

Based on these findings, the team then developed a set of flow thresholds for meeting specific ecological goals. For example, they determined that flows greater than 30 million cubic meters per day are needed to inundate floodplain and backwater areas and to provide floodplain habitat for fish spawning and feeding. Flows in excess of 40 million cubic meters per day are required to cue Australian bass to migrate downstream and to stimulate recruitment of fish and crabs at the river's mouth and in Moreton Bay. In addition to the volume of flow, the duration, frequency, timing, and other attributes of the flow regime were defined as well. By linking flow thresholds—stair-stepping from 500,000 cubic meters per day up to 100 million cubic meters per day—with the ecosystem and biodiversity functions those flows help sustain, the team was able to come up with a series of environmental flow scenarios. These scenarios were then incorporated into the model used for managing the Brisbane River dam-and-reservoir system in order to determine the effect of providing environmental flows on the system's water supply yield and reliability—the bottom line for water managers.

In some sense the results were sobering. The research team determined, for instance, that re-creating the very low flows (less than 500,000 cubic meters per day) that were part of the natural flow regime is not possible with the current infrastructure and water delivery arrangements. The absence of these very low flows has reduced critical riffle habitat and may have damaged the breeding of turtles and lizards, which bury their eggs in the riverbank. But restoring those low flows is not a simple matter. Large urban demands are met by sending water from Wivenhoe Dam downriver to the Mt. Crosby weir, from which water is supplied to south Brisbane. Reservoir releases less than 500,000 cubic meters per day would not get enough water to Mt. Crosby to meet these water demands. Nonetheless, with a change in water-delivery mechanisms—for instance, using pipes or canals (instead of the river) to deliver water from Wivenhoe to Mt. Crosby—or with an alternative source of supply for Brisbane, it might be possible to restore the natural low flows downstream of Wivenhoe Dam. These options, moreover, would become more feasible if urban conservation and demand reduction measures were implemented simultaneously, because less water would then need to be transported to Brisbane.

Similarly, restoring the very high natural flows needed for habitat diversity and ecosystem purposes would require changes in the use of automobile bridges spanning the river downstream of Wivenhoe Dam. Currently, the law says that bridges cannot be inundated for more than

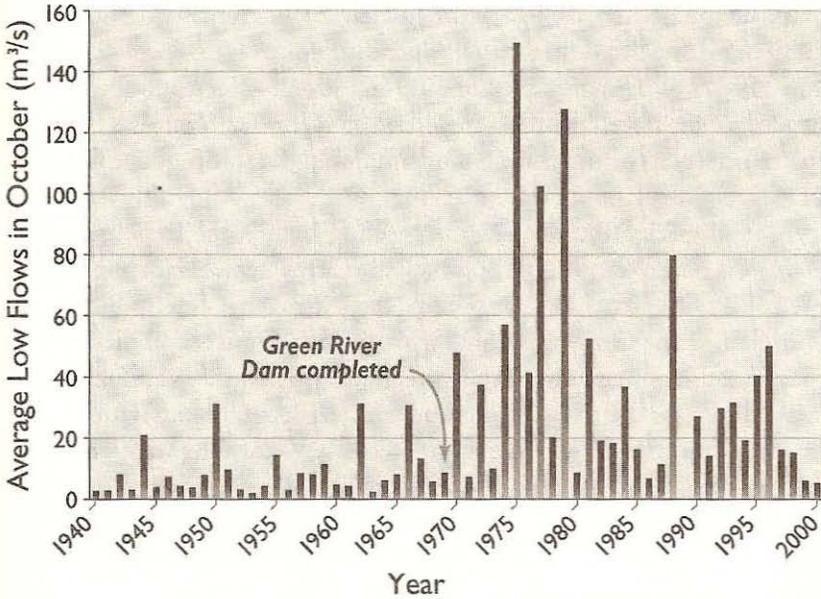


FIGURE 4-10. Alteration of Low Flows in the Green River. Autumn low flows in Kentucky's Green River were altered considerably following construction of the Green River Dam.

The Conservancy scientists believed that the flow alterations associated with the dam were causing serious problems for the Green River's mussels and fish. In particular, they were concerned about the autumn transitions. **During a time when the river's flow would naturally have been low, the large dam releases in autumn created a sustained high flow in the river, nearly filling its channel.** Figure 4-10 shows that in some years the dam-released October flows were five times higher than any of the pre-dam flows in that month. **The Conservancy scientists were concerned that these prolonged, out-of-season high flows were harmful to fish spawning and mussel reproduction occurring during this time, perhaps even flushing some mussels and small fish downstream.** They decided to discuss these issues with the Corps. A meeting with the Corps' Louisville District office was set for June 8, 2000.

On the day of the meeting, the Conservancy scientists met early to discuss their game plan. The group's hydrologist counseled the other scientists not to expect too much from the first meeting with the Corps. Their goal would be to gain a better understanding of the Corps' objectives, not