

**Developing a Master Plan
for the Santa Fe River in Santa Fe County**

**from the western boundary of the City of Santa Fe
to the Wastewater Treatment Plant**



Recommendations of the Santa Fe Watershed Association

By Paige Anna Grant, Executive Director

February 7, 2003

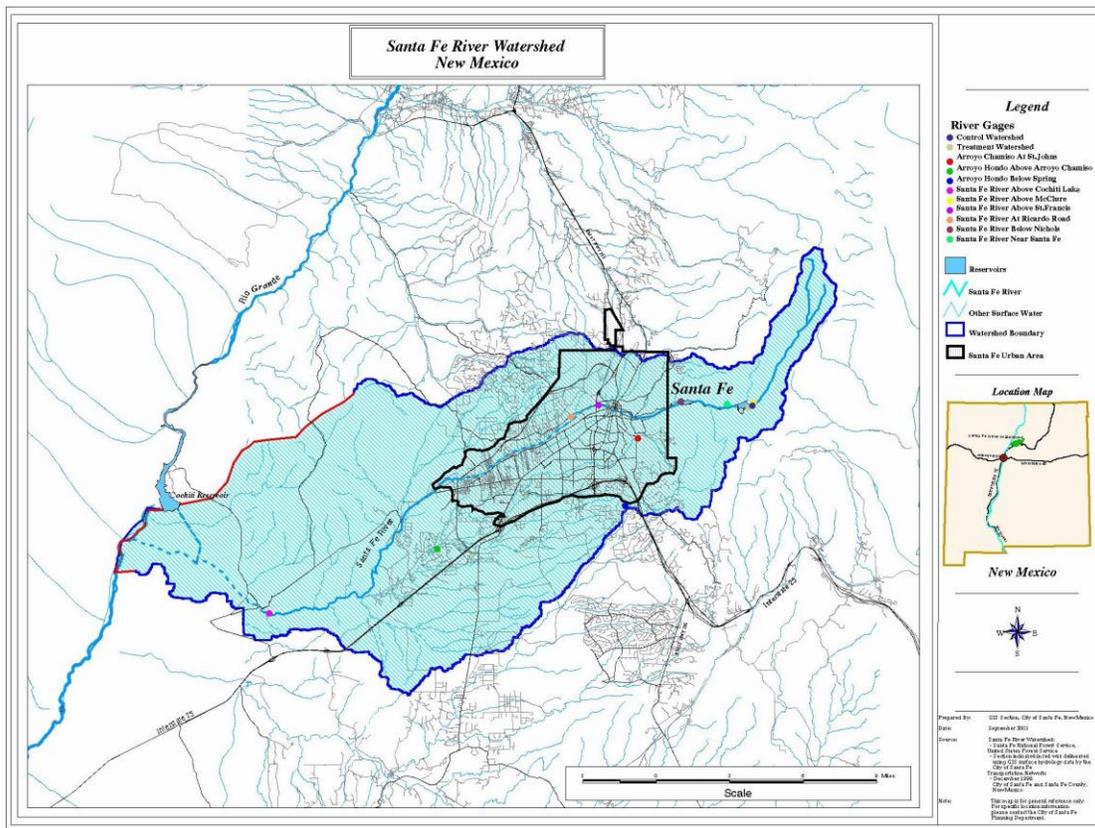
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1. INTRODUCTION

The Santa Fe River has its source below Lake Peak in the Sangre de Cristo Mountains in northern New Mexico, and flows – and doesn't flow -- for 46 miles through a 285-square-mile watershed, to its confluence with the Rio Grande. For centuries, the Santa Fe River has supplied its human population with water for farming and domestic

needs. We have grazed our animals and cut firewood and timber on the slopes above the river, diverted it for agriculture, impounded it for a municipal water supply. In the latter half of the 20th and into the 21st century, we have sprawled more and more widely across the landscape with urban and suburban development.

The result, as we enter the third millennium, is a river with intermittent flow that serves as a conduit for stormwaters collected from the ever-increasing area of streets, parking lots and rooftops – stormwaters that enter the river at high velocities, carving the channel deeper and deeper, cutting the river out from under the bosque that once lined its banks, leaving the old acequias high and dry. Decades of sand and gravel mining have removed up to 40 vertical feet of material, further disrupting the equilibrium of the system. At the wastewater treatment plant, the City’s effluent is treated to near drinking water standards and discharged back to the river channel. Within a few hundred yards of the treatment plant, high coliform counts indicate that the river is already polluted again by contaminated runoff. In the reach between the wastewater treatment plant and La Cieneguilla, the river has been diked and bermed in an attempt to protect the county road. At high flows, it seeks its natural channel and tears up roads and fences that have been laid across its path. Eventually the river drops into the lower Santa Fe Canyon, where it is amplified by springflow and is diverted to irrigate small farms. By the time it enters the plain below La Bajada, there isn’t much river left.

Some people assume the condition of the river has resulted from prolonged drought. This is not the case. Attachment A presents two graphs of precipitation history, the first for Santa Fe between 1941 and 2001, the second for the Southwest over a period of 2000 years. Both show cycles of wet and dry years, and both show that the past two decades have been unusually wet. The dewatering and degradation of our little river is a product of our land and water management practices. What we’ve done can be to a considerable degree undone: this Master Plan Guidance document offers a set of recommendations for actions that will restore the Santa Fe River to its rightful place as the heart of our landscape.

The County has a pivotal role to play in the work of restoring the Santa Fe River and its watershed. All but about ten percent of the watershed area lies in Santa Fe County (below La Bajada, the river runs for about six miles through Sandoval County to its confluence with the Rio Grande). However, the problems described in this paper call for collaborative solutions involving the multiplicity of jurisdictions, ownerships and communities that share the river and its landscape.

This Santa Fe River Master Plan Guidance builds on the 1995 City of Santa Fe River Corridor Master Plan. It focuses on the river in the rapidly developing area of Santa Fe County west of the City boundary. It offers a vision for a restored Santa Fe River;

characterizes six planning segments of the river, with special consideration for the unique qualities of each reach in recommending actions there; summarizes planning and restoration efforts related to the Santa Fe River, and provides a directory of agencies, environmental groups and funding sources involved in river work; and offers an “Rx for a River”, listing the problems of the river, causes of those problems, and approaches for addressing those challenges.

2. VISION

The Santa Fe River should once again be the heart of the community, a green and quiet refuge for people and wildlife. The landscape that drains to the river should be covered with an appropriate mix of plants that hold the soil and slow the movement of runoff after rain or snowmelt. The amount of sediment delivered into the river’s tributary arroyos and into the river itself should be in balance with the channel slope and flow. The river should contain streamflow for much of its length over much of the year, its waters shaded by cottonwoods and other bosque trees and shrubs. The floodplain should be colonized by vegetation that will stabilize the channel when the floods roar through, impeding flood flows to reduce their erosive force. Slowing such flows will induce infiltration through the riverbed, recharging groundwater which will in turn feed the springs that keep the river alive in periods of low flow.

To achieve this vision, goals for each planning segment of the river through the project area are identified in Section 5.

3. PROJECT AREA

This plan focuses on actions that the County can take to restore and protect the Santa Fe River from the City of Santa Fe’s western boundary to the Wastewater Treatment Plant. Planning segments within this zone of the river are defined in Section 5 and illustrated in the plan and profile drawings of the river contained in Attachment B.

Conditions below the Wastewater Treatment Plant differ sharply from the reaches above it, for two main reasons:

- the perennial flow of treated effluent below the Treatment Plant creates a different kind of river in that zone;
- the land reverts to a more rural character below the Treatment Plant, resulting in different issues expressed by local residents with reference to management of the Santa Fe River.

It is highly recommended that the river planning process be extended downstream to address these special circumstances.

4. PLANS AND ACTIONS RELATED TO THE SANTA FE RIVER IN THE PROJECT AREA

The plans and projects listed below (in alphabetical order) have focused directly or indirectly on the Santa Fe River. All have incorporated significant public input, and consistently the public has spoken of the importance of the Santa Fe River to their community, and their desire to restore the river and make it accessible as open space. The current effort incorporates these plans and focuses on actions the County can take in the project area to put them into action.

Airport Development District Plan (in process at time of writing). The Airport Development District extends from the community of La Cieneguilla north toward the Caja del Rio. Discussions with landowners in the area in connection with the Airport Development District planning effort have resulted in expressions of support for protecting and restoring the Santa Fe River in this zone.

San Ysidro River Park. In 2001, under its Open Lands Program, Santa Fe County acquired 14 acres of severely incised, degraded river property immediately downstream of the San Ysidro crossing of the Santa Fe River in Agua Fria. The Santa Fe Watershed Association and Santa Fe County secured an EPA Wetlands grant to restore the river using bioengineering techniques, and develop the property as a “river park”, with the goal of restoring the river to something like the conditions recalled by Agua Fria village elders. A Steering Committee made up mostly of Agua Fria community members met regularly to guide development of the River Park, and at the time of writing a design for restoration is nearing completion and applications are in progress for permits to allow construction. Attachment C contains a flier describing the River Park concept, and a guidance document for the restoration design.

Santa Fe County Open Land and Trails Plan (adopted May 22, 2000). This comprehensive evaluation of open land and trails in Santa Fe County identified the Santa Fe River from the former Two-Mile Reservoir site (now The Nature Conservancy’s Santa Fe Canyon Preserve) through the City of Santa Fe and La Cienega, as a “significant conservation area” which should be afforded protection. It states, in part: *The Santa Fe River and La Cienega Creek are two of the few remaining permanent rivers in the area and contain critical riparian habitat. The potential is great for restoration. If protected properly and action is taken to reestablish riparian vegetation and historic wetland habitats, this corridor can attract and support a great variety of wildlife...The river has potential as a major migratory corridor for avian species...* The plan recommends a trail along the Santa Fe River.

Santa Fe River Corridor Master Plan, adopted by the Santa Fe City Council in

September 1995. This plan was developed by a citizens' task force with the assistance of river restoration engineer Gary Lacy from Boulder, Colorado. To quote from the introduction: *The object of the Plan is to develop a diverse and aesthetically pleasing corridor along the Santa Fe River from Two Mile Reservoir to the wastewater treatment plant. ...The guiding principles are riparian restoration, flood protection, erosion control, aesthetic design considerations, recreational and community uses, sound engineering, public safety, and cost effectiveness.*

Santa Fe Watershed Restoration Action Strategy (2002). The WRAS was prepared by the Santa Fe Watershed Association in response to an EPA requirement that Clean Water Act Section 319 proposals be generated from an overall assessment of watershed condition and non-point source pollution issues. It was developed with the oversight of a Watershed Advisory Group representing many of the land management and regulatory agencies, environmental concerns and neighborhood representatives in the Santa Fe River watershed. It presents a summary of the natural resource base of the watershed, a history of the dewatering and degradation of the Santa Fe River, and a set of recommendations for watershed and river restoration.

Southwest Santa Fe City/County Planning Initiative: Final Report, April 2001. This report was prepared by a consortium of local and national planning consultants, designers, and public outreach facilitators, to guide the development of the rapidly urbanizing area along Agua Fria and Airport Road. The public input process employed in the study resulted in development of "Principle 10" (quoting from Chapter 5): *The Santa Fe River is an important landmark in Southwest Santa Fe. It should be protected and easements should be created to provide residents with access to the river.* The related "Building Block" of a plan for the area reads: *Access to the river will require the creation of a River Connection Zone that would border the Santa Fe River and flood plain for a depth of 200' to 350'. Easements allowing public access would be purchased from property owners.* This principle was rated 4.43 out of a possible 5 by participants in the planning process.

State Land Office Master Plan for Rio Nuevo (2002). The State Land Office owns a mile of the Santa Fe River corridor upstream of the Highway 599 crossing of the river. In a precedent-setting effort to bring federal grant funds to bear on restoration of trust lands, in 1999 and 2001 the Land Office obtained Clean Water Act Section 319 grants through the New Mexico Environment Department. With this funding, and with the assistance of the City and County of Santa Fe and environmental and community groups, the Land Office implemented a river restoration project using bioengineering techniques that has begun to restore natural meanders to the river reach, reducing bank erosion and restoring conditions for a bosque to return. The Master Plan for the project calls for permanent protection of the riparian corridor as open space, with adjacent State Land to be developed for housing and commercial uses consistent with protection of

the river corridor. Trail easements have been granted to the City of Santa Fe and Santa Fe County, to create a river trail connected with the City's Municipal Recreation Complex in the Caja del Rio area. The County's easement constitutes 45.6 acres of floodplain. The State Land Office hopes to develop a three-way Memorandum of Understanding with the City and County for management and maintenance of the riparian area.

Treated Effluent Management Plan (TEMP) (1998), a consultant report to the City of Santa Fe, evaluated various options for reuse of the treated effluent generated by the Wastewater Treatment Plant, including its use to enhance streamflow and concomitant recharge in the reach of the river affected by the City's 1950's-era well field.

5. **RIVER PLANNING SEGMENTS WITHIN THE PROJECT AREA: CURRENT CHARACTERISTICS AND GOALS**

Please refer to the Santa Fe River Plan and Profile in Attachment B in reviewing the description of individual reaches.

CAMINO CARLOS RAEI CROSSING TO CHECKDAMS NEAR ECOVERSTY

Current Character: This reach begins with a 3 ½ -foot drop from the road crossing to the river bed downstream. Textbook examples of "car-body riprap" are displayed in the banks below the crossing, illustrating several decades of attempts by private landowners to shore up the river banks against erosion by the river. These properties were threatened as the river cut progressively deeper in response to flows dropping over the crossing, as well as by headcutting due to disruption of the riverbed by sand and gravel mining downstream. This first reach ends where the river changes character as a result of a series of concrete checkdams near the river frontage of the Ecoversity property located at 2639 Agua Fria. The checkdams have arrested the downcutting of the river, creating a shallow grade in a wide channel. Vegetation in this reach is sparse and trees are mostly Siberian elms.

The river in this reach appears to be viewed by the local community more as an annoyance than a resource: landowners are generally aware of it only to the extent that it serves as a source of sand for home construction projects, or poses an erosional threat. Since it is lined with private properties and barely visible from any road, the wider community has little relationship with this reach except when they encounter occasional flows at the Camino Carlos Rael crossing.

Goals: Raise the river bed downstream of the Carlos Rael crossing to a level consistent with maintaining adequate flood conveyance capacity without threatening to inundate adjacent private property. This will assist in stabilizing the banks of the channel through sediment buildup at the toe of the side walls.

Install a boulder apron or equivalent structure below the Carlos Rael crossing to reduce the erosional effect of flows falling from the crossing to the riverbed.

Work with the City to manage the stormwater that is currently discharged at a major outfall below Frenchy's Park, to induce infiltration and attenuate discharge of such flows upstream of Camino Carlos Rael .

Once the bridge recommended by the City/County Arterial Roads Task Force is constructed at Siler Road, close the vehicular crossing at Camino Carlos Rael. A pedestrian bridge at the lower end of Frenchy's Park is currently under construction, which will help maintain connectivity between the Alameda and Agua Fria/Osage neighborhoods without the impacts of vehicular traffic on the river.

"ECOVERSITY CHECKDAMS" TO SAN YSIDRO CROSSING

Current Character: Between the above-noted concrete check dams and the low-water crossing/grade control structure at San Ysidro crossing in Agua Fria, the river is protected from the kind of downcutting seen upstream and downstream of this reach. There is a natural meander and stable, vegetated point bars in the river channel in the property belonging to Plants of the Southwest, on Agua Fria Road approximately ¼ mile southwest of the Siler Road intersection. These features may serve to make this a useful "reference reach" in establishing similar conditions upstream and downstream of this zone. Several property owners in this section are actively interested in the use of bioengineering to enhance channel stability and restore riparian vegetation, and are also receptive to providing an easement or otherwise conveying property for a Santa Fe River trail.

Goals: Work with landowners in this reach on engaging in bioengineering-based river restoration and developing a Santa Fe River trail.

SAN YSIDRO CROSSING TO LOPEZ LANE BRIDGE

Current Character: This reach, which marks the northern boundary of the historic village of Agua Fria, begins with a fall of 13 feet from road level to river bed. For several hundred feet below this drop, the channel is relatively straight, about 30 feet

wide, incised and unstable, with vertical walls up to 20 feet in height, cut in loosely consolidated or unconsolidated sediments.

The channel cuts through three sandstone “stringers” some 5 to 15 feet in width, that appear to be related to a normal fault, clearly visible in the north wall of the channel about 750 feet downstream of the San Ysidro crossing structure. This fault functions as a groundwater dam: upstream (east) of the fault, groundwater is relatively shallow, with the water table some 20-80 feet below ground level, whereas west of the fault groundwater levels drop to a minimum of 200 feet (see Attachment D). The fault can be recognized on the surface by a sharp change in the amount of vegetation on the east and west side of it. Upstream, there are a number of young volunteer cottonwoods in the river channel, while downstream, vegetation is extremely sparse. Community members point to the incision of the river through what is locally known as the “dike”, to explain the sharp drop in water levels in the Agua Fria community well and other wells in the area over the past decade or so. They speculate that as the river cut through the dike, groundwater drained through that gap. While there are doubtless other factors involved in dewatering the local aquifer, including the sheer increase in number of wells and the decline in river flows that once recharged groundwater, it is a legitimate concern that the downcutting of the river has contributed to draining local groundwater resources.

A short distance below the last of the sandstone stringers, the river swings through a northerly bend, apparently induced by introduction of a large amount of fill dirt on the north bank. It then enters a zone where the channel is much wider – up to 200 feet in places -- and extraordinarily degraded. This is largely due to the activities of the M&R Sand and Gravel mine, which owns about 12 acres of riverbed and adjacent land in this reach. Their operations have created critically unstable bank walls over 30 feet high, excavations on the order of 15 feet deep within the river channel, and landfills of construction debris and possibly other materials within the river channel.

From M&R’s western boundary to the Lopez Lane Bridge is approximately 2000 feet. In this zone, modular housing units and fencing have recently been installed very close to the edge of the current river bank, threatening both the safety of residents and the options for river restoration.

Notwithstanding the critical condition and multiple insults to this reach of the Santa Fe River, many residents in this area remember the river as it was 50 years ago and less, with duck ponds and giant cottonwoods and a shallow riverbed, and they are working to restore those conditions. The County has acquired 14 acres of the river corridor between San Ysidro crossing and the M&R operation, and an EPA

Wetlands grant has been obtained to begin restoring the river in this reach. A Steering Committee of community members, County staff and others are actively engaged in design of the restoration project and outreach to the rest of the community. The County is engaged in a legal action against M&R Sand and Gravel for mining without a permit, and the company has been cited by the New Mexico Environment Department for violations of Solid Waste Management regulations, and by EPA for violations of Clean Water Act regulations. It is anticipated that eventually the County will be able to acquire that section of the San Ysidro-to-Lopez Lane reach and extend restoration activities into that zone.

Goals: Purchase as County Open Space the entire Santa Fe River corridor between San Ysidro Crossing and Lopez Lane, to protect the floodplain from development, protect private and public property from erosion by restoring riparian conditions, and fulfill the objective of the Southwest Santa Fe City/County Planning Initiative to maximize the use of the river as low-impact recreational open space.

Through cooperative projects with landowners, implement watershed treatments on private lands adjacent to the river corridor to improve vegetative cover, reduce flood peaks and use storm flows to create baseflow in the Santa Fe River.

Fully implement the River Park restoration project and extend it upstream and downstream.

Ascertain community support for a trail along the river, and if it meets local and regional recreational planning objectives, establish a trail with connections to a regional trail network.

LOPEZ LANE BRIDGE TO EASTERN BOUNDARY OF "RIO NUEVO" REACH

Current Character: This reach is the most critically destabilized section in the entire 46-mile course of the Santa Fe River. The drop structure at the Lopez Lane bridge, which props up the river bed upstream of the bridge, concentrates flows across the structure in such a way as to increase their erosivity downstream. Recent road improvements on Agua Fria Road through the historic village included a storm water management design that collects flow from a mile of road and delivers it into the river in a single culvert at the drop structure. Landowners downstream of Lopez Lane, chiefly on the south bank, have made attempts to shore up the channel walls to prevent property loss; the result has been to shunt flows toward the north bank, where they have undermined the channel wall, resulting in exposure of a major City sewer line. This presents the threat of a ruptured sewer line discharging raw sewage into the channel – repeating the events of July and September 1996,

when that exact scenario took place upstream near the Camino Carlos Rael crossing. The City has carried out an emergency stabilization project focused on the exposed sewer pipe, which can be expected to buy some time for the sewer line, but it cannot address the underlying causes of the erosion crisis in this reach, which call for whole-river and watershed-based restoration.

Goals: Acquire the river channel and sufficient property adjacent to the banks to protect the floodplain from development, and protect private and public property from erosion by restoring riparian conditions. This would also have the effect of fulfilling the objective of the Southwest Santa Fe City/County Planning Initiative to maximize the use of the river as recreational open space.

Through cooperative projects with landowners, implement watershed treatments on private lands adjacent to the river corridor to improve vegetative cover, reduce flood peaks and use storm flows to create baseflow in the Santa Fe River. Enforce Solid Waste Management regulations to prevent the casual dumping that doubles as “riprap” along this corridor.

Ascertain community support for a trail along the river, and if it meets local and regional recreational planning objectives, establish a trail with connections to a regional trail network.

RIO NUEVO REACH

Current Character: With limited exceptions, the State Land Office owns land on both sides of the river in this reach, which is bounded on the west by the crossing of Hwy 599. Since 1999, they have brought federal funding and volunteer efforts to bear on restoration of this reach of the river using induced meandering and other bioengineering techniques. They have succeeded in reintroducing a central, meandering or braided channel and reducing the aggressive bankcutting that formerly characterized the reach. Planted and volunteer cottonwoods and willows are beginning to regenerate a bosque. As discussed in Section 4, a master plan for the Rio Nuevo project provides for protection of the floodplain while allowing for development of State Land Office land on the banks; trail easements have been provided to the City and County. This reach remains subject to two significant threats: (1) high, destructive flows bearing sediment and trash from the unprotected river upstream, and (2) off-road vehicles (ORVs) operating in the channel, floodplain and banks, damaging vegetation and flow deflection structures that have just begun to become established.

Goals: Continue to manage the river channel and floodplain as specified in the Rio Nuevo Master Plan and terms of the City and County trail easements.

Enforce Solid Waste Management regulations to prevent casual dumping.

Install fencing and other appropriate barriers to ORV traffic.

599 BRIDGE TO BRIDGE BELOW WASTEWATER TREATMENT PLANT

Notwithstanding the towering artificial sand dunes and industrial architecture of aggregate mining on both sides of the river channel at the eastern end of this reach, and despite several low-water crossings used to access the sand-and-gravel operations, this section of the Santa Fe River is in remarkably good shape. A hundred yards downstream of the 599 crossing, it begins to meander around cobble point bars and occasionally divide around a central cobble island, with a clearly defined channel and floodplain, and minimal active erosion apparent. Vigorous willow and cottonwood stands are present, with considerable recruitment of young plants – and this was observed during a period when the City was in a Stage 3 water emergency and the river had experienced no flow in this reach for some 8-10 months.

Goals: Require that sand-and-gravel operators shift their activities further back from the river corridor, to avoid spalling of the sand piles into the river and to protect the river's viewshed. Require closure plans for these operations, with requirements to reestablish near-natural contours, provide swales and planting basins to provide microhabitats and revegetate with native grasses and shrubs. During and following active mining activities, stormwater should be managed to encourage infiltration and prevent erosion.

Ensure that a floodplain corridor 500 feet wide, centered on the thalweg, is protected from development through regulation, easement, or acquisition.

Explore the receptiveness by local landowners and the local community to a pedestrian/bike/equestrian trail along the river. If there is general support for extending the trail through this reach, it would be a superb site for a quiet nature trail with views to the Jemez and the Sangres.

6. Rx FOR A RIVER: PROBLEMS AND SOLUTIONS

PROBLEM: A DEWATERED RIVER

Causes:

- Retention of runoff in the municipal reservoirs.
- Ground water drawdown by municipal and domestic wells.
- Loss of vegetation in the channel to assist in detention of occasional flows.
- Incision of the channel causing loss of aquifer material, and drainage and loss of shallow groundwater.

Solutions:

- ⇒ Manage reservoir operations to ensure that the municipal reservoirs are operated to allow the release of as much water as possible to the Santa Fe River below the reservoirs, while delivering to the City and active east-canyon acequias their full water rights.
- ⇒ Review acequia diversions to ensure that procedures are in place to ensure delivery of their full water rights without overdiversion from the river.
- ⇒ Carry out river restoration including revegetation and river training works to assist in flow detention, hence recharge.
- ⇒ Carry out river restoration to halt channel incision and aggrade the channel where appropriate, while leaving sufficient channel capacity to convey major flows.

Partners in Implementing Solutions: (preliminary and partial list)

City of Santa Fe would be a logical partner in monitoring reservoir operations and acequia diversions, and in planning the City water supply to include enhancing river flow for aquifer recharge benefits. Acequia associations may be willing to work on collaborative solutions that will keep their water rights intact while helping to protect flow in the river. The Nature Conservancy is the landowner of the former Two-Mile Reservoir site: they are managing the site for riparian benefits, and are interested in maintaining flow to the site; hence may be an ally in monitoring and support of City. The Santa Fe Watershed Association is a current and potential future partner in riparian restoration projects.

PROBLEM: EROSION OF CHANNEL BED AND BANKS

Causes:

- The streets of Santa Fe have been paved with sand and gravel mined in considerable part from the Santa Fe River. Aggregate mining within the floodplain of the Santa Fe River has produced severe downcutting, resulting in unstable side slopes impacting public works and private property.
- Inadequate terrain management, including failure to protect or restore vegetative cover on the landscape that contributes runoff to the Santa Fe River or its tributary arroyos.
- Storm water routing in developed areas, in which runoff is shunted rapidly into channels to prevent ponding in streets and paved areas.
- Increased area of pavement and consequent reduction of infiltration of precipitation (note however that compacted dirt streets are not highly conducive to infiltration and they produce sediment-laden runoff).
- Loss of vegetation in the channel to assist in detention of occasional flows; without riparian vegetation, the root mat that would help to hold the banks and bars against erosion at high flows, is absent.

Solutions:

- ⇒ Terminate sand and gravel mining operations in the floodplain of the Santa Fe River and its tributaries. (Ultimately, phase in sunset dates for sand and gravel mining in arroyos and streams throughout Santa Fe County.)
- ⇒ Explore opportunities to work with landowners and neighborhood associations in existing developed areas to improve vegetative cover and landscaping using runoff harvesting.
- ⇒ Review County streets and drainage projects to ensure that stormwater is handled so as to reduce erosion and increase infiltration. Encourage multiple small wetlands and swales rather than collection of runoff from large areas, funneled through major culverts and dropped into an arroyo or river channel with erosive impact.
- ⇒ Work with acequia associations, City stormwater planners and City and County Public Works Departments to identify opportunities for stormwater routing through acequias, in such a way as to reduce damage to acequias and take advantage of the function of the acequia as a line source of recharge to the

shallow groundwater that feeds flow in the river.

- ⇒ In review of development plans, require or provide density incentives to minimize impervious surfaces; maximize runoff harvesting for landscaping, including roof and parking lot catchments; maintain good xeric vegetative cover; and utilize best management practices including wetlands and swales for stormwater management.

- ⇒ Incorporate bioengineering-based riparian restoration principles into all County projects that affect the Santa Fe River. These principles include, but are not limited to:
 - ◇ the use of geomorphologic analysis to determine the fluvial dynamics of the stream in the reach of the County project, and how best to work with those dynamics to avoid or repair disequilibrium of the reach;
 - ◇ where possible, the use of induced meanders, encouragement of pool/riffle/bar development and enhancement of native vegetation growth for channel stability (see Attachment E for illustration of this approach);
 - ◇ where structural controls are unavoidable due to a steeply incised channel, inadequate room within the floodplain to allow the river to meander, or other constraints, structures should typically be confined to low-head drop structures with a defined lip to conduct flow; and emplaced boulders or other natural materials to deflect erosive flows from sensitive bank areas and to cause the stream to drop its sediment where it enhances beneficial bar development. Design guidelines are provided in the City of Santa Fe River Corridor Master Plan (1995), incorporated into this document by reference.

Partners in Implementing Solutions: (preliminary and partial list)

City of Santa Fe; Neighborhood Network and individual neighborhood associations; New Mexico Riparian Council; Santa Fe Watershed Association.

PROBLEM: ENCROACHMENT ON FLOODPLAIN

Human development in the floodplain confines the river to a narrow channel, causing increased velocity of flows that in turn cause increased erosion and decreased infiltration and recharge. Government agencies are then called upon to use public funds to protect public and private property from damage that could

have been avoided simply by leaving the floodplain to the river, which would provide open space, wildlife habitat and recharge benefits while reducing the cost of public works. Private development of the floodplain also limits restoration options: river restoration is difficult to achieve one short reach at a time, because that relatively stable section is constantly impacted by erosive storm flows from upstream and headcutting from downstream.

Causes:

- Traditional agricultural land use patterns created land ownership in long narrow strips that ended in the river. As the land began to be used for homes and commercial development rather than farming, landowners could only make full use of their property by constructing buildings, roads and utilities down to the riverbank.
- Governments have been reluctant to apply floodplain zoning that restricted a landowner's choices in locating development on his land – even while numerous other aspects of development (setback requirements, building codes, etc) are routinely regulated.

Solutions:

- ⇒ Adopt an ordinance restricting construction in the 100-year floodplain as delineated by the Federal Emergency Management Agency (FEMA); or fifty feet from the river edge of the first bench above the river -- whichever is the greater distance.
- ⇒ Take steps to qualify under the National Flood Insurance Program/Community Rating System for lowered flood insurance rates based on improved floodplain protection. This could help to provide a carrot for landowners, to compensate for the stick of prohibiting development within the floodplain.¹

Partners in Implementing Solutions: (preliminary and partial list)

City of Santa Fe (recently passed Stormwater and Flood Management ordinances which, in part, restrict construction in the floodplain); Federal Emergency Management Agency (FEMA) for floodplain delineation and application to Community Rating System; Neighborhood Network for

¹ At the time of writing, the County had contracted for a floodplain study within the fifth reach defined in this Guidance – from Hwy. 599 to the Wastewater Treatment Plant – to result in a “Conditional Letter of Map Revision” (CLOMR) and “Letter of Map Amendment” (LOMA), amending the FEMA floodplain maps for the area with the ultimate goal of protecting a larger floodplain area from development.

outreach to communities regarding changes in buildable area on riverside lots; 1000 Friends of New Mexico for assistance with model zoning ordinances.

PROBLEM: "CONCRETE BAND-AIDS"

-- "hard" repairs to specific erosion problems in a channel, including various types of riprap, concrete lining, berms, checkdams, groins etc. that typically solve a problem in one location while creating others elsewhere, usually downstream. In addition to the propagation of erosion problems generated by such site-specific repairs, they can present safety hazards to pedestrians -- often children playing in the channel: walled channels are hard to climb out of when floods come through, and poorly designed drop structures can create "keeper waves", hydraulics that constitute a drowning hazard.

Causes:

- Narrow definition of a problem, so that solutions are tailored to address a specific threat: i.e., "if we don't shore up the bank at this point, that power pole is going to fall in the river" rather than "why is this entire bank so unstable and what can we do to return equilibrium to the system?"

Solutions:

- ⇒ Apply a watershed approach to problems of drainage, stormwater management and channel erosion.
 - ◇ Provide training for planning and public works staff in fluvial geomorphology, watershed management, and integrated restoration techniques.
 - ◇ Assess existing drainage and erosion control projects in and adjacent to the Santa Fe River and its tributaries. Plan reclamation work that may extend the life of, or improve upon these projects. Prioritize in terms of relative threat if the projects fail (i.e., will it immediately undermine a bridge, or will it cause a quarter-mile of headcutting but with no direct threat to property?) Incorporate such projects into Public Works funding plans.
 - ◇ Fund public works projects in and adjacent to the Santa Fe River and its tributaries, in the context of river reclamation work.

Partners in Implementing Solutions: (preliminary and partial list)

NM Riparian Council is potentially available for low-cost training in bioengineering theory as well as site-specific problem recognition and design solutions.

PROBLEM: OFF-ROAD VEHICLES

ORVs operating in the bed and up and down the banks of the Santa Fe River and its tributaries exacerbate erosion problems, in addition to being a noise and dust nuisance to property owners in the area. Under current conditions, they probably have a minor effect compared to impacts listed above. However, as reclamation projects go into effect ORV use will impede these efforts, threatening the establishment of riparian and upland vegetation.

Causes:

- Arroyos have traditionally been no-man's-land, available to walk or ride in without restriction, to collect sand for personal use, etc. With increasing population density, the demands made on common lands for such purposes have overcome the ability of the system to absorb such disruptions.
- With increasing urbanization, there are fewer of the open lands where Santa Feans used to be able to walk or ride (horses, traditionally; now increasingly, and with greater erosional impacts, ORVs). Hence, the arroyos may be receiving greater use.

Solutions:

- ⇒ Block ORV access to the Santa Fe River and tributary arroyos, beginning with low-water crossings and bridges, which are often the entry point to a channel. The importance of this for protection of riparian restoration projects cannot be overstated.
- ⇒ Establish ORV "playgrounds" (potentially wrap this use into the solid waste facility); publicize their availability; offer Saturday rides for ORVs and their riders to and from these areas. Post signs explaining that ORVs are not allowed in the river/arroyos and providing lists of ORV playgrounds.
- ⇒ Support school projects and community events that promote bicycling (including dirt trail-riding), roller-blading and other non-motorized trail sports.

Partners in Implementing Solutions: (preliminary and partial list)

ORV retail outlets may be approachable to help with purchase and maintenance of an ORV “rodeo ground”, and to sponsor ORV “rodeos” to popularize the area as an alternative to riding in arroyos and the Santa Fe River. Cycling clubs may be willing to sponsor school clubs or events to promote non-motorized wheeled sports. Neighborhood Watch groups may assist in calling law enforcement to enforce ORV restrictions.

PROBLEM: LOSS OF RIPARIAN HABITAT

Riparian vegetation is almost nonexistent along the dewatered reach of the Santa Fe River west of the City line. Where vegetation does occur, exotic species are often more successful than native species at maintaining a foothold. Given the missing riparian vegetation, wildlife habitat is severely impoverished to nonexistent. Aesthetics are similarly affected.

Causes:

- See Problems and Causes listed above.
- Landscaping with such invasive plants as tamarisk (salt-cedar) and Russian olive can increase the occurrence of such species in the “wild”, where they out-compete native species that are more suitable in the riparian environment.

Solutions:

- ⇒ Revegetation with appropriate species in connection with river restoration work. Note that revegetation alone may not withstand the impact of flood flows. To maximize the survival of riparian vegetation, it is usually necessary first to stabilize a reach using the principles cited above under “Problem: Erosion of Channel Bed and Banks”.
- ⇒ Suppression of invasive plants. In the case of woody plants, this will involve cutting back the invasive vegetation, ideally in early spring, and immediately painting the cut stump with an herbicide. The products “Rodeo” and “Pathfinder II” have been approved for this use by The Nature Conservancy and the City of Santa Fe’s Integrated Pest Management Specialist.

Partners in Implementing Solutions: (preliminary and partial list)

Environmental and community groups can often be mustered for a half-day planting exercise. Suppression of exotic vegetation, due to the use of dangerous tools and herbicides, is best left to professional crews.

PROBLEM: UNDERUTILIZED OPEN SPACE

Causes:

Even in those reaches where the Santa Fe River is the most degraded, it provides a quiet refuge away from developed parts of town, with, in many places, long views of the mountains. However, access is limited by steep channel banks and private property.

Solutions:

- Provide trails for non-motorized traffic connecting neighborhoods with open space, including the Santa Fe River and its tributaries. In addition to serving as a recreational resource, the experience of other towns that have created urban trail systems is that they can measurably reduce traffic by providing alternate commuting routes.

7. STEPS IN THE RIGHT DIRECTION

Over the past few years, there has been a convergence of interest on the part of citizens and land management agencies to reclaim the Santa Fe River. The reasons for doing so range from erosion control, flood control, public safety and protection of property (including roads and bridges), to aesthetics, recreation and wildlife habitat. There is also a dawning recognition that these efforts will be far more effective if there is collaboration among the different agencies and landowners that are engaged in this effort. The following is a listing of agencies and non-governmental groups with missions and/or particular projects that affect the Santa Fe River in the project reach considered in this plan.

BUREAU OF LAND MANAGEMENT

Negotiating transfer of property adjacent to the Santa Fe River in Agua Fria, to Santa Fe County.

CITY OF SANTA FE

Adopted a River Corridor Master Plan (1995) to guide riparian restoration, erosion control efforts and the development of a riverside trail. Some elements of that plan have been implemented, including:

- Hire a River Coordinator.
- Convene a River Commission.
- Riverside trail projects
- Erosion control projects within the Santa Fe River corridor
- Erosion control projects within tributaries draining to the Santa Fe River
- Preparation of a Treated Effluent Management Plan (TEMP), which outlines options for reuse of wastewater including sustaining streamflow in the dewatered reach.
- Pilot project to implement “best management practices” for stormwater in the Los Pinos arroyo, a tributary of Arroyo Chamiso.
- Gauging stations installed within the urban reach of the river, to better understand the water balance of the watershed through town.
- Stormwater management plan addressing National Pollutant Discharge Elimination System (NPDES) Stormwater permit requirements, including watershed-scale plans for increasing infiltration of runoff.

ENVIRONMENTAL AND COMMUNITY GROUPS

Camino Real River Connection: broad collaboration between a number of environmental and neighborhood groups, the City and County of Santa Fe, BLM, State Land Office and others, to acquire land along the Santa Fe River Corridor to protect it as open space, and to carry out river trail projects where funding and community support are obtained for such projects.

Community Farm: with property fronting on the river just upstream of the San Ysidro crossing area in Agua Fria, the owners of the Farm are strongly supportive of river and watershed restoration and are working with the YCC (see below) to implement such treatments on their property.

Santa Fe Watershed Association: collaboration with the County on San Ysidro River Park project (Attachment C); involvement in governmental planning processes related to water and landscape management, including authorship of the Santa Fe River Watershed Restoration Action Strategy (2002) and the Santa Fe River Master Plan Guidance (2003); public outreach on river, water and

landscape management issues.

Trust for Public Land: active in trail development in the Santa Fe area; generous with expertise in negotiation of conservation and trail easements and acquisition of property for public uses.

Youth Conservation Corps under Youthworks: river planting and erosion control projects.

NEW MEXICO STATE LAND OFFICE

Reclamation project applying the design guidelines cited in Attachments C and E on a one-mile of the Santa Fe River that traverses State Trust Land above the crossing of Hwy 599.

SANTA FE COUNTY

Under its Open Space program, purchased three properties and one easement along the Santa Fe River, for a total expenditure of \$1,599,885 to date. Within the project area, the County owns the San Ysidro River Park property - 14.5 acres, purchased for \$295,246 -- and holds the trail easement in the State Land section, consisting of 45.6 acres with a cost to the County of \$22,632 (CRRC contributed \$6,815 toward the total purchase price of \$29,447, including retirement of mineral rights).

Requested the Corps of Engineers to perform a two-year, \$100,000 watershed reconnaissance, commencing in fall of 2002. This study could serve to identify future watershed restoration projects and funding sources.

Engaged in restoration project at San Ysidro River Park (Attachment C).

Contracted for Santa Fe River Master Plan Guidance, toward adoption of a County River Master Plan.

Contracted for floodplain study west of Hwy. 599.

Engaged in planning to meet NPDES Stormwater permit requirements.

COLLABORATIVE EFFORTS

City/County Regional Planning Authority: long-range planning for the 5-mile Extraterritorial Zone surrounding and including the City of Santa Fe and extending into the County. Reconciliation of the City's 1999 General Plan and the County's 1999 Growth Management Plan.

Jemez y Sangre Regional Water Planning Council: multi-agency/tribal effort with significant citizen input, to plan to balance water supply and demand in the region including the cities of Santa Fe and Espanola.

8. FUNDING SOURCES FOR RIVER RESTORATION

For federal funding sources, a useful reference is EPA's Catalog of Federal Funding Sources for Watershed Protection, updated every year or two; document number EPA 841-B-97-008. In funding restoration projects in the Santa Fe watershed, Clean Water Act Section 319 grants have played a critical role. These projects, and indeed most federal funding opportunities, require partnerships so that the federal grant match requirements can be met by a combination of a cash or in-kind match, either put up by a local agency or obtained through a non-governmental grant. The participation of community volunteers can also be offered as match to a government grant.

State and local agencies have independently initiated and funded projects along the lines of those recommended in "Rx for a River", above. Notable among these projects are the City's River Corridor Master Plan and the projects developed to date under that guidance; the County's Open Space program; and the State Land Office Rio Nuevo project.

The State Library on Cerrillos Road at Camino Carlos Rey in Santa Fe maintains a clearinghouse on private foundations in their reference section. The so-called "New Mexico State Library Foundation Center Cooperating Collection" includes CD-ROMs with thousands of philanthropic organizations, searchable by geography, subject area, etc. The librarians are generous with their assistance in learning to use the Foundation Center materials.

River Network, which is "dedicated to building the capacity of river and watershed organizations to support themselves financially", offers a quarterly Fundraising Alert and a web site with information on funding sources friendly to river and watershed protection efforts. They can be contacted at:

River Network Eastern Office
4000 Albemarle St. NW #303
Washington D.C. 20016
(202) 364-2550; FAX - 2520
email: dc@rivernetwork.org
website: www.rivernetwork.org

9. FINAL WORD

“Eventually, all things merge into one, and a river runs through it. The river was cut by the world’s great flood and runs over rocks from the basement of time. On some of the rocks are timeless raindrops. Under the rocks are the words, and some of the words are theirs.

I am haunted by waters.”

Norman MacLean, *A River Runs Through It*