

RIVER RESTORATION

Colorado City Plans Enhancements to South Platte River

RECENTLY APPROVED plans for enhancing portions of a 2.4 mi long segment of the South Platte River in Littleton, Colorado, aim to improve ecological conditions on a heavily modified urban waterway whose flow regime was significantly reduced more than 30 years ago. A chief goal of the project is to alter the channel in various ways, essentially recalibrating it so that it will conform more closely to its current hydrologic conditions. In return, the revamped section of river is expected to function in a more natural way and sustain increased populations of fish and wildlife.

The stretch of the South Platte River that is the focus of the enhancement plan is encompassed within the 878-acre South Platte Park, which is owned by the City of Littleton and managed by South Suburban Parks and Recreation, a quasi-municipal corporation that is based in Centennial, Colorado, and oversees parks for Littleton and five other cities. Although much of the South Platte River within the Denver metropolitan

area was channelized decades ago as part of efforts to control flooding, the section of the river within South Platte Park was not. Instead, the City of Littleton created the park in 1973 to provide a nonstructural means of flood control and offer recreational opportunities along the river. The hundreds of thousands of visitors to the park each year take advantage of such amenities as hiking trails, a fishing pier, and boat chutes.

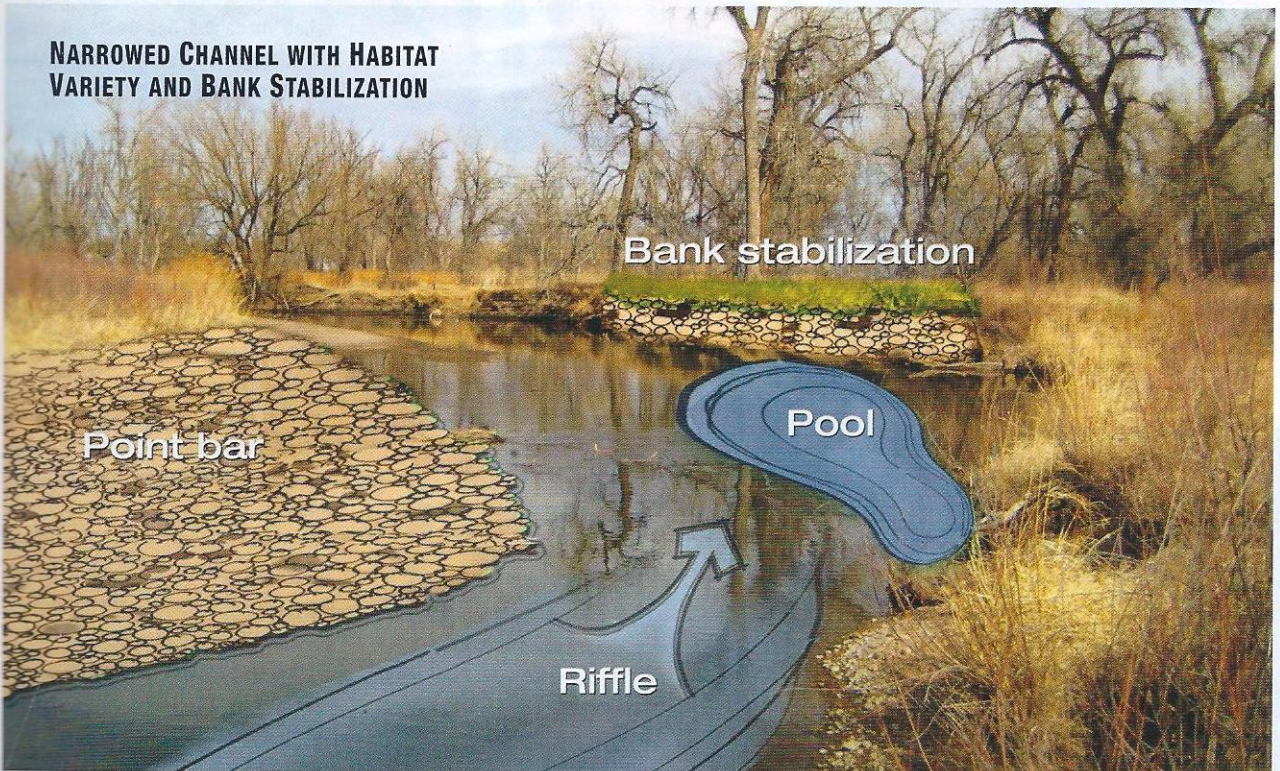
In December the City of Littleton and South Suburban Parks and Recreation approved a plan developed by Ecological Resource Consultants, Inc., of Evergreen, Colorado. In particular, the plan calls for making improvements to the river using restoration techniques that seek to mimic a natural stream system. The improvements are designed to counteract the negative effects within the channel caused by the construction of a large dam upstream. After severe flooding in 1965, the U.S. Army Corps of Engineers constructed Chatfield Dam on the South Platte River about 1.5 mi upstream of the current project boundary. Completed in 1975, the 13,136 ft long rolled-earth dam forms Chatfield Lake, which has a total storage capacity of 355,000 acre-ft.

Upstream of Chatfield Dam, the South Platte drains a basin having an area of approximately 3,000 sq mi. Be-

fore the dam's construction, the section of the river that passes through South Platte Park typically experienced flows of roughly 4,000 cfs during a 1.5-year flood. After the dam was constructed, those flows declined to about 650 cfs. As a result, the existing stream channel is "much wider than it ought to be for its current flows," says Troy Thompson, P.E., the president and a senior water resources engineer for Ecological Resource Consultants. In turn, the excess channel width leads to water levels that are shallower than they would be normally. Under low-flow conditions, in particular, the shallow water can be deleterious to fish and other aquatic species.

Because flows released from the dam contain little sediment, water traveling downstream causes significant erosion. After the dam was completed, the river began a process known as downcutting, in which downward erosion of the channel itself lowers the elevation of the riverbed. Although the Corps subsequently installed grade control structures to halt this downward erosion, those structures altered the profile of the channel and created vertical drops that form a barrier to migrating aquatic species. Meanwhile, land use practices in the vicinity of the park over the years have encroached on the channel, significantly reducing

NARROWED CHANNEL WITH HABITAT VARIETY AND BANK STABILIZATION



Civil Engineering

NEWS

its sinuosity and removing much of the woody vegetation along its banks. All told, the changes in flow regime, sediment load, and channel layout have significantly altered the riparian areas within the project location.

To address these problems, the enhancement plan for the portion of the river passing through South Platte Park calls for implementing a variety of measures, including reducing the stream bank-full, or active channel, width. "What we're trying to do is generate a stream corridor that is in balance" with current flow conditions, Thompson says. To this end, the plan calls for regrading

the channel to restore such natural features as riffles, pools, and glides—that is, the segments between pools and the next riffle downstream. The channel will be formed with a distinct thalweg to keep the water within a demarcated zone during periods of low flow. To facilitate fish migration, riffles will maintain minimum flow depths during dry periods and will be used to eliminate the

vertical drops currently present at existing grade control structures.

The plan also calls for the construction of terraces, or point bars, to narrow the channel width and increase channel sinuosity. To be located on alternating sides of the river, the point bars will help restore a meandering flow pattern while reducing channel width. Designed to be inundated during periods of high flows, the point bars will be exposed during low flows. Depending on the potential for erosion at a given location, the point bars will be made of soil riprap or native materials.

The various measures used to reduce channel width will benefit fish and other aquatic species, Thompson says. "By having a narrower channel, we'll be able to make the average flows much deeper, which will improve the aquatic habitat," he says. Since the South Platte is the largest waterway in the Denver metropolitan area, the project offers a real "opportunity" to rejuvenate populations of fish and other wildlife in an urban setting without diminishing the park's existing flood control characteristics, Thompson says.

Meanwhile, two different approaches

to bank stabilization will be used along the project reach. In locations where large cottonwood trees are present or eroding banks are to be left to maintain habitat for such wildlife as kingfishers, the toes of the banks will be reinforced with soil-filled riprap to hold the upper portion of the bank in place. In other locations, the toes of eroding banks also will be stabilized by means of soil-filled riprap, but the upper portions will be recontoured to create a less vertical and more stable slope. These slopes will then be planted with native riparian vegetation. In another effort to improve wildlife habitat, the plan calls for creating a zone of wetlands along the fringes of a lake within the park formed by prior quarry activity and creating native riparian pockets along the river.

Overall, the improvements called for in the enhancement plan are expected to cost \$4.2 million, says Skot Latona, the supervisor of South Platte Park for South Suburban Parks and Recreation. For financial reasons, the work will be conducted as funding allows. Three projects having a total estimated cost of roughly

\$400,000 are expected to be constructed by year's end, Latona says. The three projects will entail stream improvements to the river near the park's nature center, the creation of a wetland fringe along one of the park's lakes, and stabilization of a section of eroded riverbank.

Because design work remains to be done, construction work on the three initial projects probably will not begin before this fall at the earliest, says Laura Kroeger, P.E., the assistant manager of design, construction, and maintenance programs at the Urban Drainage and Flood Control District, a quasi-government agency that assists local governments in the Denver area with matters relating to drainage and flood control. In addition to helping fund the enhancements to the South Platte River, this agency is serving as the program manager. Other organizations contributing financially to the project include Colorado Parks and Wildlife, the Colorado Water Conservation Board, the Corps of Engineers, and two local chapters of the conservation organization Trout Unlimited, of Arlington, Virginia. —JAY LANDERS