WATER RESOURCES
IMPACT

GREEN RIVER, KENTUCKY, CONSERVATION PROJECT

W. Michael Turner

How can something exist and not exist at the same time, effect change yet remain almost invisible and virtually unknown? Such a situation would not appear to be a formula for success. But, it is, and therein is the story of the Green River Conservation Partnership.

Citizens and agencies of Kentucky and the Federal government had been working in their own areas of interest in the Green River basin for many years. Mammoth Cave National Park (MCNP) was largely a result of citizen involvement. Contamination of Lost River and Hidden River caves prevented visiting such until pollution was ended as a result of U.S. Environmental Protection Agency involvement in the early 1990s.

The Nature Conservancy (TNC) began its involvement in the Green River basin in the late 1990s and served as a catalyst to bring together many parties sharing an interest in the river. The National Park Service, the U.S. Army Corps of Engineers (Corps) and others had worked together before but now there seemed to be a more common and unified purpose – protection and restoration of the Green River. These projects include the Sustainable Rivers Project, the Handy Riparian Habitat Restoration Project, Mussel Propagation and Reintroduction, Conservation Reserve Enhancement Program and the possible removal of Lock and Dam No. 6.

GREEN RIVER BASIN

The Green River basin is located almost entirely in west central Kentucky covering more than 9,300 square miles. Topography varies from gently rolling in the east to the moderately rugged Western Kentucky coalfields and then into a broad, nearly flat alluvial flood plain as the Green River joins the Ohio River. Generally, the lower third of the basin has more flooding due to relatively level terrain. The middle third, especially tributaries, is greatly impacted by acid mine drainage. Threats to the upper third, the area of Green River Bio-reserve, include agricultural runoff and timbering.

SUSTAINABLE RIVERS PROJECT

The Green River is one of the most biologically diverse rivers in the country. Among its 151 species of fishes and 71 species of freshwater mussels are 12 endemic fishes, more than 35 imperiled aquatic species, and 10 threatened or endangered species that depend on the river and its tributaries for their life cycle requirements. Examples include the eastern hellbender, American eel, and gray and Indiana bats. The Green River forms the base level for on-going development of the Mammoth-Flint Ridge cave system, the longest mapped cave system in the world. The endangered endemic Kentucky Cave Shrimp is one of many species dependent upon this subterranean habitat. The Green River holds the last known reproducing population of the endangered ring pink mussel.

Green River Lake became the first Corps project to receive approval for permanent operation for ecological benefits downstream of a Corps reservoir as part of the Sustainable Rivers Project, a joint effort of the Corps TNC. Final approval was granted on May 16, 2006. This approval was the culmination of a collaborative effort that had its beginnings with a fall 1998 meeting between the Corps' Louisville District and TNC.

Beginning in 1999, TNC and Corps staff worked together to develop reservoir management alternatives that were ecologically sustainable while maintaining authorized project purposes. A preferred plan was identified and implemented on an experimental basis in December 2002. The most important changes are: raising winter pool elevation; delayed fall drawdown and spring filling of the lake; greater use of maximum releases during non-crop seasons; increased releases following crest of downstream high water events; and passing of precipitation events, especially summer thunderstorms, through the uppermost gates of the lake's multilevel control tower as much as possible. Benefits realized from these changes are: improved conditions for reproduction of aquatic species, especially endangered mussels; improved water quality of releases primarily during fall drawdown; extended recreation season on the lake; and variability of releases mimics natural hydrograph prior to dam construction. While temperature control is improved, periods of colder water releases remain a concern during the spring. Experimental operations were evaluated for three years prior to becoming permanent. It was this joint effort at Green River Lake that led directly to the establishment of the Sustainable Rivers Project.

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There have been physical changes in the stream channel, especially within the first 32 miles. Greater movement of bedload sediments, large woody debris, and braiding of gravel bars has been observed and is associated with higher releases during fall drawdown. The effect is a return to more naturally occurring stream processes within this reach of river, a positive impact with regard to maintaining and restoring downstream channel and stream habitat lost to vegetative encroachment and sedimentation over the previous 33 years of

operations. Another important physical change is elimination of unnatural backflows into Mammoth Cave caused by fall drawdown of Green River Lake.

THE HANDY RIPARIAN HABITAT RESTORATION PROJECT

The Corps and TNC were evaluating the Green River Lake operation when, in 2000, Congress authorized non-governmental organizations as cost-sharing partners for certain Corps authorities. The Handy Riparian Habitat Restoration Project became the first such cost shared project between the two organizations. The project constitutes 32 stream miles immediately downstream of the lake. The U.S. Fish and Wildlife Service identified this location as the greatest contributor of sediment to the upper Green River.

At their confluence, the Green River and Russell Creek have watersheds of 743 and 289 square miles, respectively. The uncontrolled watershed of the Green River was reduced to 61 square miles with lake impoundment. Russell Creek became the dominant stream as its watershed is not controlled by any reservoir. For 33 years Russell Creek directly impacted the project site, eroding soils and removing bottomland hardwoods while increasing sediment load and degrading aquatic habitat.

Green River Lake eliminated most out-of-bank flooding in the project area. Prior to impoundment, the project area experienced out-of-bank flooding with each five-year storm event. Now flooding occurs only with a 100-year event. Lack of flooding severely restricts natural recruitment of native trees by eliminating the primary method of seed dispersal.

The project was constructed in the fall 2001 and plantings were finished in spring 2002, all while operational studies of the lake and river were ongoing. At a May 2002 project dedication, Louisville District of the Corps and the Kentucky Chapter of TNC signed the first partnering agreement between two local units setting the stage for others that followed. This agreement also benefited the review and approval process for revised operation of the lake.

MUSSEL PROPAGATION AND REINTRODUCTION

During this same period, the National Park Service constructed a facility for freshwater mussel propagation in MCNP. The facility at Tennessee Technological University, in cooperation with the U.S. Geological Survey, raises mussels for reintroduction into suitable habitats in the Green River basin. The Freshwater Mollusk Conservation Center of Kentucky Department for Fish and Wildlife Resources operates the MCNP facility.

These and two other similar regional facilities are making important advances in propagation of mussel species. Reintroduction of species or augmenting of existing populations is expected soon as in-stream habitat

Green River Handy Riparian Habitat Restoration Project (or simply, GR ecosystem restoration site) Near Greensburg, Kentucky (photo by Richie Kessler, TNC, Winter, 2000-2001).

responds and stabilizes under the SRP operational plan for Green River Lake.

CONSERVATION RESERVE ENHANCEMENT PROGRAM

The U.S. Department of Agriculture, the Kentucky Department of Conservation, and the Kentucky Department of Fish and Wildlife Resources, cooperatively operate the TNC-initiated Conservation Reserve Enhancement Program (CREP) within the bio-reserve. The program provides payments to land owners along the river and tributaries to put land into conservation easements requiring certain land management practices. CREP was very beneficial to the revised operation of Green River Lake and its approval as the first SRP project through removal of low lying lands from agricultural production.

LOCK AND DAM NO. 6

The Corps Louisville District has recommended removal of Dam 6 allowing restoration of 17 river miles, almost all within MCNP, to natural conditions. The river, upstream of MCNP, is designated an Outstanding Resource Water. Such designation ends at the upper reach of Pool 6. It is expected that the 17 mile stretch will attain the same physical and biological characteristics as that of the nearly 100 miles of Outstanding Resource Water upstream. At present, removal remains only a controversial proposal.

LOOKING AHEAD

The Corps Louisville District, TNC, and the many partners of the Green River Conservation Partnership are involved with: (1) monitoring reservoir operations and biological and physical responses; (2) considering modifications to existing outlet works of dams; (3) developing comprehensive reservoir regulation system for all four basin lakes; (4) removing Lock and Dam 6, restoring 17 miles to free flowing stream environment; and (5) studying/implementing SRP practices at Barren River and Nolin River lakes if practicable.

CONCLUSION

The Green River Conservation Partnership has no formal organization, no charter, no rules and regulations. Rather, it is the sum of its parts and members working together in their own areas of expertise toward a common goal to protect and improve the river. There has been significant progress in the past decade. Recognition of accomplishments of the many partners is indicated by those who have visited during this period including: U.S. Senator Mitch McConnell; Secretary of Agriculture Anne Venneman; Christine Whitman, Director of U.S. Environmental Protection Agency; General Robert Flowers, Commanding General of the Army Corps of Engineers; Assistant Secretary of the Army John Paul Woodley; and Steve McCormick, President, The Nature Conservancy. The efforts of two partners, the Louisville District, Corps of Engineers, and the Kentucky Chapter, TNC, even led to the development of a national program, the Sustainable Rivers Project, to enhance environmental productivity and sustainability of the nation's freshwater streams. Not bad for something that doesn't really exist!

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