project has varied between storing all or part of released water in El Vado and/or Abiquiu reservoirs for future use by contractors including the City, to conditions requiring releases below Abiquiu Dam to be concentrated in short periods depending upon specific hydrologic and operational conditions or regulatory and operational needs of the City. Similarly, release patterns for this block of water will be performed to replace calculated depletion effects on Rio Grande flows as a result of the pumping of the Buckman wellfield (offsets) or to provide for direct diversions for drinking water supply from the Rio Grande. These conditions are considered in Chapter 3, Affected Issues and Environmental Resources.

CHAPTER 3. AFFECTED ISSUES AND ENVIRONMENTAL RESOURCES

3.1 Introduction

This Chapter describes the existing conditions of the affected environment. It is based, in large part, on the information and data found in the Draft Environmental Impact Statement for the Buckman Water Diversion Project (Buckman Water Diversion Project DEIS) (USFS, 2004).

3.2 Surface Water Resources

The Proposed Action would approve the lease of water which would be released for use by the City from Heron Dam, located on the Rio Chama approximately 80 miles northwest of Santa Fe. The hydrologic setting commences at Heron Dam, south into Rio Chama, through El Vado and Abiquiu reservoirs, to Rio Chama's confluence with the Rio Grande and ending at Cochiti Reservoir.

3.2.1 Hydrologic Setting

There are four reservoirs within the Project Area: Heron, El Vado, Abiquiu, and Cochiti. Table 1 provides a summary of information about each of these reservoirs.

Table 1. Summary of Reservoir Data

Reservoir	Purpose	Storage Capacity (ac-ft)	Crest Elevation (ft)	Max Dam Height (ft)	Max Surface Area (ac)	Drainage Area (sq mi)	Type	Location	Operator
Heron	Storage and delivery of San Juan-Chama water	401,000	7,199	269	5,950	193	Earthfill	80 miles northwest of Santa Fe	Reclamation
El Vado	Storage for irrigation, recreation, incidental flood control, and sediment control	209,330 minus sediment reductions	6,902	205	3,200	877	Earthfill and steel-plated rockfill	5 miles downstream of Heron Reservoir	Reclamation

Reservoir	Purpose	Storage Capacity (ac-ft)	Crest Elevation (ft)	Max Dam Height (ft)	Max Surface Area (ac)	Drainage Area (sq mi)	Type	Location	Operator
Abiquiu	Flood and sediment control, and San Juan-Chama water storage	1,212,000 minus sediment reductions	6,375	341	15,536	2,146	Rolled earth	32 miles upstream of Rio Grande confluence	USACE Albuquerque District
Cochiti	Primary flood control for snowmelt runoff control on mainstem of the Rio Grande; recreation pool	596,400 minus sediment reductions	Approx. 5,475	250	9,365	14,900	Rolled earth	About 25 miles west-southwest of Santa Fe	USACE Albuquerque District

Source: USFS, 2004

3.2.1.1 Rio Chama

The Rio Chama flows for approximately 60 miles below Heron Dam, with a drainage area of 3,159 square miles, of which 2,146 square miles are above Abiquiu Dam. Elevations in the entire watershed range from about 12,000 feet above sea level in the San Juan Mountains to about 5,600 feet above sea level at the mouth of the Rio Chama.

3.2.1.2 Heron Dam and Reservoir

Heron Dam is located on Willow Creek, a tributary of the Rio Chama, just above the creek's confluence with the Rio Chama. The dam and reservoir provide regulating and storage capability for San Juan River water diverted through the Continental Divide via the San Juan-Chama Project. Heron Dam is located about 80 miles northwest of Santa Fe. Water is delivered to Heron Reservoir via Willow Creek and released directly into the Rio Chama at the Dam's outlet works.

3.2.1.3 El Vado Dam and Reservoir

El Vado Dam is located on the Rio Chama about five miles downstream from Heron Dam. The reservoir is authorized to store both native and San Juan-Chama water primarily for the benefit of the Six Middle Rio Grande Pueblos and the Middle Rio Grande Conservancy District (MRGCD), but other entities, including the City of Santa Fe, store San Juan-Chama water there through a separate agreement with the MRGCD. Reclamation operates El Vado Dam.

3.2.1.4 Rio Chama from El Vado Dam to Abiquiu Reservoir

On November 7, 1988, Congress passed Public Law 100-633, which added two segments of the Rio Chama between El Vado and Abiquiu Reservoirs to the national Wild and Scenic River system. The two segments combined are approximately 25 miles in length.

3.2.1.5 Abiquiu Dam and Reservoir

Abiquiu Dam is located 32 river miles upstream from the confluence of the Rio Chama with the Rio Grande. Abiquiu Dam and Reservoir is operated primarily for flood and sediment control, as well as storage of San Juan-Chama water. The USACE Albuquerque District operates Abiquiu Dam.

3.2.1.6 Rio Chama from Abiquiu Dam to Rio Grande Confluence

Abiquiu Dam has regulated native Rio Chama flows below the dam since 1963, and beginning in 1971 has also has regulated the added San Juan-Chama flows introduced into the system. Prior to the introduction of San Juan-Chama water, no significant reservoir storage accrued behind the dam. In 1981 Congress authorized the additional purpose of storing transbasin (San Juan-Chama) water in Abiquiu Reservoir. This has provided a significant flat water recreation resource as a result of storage of San Juan-Chama water through separate agreements with USACE and the City of Albuquerque. The releases from the dam support the production of salmonids for several miles downstream (USFS, 2004). Numerous acequias (irrigation ditches) exist along this stretch of the Rio Chama.

3.2.1.7 Rio Grande from Confluence with Rio Chama to Cochiti Reservoir

The Rio Grande flows approximately 15 miles from its confluence with the Rio Chama to the tailwaters of Cochiti Reservoir. This stretch of the Rio Grande is highly regulated due to Abiquiu Reservoir operations. The Rio Grande slopes approximately six feet per mile and has an average width of 300 feet through the subject reach.

The U.S. Geological Survey (USGS) Otowi gage is located about 10 miles below the confluence of the Rio Chama with the Rio Grande at the Otowi Bridge near San Ildefonso, New Mexico. The gage has recorded stream flows from February 1895 to December 1905 and from June 1909 to the present, making it one of the oldest stream flow records in the United States. Since 1963, after Abiquiu Dam was constructed, the average annual flow at the Otowi gage has been about 1,500 cubic feet per second (cfs). Seasonally, the average high-flow month has been May, with an average flow of about 3,400 cfs, and average flows from August through February typically range from about 800 to 1,000 cfs.

Much of the reach from the Otowi Bridge is confined within a canyon until it discharges into the Cochiti Reservoir pool. The bed material is dominated by sand, cobble, and some boulders. According to USGS flow records, the width of the river at Otowi Bridge is

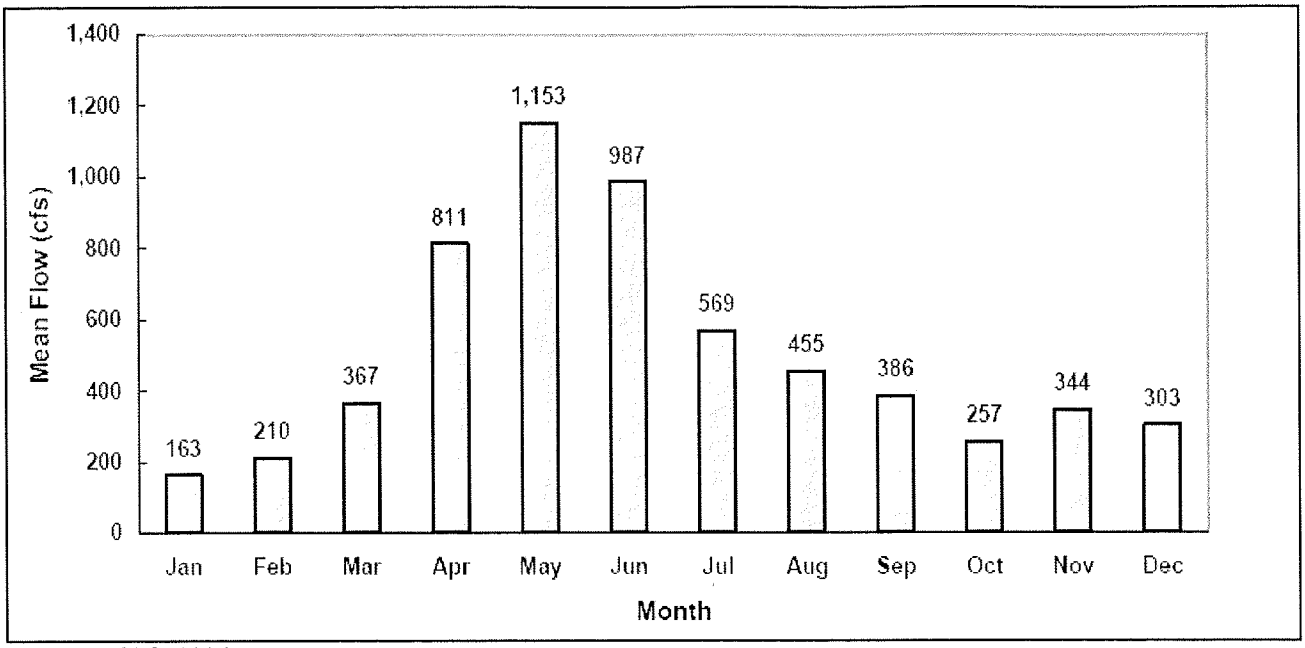
about 120 feet and the flow velocity is typically on the order of 3 feet per second during average flow conditions (on the order of 1,500 cfs).

3.2.1.8 Cochiti Dam and Reservoir

Cochiti Dam was constructed pursuant to authorization of the Flood Control Act of 1960 and is located just downstream from White Rock Canyon near the confluence of the Santa Fe River and the Cañada de Cochiti. It is upstream of the confluence of the Rio Grande with the Jemez River. Cochiti Reservoir (lake) has a surface area at the top of the flood control pool that extends approximately 20 miles upstream into White Rock Canyon. USACE was authorized to include a permanent 50,000 acre-foot sediment retention and recreation pool provided the water was from outside the Rio Grande basin. The United States provides up to 5,000 ac-ft/yr of San Juan-Chama water to establish and maintain the pool.

3.2.2 Streamflow

Average monthly flows below Abiquiu Dam on the Rio Chama are illustrated in Figure 2. Since February 1963, when Abiquiu began operation, flows have varied greatly along this reach of the river from a high of 2,990 cfs, recorded in July 1965 to times when there has been no flow in the channel. Evacuation of San Juan-Chama water stored in Abiquiu Reservoir may be required when the snowmelt forecast indicates a need for flood capacity exceeding 302,000 ac-ft. In the Rio Chama below Abiquiu Dam, summer and fall flows are higher than natural due to increased reservoir releases, including releases of imported San Juan-Chama water and storage from Abiquiu Reservoir. The average annual flow in the Rio Chama below Abiquiu Dam was about 500 cfs from 1962 to 2001, but has ranged between a low of 201 cfs in 1964 to a high of 946 cfs in 1987.

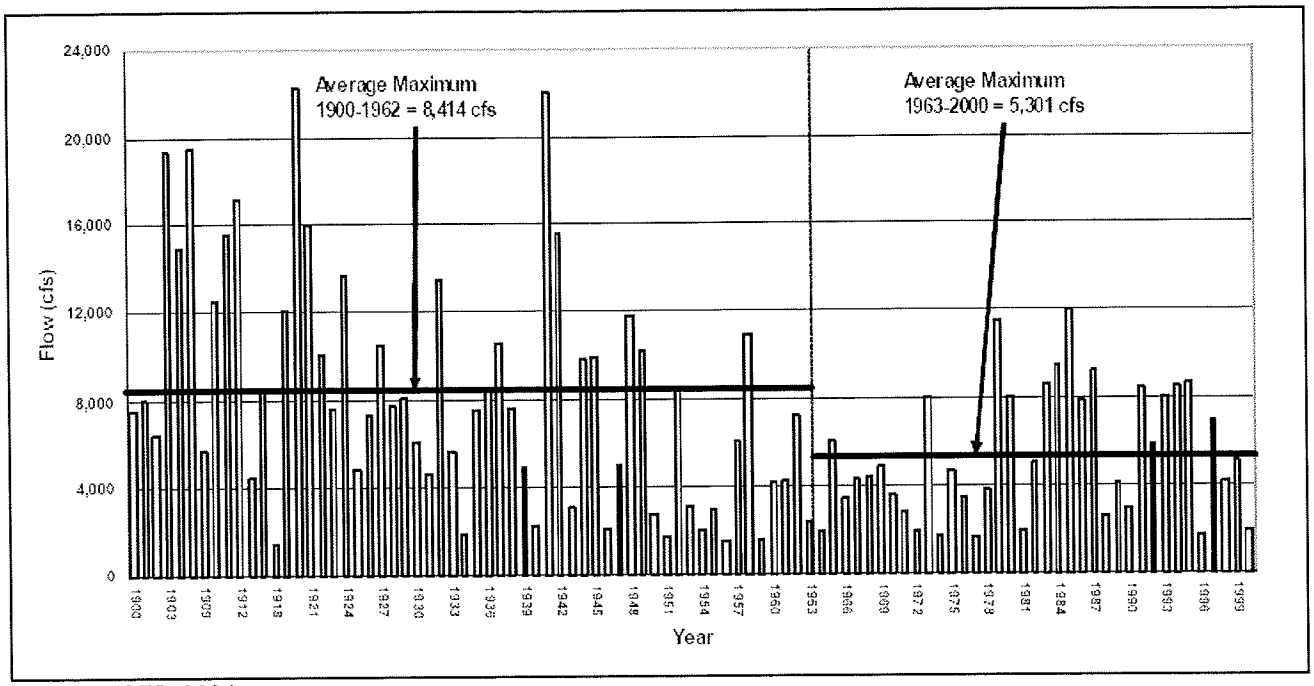


Source: USFS, 2004

Figure 2. Monthly Average Streamflows in Rio Chama Below Abiquiu Dam

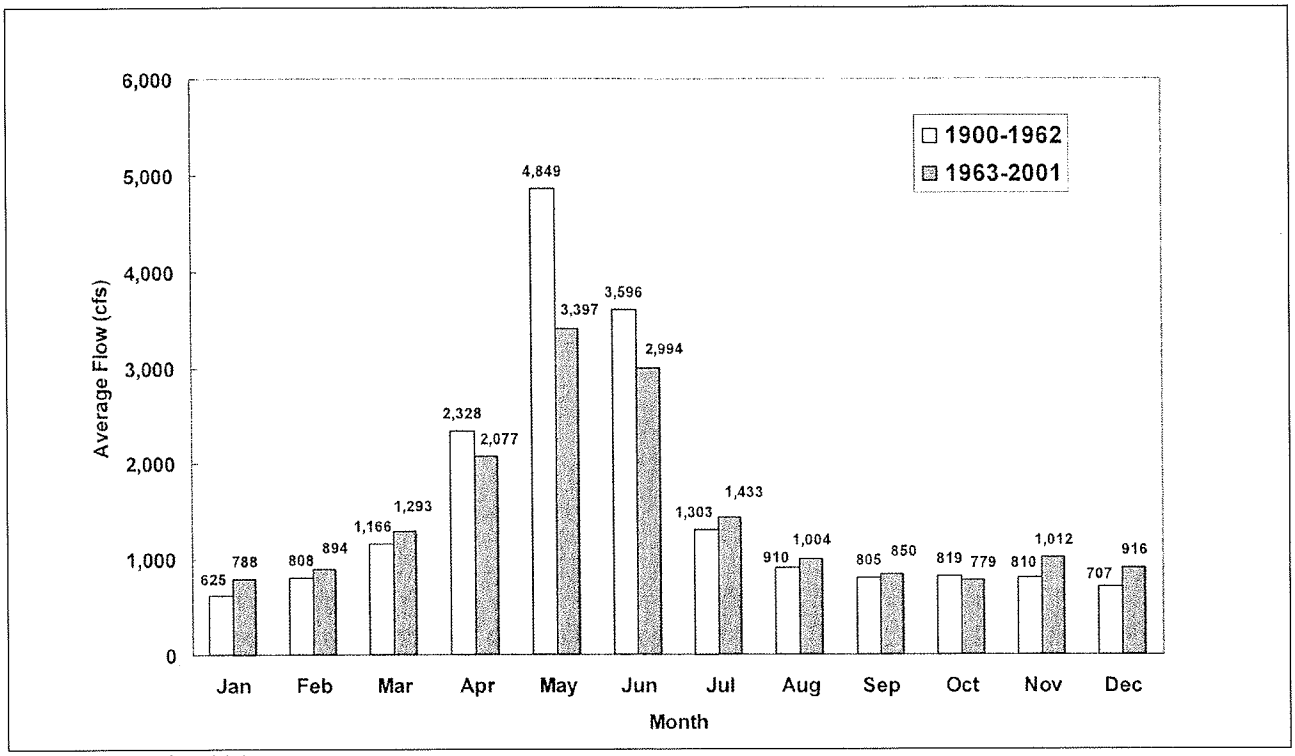
Because the Otowi gage is located about 10 miles downstream from the confluence of the Rio Grande and the Rio Chama, it is useful for determining the effects of San Juan-Chama Project releases, which began in 1971, on Rio Grande flows. From 1971 to 1998, San Juan-Chama water increased flows at the Otowi gage by an average of 73 cfs, an increase of about 5 percent over non-San Juan-Chama flow. Figure 3 illustrates annual maximum daily flows in the Rio Grande at the Otowi gage from 1900 to 2000. The Otowi gage also is used to determine New Mexico's obligation to Texas under the Rio Grande Compact. In accordance with the Colorado and upper Colorado River and Rio Grande Compacts, the inflows from the San Juan-Chama Project are specifically excluded from native flows at the Otowi gage and are accounted for separately.

Flows in the Rio Grande at Otowi vary with the seasons as shown in Figure 2 and Figure 3. Figure 4 illustrates how average monthly flows have varied before and after the construction of Abiquiu Dam. Monthly average flows from August through February for the period 1963 to 2001 range from about 800 cfs to 1,000 cfs, whereas the average monthly flow for May for the same period is about 3,400 cfs.



Source: USFS, 2004

Figure 3. Maximum Daily Flows in Rio Grande at the Otowi Gage, 1900-2000



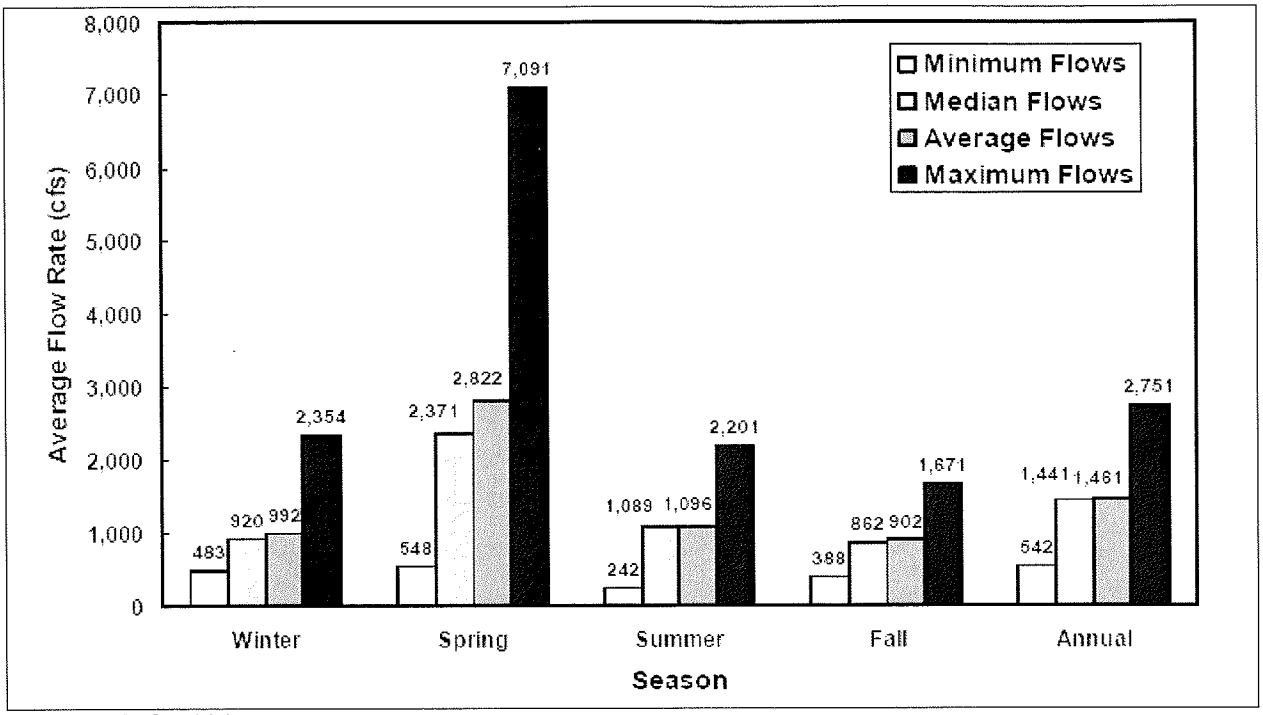
Source: USFS, 2004

Figure 4: Average Monthly Flow (cfs) at Otowi Gage (1990-1962 and 1963-2001)

Figure 5 illustrates the minimum, average, median, and maximum seasonal and annual flow variations between 1963 and 2001. The seasons include the following months:

- Winter = January through March
- Spring = April through June
- Summer = July through September
- Fall = October through December

From 1963 through September 2001, the average annual flow in the Rio Grande at this site ranged from 542 cfs (1964) to 2,751 cfs (1985). The average annual flow for the period from January 1963 through September 2001 was 1,461 cfs. Flow data gathered by the USGS and shown in these figures can be found at http://waterdata.usgs.gov/nm/.



Source: USFS, 2004

Figure 5: Average Seasonal Flow (cfs) at the Otowi Gage, 1963-2001

3.2.2.1 Surface Water Quality

Surface water quality within the Jemez y Sangre planning region (an area encompassing three northern New Mexico counties: Los Alamos, Rio Arriba, and Santa Fe) is generally good with respect to applicable water quality standards. Total dissolved solids (TDS) concentrations in surface waters typically fall below a value of 250 milligrams per liter (mg/L), which are substantially below the regulatory standard of 500 mg/L for this reach, and well below the 1,000 to 3,000 mg/L range that the Interstate Stream Commission uses to classify "slightly saline" waters. Surface waters in the study region also typically comply with other applicable water quality standards and guidelines.

Over most of the study region, the surface water is characterized as a calcium-bicarbonate type, although calcium-magnesium-bicarbonate and sodium bicarbonate types are occasionally observed. Most surface waters in the study region are classified as moderately hard to hard because of the concentrations of calcium and magnesium.

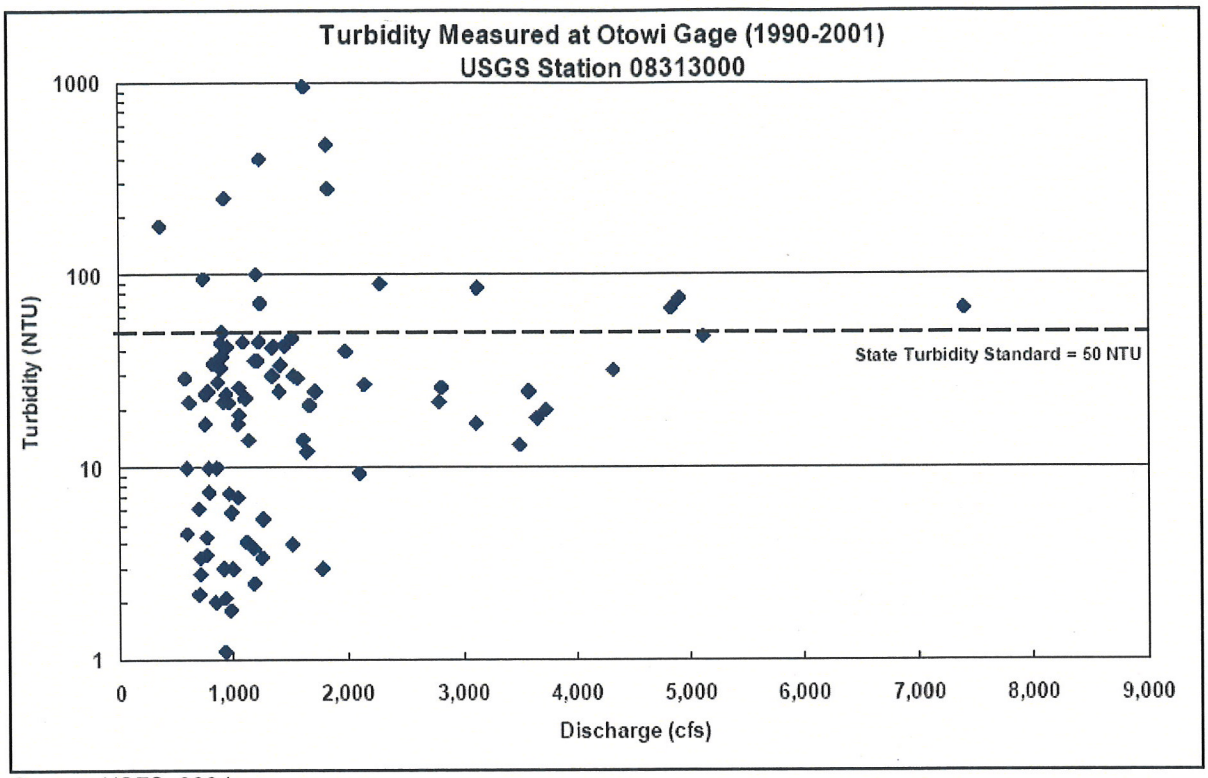
Nutrients (typically compounds with nitrogen or phosphorous) dissolved in surface waters of the region can occur from agricultural land uses, urbanization, and wastewater discharges. Contributions to dissolved nutrients on the main stem Rio Grande are made by agricultural sources from as far north as San Luis Valley in southern Colorado and the Rio Chama above El Vado Reservoir. Noticeable nutrient sources in and from tributaries include irrigated areas near Española, one of the more urbanized locales in the study

region, and along the lower Santa Fe River downstream of the City of Santa Fe. Surface water in the Pojoaque Valley occasionally contains elevated nutrient concentrations.

USGS conducted a National Water Quality Assessment (NAWQA) study of the Rio Grande Valley between 1993 and 1995. Monthly samples were gathered between April 1993 and September 1995. Several chemistry variables were examined that included dissolved solids, major inorganic constituents, and nutrients. The sampling found a median pH at Otowi Bridge of 8.1 with a median dissolved oxygen (DO) percent of saturation was 95. The average and maximum observed TDS concentrations were 186 and 221 mg/L, respectively. Hardness ranged from 95 to 140 mg/L as calcium carbonate, indicating moderately hard to hard water.

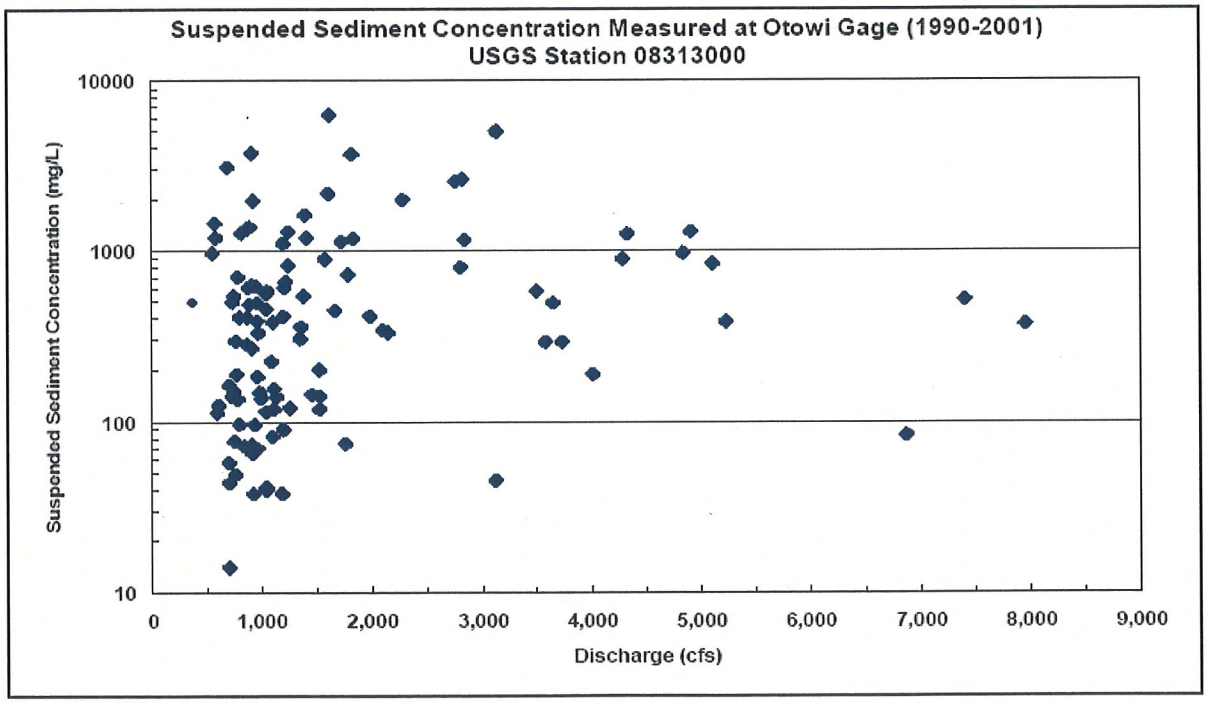
While nutrient levels are higher in the Rio Grande than the Rio Chama, nutrient concentrations in both rivers are still low. This is partially due to the tendency of both flows and nutrient concentrations to be somewhat higher on the main channel of the Rio Grande above Española than they are on the Rio Chama. During the NAWQA study, the Otowi median concentration of nitrite plus nitrate as nitrogen was 0.06 mg/L. This can be compared to the EPA Maximum Contaminant Level standard for drinking water of 10 mg/L.

The USGS recorded 98 turbidity samples (Figure 6) and 126 suspended sediment samples (Figure 7) between January 1990 and September 2001 at the Otowi gage. The samples were collected at a wide range of instantaneous discharges, from less than 500 cfs to over 8,000 cfs. About 15 percent of the turbidity samples were above the current State of New Mexico standard. The State has proposed removal of the site-specific 50 Nephelometric Turbidity Unit (NTU) turbidity standard as part of its 2003 Triennial Review Process.



Source: USFS, 2004

Figure 6: Turbidity Data Recorded at Otowi Bridge (Jan 1990-Sep 2001)



Source: USFS, 2004

Figure 7: Suspended Sediment Data Recorded at Otowi Bridge (Jan 1990-Sept 2001)

3.2.2.2 Water Use and Water Rights

Water use and water rights issues include surface water and groundwater. Water use and water rights for the City, County, and Las Campanas are discussed in detail in the City's Buckman Water Diversion Project DEIS (USFS, 2004).

The existing City water system is supplied from a variety of sources, and the City holds water rights for each of its sources of supply (Figure 8). The City has a permit issued by the New Mexico Office of the State Engineer (OSE) to pump and use water from the Buckman Well Field. This permit requires the City to offset stream depletions caused by the pumping, determined by OSE using groundwater modeling. Historically, the City has used a portion of its San Juan-Chama contract allocation to offset depletions to the Rio Grande, and water rights on the Rio Pojoaque and Tesuque Creek to offset depletions to those tributaries to the Rio Grande.

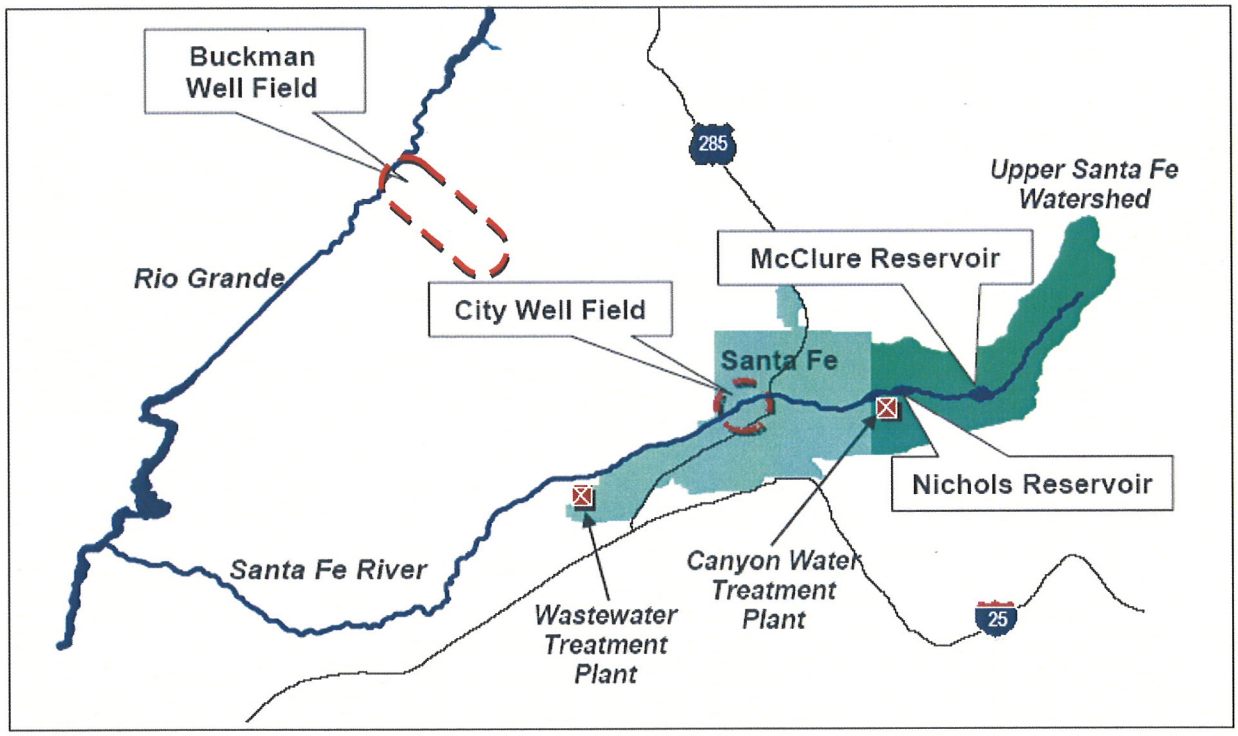


Figure 8: City of Santa Fe Existing Water System

3.2.2.3 Floodplain

Flood events within the Project Area have been reduced by the flood control reservoirs upstream. However, heavy rainfall events occasionally occur along this reach, resulting in higher than average discharge. Over time, high flow events have caused the river to reclaim an old meander channel near the terminus of Buckman Road. Subsequent flood events have removed the cobble bar and sand bars that are between the abandoned meander channel and the active channel. This suggests that high rates of sediment transport occur that move boulders, cobbles, sand, silt, and clay down the Rio Grande.

3.3 Groundwater Resources

The City of Santa Fe uses groundwater from the Buckman Well Field for a portion of its municipal water supply. The Buckman Well Field consists of 13 wells that currently normally supply about 40 to 60 percent of the water demand for the City in a normal precipitation year. The wells pump from the Ancha aquifer, part of the Tertiary-age Santa Fe Group of Rio Grande rift basin-fill sediments.

Pumping at the Buckman Well Field has resulted in a drawdown of the aquifer. Drawdown from the well pumping does not occur uniformly throughout the aquifer but rather occurs in the vicinity of the wells, forming a cone of depression. Since 1982, the measured drawdown at the Buckman Well Field has been approximately 200 feet and exceeds 300 feet in the portion of the aquifer where most of the pumping occurs. In close proximity to wells the drawdown can exceed 340 feet (USFS, 2004). OSE uses a numerical model to estimate the annual depletion of flow in the Rio Grande and its tributaries related to the drawdown resulting from pumping at the Buckman Well Field. Based on those model estimates the OSE requires offsets for water depletions in the Rio Grande and its tributaries up to 2,705 ac-ft/yr (through 2001) (USFS, 2004).

These Rio Grande depletions will not change rapidly regardless of whether or not the Buckman Well Field pumping is reduced following implementation of the Buckman Water Diversion Project. Because the City plans to annually divert all of its allocated San Juan-Chama Project water once the Buckman Water Diversion Project is operational, the City requires another source of water to offset the continued depletions of the Rio Grande caused by the Buckman Well Field. That is the City's primary reason for leasing 3,000 ac-ft/yr of water from the Jicarilla Apache Nation.

3.4 Biological Resources

3.4.1 Aquatic Communities

Aquatic habitat along the Rio Chama and Rio Grande consist of main channel runs and limited pool habitat. Gravel and cobble riffles and bars are also found within the Project Area. As a part of the Buckman Water Diversion Project DEIS (USFS, 2004), which includes the Rio Grande portion of the Project Area for this EA, fish sampling (electro-shock) was conducted in August 2002. In addition, silt, sand, gravel, cobble, boulder and vegetation substrates were sampled.

Electro-shocking near the proposed Buckman Water Diversion Project identified seven fish species (brown trout [*Salmo trutta*], white sucker [*Catostomus commersoni*], common carp [*Cyprinus carpio*], flathead chub [*Platygobio gracilis*], longnose dace [*Rhinichthys cataractae*], channel catfish [*Ictalurus punctatus*], and smallmouth bass [*Micropterus dolomieui*]). The white sucker and flathead chub were the most abundant fish collected, but only the flathead chub and longnose dace are native to the Rio Grande in New Mexico. Review of available literature related to past fisheries sampling indicates the historical presence of Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*),

Rio Grande sucker (*Catostomus plebeius*) and the Rio Grande chub (*Gila pandora*). These species are unlikely to be found in the area because the Rio Grande cutthroat trout prefers clear, silt-free water in cold streams and lakes with gravel beds, and the Rio Grande sucker is rarely found in waters with heavy loads of silt and organic detritus. The Rio Grande chub prefers impoundments and pools of small to moderate streams and is frequently associated with aquatic vegetation. These habitats are limited or absent at this time.

Field surveys (including the bank, pool habitat, and main channel of the Rio Grande) conducted for the Buckman Water Diversion Project DEIS did not find amphibians, including tadpoles. Water velocities in the main channel are too high to meet habitat requirements for relatively poor-swimming tadpoles. No appropriate frog habitat exists inland of the Rio Grande within the Project Area (USFS, 2004).

3.5 Riparian Resources

3.5.1 Plant Communities

Plant communities within the Project Area have been altered from their natural composition by a range of disturbances such as fire suppression, development, livestock grazing, off-road vehicle use, reduced surface water flow, and the invasion of exotic plant species. The dominant plant communities within the project region include the Floodplains-Plains Riparian along the Rio Grande and the Juniper Savanna that encompasses most of the remaining area (USFS, 2004).

The Juniper Savanna has been expanding within New Mexico in the last 150 years and is characterized by a relatively low density of trees (130/acre) within grassland. The canopy of this plant community is generally open, except for scattered clusters of closely spaced trees, particularly in the Diablo Canyon area and hillsides. Within the Project Area the groundcover averages about 60 percent.

Native and non-native riparian vegetation is found in a dense, narrow band along the rivers. Woody species within the Project Area include saltcedar (*Tamarix ramosissima*), cottonwood (*Populus deltoides*), Russian olive (*Elaeagnus angustifolia*), and coyote willow (*Salix exigua*). The understory is dominated by forbs and grasses such as field mint (*Mentha arvense*), spreading dogbane (*Apocynum cannabinum*), and fescue grass (*Bromus catharticus*). Farther inland, plants are only partially dependent on near-surface groundwater, including New Mexico olive (*Forestiera neomexicana*), sweet clover (*Melilotus officianalis, M. alba*), New Mexico locust (*Robinia neomexicana*), camphorweed (*Heterotheca subaxillaris*), and lemonade bush (*Rhus trilobata*). The lower Cañada Ancha floodplain located southeast of the riparian and semi-riparian areas along the Rio Grande is a highly disturbed area as it is subjected to intense pressure from cattle grazing and human activities such as off-road driving, refuse dumping, and camping. This broad, open floodplain is dominated by rabbitbrush (*Ericameria nauseosa, E. depressus*) and snakeweed (*Guttierezia sarothrae*). Other plants in the area include

Apache plume (*Fallugia paradoxa*), four-wing saltbush (*Atriplex canescens*), and two species of globemallow (*Sphaeralcea angustifolia, S. incana*). Outside of the floodplain, one-seeded juniper (*Juniperus monosperma*) becomes the most common tree species. Other woody vegetation includes piñon pine (*Pinus edulis*), yucca (*Yucca glauca*), tree cholla (*Opuntia imbricata*), sand sage (*Artemesia filifolia*), and rabbitbrush.

Two general types of washes are found in the area. The first type is a low-lying wash not subjected to recent flash floods and has denser vegetation, including juniper and rabbitbrush, than the surrounding upland areas. The second type of wash is the sandy, open, scoured arroyo. These areas support relatively few plants and only annuals such as scurfpea (*Psoralidium lanceolatum*) and clammyweed (*Polanisia dodecandra*).

3.5.2 Non-Native Invasive Plant Species

New Mexico has delineated three distinct classes of weeds with separate management characteristics. Class A weeds are not native to an ecosystem and have a limited distribution. Class A weeds receive the highest priority management because the limited distribution pattern improves the chances of removing that species entirely and preventing reinfestation. Class B weeds are more dispersed but are limited to specific areas in New Mexico. Management emphasis is given to containing these weeds to their current range and keeping such plants from spreading into new areas. Class C weeds are widespread throughout New Mexico and require long-term programs that focus on management and suppression. Non-native invasive plant species present along with their New Mexico designation, if any, within the Project Area are listed in Table 2. The Santa Fe National Forest is analyzing a proposal to control, contain or eradicate invasive plant species throughout that Forest.

Table 2. Non-Native Invasive Plant Species

Scientific Name	Common Name	Management Class
Canada thistle	*Cirsium arvense*	Class A
Cheatgrass	*Bromus tectorum*	Class A
Dalmatian toadflax	*Linaria genistifolia* spp. *Dalmatica*	Class A
Yellow toadflax	*L. vulgaris*	Class A
Russian thistle	*Salsola kali*	Class C
Siberian elm	*Ulmus pumila*	Class C
Saltcedar	*Tamarix ramosissima*	Class C
Russian olive	*Elaeagnus angustifolia*	Class C

3.5.3 Wildlife

The Project Area is characterized by aquatic and riparian habitats along the Rio Grande and Rio Chama. In New Mexico, at least 80 percent of all animals use riparian areas at

some stage of their lives, with more than half of them considered to be riparian obligates (BLM, 1999). Additionally, the Rio Grande is a main corridor for migratory birds moving to and from wintering and breeding grounds. Riparian areas along the Rio Chama and Rio Grande provide suitable habitat for a more diverse population of avian species such as the southwestern willow flycatcher (*Empidonax traillii extimus*) and yellow-billed cuckoo (*Coccyzus americanus occidentalis*).

Inland from the river corridors are habitats for a variety of bird species, including raptors, and small game animals, such as jackrabbits (*Lepus californicus*). However, these species generally do not occur in high enough numbers for the area to be considered an important game region. Mammalian species that could be expected to utilize all undeveloped habitats are representative of the region. These species include: mule deer (*Odocoileus hemionus*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), jackrabbit, cottontail rabbits (*Sylvilagus* sp.), woodrats (*Neotoma* ssp.), and deer mice (*Onychomys* ssp.). Predatory species would include black bear (*Ursus americanus*), coyote, fox (*Vulpes* sp.), mountain lion (*Felis concolor*), and skunk (*Mephitis* sp.). Human activities and hunting pressure within the Rio Grande corridor have kept large and predatory mammal populations at fairly low levels. However, the region is still a very important refuge for large and small mammals in New Mexico (BLM, 1999).

3.6 Threatened And Endangered Species

As a part of the Buckman Water Diversion Project DEIS (USFS, 2004), an extensive literature review was completed, along with field surveys and consultation with state and federal agencies, to identify threatened and endangered and special status species within the Project Area. Because this Proposed Action extends beyond Santa Fe County, into Rio Arriba and Sandoval Counties, the search was expanded to determine the species of potential concern related to this proposed water subcontract.

Special status species are defined as plants and animals protected under the Federal Endangered Species Act, New Mexico state endangered and threatened species protected under the New Mexico Conservation Act, and lists maintained by BLM and USFS. Species status was based upon lists maintained by USFWS, BLM, USFS, New Mexico Department of Game and Fish, New Mexico Rare Plant Technical Council, and the New Mexico Natural Heritage Program (USFS, 2004). Species afforded consideration under the Migratory Bird Treaty Act of 1918 and Santa Fe National Forest Plan Management Indicator Species were also considered.

Twenty-six plant and 42 wildlife special status species are currently tracked by the New Mexico Natural Heritage Program (NMNHP, 2005), that may occur in Santa Fe County, Rio Arriba County or Sandoval County. Through a literature review and habitat assessments it was determined that one plant and 14 wildlife special status species could be potentially found within the riparian habitats of the Project Area (see Table 3). The

remaining species were determined not likely to occur in the Project Area based on the lack of suitable habitat or their known distribution.

Table 3. Threatened and Endangered Plants and Animals That Could Occur Within the Project Area

Common Name	Status		Species Information
(Scientific Name)	USFWS	NM	Habitat Requirements
PLANTS			
Parish's alkali grass (*Puccinellia parishii*)	–	E	Alkaline springs, seeps, and seasonally wet areas that occur at the heads of drainages or on gentle slopes at 2,600-7,200 ft range-wide. The species requires continuously damp soils during its late winter to spring growing period.
FISH			
Flathead chub (*Platygobio gracilis*)	–	–	Habitat requirements consist of turbid, alkaline waters with shifting substrates. This species is common in the Rio Grande.
Rio Grande sucker (*Catostomus plebeius*)	–	–	The Rio Grande sucker lives in small to large, middle elevation (2000-2600 m) streams usually over gravel and/or cobble, but also in backwaters and in pools below riffles. It is rarely found in waters with heavy loads of silt and organic detritus.
Channel catfish (*Ictalurus punctatus*)	–	–	The channel catfish is found in a wide range of warm to cool water habitats, from large rivers with low gradients to ponds and reservoirs.
Rio Grande silvery minnow (*Hybognathus amarus)*	E	E	The Rio Grande Silvery Minnow is a federal endangered species that requires silt and sand substrates with slow backwaters or eddies. It is potentially present from below Cochiti Dam to the headwaters of Elephant Butte Reservoir.
Rio Grande chub (*Gila pandora*)	–	S	Habitat requirements consist of impoundments in small to moderate streams. Although not collected in recent surveys, it is possible that the chub does occur at low densities or intermittently.
REPTILES AND AMPHIBIANS			
Desert kingsnake (*Lampropeltis getula splendida*)	–	–	The desert kingsnake prefers riparian and grassland habitats in New Mexico but is also found in piñon-juniper and low desert areas. This snake uses rock outcroppings or mammal burrows to escape mid-day heat. It is likely to occur in the Project Area.
Northern leopard frog (*Rana pipiens*)	–	–	This species is found along the entire length of the Rio Grande. It is mainly found in streams and rivers, but also occurs in marshes, ponds, and irrigation ditches.

Common Name	Status		Species Information
(Scientific Name)	USFWS	NM	Habitat Requirements
BIRDS			
Bald eagle (*Haliaeetus leucocephalus*)	T	T	The bald eagle is a winter migrant along the Rio Grande. Most of the preferred roost sites are in snags and cliffs along the river in the section between Bandelier National Monument and the Cochiti Reservoir delta.
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	C	–	The current preferred habitat of the cuckoo is areas of willow and cottonwood and is generally a riparian obligate.
American peregrine falcon (*Falco peregrinus anatum*)	–	T	American peregrine falcons are occasional migrants in the spring or fall and winter visitors. They breed along sandstone cliffs and may frequent riparian areas in search of their shorebird or waterfowl prey.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	E	E	This species habitat consists of riparian areas with dense groves of willows, arrowweed, buttonbush, tamarisk, Russian olive, or other plants, often with a scattered overstory of cottonwood. Portions of the Project Area are proposed as critical habitat.
MAMMALS			
New Mexican jumping mouse (*Zapus latonius luteus*)	–	T	Preferred habitat for the meadow jumping mouse contains permanent streams, moderate to high soil moisture, and dense and diverse streamside vegetation consisting of grasses, sedges, and forbs. Such habitats include the edges of permanent ditches and cattail stands in the Rio Grande Valley
Big free-tailed bat (*Nyctinomops macrotis*)	–	–	This bat prefers coniferous and mixed woodland and depend on rocky cliffs for roosting. They have been found in cottonwood riparian habitats.
Long-legged myotis (*Myotis volans*)	–	–	This species is primarily montane, but is more common in lowland during migration. They have been found in cottonwood riparian habitats.
Western spotted skunk (*Spilogale gracilis*)	–	S	This species has been recorded in Santa Fe County and can occur in many habitats including lower montane, mixed shrub, sagebrush, piñon-juniper, wetland, and riparian areas. They generally use rocky areas for denning sites.

Status designations are: Endangered (E), Threatened (T), Sensitive (S), and Species of Concern (SC). Table designations in parentheses are listed by the agency for New Mexico, but not specifically for Santa Fe County.

(Source: New Mexico Game and Fish BISON-M, Biota Information System of New Mexico web site at http://nmnhp.unm.edu/bisonm/bisonquery.php.)

Bald eagles (*Haliaeetus leucocephalus*), a federally listed threatened species, are known to be a winter migrant in the area. Critical habitat has recently been proposed along portions of the Rio Chama and Rio Grande for the southwestern willow flycatcher, a federally listed endangered species that has the potential to occur in the Project Area (Federal Register, October 12, 2004). The Rio Grande silvery minnow does not occur within the project vicinity; however, a discussion is provided below because of the proximity of silvery minnow critical habitat downstream from the Project Area.

The Santa Fe National Forest Plan identifies seven species as Management Indicator Species, which were selected to represent specific habitats and the species that use those habitats. These species are: Rio Grande cutthroat trout, piñon jay (*Gymnorhinus cyanocephalus*), wild turkey (*Meleagris gallopavo*), hairy woodpecker (*Picoides villosus*), Mexican spotted owl (*Strix occidentalis lucida*), mourning dove (*Zenaida macroura*), elk (*Cervus elaphus nelsoni*), and Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). Other than the Rio Grande cutthroat trout, which is not found within the Project Area, none of these species are considered riparian species and would, therefore, not be impacted by the proposed project.

3.6.1.1 Rio Grande Silvery Minnow

In February 2003, the USFWS issued a final ruling for the designation of critical habitat for the Rio Grande silvery minnow, which became effective March 21, 2003. The final rule states that the reach of the Rio Grande upstream of Cochiti Reservoir to the confluence of the Rio Chama is not designated as critical habitat due to the generally degraded and unsuitable habitat of the reach, and is not essential to the conservation of the silvery minnow (Federal Register, February 19, 2003). The Project Area is located above Cochiti Reservoir and is not considered critical habitat. No documentation of the silvery minnow above Cochiti Dam has occurred since the construction and operation of Cochiti Dam in the mid-1970s (BOR, 2004).

The presence of silvery minnow has only been documented in less than 5 percent of its historic range, and it is now restricted to the reach from Cochiti Dam to the tailwaters of Elephant Butte Reservoir.

3.6.1.2 Southwestern Willow Flycatcher

The southwestern willow flycatcher, a small passerine bird, is an insectivore generalist that feeds on various invertebrate terrestrial and aquatic insects. The flycatcher will forage within and occasionally above dense riparian vegetation, taking insects on the wing and gleaning them from foliage. The flycatcher is a Neotropical migrant, spending time from April to September in the United States, where it breeds in riparian areas along rivers, streams, or wetlands where relatively dense tree and/or shrub growth exist. They migrate statewide and are considered rare to fairly common. The flycatcher summers regularly in the San Juan, Rio Chama, Rio Grande, San Francisco and Gila valleys, and in the San Juan Mountains where dense groves of willows, arrowweed, buttonbush,

tamarisk, Russian olive, or other plants are present, often with a scattered overstory of cottonwood. These riparian communities provide nesting, foraging, and migratory habitat throughout the breeding range of the flycatcher. The rest of the year is spent in Mexico and Central and South America (Federal Register, October 12, 2004).

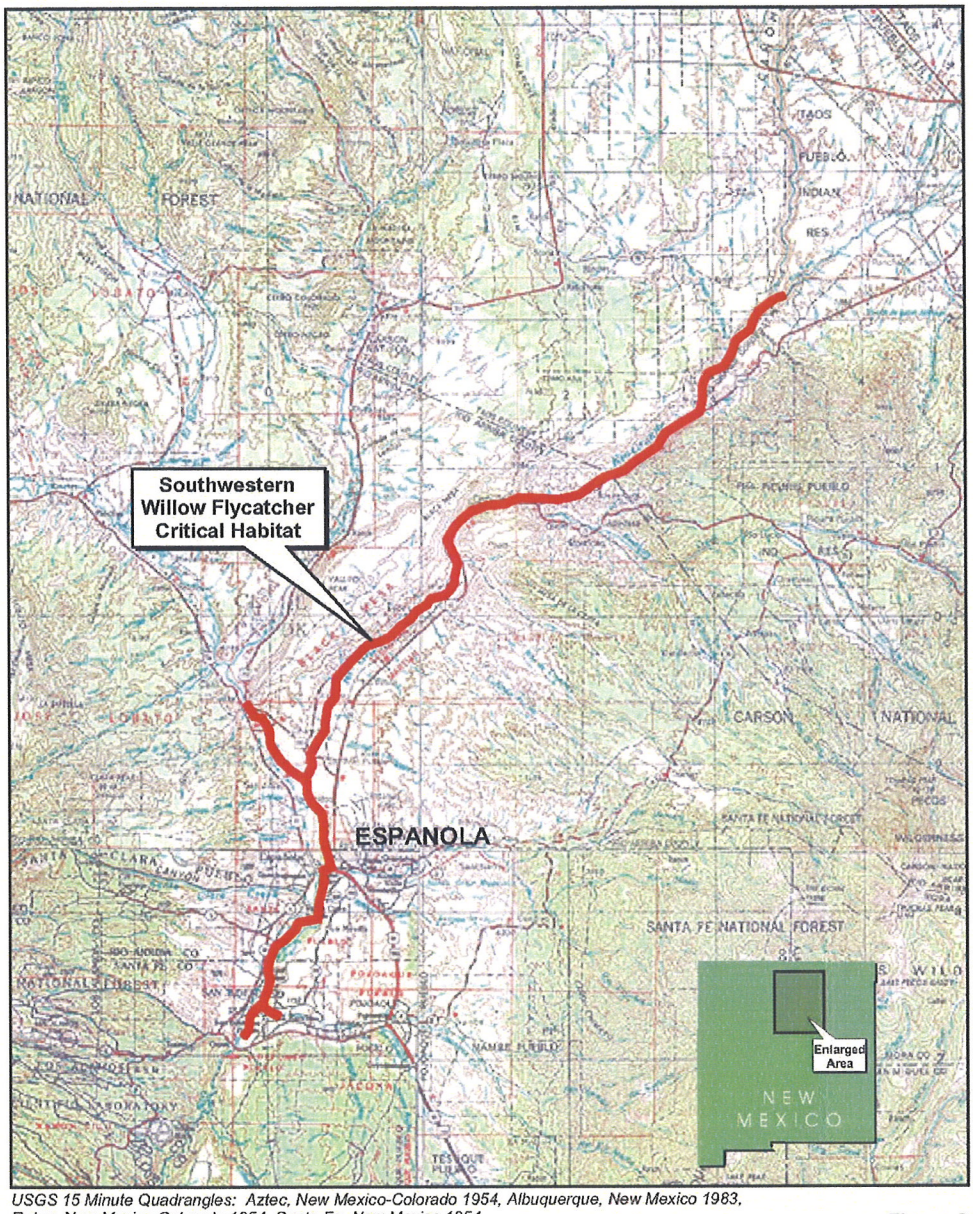
Human activity and its adverse impact on rivers and related riparian areas are the primary reasons for the reduction in population of willow flycatchers. Riparian habitat loss has also been precipitated by the introduction of invasive plant species, poor water quality and water management practices related to dam operations, water diversions, and groundwater pumping. River channelization, streambank stabilization, grazing, fire suppression, and recreation have also contributed to a denuded riparian habitat.

The southwestern willow flycatcher was listed as a federal endangered subspecies in February 1995, with critical habitat identified in July 1997 (Federal Register, October 12, 2004). In October 2004, USFWS proposed additional critical habitat for the southwestern willow flycatcher. Critical habitat areas were chosen based on "primaryconstituent elements," or essential features of a dynamic riverine environment that "germinates, develops, maintains, and regenerates" the riparian areas the willow flycatchers use for nesting and foraging. All proposed critical habitat areas are within the willow flycatcher's geographic range and have enough of the primary constituent elements to support the species (Federal Register, October 12, 2004). A portion of the Project Area is within the Rio Grande Recovery Area, which is broken into three river segments designated as willow flycatcher critical habitat. Of the three segments, only the upper Rio Grande segment (Figure 9) is within the Project Area. The upper Rio Grande segment extends approximately 46 miles from the Taos Junction Bridge (State Route 520) downstream to Otowi Bridge (State Route 502), and on the Rio Chama from its confluence with the Rio Grande upstream approximately eight miles.

3.7 Cultural Resources

The Proposed Action does not involve any construction or alteration of any facilities along the river system. Because no alteration or ground disturbance is proposed, cultural resources would not be affected and were not evaluated.

Figure 9: Souththwestern Willow Flycatcher Critical Habitat



USGS 15 Minute Quadrangles: Aztec, New Mexico-Colorado 1954, Albuquerque, New Mexico 1983, Raton, New Mexico-Colorado 1954, Santa Fe, New Mexico 1954

Figure 9
Southwestern Willow Flycatcher Critical Habitat

Scale - 1 : 375 000

3.8 Environmental Justice

U.S. Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations) directs Federal agencies to assess whether the Proposed Action or alternatives would have disproportionately high and adverse human health or environmental effects on minority and low-income populations. The Project Area is within the Rio Chama and Rio Grande river systems, located primarily within USFS and BLM rangelands that contain small isolated residential communities. The City of Española, a low income and largely Hispanic community, is located on the Rio Grande near the confluence with the Rio Chama. Several federally recognized Indian tribes are in the general area, including the Pueblo of San Ildefonso, located on the Rio Grande in the vicinity of the Otowi gage; the Pueblo of San Juan, located at the confluence of the Rio Chama and the Rio Grande; the Pueblo of Santa Clara, located south of the Pueblo of San Juan; and the Pueblo of Cochiti, upon whose lands Cochiti Reservoir is located. Portions of the San Juan-Chama Project are located on the Nation's lands and the subcontract involves water rights of the Nation.

3.9 Indian Trust Assests

Indian Trust Assets (ITAs) are "legal interests" in assets held in trust by the Federal Government for Indian tribes or individual Indians. Examples of things that can be ITAs are lands, minerals, water rights, hunting and fishing rights, other natural resources, money, or claims. A characteristic of an ITA is that it cannot be sold, leased, or otherwise alienated without the approval of the Federal government. Secretarial Order 3175 and Reclamation ITA procedures require Reclamation to assess the impacts of its projects on identified ITAs. Reclamation, in cooperation with American Indian Tribes impacted by a given project, must inventory and evaluate assets, then mitigate or compensate for adverse impacts to the assets held in trust for Federally recognized American Indian Tribes or Indian individuals.

As noted in Section 3.7 above, several Indian tribes are located within the Project Area. However, no ITAs, other than the water rights of the Jicarilla Apache Nation that will be leased under the Proposed Action, will be involved in the Proposed Action.

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

This chapter describes environmental effects associated with the No Action and Proposed Action alternatives. The direct, indirect, and cumulative environmental consequences are described for each of the various resources. The potential impacts of the alternatives are based, in large part, on the information and data found in the Buckman Water Diversion Project DEIS (USFS, 2004). While the proposed subcontract is independent of the Buckman Water Diversion Project, the potential effects associated with the Proposed Action would similarly affect many of the same natural resources.