River Restoration for Wildlife
—*In and Out of the Water*

When considering connectivity for wildlife, let's not forget the aquatic species whose water-dependent habitat is perhaps the most sensitive of all here in the Southwest.

Restoring an active, moving river requires a significant commitment of time and financial resources to accomplish, which explains in part why waterways on both public and private property throughout New Mexico have degraded in a myriad ways over the decades and centuries. Drought, floods, the ash and heavy debris from forest fires, and years of silt runoff and build-up from development and certain land management and agricultural practices take their toll on our waterways and associated riparian and wetland areas. When landowners do invest in riparian restoration, they contribute to the resilience of the larger watershed, help improve connectivity and preserve whole ecosystems and the biodiversity of plant, animal and insect life that might otherwise be lost entirely.

Working with the River

"The best thing anyone can say to me when they look at the river now, a few years after the restoration work is done is: "It doesn't look like you did anything,'" says **Jack Kelly**, with a grin.

Jack retired as the Chief of Fisheries for the New Mexico Department of Game and Fish after a long career with the agency. He is now a restoration consultant, working with landowners to improve their properties.

Jack is passionate about rivers. Generally, there are two different approaches to river restoration, he explains – one approach that needs to be worked on repeatedly every year to maintain, or the longer-lasting approach he prefers which is to work ***with*** nature by intervening in ways that enhances the river's ability to continue the restoration process ***on its own***.

One such project Jack consulted on began in 2007 when the current landowner acquired the property along the Pecos River, which is now under conservation easement, held by NMLC. At that time, the river looked nothing like it does today.

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July 2007. A 225-yard stretch of the Pecos River. Straight, no meanders, poor sport fish habitat.

September 2007. Measuring stream width.

July 2007 Steep, cut banks. High turbidity during spring runoff and flood events.

BEFORE: post-spring runoff, June 2007.

October 2008. Installing "boulder barbs" designed to protect the bank and move the force of the river 8 to 10 feet offshore.

October 2008. Shaving the bank to encourage the establishment of riparian vegetation.

June 2009. The boulder barbs are beginning to "lock in" as organics are filling in. Grasses are starting to establish. Large cobble gravel bars emerge as water level drops.

Riffle drop structures are used to deepen the upstream pool/run habitat, regulate stream velocity and provide habitat for macro-invertebrates.

July 2020. The Pecos River as it looks today.

A River Restoration Plan (cont.)

In Jack's initial onsite assessment of the river's condition he noted long stretches that exhibited the following characteristics:

- Straight (no meanders)
- Wide (up to 75 feet across)
- Shallow (ankle deep)
- Solid ice, surface to bottom, during winter months
- Steep, cut banks (high turbidity during spring runoff and monsoon flood events)
- Increased water temperatures during late summer/early fall (routinely exceeding New Mexico State Water Quality Standards)
- Poor to almost nonexistent sport fish habitat

"The river will just keep trying to cut its banks – it just keeps spreading wider," Jack said. "Width and depth are related," he added, "and depth affects temperature which in turn affects aquatic habitat." To address these issues, Jack put together a plan with the following objectives:

- Stabilize the banks to withstand normal spring runoff and monsoon flood events.
- Reestablish a more historical stream width of 35 feet.

"When you turn a river 75 feet wide and ankle deep to 35 feet wide, you increase velocity which cleans out the river like a hose nozzle – like a power wash," Jack said.

- Shave steep-cut banks to encourage vegetative riparian species
- Restore the meander pattern in the stream
- Established gravel bars to maintain stream width and velocity
- Provide aquatic habitat for the sport fish (brown and rain bow trout), native forage fish (long nose dace, Rio Grande chub), and macro-invertebrates (mayflies, caddis flies and stoneflies) by:

  1) establishing shallow riffle drop structure (see photo, left page, bottom left) for macro-invertebrates and controlled velocity; 2) interconnecting runs to allow sport fish and forage fish to travel freely; 3) establishing deep pool habitat (refugia for low summer flows and winter ice-over); 4) maintaining in-stream islands to provide narrow side channels for spawning habitat

- Construct all habitat improvement/protection structures for low annual maintenance.

The landowner commissioned the work and after much of the "heavy lifting" was completed – mainly moving earth and stones – the natural behavior of the river contributed to its own restoration. For example, "Mother Nature did all the revegetation," Jack said. "We didn't have to seed a thing."

"You want to try and make changes that will hold up during the average spring runoff seasons and hopefully, through a major flood event like we had in the fall of 2013," Jack said. "We were lucky that flood was six years after the restoration had filled in – the work held relatively well and the river recovered pretty quickly," he reported.

Working with NMLC, the landowner later placed a conservation easement over the property to protect the restoration effort from future development, and the proceeds from the sale of the associated New Mexico state tax credits helped cover some of the restoration costs.

The river was hit hard by the resulting debris from forest fires upstream the summer of 2013. "The river turned black with ash, huge ponderosas jamming up in places, and dead fish everywhere . . ." Jack recalled, sadly. But the restoration efforts along with the previous flood enabled the river to eventually flush out the debris and damage, and the fish populations are slowly rebuilding.

Wildlife, both in and out of the water, benefit from this little stretch of riparian oasis. Jack said, "We had a beautiful bull elk on the property recently. That's the best testimonial you can get!" #

All photos courtesy of Jack Kelly