Santa Fe River Watershed Study

Vegetation Mapping Report

2015

1. Introduction

In December 2007, a Report on Existing Conditions and Potential Natural Resources Restoration Projects (Blue Earth) was completed as part of the Santa Fe Watershed Study. This report covered existing ecological conditions in the original study reach, which was from Camino Alire Rd. to where the river passes under NM 599 (approximately 8.4). In 2008, the study area was expanded to include additional portions of the river both upstream and downstream of the original study area. This included an additional 1.6 miles below NM 599, an additional 4.5 miles above Camino Alire Rd, as well as four arroyo tributaries: Arroyo Mascaras (1.6 miles), Arroyo de la Piedra (2.6 miles), Arroyo Ranchito (1.8 miles), and Arroyo Barranca (1.9 miles), for a total of 14 additional miles (Figure 1). The original study area is show in Figure 2.

In 2009-2011, an inventory of existing vegetation of these additional areas was performed. The remainder of this document will discuss that mapping, how it integrates with the previous vegetation inventory, and the overall results.

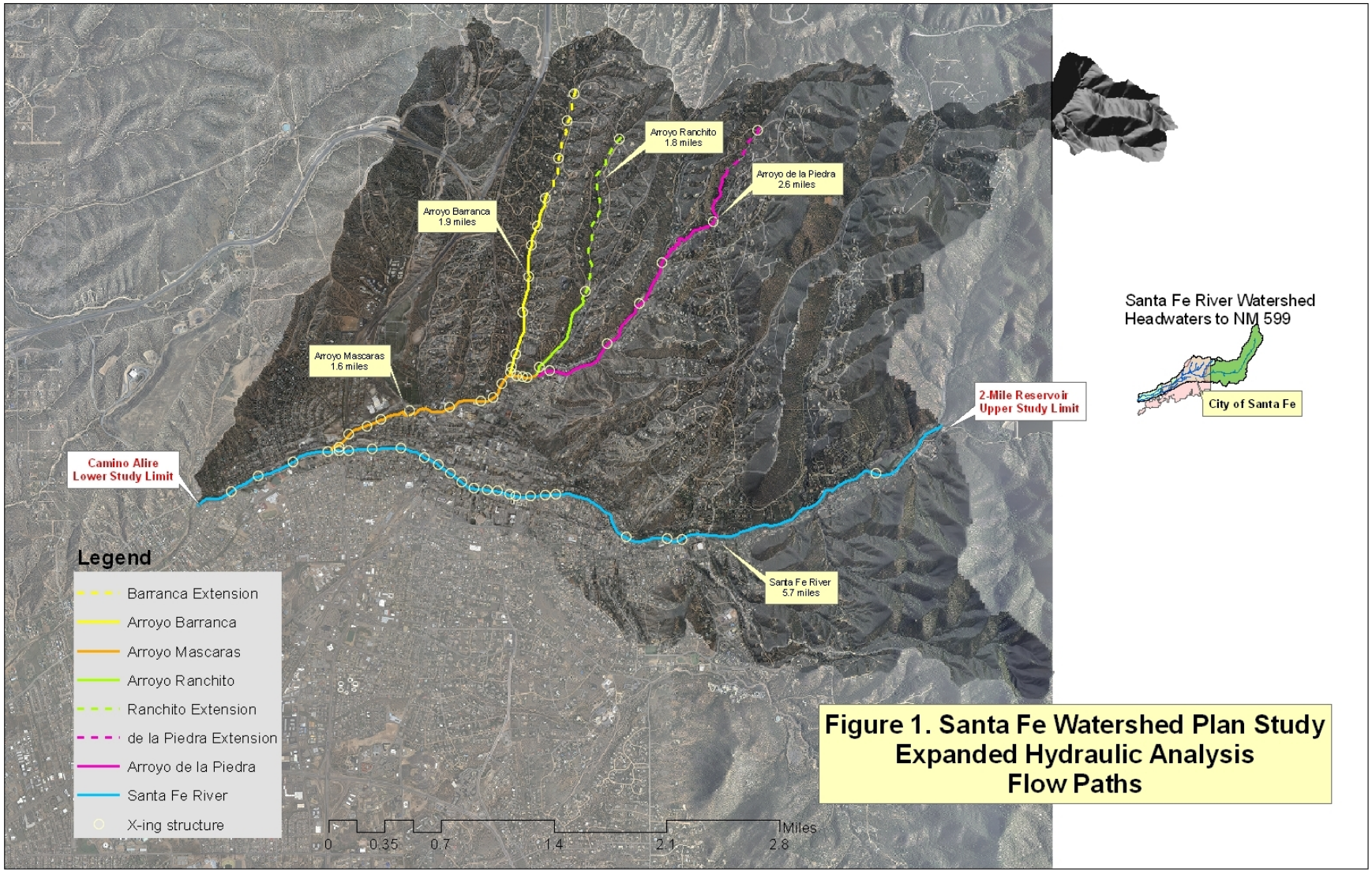
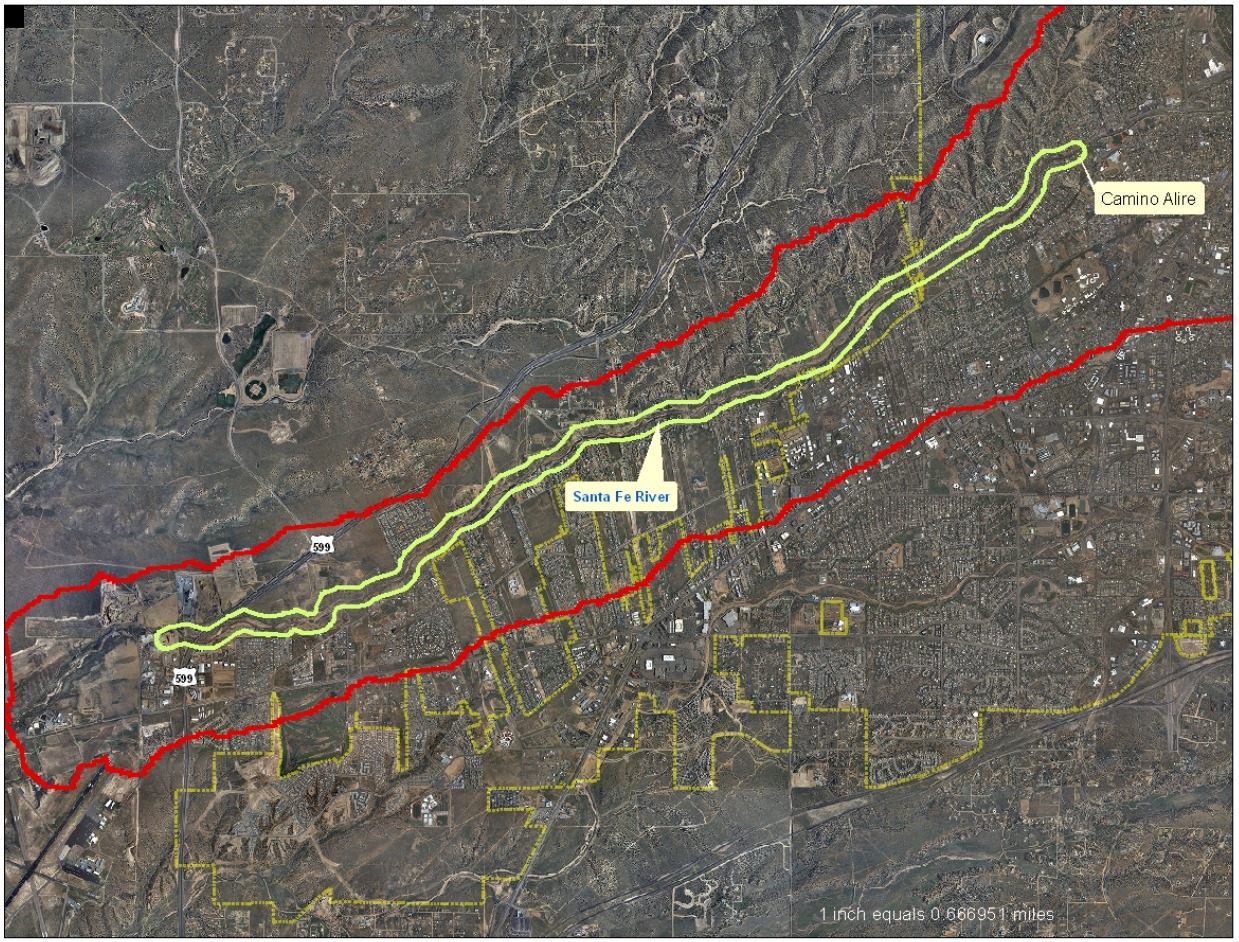
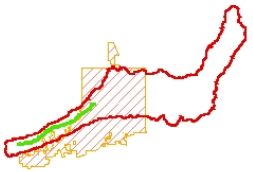


Figure 1. Santa Fe Watershed Plan Study
Expanded Hydraulic Analysis
Flow Paths





Overview of Study Area

N

Legend

- Santa Fe River Watershed
- Study Area
- City of Santa Fe

Figure 2
Santa Fe, NM
Study Area:
Camino Alire to NM599

US Army Corps of Engineers
Albuquerque District

2. Channel Morphology

2.1 Classification of Stream Segments in the additional Study Area

The Blue Earth report described causes for channel incision in the Santa Fe River. The additional portions of the study contain similar incision issues.

When the Corps performed vegetation mapping on the additional areas, some channel morphology measurements were also taken. Downstream of 599, the channel is fairly wide until it reaches the treatment plant. At this point the channel becomes more constricted just above where 599 crosses the river.

Where the river runs through the center of town, the channel is very constricted and has rock walls defining its edges through much of this stretch (Figure 3). Development including homes and businesses line the river on both sides throughout this area.

Figure 3. Portion of the Santa Fe River along West Alameda Street

The upper portion of the Santa Fe River includes an Audubon Wildlife Preserve Area just downstream of Upper Canyon Dam. In this area, the channel is wider and more natural but still bounded by large individual lots on either side (Figure 4).

Figure 4. West bank of the Santa Fe River downstream of Upper Canyon Dam

The Arroyo Mascaras runs northeast from the Santa Fe River starting at North Saint Francis Drive. It runs along the south side of Paseo del Peralta and bends to the north before becoming Arroyo Barranca. The channel is flat and open (Figure 5) until it meets up with Arroyo Barranca at the Fort Marcy Park where it is heavily used for recreation (Figure 6).

Figure 5. Arroyo Mascaras

Figure 6. Arroyo Mascaras where it becomes Arroyo Barranca

Arroyo Barranca begins just above Camino Encantado and runs down to where it meets/becomes Arroyo Mascaras above the Fort March Park at Murales Road. The channel is wide and flat. Development is comprised of large open lots that are spread out on either side of the river with limited structures directly adjacent to the Arroyo (Figure 7).

Figure 7. Arroyo Barranca

Arroyo de la Piedra and Arroyo Ranchito were not visited due to time and budget constraints of the study.

The Santa Fe River downstream of 599 includes a portion near the treatment plant. In this area, the channel is more constricted but contains lush native riparian vegetation along the banks (Figure 8). Between the treatment plant and 599, the channel is more open with sparse vegetation (Figure 9).

Figure 8. Santa Fe River channel downstream of the treatment plant


Figure 9. Santa Fe River channel between 599 and the treatment plant

3. Plant Communities

Plant communities in the study area were mapped using the community-structure (C-S) classification scheme developed by Hink and Ohmart (1984). This classification combines identification of community dominants in the tree and shrub strata with the structural character of the stand being delineated, where structural character is defined as the variation in foliage density with height above the ground surface. From 2009-2011, the Corps mapped the vegetation within the additional study areas using the same methodology employed by Blue Earth for the original study area. The Corps completed mapping along the areas added to the mainstem of the Santa Fe River as well as the Arroyo Mescaras and Arroyo Barranca. Mapping was not completed on Arroyo de la Piedra or Arroyo Ranchito.

Six structure types are used in the classification. These range from structure type I, characterized by an overstory canopy provided by mature trees (*i.e.* 50 to 60 feet tall) and understory foliage to type VI, characterized by sparse herbaceous and shrubby vegetation. A seventh structure type, X, was added to the classification to describe lacking woody dominants and with foliage restricted to three feet above the ground and lower. This structure type was used in the original analysis by Blue Earth. Two miscellaneous cover classes were used for area lacking woody vegetation. The code BARE was used for areas with sparse herbaceous cover and greater than 70 percent bare ground. The code HERB was used for areas dominated by herbaceous plants. The only difference was that the Corps did not use the 'Bare X' category employed by Blue Earth. This was used in the original study area "to describe lacking woody dominants and with foliage restricted to three feet above the ground and lower" (Blue Earth, 2007). Instead, the Corps

utilized the OP (open) code when required (when the majority (~70-100%) of the polygon contained no vegetation and also utilized the Type VI structural code for 'very young, low, and/or sparse stands, the majority of which is between 0-5 feet in height' per the Hink and Ohmart protocol. There were only two cases where this was required, on the south end of the Santa Fe River between 599 and the new southern end of the study area.

Plant community types were classified using a combination of 16 codes for dominant or co-dominant species or cover type (3 codes were added for the new study area). Nine of the codes were for native woody or suffrutescent plant species: C for cottonwood (including Rio Grande, narrowleaf, and lance-leaf), CW for coyote willow, GW for Goodding's willow, J for one-seed juniper, LO for New Mexico locust, RB for rubber rabbitbrush, P for pinon pine, MM for mountain mahogany, and BE for Box elder (Table 1). Another five codes were for non-native woody plants: HL for honey-locust, RO for Russian olive, SC for saltcedar, SE for Siberian elm, and TH for tree-of-heaven (Table 1).

Dominant herbaceous species in areas delineated as HERB included hairy golden-aster (*Heterotheca villosa*), horseweed (*Conyza canadensis*), smooth oxeye (*Heliopsis helianthoides*), sand-daisy (*Dieteria canescens*), rough cocklebur (*Xanthium strumarium*), prickly lettuce (*Lactuca serriola*), bur ragweed (*Ambrosia acanthicarpa*), Russian-thistle (*Salsola tragus*), white sweet-clover (*Melilotus albus*), sorrel wild-buckwheat (*Eriogonum polycladon*), cañaigre (*Rumex hymenosepalus*), Canada wildrye (*Elymus canadensis*), Indian ricegrass (*Achnatherum hymenoides*), cheatgrass (*Bromus tectorum*), Carolina lovegrass (*Eragrostis pectinacea* var. *pectinacea*), and foxtail barley (*Hordeum jubatum*).

CODE	SPECIES/COVER
BARE	Mostly bare ground with scattered herbaceous plants
HERB	Herbaceous vegetation
C	Rio Grande, narrowleaf, and/or lance-leaf cottonwood; lance-leaf is a hybrid between Rio Grande and narrowleaf (*Populus deltoides wislizenii*, *P. angustifolia,* and/or *P.* x *acuminata*)
CW	coyote willow (*Salix exigua*)
GW	Goodding's willow (*Salix gooddingii*)
J	one-seed juniper (*Juniperus monosperma*)
LO	New Mexico locust (*Robinia neomexicana*)
RB	rubber rabbitbrush (*Ericameria nauseosa*)
P	Pinon pine (*Pinus edulis*)
MM	Mountain mahogany (*Cercocarpus montanus*)
BE	Box elder (*Acer negundo*)
HL*	honey-locust (*Gleditsia triacanthos*)
RO*	Russian olive (*Elaeagnus angustifolia*)
SC*	saltcedar (*Tamarix chinensis*)
SE*	Siberian elm (*Ulmus pumila*)
TH*	tree-of-heaven (*Ailanthus altissima*)

Table 1. Species/cover codes used in describing plant community types in the study area. Scientific and common names follow Allred (2006). Those species marked with an asterisk (*) are non-native.

The lower end of the Santa Fe River from Highway 599 down to just below the treatment plant was mapped in 2009-2010. The area between Highway 599 down to the treatment plant is similar to the river above Highway 599 with an open wide channel and sparse vegetation comprised of more upland species such as sand sage and juniper with some riparian species mixed in (Figure 10). The area just below the treatment plant, however, contains a diverse mix of riparian vegetation due to the continual water source from the treatment plant. This area is dominated by cottonwood, coyote willow and tree willow with some Siberian elm and Russian olive mixed in (Figure 11). The understory is also very thick in much of this area creating Type I and Type III stands. The habitat in this area is a good example of what potential restored habitat should mimic.

Figure 10. Santa Fe River between 599 and the treatment plant

Figure 11. Vegetation along the Santa Fe River downstream of the treatment plant

The upper end of the Santa Fe River that was not in the original study area was mapped in 2010-2011. This upper portion of the river was mapped from the Audubon Preserve Area just below the Upper Canyon Dam down to the original study area boundary (St. Francis Drive). The upper portion of this stretch starting at the Preserve Area contained more riparian and montane species with cottonwood, box elder, coyote willow and tree willow being dominant species (Figure 12). Box elder (*Acer negundo*) was added to the C-S list due to its presence in this area. Some additional woody species that were detected in this area include: coral berry (*Symphoricarpos orbiculatus*), Wood's rose (*Rosa woodsii*), spruce (*Pinaceae*), and currant (*Ribes* spp.).

Figure 12. Vegetation downstream of Upper Canyon Dam

Arroyo Mascaras also runs northeast from the Santa Fe River but to the east of Arroyo Barranca and Arroyo Ranchito. Plant C-S types in this arroyo were dominated by the following native woody species: Siberian elm, rabbitbrush, and some small patches of cottonwood and coyote willow (Figure 13).

Figure 13. Vegetation along Arroyo Mascaras

Arroyo Barranca runs northeast from the Santa Fe River and ends just above Camino Encantado. Pinon pine (*Pinus edulis*) and mountain mahogany (*Cercocarpus montanus*) were added to the C-S list due to their presence in this arroyo. Plant C-S types in this arroyo were dominated by the following native woody species: juniper, pinon pine, mountain mahogany, and rabbitbrush (Figure 14). The majority of stands were Type IV structure.

Figure 14. Vegetation along Arroyo Barranca

Major factors influencing the current condition of riparian vegetation in the study area are 1) significantly reduced surface water flow; 2) loss of the shallow alluvial aquifer; 3) massive bed degradation throughout the reach initiated in the mid 1970s by removal or lowering of grade control structures; and 4) scouring peak flows associated with storm-water runoff that are now contained within a narrow, entrenched valley throughout most of the study area. Because of these factors, riparian vegetation is sparse throughout the study area and where it is found it is typically characterized by early successional stages.

Vegetation maps of the entire study area are provided as a separate 11x17 map book document.