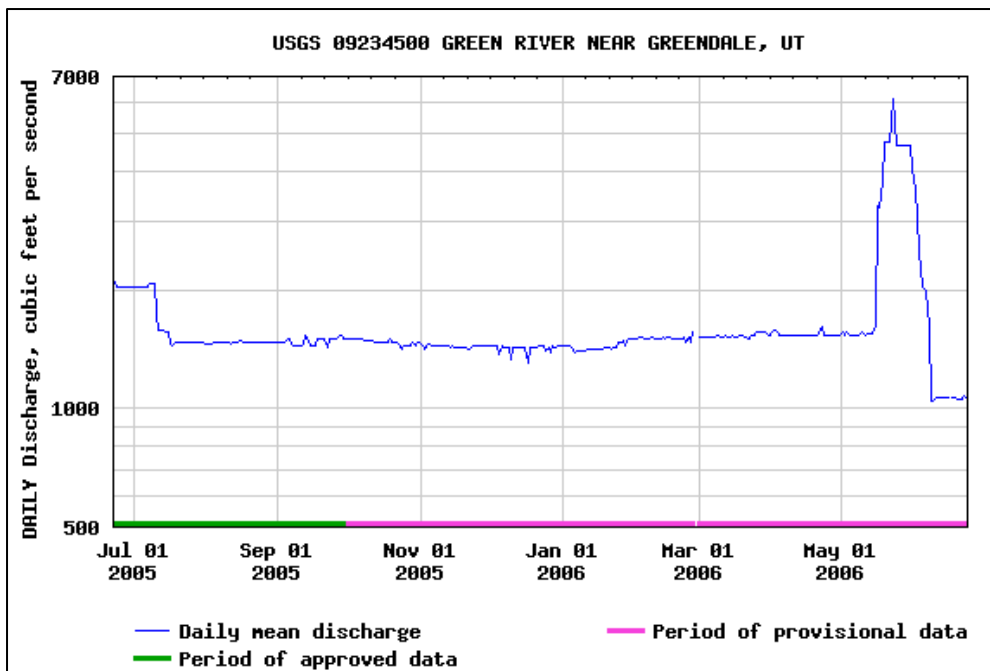
# *Reproducing the natural water cycle and the role of low flows in the middle Green River*

by Karrigan S. Börk

As our raft floated through Brown's Park on June 15<sup>th</sup>, we repeatedly ran aground on sandbars, in spite of the best efforts of our guide. The entire river, from bank to bank, was very shallow in many stretches and lacked a well defined channel. As we pushed the raft off the umpteenth sandbar, I began to consider what the river would have looked like under historic base flows. The flow on June 15<sup>th</sup> was roughly 900 cubic feet per second (cfs) at the USGS Greendale Gage, which is close to the average base flow for much of the last 30 years. The lowest recorded flow in the last 30 years 860 cfs in 1992, based on data from the USGS website.



**Figure 1.** Daily mean flows 1951 – 1961, Greendale Gauge.



**Figure 2.** Daily mean flows 6-23-2005 to 6-23-2006, Greendale Gauge.

These baseflows show a stark contrast with the last 10 years unregulated daily mean discharges, and the contrast is apparent in figures 1 and 2. The River went well below 800 cfs every year before the dam was built, and may have been at even lower flows for a considerable length of time in the unrecorded, pre-

1950 era. These lower flows were likely a significant hurdle to invasive fish trying to colonize the Green River system. While we don't have data on the pre-dam pattern of pools and other deep water refugia that might persist in dry years, the pre-dam hydrologic cycle certainly included more dry periods. The remaining water would have been much warmer and fish would have been crowded into small, low oxygen pools. These high-mortality years would have also reduced or prevented reproduction for many species, which would help to limit invasive species that relied on consistently spawning large number of fish. In contrast, several years without additional recruitment would have had a smaller impact on the native fish, since their life histories are well adapted to the variable environment of the unregulated Green River (Wintzer 2006) (long lived, highly fecund when they do reproduce, fast maturation, etc).

The work on flow restoration in the Green River system has focused on high flow events and temperature maintenance, but this system may require recreation of low flow or drought events for long term maintenance of native fishes. Ironic though it seems, too much water may be as damaging for native fish as too little. The benefits of low flow events for native fish merits additional research.

#### **References:**

Wintzer, A.P. 2006. Ecology and management of native fishes in the Green River, *in* Ecogeomorphology of the Green River, University of California, Davis.