



## CHAPTER V

# **C H A P T E R V**

## **ENVIRONMENTAL CONSIDERATIONS**

### **INTRODUCTION**

The purpose of this chapter is to address various environmental elements, which are generally taken into consideration when pursuing efforts directly related to economic development. Issues which are of concern in maintaining a proper balance between economic development and environmental conservation include the protection of environmentally sensitive and protected areas; the preservation and protection of native wildlife habitats; maintaining and having adequate access to quality surface water and groundwater reserves; and maintaining sound municipal and regional infrastructure in an effort to facilitate development which is compatible with the local environment, and that also ensures the public health and safety. The information provided within this Chapter will assist in the identification of environmentally sensitive issues and geographical locations within the CAAG District, which may impede or constrain future economic development projects.

### **DESCRIPTION OF THE REGION**

As discussed within Chapter IV, the CAAG District is comprised of both Gila and Pinal Counties, and is geographically situated within the south central interior region of the State of Arizona. Gila County contains 4,752 square miles of land, whereas Pinal County contains a total of 5,344 square miles of land. Together, the two county CAAG District contains a total of 10,096 square miles of total surface land area. This composite figure is the equivalency of approximately 9 percent of the State of Arizona's total land area of 113,508 square miles.

The physical landscape of the CAAG District is extremely diverse, ranging from the low-lying desert terrain of southern Pinal County, to the distinctively unique steep hills and mountainous terrain, which is characteristic of northern Gila County. The majority of the District lies within the Transition Zone and Basin and Range geologic provinces, as displayed on Map Number 2, located in the back of the text. In direct correlation to the physical landscape and topographical features, the geographical distribution of various vegetation patterns throughout both Gila and Pinal Counties are also extremely diversified.

As discussed within Chapter IV, the CAAG District contains 8 different biotic communities, ranging from the low lying desert sage of southern Pinal County, to the vast open stands of ponderosa pines located throughout northern Gila County. Vegetation patterns within Gila and Pinal Counties are in part a direct result of elevation and long-term climatic conditions. There are several climatic zones within the District, which significantly contribute to the noticeable differences in fauna and flora throughout both counties. Average annual precipitation within the District ranges from 4 to 9.5 inches in the lower desert regions, to a range of approximately 14 to 25 inches in the mountainous terrain of northern Gila County. The climate in southern Gila and Pinal Counties is characterized by mild winters and warm summers, whereas the climate throughout northern Gila County is considered to be relatively cooler and mild throughout both the summer and winter seasons.

## **POLITICAL GEOGRAPHY**

The purpose of this section is to identify the percentages of county lands that are under direct jurisdiction of federal, state, and private ownership. As displayed in Table Number 2, located in the back of the text, approximately 84.2 percent of all composite lands within the CAAG District in 1999 were under the direct ownership of both the state and federal governments; whereas only approximately 15.8 percent of all composite land holdings within the District were under direct private ownership.

According to 1999 data compiled by the Arizona State Land Department, within Gila County approximately 55.5 percent of all county land was under the direct jurisdiction of the U.S. Forest Service; 37.9 percent of land was comprised of Native American Indian Reservations; 1.9 percent of land was held by the Bureau of Land Management; and a minimal percentage of overall county land acreage was under the direct jurisdiction of the National Park Service. Within Pinal County, approximately 35.4 percent of all county land was held within State Trust; 20.1 percent of land was comprised of Native American Indian Reservations; 11.1 percent of all lands were under the direct jurisdiction of the Bureau of Land Management; 6.5 percent of all land was held by the U.S. Forest Service; and minimal percentages of overall county land acreages were under the direct jurisdiction of the U.S. Military, the National Park Service, and by Pinal County for the purposes of providing public parks and recreational lands.

In addition, the incorporated communities of Globe, Hayden, Miami, Payson, Star Valley, and Winkelman together comprised approximately 1 percent of all composite lands within Gila County. Within Pinal County, the incorporated communities of Apache Junction, Casa Grande, Coolidge, Eloy, Florence, Kearny, Mammoth, Maricopa, Queen Creek, and Superior together comprised approximately 5.1 percent of all composite lands within Pinal County. In 2007, all lands located within the municipal civil boundaries of the District's sixteen incorporated communities accounted for approximately 3.5 percent of all composite land areas within Gila and Pinal Counties.

## **LAND USAGE**

### **Zoning**

Zoning is a process, which delineates communities into land use zones and districts, and is designed to ensure the public health, safety, and welfare of all individuals residing within the community. The primary function of zoning should be to implement the adopted measures of the community land use or general plan, and to protect desirable existing development. Zoning is enforced through the formal adoption of a community zoning ordinance, which regulates and restricts the use of private property in the public interest. As displayed in Table Number 29, located in the back of the text, 13 incorporated communities within the CAAG District have formally adopted community zoning ordinances, and all communities, with the exception of the Towns of Hayden, Mammoth, Miami, and Winkelman have formally adopted subdivision ordinances. In addition, all incorporated communities within the District presently maintain building codes, which are enforceable by law. Through the adoption of a master, or general plan, each incorporated municipality within the CAAG District has set aside specific areas of land within their individual community for residential, commercial, industrial, institutional, public, agricultural, and recreational utilization.

## **Superfund Sites**

In 1980, the United States Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in an effort to clean up hazardous materials spills and contaminated waste sites throughout the United States. This Act was soon followed by the Superfund Amendments and Reauthorization Act (SARA) of 1986. The primary intent of the Superfund legislation is to identify locations or individual sites that pose a detrimental threat to the public health and environment of a specific area, and to ensure that immediate precautionary measures are undertaken in an effort to eliminate all potentially adverse repercussions that could occur in a given community or location. Aside from all Superfund sites that have been identified at the federal level by the Environmental Protection Agency, the Arizona Department of Environmental Quality also identifies locations throughout the state that pose potential harm to local populations and environments. Funding at the state level is obtained from the Water Quality Assurance Revolving Fund (WQARF) program.

In 1993, the CAAG District contained one federally identified Superfund site, and two individual sites that were identified by the Arizona Department of Environmental Quality as potentially causing serious harm to local populations. Within Gila County, the Environmental Protection Agency has identified the Mountain View Mobile Homes Park, located near the City of Globe, as a federally designated Superfund site. This area is situated upon a 17-acre parcel of land near the communities of Globe/Miami, and prior to 1973, consisted of several smaller, on-site asbestos mills that processed chrysotile asbestos ore extracted from nearby mines. The mills failed to comply with the Environmental Protection Agency's emissions standards, and were ordered to close. However, one of the mills obtained a permit to rezone the property into a residential subdivision, and left large remnants of asbestos mill tailings and asbestos-laden equipment upon the site long after mobile homes were placed upon the location. Because the air and soils upon the site were contaminated with asbestos, in 1980, the state provided temporary housing to residents of the mobile home park while the site was being decontaminated. The site was cleaned up in the mid 1980's, and the State of Arizona agreed to maintain and monitor the site for a minimum of twenty years. Although the site was removed from the Environmental Protection Agency's National Priority List in 1988, and was ensured as being safe, it remains on the federal Superfund list. Due to the fact that all asbestos related materials and mining equipment was buried on-site to existing EPA rules and regulations, any excavation of the grounds would cause severe harm to the local population and environment.

The Arizona Department of Environmental Quality has also identified two WQARF sites within the CAAG District that contain severely toxic materials, and are considered detrimental to local populations and the environment. Within Gila County, the Pinal Creek site, located near the Town of Miami, was issued a finding of violation by the Environmental Protection Agency on July 28, 1986. The site is presently owned by the Phelps Dodge Inc., and contains a highly contaminated body of acidic underground mine drainage that has been steadily seeping into an alluvial aquifer under Pinal Creek. The contaminated groundwater is presently in danger of releasing perennial discharge into Pinal Creek, which would in turn flow into nearby Roosevelt Lake, jeopardizing native aquatic life or wildlife, and potentially endangering metropolitan Phoenix's water supply. Remedial actions are presently being taken in an effort to alleviate all potential threats to the groundwater and the local environment.

Within Pinal County, the Hexcel Corporation's chromium disposal site, located approximately 5 miles northwest of the City of Casa Grande, was placed on the Water Quality Assurance Revolving Fund priority list in 1987. The site was primarily utilized for the disposal of chromium-bearing aqueous

waste, which was generated from various industrial processes at the corporation's composite materials plant in Casa Grande. From 1968 to 1970, chromium water waste, arsenic, and sulfuric acid solutions were transported to the site and drained into several surface cells. It has been estimated by the Arizona Department of Environmental Quality that approximately 6,000 square feet of soil has been severely contaminated by chromium to a depth of 70 feet below the surface. There is concern that exposure to on-site surface soil, or chemical infiltration into the local watertable may in fact cause adverse health conditions. State and company officials have proposed to construct an engineered cap over the waste disposal cells, construct several surface drainage controls, and to continuously monitor the performance of the cap to ensure the elimination of future surface infiltration and immediate soil exposure.

### **Prime or Unique Farmlands**

The central region of Pinal County contains approximately 226,588 acres of prime farmland, which is solely utilized for the cultivation of various seasonal crops. The primary crops grown within the county consist of cotton, wheat, barley, and alfalfa. Also, limited amounts of vegetable and melon crops are grown, along with several orchard crops which consist of pecans, jojobas, citrus, and grapes. In 1997, Pinal County planted and harvested more cotton than any other county within the State of Arizona, and the county's average annual wheat and barley production over the past five years has been among the highest in the state.

The central farming region of Pinal County extends from the Gila River Indian Reservation, located in the north central part of the county, to an area immediately south of the City of Eloy. The farming region also extends from the far northwestern region of the county, to the areas immediately adjacent to the municipal boundaries of the Town of Florence. The majority of farmland (approximately 95 percent) within central Pinal County is located within the Pinal Active Management Area.

According to the Arizona Department of Water Resources, in 1995 approximately 42 percent of all water used to irrigate Indian farmlands (estimated at 38,000 acres) within the Pinal Active Management Area was groundwater. Surface water diversions from the Gila River and water from the San Carlos Irrigation District accounted for 16 percent and Central Arizona Project (CAP) water made up the remaining 42 percent. Approximately 12 percent of all non-indian farmlands are not located within an irrigation district, and still depend upon groundwater supplies for irrigation purposes.

The agricultural cultivation of prime farmlands within central Pinal County is expected to undergo considerable changes during this century. The majority of individual farm owners within this region are expected to make a major transition from groundwater usage to available CAP waters, which will be provided through various irrigation districts. A lower degree of groundwater reliance will ultimately alleviate the rapid depletion of groundwater reserves located within central Pinal County's underground aquifers.

Aside from prime farmlands located within the central region of the county, there is a minor concentration of farmland located in eastern Pinal County, located in a linear corridor between the Town of Superior, and the Town of Winkelman. In addition, according to the U.S. Department of Agriculture, Soil Conservation Service, prime farmlands within Gila County do not presently exist.

## **Conservation Areas**

The official care, protection, and management of our natural resources is an important element of protecting the natural environment. Within the CAAG District, there are many areas, which have distinctively been set aside for the purposes of conservation. The U.S. Forest Service presently contains a total of 2,187,796 acres of land within the CAAG District. This composite figure is the equivalent of 3,418 square miles of land, which accounts for approximately 34 percent of all surface lands within the District. Tonto National Forest contains 1,898,923 acres of land, and is geographically situated within central Gila, and northern Pinal Counties. Coronado National Forest is predominately situated within Pima County. However, 28,872 acres of forest land extends into the far southeastern region of Pinal County.

The Tonto National Forest offers numerous recreational and cultural resources, and also contains the Superstition, Sierra Ancha, Salt River Canyon, Salome, Hellsgate, and Mazatzal wilderness areas; along with the Three Bar and Roosevelt Lake wildlife areas, which are located adjacent to Roosevelt Lake. The wilderness areas contain various trails for hiking and horseback riding, and do not contain campsites, which allows for the preservation of the natural environment. The wildlife located within close proximity to Roosevelt Lake are solely intended for the preservation of important wildlife habitats. The Tonto National Forest has also set aside designated lands for animal forage and limited timber production.

The Coronado National Forest is situated directly south of the Community of Oracle, and contains numerous trails and scenic vistas, which are located within the Santa Catalina Mountains. Aside from National Forest lands, Pinal County also contains the Aravaipa and Table Top Wilderness Areas. The Aravaipa Wilderness Area is located in the far eastern region of the County, and contains Aravaipa Creek, which is a well documented riparian area; whereas the Table Top Wilderness Area is located in the far western region of Pinal County, and is situated within the Table Top Mountain Range. The Bureau of Land Management and the Nature Conservancy maintains both wilderness areas. Another notable conservation area within the CAAG District is the Boyce Thompson Southwestern Arboretum, which is an outdoor museum containing more than 10,000 different species of distinctive southwestern flora and fauna. This particular site is situated upon 35 acres of land, and is located approximately three miles west of the Town of Superior.

## **PUBLIC SERVICES**

### **Wastewater Collection and Treatment Facilities**

According to the Arizona Department of Environmental Quality, Water Pollution Compliance Unit, there are presently a total of 12 municipal wastewater treatment facilities; and 256 commercial, industrial, and institutional on-site wastewater facilities within the CAAG District. Table Number 18, located in the back of the text, identifies all municipal wastewater treatment facilities within Gila and Pinal Counties, and provides information on each system's design capacity, and daily generated volume flows.

The Arizona Department of Environmental Quality utilizes various criteria to determine whether a facility is in compliance with standardized requirements. Such criteria involves the results of on-site operational inspections; the submittal of accurate facility data; the ability to facilitate and maintain wastewater capacities; and the monitoring of operational procedures that are carried out and

adhered to for each facility. Within Gila County, the City of Globe-Pinal Creek, Town of Miami, and Town of Winkelman municipal wastewater treatment facilities have all been identified as being in a status of noncompliance by officials with the Arizona Department of Environmental Quality. Within Pinal County, Arizona City and the City of Eloy wastewater treatment facilities have been classified as being in full-compliance; the City of Casa Grande, City of Coolidge and the Town of Mammoth wastewater treatment facilities have been classified as being in substantial compliance; and the Town of Florence, Town of Kearny, community of Oracle, and the Town of Superior wastewater treatment facilities are presently in a status of noncompliance. Capacity level data and additional information pertaining to each municipal wastewater treatment facility can be found in Chapter IV.

Within Gila County, there are presently 74 on-site commercial, industrial, and institutional wastewater facilities. As reported by the Arizona Department of Environmental Quality, 60 percent of all facilities were reported as being within full compliance; whereas 40 percent of all wastewater facilities were reported as being in substantial or noncompliance. Within Pinal County, there are presently 182 on-site commercial, industrial, and institutional wastewater facilities. Of this total number, 78 percent of all facilities were reported as being within full compliance; whereas 22 percent of all wastewater facilities were reported as being in substantial compliance or noncompliance. Although there have been several isolated cases of individual on-site septic failures throughout the District, there have been no reported wide-spread detrimental effects of leakage that would pose adverse impacts upon the public or local environments.

### **Community Water Systems**

As discussed in Chapter IV, the Arizona Department of Environmental Quality has established a set of standardized criteria in an effort to ensure safe drinking water for various service area populations located throughout the State of Arizona. According to information obtained from the Arizona Department of Environmental Quality, Water Compliance Unit, in 2001 there were a total of 210 public and private drinking water systems within Gila and Pinal Counties. Of this composite figure, Gila County contained 100 water systems, whereas Pinal County contained 110 water systems.

The Arizona Department of Environmental Quality, Water Compliance Unit, collects water samples from each facility's primary water source, and conducts several tests which provide for a collective analysis of the water's bacteriological, radiochemical, trihalomethane, and turbidity levels; along with the overall organic, inorganic, and volatile organic chemical content of the water obtained from the system. In addition, the Arizona Department of Environmental Quality, Water Compliance Unit, periodically investigates the operation, maintenance, and monitoring procedures of each facility located within the CAAG District in order to ensure continual system compliance with state and federal drinking water regulations.

As described in Chapter IV, the Arizona Department of Environmental Quality categorizes all public and private water systems within the State of Arizona as being in full compliance, substantial compliance, or in a state of non-compliance. In 1999, Gila County reported that 91 out of 108 water systems, or approximately 84 percent of all public and private water systems monitored by the Water Compliance Unit were not in compliance with the Environmental Protection Agency's drinking water quality standards. In 1999, Pinal County reported that 93 out of the 143 water systems, or approximately 65 percent of all public and private water systems within the county were not in compliance with the Environmental Protection Agency's drinking water quality standards.

The Arizona Department of Environmental Quality, Water Compliance Unit, is currently in the process of addressing all noncompliance cases within the State of Arizona in an effort to reduce the number of public and private drinking water systems that are experiencing difficulties pertaining to operational and monitoring requirements, or that are in direct violation of one or more of the applicable drinking water quality standards. The Water Compliance Unit has initiated an enforcement policy whereby all systems in noncompliance are notified of the specific violation, and are given a 30 day period to respond to the violation. The Water Compliance Unit will work with the owners of noncomplying systems to rectify discrepancies in order to ensure safe drinking water for service area populations. However, in the event that owners do not respond to system violations, they are given an alternative course of due process, which may involve an administrative or public hearing. If the violation has not been cleared, systems may eventually be subject to closure by a court of law as established within the Arizona state statutes.

Many of the noncomplying public and private water systems within Gila and Pinal Counties have already been notified of specific violations by representatives of the Arizona Department of Environmental Quality, Water Compliance Unit, and are currently in the process of developing plans and alternative measures in order to eliminate system violations which may be detrimental to service area populations. The number of public and private drinking water systems within the CAAG District that are in violation of operational and monitoring requirements, or applicable drinking water quality standards, are expected to substantially decrease over the next five years as the result of regulatory water enforcement policies that are presently being carried out by the Arizona Department of Environmental Quality, Water Compliance Unit.

### **Solid Waste Handling and Disposal**

According to the Arizona Department of Environmental Quality, Solid Waste Unit, in 2000 there were a total of 4 active municipal solid waste landfills, and 13 privately operated solid waste landfills located in the CAAG District. Table Number 19, located in the back of the text, indicates all of the private and municipal solid waste landfills that are presently in operation within the CAAG District, and also lists each site's anticipated life span.

Within Gila County, the Buckhead-Mesa and Russel Gulch solid waste landfills are expected to continue operations into the next century. As discussed in Chapter IV, the mandatory requirements will result in significantly higher operational costs, thereby making it financially difficult for these particular solid waste landfills to continue operations. Gila County is currently in the process of assessing alternative sites and waste disposal measures in an effort to meet future anticipated demand levels. Within Pinal County, the City of Casa Grande and the City of Eloy have the only municipal operated solid waste landfills. The remainder of the solid waste landfills are privately operated. There is sufficient room to meet anticipated demand within the county's municipal solid waste landfills over the next ten to fifteen years. Also, realizing the impact that sufficient solid waste disposal has on community development efforts at the local and regional levels, Pinal County completed a comprehensive solid waste management report in 1989 that addresses various environmental concerns, along with alternative solid waste measures that will accommodate future demand levels well into the next century.

### **Transportation Facilities**

According to the Arizona Department of Transportation, the CAAG District contains a total of approximately 5,808 miles of roadway. The current regional roadway system accommodates both

local and regional vehicular traffic through a network of local streets, collectors, and principal arterials. The majority of roads throughout the District are under the direct jurisdiction of both Gila and Pinal Counties, as well as the individual communities and municipalities. Most of the roadways, which link the District's incorporated communities, and accommodate regional travel from rural and exterior areas are under the direct jurisdiction of the State of Arizona.

As discussed in Chapter IV, the Arizona Department of Transportation has developed a Sufficiency Rating System for evaluating state highways throughout Arizona. The Sufficiency Rating System was designed to collectively assess characteristics such as pavement life; pavement rut life; accident rates; accident severity rates; daily traffic rates per lane; and future daily traffic rates per lane. From this selected criteria, the Arizona Department of Transportation compiles a composite roadway sufficiency status designed to formulate an overall depiction of each roadway segment's condition.

Based on the latest composite sufficiency rating data available from the state Department of Transportation, the overall status of the CAAG District's rural regional network ranges in between fair to good condition. However, there are presently several roadway segments located throughout both Gila and Pinal Counties that contain poor conditions in several of the assessed categories as established by the Arizona Department of Transportation.

Within the CAAG District, pavement life sufficiency and future daily traffic per lane sufficiency are areas of concern. Pavement life sufficiency is a primary criterion, which assesses the number of years remaining before some form of remedial action will be required to resurface, or repair a highway segment. Generally, when a road is classified as containing poor pavement life sufficiency, some form of remedial action is required within five years from the date of the original assessment in order to ensure an adequate road surface to facilitate travel. Traffic per lane sufficiency is an estimate that is based on current average daily traffic counts, in an effort to determine the ability of a roadway segment to adequately facilitate future demand levels.

Within the District, there are several roadway segments that are anticipated to encounter increasing levels of daily traffic congestion in the next five to ten years. These segments include: Interstate Highway 10, extending between the Maricopa County boundary in the north, to the Pima County boundary, located in the southern region of Pinal County; U.S. Highway 60, located between Florence Junction and the City of Globe; and SR 260, extending between the Town of Payson and the Coconino County boundary. The higher levels of daily traffic on Interstate Highway 10 can be attributed to increased regional travel between the metropolitan centers of Tucson and Phoenix; whereas higher levels of daily traffic upon US 60 and SR 260 is the result of increased travel to various recreational areas within the State of Arizona. All are resoundingly affected by urban sprawl facilitated by growth of Arizona's large urban areas.

## **SITES OF HISTORICAL SIGNIFICANCE**

The National Register of Historic Places is a composite list of individual sites and properties that are of considerable historical, archaeological, engineering, and cultural significance to communities, states, and regions throughout the United States. The national register is maintained by the National Park Service, and expanded through nominations by individuals, organizations, state and local governments, and federal agencies. According to the National Park Service, a property or site may be placed on the National Register if it is associated with events that have made a significant contribution to the broad patterns of our history; if it is associated with the lives of persons significant

in our past; if it embodies a significant type, period or method of construction, or artistic splendor; or if it is of recognizable importance to prehistoric or historic events.

As of 2007, there are a total of 176 properties and sites located within the CAAG District that are listed on the National Register. Gila County contains a total of 55 entries, whereas Pinal County contains 121 properties and sites. Each individual listing is located at the back of this chapter by county and locational vicinity. In addition, information is provided for each property and site indicating the official date of listing on the National Register.

## **SURFACE AND GROUNDWATER**

### **Surface Water Basins and Water Quality Assessment**

As displayed on Map Number 3, located in the back of the text, the CAAG District encompasses a geographical region that includes portions of 6 surface water basins. As described by the Arizona Department of Environmental Quality, surface water basins basically reflect surface water drainage patterns, and also provide an organizational construct for identifying and characterizing water quality problems throughout the State of Arizona. Within the CAAG District, the 6 surface water basins include the Middle Gila River, San Pedro River, Salt River, Santa Cruz River, Upper Gila River, and the Verde River surface water basin. The following information provides a brief description of each surface water basin, and addresses any activities that may be of environmental concern to the region.

#### **Middle Gila River Basin:**

The Middle Gila River Basin covers a large percentage of Pinal County's surface land area, along with the southern portion of Gila County. The Middle Gila River Basin extends beyond Pinal County, and encompasses the Greater Metropolitan Phoenix region. Approximately 65 percent of the state's population resides within the boundaries of the Middle Gila River region. The basin receives limited precipitation on an annual basis, and the majority of surface water flow within the Gila River can be attributed to periodic releases from upstream impoundments, agricultural return flows, and effluent from wastewater treatment plants.

Past mining activities that have taken place within southern Gila and eastern Pinal Counties have had adverse impacts on regional surface water quality. The Gibson Mine site, which is located on a ridge separating the Salt River and Middle Gila River Basins, was utilized to produce high-grade copper ore between the years of 1906 and 1918. After the mine was closed in 1918, it was still used on a continual basis to produce copper, and is presently the site of several leaching facilities. During 1988, the Arizona Department of Environmental Quality conducted a series of tests in the immediate region and discovered that mining operations at this particular facility have been contaminating streams throughout both the Middle Gila River and Salt River Basins. Various water samples which were retrieved along a tributary of Mineral Creek, which is located along the Gila and Pinal County line between the Communities of Globe and Kearny, provided evidence for high contamination levels within the vicinity. In addition, during 1990, exceptionally heavy rainfall at ASARCO's Ray Mine caused three separate ponds containing heavy volumes of leachate solution to overflow into the Gila River, which resulted in an 18 mile long plume that was highly contaminated with copper, sulfates, phosphorous, and various suspended solids.

**San Pedro River Basin:**

The San Pedro River Basin contains the San Pedro River, and comprises the southeastern region of Pinal County. The San Pedro River has its origins in the higher mountainous regions of northern Mexico and flows in a northerly direction into Arizona, to where it eventually merges with the Gila River near the Town of Winkelman. Abandoned and active mining activities are considered to be the primary sources of pollutants within the water basin. However, tests that were conducted by the Arizona Department of Environmental Quality near the Apache Powder Superfund Site, which is located immediately south of the CAAG District in Cochise County, has revealed that large amounts of ammonia, copper, fecal coliform, lead, mercury, nitrate and turbidity are seriously polluting the river. Seepage from an underground aquifer along the riverbank appears to be a major source of this contamination. Although the majority of pollutants associated with the Superfund site affect the immediate region within Cochise County, this is of major concern to the CAAG District, primarily due to the fact that the remaining pollutants within the river flow in a northerly direction to its confluence with the Gila River near the Town of Winkelman. As a result, wildlife in or around the San Pedro River may be harmed by such contaminants leaking into the river, and people who ingest contaminated surface waters may also be at risk.

**Salt River Basin:**

The Salt River Basin comprises the majority of surface lands within central Gila County, and contains the Black, Salt, and White Rivers, along with the Pinal, Pinto, and Tonto Creeks. These particular surface stream waters all flow into Theodore Roosevelt Lake, which in turn flows into Apache Lake, Saguaro Lake, and Canyon Lake. This surface water chain within the Salt River Basin serves as the primary source of drinking water for the Phoenix Metropolitan Area.

According to the Arizona Department of Environmental Quality, mining activities within the Pinto Creek and Pinal Creek watersheds have significantly contributed to very serious surface water contamination by heavy metals; boron; sulfate; TDS (Total Dissolved Solids); and low pH levels, which indicate a high degree of acidic content. As previously stated within this chapter, a WQARF Superfund project has been established in the Globe/Miami copper mining area along Pinal Creek and its immediate tributaries. Excessive TDS, manganese, and sulfate near the mouth of Pinal Creek provide sufficient evidence to suggest that surface and groundwater contamination has continued to move closer to the Salt River and Roosevelt Lake, which serves as the primary source of drinking water for the majority of the population residing within the State of Arizona.

**Santa Cruz River Basin:**

The Santa Cruz River Basin comprises a relatively large percentage of land surface within western and southern Pinal County. The Santa Cruz River has its origins in the mountainous, higher elevations of northern Mexico. The river flows in a northerly direction across the western half of Pinal County to where it converges with the Gila River in the far northwestern region of Pinal County, immediately adjacent to southern Maricopa County. Due to extensive groundwater usage throughout the basin, most of the Santa Cruz River has ceased perennial flows, and the majority of surface water can be attributed to wastewater discharges and seasonal rainfalls. Although adverse environmental conditions related to mining activities and Mexican raw sewage exist in the southern regions of the basin near the Nogales Wash, adverse environmental conditions within the Santa Cruz River Basin in Pinal County are not known to exist.

**Upper Gila River Basin:**

The Upper Gila River Basin is located within the south central region of Gila County, and contains the San Carlos River, which flows in a southerly direction from southeastern Gila County to San Carlos

Lake. Further to the south and east, the Gila River flows into Arizona from the State of New Mexico, and crosses Greenlee and Graham Counties to where it flows into the San Carlos Reservoir, which is located in southern Gila County. Although serious environmental impacts are not known to exist within the portion of the Upper Gila River Basin which is located throughout southern Gila County, recent monitoring conducted by the Arizona Department of Environmental Quality indicate that minimal standards for turbidity, copper, and mercury have been exceeded along selected points of the Gila River further south of the San Carlos Reservoir. Due to the fact that these particular areas of the Gila River which contained high exceedance levels are located throughout Graham and Greenlee Counties, it has not been determined whether surface water quality within the San Carlos Reservoir has been effected as a result of converging stream flows from these regions. Also, monitoring along selected points of the San Carlos River indicate minimal exceedances for dissolved oxygen, ammonia, and turbidity. Such problems can be attributed to inadequate rangeland management and mining activities (though limited) throughout southern Gila County.

### **Verde River Basin:**

The Verde River Basin encompasses a smaller region of northwestern Gila County, and includes the Verde and East Verde Rivers. The majority of lands associated with this basin are under the direct jurisdiction and management of the United States Forest Service, and are primarily utilized for the purposes of silviculture, grazing, recreation, and limited mining activities. The Verde River Basin supplies very high quality water for agricultural usage and potable purposes. Within northern Gila County, there are currently no adverse environmental conditions or detrimental industrial and rangeland activities which affect the overall quality of surface water in the region.

### **Groundwater**

The purpose of this section is to provide a brief assessment of regional groundwater quality within the CAAG District's underground aquifers, and to identify any activities or conditions within each region that may result in adverse impacts to regional service area populations and environments. As defined by the Arizona Department of Water Resources, an aquifer is basically a groundwater-bearing, geologic formation that is sufficiently permeable to yield useable quantities of water to wells and springs. The protection of groundwater reserves from contaminating sources is of major concern, primarily because groundwater is the principal source of public water supplies within the State of Arizona. In addition, because of the low annual rainfall levels typically associated with a desert environment, farmlands within Pinal County rely heavily on quality groundwater for the irrigation of crops.

According to the Arizona Department of Environmental Quality, groundwater contamination may occur in slowly developing pockets or plumes that emanate from point sources such as landfills, waste lagoons, and industrial dump sites. Also, the general deterioration of groundwater over a larger area or region may occur as a result of nonpoint sources of contamination, resulting from such activities as mining, the application of agricultural fertilizers and pesticides, septic systems, and leaking sewer networks. Within the CAAG District, groundwater contamination is closely associated with regional land use activities such as mining, industrialization, and agriculture.

According to information obtained from the *1993 Arizona Water Resources Assessment, Inventory and Analysis*, the Arizona Department of Water Resources has identified a number Water Resources Planning Areas and Active Management Areas in an effort to collectively assess surface and groundwater quality and availability for various regions throughout the State of Arizona. As displayed on Map Number 9, and in Tables 10 through 16, located in the back of the text, the CAAG

District is delineated into the Central Highlands and Southeastern Arizona Water Resources Planning Areas; and the Phoenix, Pinal, and Tucson Active Management Areas. The Central Highlands Water Resources Planning Area is subdivided into the Salt River, Tonto Creek, and Verde River Groundwater Basins; whereas the Southeastern Arizona Water Resources Planning Area is subdivided into the Donnelly Wash, Dripping Springs Wash, Lower San Pedro, and Safford Groundwater Basins. Individual groundwater basins were primarily designated on the basis of physiography, surface drainage patterns, subsurface geology, and aquifer characteristics. These Water Resource Planning Areas and Active Management Areas also encompass the major surface water basins discussed in the previous section. The Arizona Department of Environmental Quality has adopted the above stated groundwater basin boundaries established by the Arizona Department of Water Resources in an effort to summarize groundwater quality conditions throughout the state. The following categories represent a brief assessment of regional groundwater quality and additional concerns related to the depletion of groundwater reserves within the CAAG District's Active Management and Planning Areas.

**Pinal Active Management Area:**

The Pinal Active Management Area (AMA) encompasses an area of approximately 4,000 square miles, and includes portions of Pinal, Pima, and Maricopa Counties. It is one of five AMAs in the state that were established pursuant to the 1980 Groundwater Management Code (GMC). The majority of surface lands within the Pinal AMA are located within Pinal County, with the major population centers consisting of Casa Grande, Eloy, Coolidge, and Florence. The Pinal AMA is divided into five Sub-basins: Maricopa-Stanfield, Eloy, Vekol Valley, Santa Rosa Valley, and Aguirre Valley. The majority of groundwater that is pumped within the Pinal AMA is utilized for agricultural purposes.

Heavy reliance upon groundwater for the irrigation of crops within central Pinal County over the past fifty years is an area of concern, and has resulted in major depletions of subsurface groundwater reserves. It has been estimated by the Arizona Department of Water Resources that there has been a 400 foot decline in subsurface water levels, which has caused more than 15 feet of land subsidence in areas located immediately south of the City of Eloy. The subsidence within south central Pinal County has resulted in earth fissures that extend for a distance of up to approximately nine miles in length.

Maricopa-Stanfield Sub-basin:

Groundwater depths range from around 150 feet to more than 600 feet in this Sub-basin. Currently, groundwater levels are making a significant recovery following 40 years of intensive pumping for agricultural purposes. In some areas, groundwater levels have risen nearly 100 feet. This recovery has been attributed to an overall reduction in groundwater pumping, recharge from flood events, and the widespread use of CAP water. There is no known outflow of groundwater from this Sub-basin.

The total volume of groundwater in storage is estimated to be 9.6 million acre-feet (to a depth of 1,200 feet). Groundwater storage is estimated to have increased at the rate of 15,000 acre-feet a year since 1989.

Eloy Sub-basin:

Depth to water in the Eloy Sub-basin varies from around 100 feet in the northern portion of the Sub-basin to between 300 and 400 feet in the south-central region. Near Casa Grande is a perched water table that ranges in depth from less than 10 feet to about 100 feet below the surface.

Water levels have risen in this Sub-basin from 50 to more than 100 feet since 1989. This rise has been mostly attributed to recharge from several major flood events that have occurred here since the late 1970's. Approximately 377,000 acre-feet of recharge has been attributed to Gila River flood events that took place between 1989 and 1993. Decreased groundwater withdrawals and use of CAP water throughout the Sub-basin are also factors.

The total volume of groundwater in storage to a depth of 1,200 feet is estimated to be 24.2 million acre-feet. The increase in groundwater storage in the Eloy Sub-basin since 1989 is around 300,000 acre-feet.

#### Other Sub-basins:

The Vekol Valley, Santa Rosa Valley, and Aguirre Valley are, for the most part, undeveloped. Little information exists in regard to water levels, groundwater availability, and water in storage.

The overall quality of groundwater within the Pinal AMA is considered to be somewhat favorable. However, nitrate, sulfate, and metals contamination have been recorded throughout various areas of the Pinal AMA. Within the western and central regions of Pinal County, collected groundwater samples have detected minimal exceedances of nitrates, sulfates, and contaminated metals. Repeated applications of nitrogen fertilizers for irrigated agriculture, the use of septic systems, concentrated animal feeding operations, and wastewater treatment plants within the Pinal AMA have resulted in areas of nitrate concentrations in groundwater that exceed the State of Arizona's Aquifer Water Quality Standards. Areas containing higher levels of sulfate are directly attributable to mining operations within the southwestern region of Pinal County. Isolated sites within the Pinal AMA that contain contaminated metals such as arsenic and selenium can also be traced to mining operations, as well as landfills and other industrial activities. As previously stated, the Hexcel Corporation's chromium disposal site, located approximately 5 miles northwest of the City of Casa Grande, was placed on the State Superfund list in 1987. In 1992, only one groundwater sample that was conducted by the Arizona Department of Environmental Quality within the Pinal AMA tested positive for pesticide contamination. Generally, chemical contaminant levels are lowest in the undeveloped portions of the Pinal AMA, and are greatest in the immediate vicinity of agricultural property.

#### **Phoenix Active Management Area:**

The Phoenix Active Management Area encompasses a surface land area of approximately 5,646 square miles, and contains a small percentage of surface land area within the north central region of Pinal County. Groundwater enters into the eastern portion of the Phoenix AMA as underflow from the Eloy groundwater Sub-basin, located in the Pinal AMA. A large cone of depression created by groundwater pumping for agricultural usage has formed near Queen Creek, which is geographically situated on the boundary between Maricopa and Pinal Counties. As a result of groundwater utilization, water levels within north central Pinal County have decreased substantially.

According to the Arizona Department of Water Resources, groundwater quality data indicate that most of the groundwater located throughout northern Pinal County is suitable for most uses, including domestic use. However, poor quality groundwater restricts use in many areas. Several pockets of land located immediately adjacent to the northern Pinal County boundary, within the CAAG District, contain total dissolved solids (TDS) that exceed the Environmental Protection Agency's maximum contaminant levels. In addition, test results at various agricultural locations throughout northern Pinal County indicate that the distribution of sulfates and nitrates within groundwater are highly concentrated at specific sites. Such concentrations are directly related to agricultural activities and have not been the result of industrial activity or infiltration from solid waste landfills.

**Tucson Active Management Area:**

The Tucson Active Management Area is located in southern Arizona, and covers 3,866 square miles with a small geographic area located within south-central Pinal County. This particular area is experiencing rapid residential development, and is comprised of limited agricultural activity and expansive areas of natural desert vegetation. According to the Arizona Department of Water Resources, the chemical quality and overall composition of groundwater within south central Pinal County is considered suitable for agricultural uses and general consumption.

**Central Highlands Water Resources Planning Area:**

The Central Highlands Planning Area is located in the east-central portion of the state contains five groundwater basins: Agua Fria Basin, Salt River Basin, Tonto Creek Basin, Upper Hassayampa Basin, and the Verde River Basin. Of these five groundwater basins, the Salt River, Tonto Creek, and Verde River groundwater basins are located within the CAAG District. The Central Highlands Planning Area is of primary importance, due to the fact that the majority of Arizona's perennial streams originate within this region, and water resources attributable to the planning area account for approximately 60 percent of the state's drinking water supply. A narrow range of rugged mountains composed of igneous, metamorphic, and sedimentary rocks characterize this planning area. Due to steep gradients, high elevations, and the predominance of hard rock, which contribute to high runoff, the Central Highlands has little groundwater storage capabilities. The demand for water is concentrated in Globe-Miami, Payson, the Verde Valley, and in Wickenburg.

Climate in the planning area varies widely and is mostly determined by elevation. Elevations range from around 1,500 feet above sea level at Saguaro Lake to 12,600 feet above sea level at Humphrey's Peak in the San Francisco Mountains near Flagstaff. The lower elevations, which are dry and semi-arid, receive the majority of their precipitation during the winter. Intense late-summer thunderstorms provide short duration rainfall that produce large amounts of runoff, but less infiltration than the low-intensity winter rains. The higher elevations receive their heaviest precipitation in July and August, however the winter months all have moderate to high precipitation. Average annual precipitation ranges from 10 inches in the lower elevations of the Agua Fria Basin to 35-40 inches in the higher elevations of the Salt River Basin.

The Verde River Groundwater Basin encompasses a small region of northwestern Gila County. The Mogollon Rim escarpment forms a topographic relief of as much as 2,000 feet and trends northwest across the basin. It is divided into three sub-basins: the Big Chino, Verde Valley, and the Verde Canyon.

Further to the south, the Tonto Creek Basin covers an area of approximately 920 square miles situated throughout north central Gila County. This area is composed of rugged mountains consisting of igneous, metamorphic, and sedimentary rocks. All rock units contain some groundwater reserves. The basin was formed by faulting and trends north to south. It is drained by Tonto Creek and its tributaries.

The majority of lands within these basins contain high-quality groundwater suitable for all forms of intended utilization. However, little groundwater development has occurred within this region, because 97 percent of the lands are under the direct jurisdiction of the United States Forest Service. There are several wells located throughout both of the groundwater basins in northern Gila County that pump groundwater for irrigation purposes. However, such amounts are minimal, and accurate measurements are not readily available. The Town of Payson accounts for the majority of

measurable groundwater withdrawal within the Verde River Basin. It has been estimated by the Arizona Department of Water Resources that public wells located within the central area of the Town of Payson have experienced groundwater declines of four to five feet per year. Other wells located within the vicinity of the Town of Payson that are utilized for commercial and residential purposes show no immediate signs of decline.

The Salt River Groundwater Basin contains about 5,130 square miles and is primarily situated within the central region of Gila County. Its groundwater is utilized for agricultural, mining, and municipal purposes. The U.S. Geological Survey estimated that in 1984, approximately 10,000 acre-feet of groundwater was pumped from the basin.

In the Globe-Miami area, an alluvial aquifer (known as the Gila Conglomerate) along Pinal Creek and Miami Wash contains a contaminant plume of extremely acidic, contaminated mining water that exhibits high levels of heavy metals such as aluminum, barium, copper, manganese, and iron. According to the Arizona Department of Water Resources, high sulfate levels are also present in the groundwater. As previously discussed within this chapter, the Pinal Creek site was officially designated as a State WQARF Superfund site. Public and industrial water in the Globe-Miami area is also supplied by a limestone aquifer. Where this aquifer has been faulted and fractured, large amounts of good quality water are supplied. Other than the public and industrial supply wells, most water production is from low-demand domestic and stock wells.

#### **Southeastern Arizona Water Resources Planning Area:**

The Southeastern Arizona Water Resources Planning Area contains 14 groundwater basins which extend over the southeastern region of the State of Arizona. Of this number, the Aravaipa, Donnelly Wash, Dripping Springs Wash, Lower San Pedro, and Safford Groundwater Basins are located within the CAAG District. According to the Arizona Department of Environmental Quality, the chemical quality of groundwater within these basins is suitable for human consumption and agricultural activity. Although there are several major mining operations located near the communities of Mammoth and San Manuel, the Arizona Department of Environmental Quality has not identified specific sites or areas within this region of the CAAG District that contain groundwater contamination.

The planning area climate varies greatly over relatively short distances as lowlands alternate with mountains. Annual precipitation averages range from 8 inches in the valley to more than 30 inches in the higher elevations. Average annual temperatures range from 54° F near the Chiricahua Mountains to 65° F at Winkelman.

#### **Lakes**

There are presently a total of six identifiable lakes located throughout the CAAG District. Within Gila County, Georges Lake is situated upon the Fort Apache Indian Reservation, located in the far east central region of the county; Seneca Lake is located in central Gila County, and is on the San Carlos Indian Reservation; and Roosevelt Lake, which is located in west central Gila County. Within Pinal County, Kearny Lake and the Picacho Reservoir are the only identifiable surface water bodies that retain water on an annual basis. Kearny Lake is located in the eastern region of the county, near the Town of Kearny; whereas the Picacho Reservoir is located in between the Cities of Coolidge and Eloy. San Carlos Lake is located in the eastern region of the CAAG District, and is situated between Gila and Pinal Counties, on the San Carlos Indian Reservation.

According to data obtained from the Arizona Department of Environmental Quality and Arizona State Parks, the San Carlos and Roosevelt Lakes are the largest lakes within the District. San Carlos Lake contains a total surface water area of approximately 17,410 square acres; whereas Roosevelt Lake contains a total surface water area of approximately 17,300 square acres. The Picacho Reservoir contains a total surface water area of 1,100 square acres, and Kearny Lake contains 10 square acres. According to Arizona State Parks, Georges and Seneca Lakes contain little measurable surface water, and contain water levels which seasonally fluctuate.

San Carlos and Roosevelt Lakes are primarily utilized for recreational purposes. However, Roosevelt Lake is also a major supplier of drinking water for residents of metropolitan Phoenix. As discussed within this Chapter, the preservation of quality water within the lakes district of the Salt River Basin is a primary environmental concern.

### **Wetlands**

Due to low annual rainfall and high evaporation potential, natural wetlands within the State of Arizona are scarce. Wetlands are defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Examples of wetlands commonly include marshes, swamps, bogs, cienegas, tinajas, and similar areas. Within Gila and Pinal Counties, wetland conditions are generally found within surface water channels or back water tributary creeks or washes, and are often associated with perennial stream activity. Wetland conditions can also develop in close proximity to stockponds, small reservoirs, or areas where extensive irrigation practices allow return flows or ditch seepage to accumulate at regular intervals. A comprehensive inventory of wetland sites within the state is not presently available.

### **Riparian Areas**

Within the State of Arizona, the preservation of identified riparian areas is an important environmental concern. As a result of 1992 legislation, the Governor of Arizona signed into law an act that provided for the collection of economic and scientific data by several state agencies in an effort to identify and ultimately protect riparian vegetative communities located throughout Arizona. As a result of such legislation, in 1994 the Arizona Department of Water Resources completed a detailed study entitled the *Riparian Protection Program Legislative Report*. This particular report placed an emphasis on the basic hydrological and ecological processes that occur in riparian ecosystems, and also evaluated the effects that surface water diversions and well pumping have upon a functional riparian vegetative area.

According to the Arizona Department of Water Resources, a Riparian Area is defined as a geographically delineated area with distinct resource value, and is characterized by various deep-rooted plant species that depend upon having roots in the water table or its capillary zone, and that occurs within or adjacent to a natural perennial or intermittent stream channel, or within or adjacent to a lake, pond, or marsh bed maintained primarily by natural water sources. The designation of a Riparian Area does not include areas in or adjacent to ephemeral stream channels; artificially created stockponds; man-made storage reservoirs constructed primarily for conservation or regulatory storage; municipal and industrial ponds; or man-made water transportation and distribution off-stream storage and collection systems. A riparian area is typically associated with a riparian ecosystem, which is an ecological community that is associated with a body of surface water, and is comprised of a biological and physical component. The biological component includes surface

vegetation such as shrubs, trees and grasses; aquatic and semi-aquatic vegetation; and various animals that are associated with the ecosystem. The physical component includes the soils, nutrients, and surface water that is vital for the sustainment of biotic organisms.

The Arizona Game and Fish Department has estimated that approximately 75 percent or more of Arizona's native wildlife species depend on healthy riparian systems during some portion of their life cycle. Groundwater withdrawal, surface water diversions, and the surface runoff or infiltration of contaminants can all pose serious threats to riparian areas. As a result of the 1992 legislation, the State of Arizona has developed policies for the preservation and implementation of appropriate mitigation measures for sensitive environmental areas.

There are presently many well-documented locations throughout the CAAG District that have been identified as functional riparian areas. All of these locations are directly associated with perennial and intermittent surface water, and form linear corridors along the surface water channels. Within Gila County, important riparian areas have been identified along the East Verde River and its tributaries; Tonto Creek; the San Carlos River; the Upper Salt River and several of its tributaries, which is inclusive of Cherry Creek; and areas along the White and Black Rivers. Within Pinal County, important riparian areas have been identified along the Gila River, extending from San Carlos Lake to the central region of Pinal County; the San Pedro River; and have also been identified along Aravaipa and Queen Creeks. Although the direct implications of future state policy regarding riparian areas is not thoroughly known at this time, it is certain that these particular areas will be highly safeguarded in an effort to preserve the natural environment.

## **AIR QUALITY**

The State of Arizona is authorized to regulate air quality as established within the Federal Clean Air Act, and from various State Statutes. The Federal Clean Air Act was originally passed in 1963, and amended in 1965, 1967, 1970, 1977, 1990 and 1997. It was primarily designed to function as a regulatory authority, and to distribute grants to air pollution control agencies. One important element of the Federal Clean Air Act was the establishment of National Ambient Air Quality Standards (NAAQS) in 1970. Under this Act, the Environmental Protection Agency set NAAQS for six criteria pollutants considered harmful to public health. These include particulate matter (PM<sub>10</sub>), ozone (O<sub>3</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), and lead (Pb). Another important element of the Act requires each individual state to formulate a State Implementation Plan (SIP), which would comply with the elements set forth in the National Ambient Air Quality Standards of 1970. Each State Implementation Plan is submitted to the Environmental Protection Agency for initial review and approval, and includes information directly related to items such as the adoption of enforceable regulations that are necessary for attainment and maintenance of the NAAQS standards; emission regulations; compliance schedules; ambient monitoring and data analysis; permitting programs; source surveillance; prevention of air pollution emergency episodes; and the inspection and testing of motor vehicles.

Arizona's State Implementation Plan contains state statutes and rules, county regulations, and nonattainment area plans that are required for the attainment and maintenance of the NAAQS. Arizona state statutes divide jurisdiction over air pollution sources between the state and the counties. According to the Arizona Department of Environmental Quality, the State has exclusive jurisdiction over air pollution sources having potential total emissions of 75 tons or more per day; air pollution sources owned or controlled by State or other governmental entities; and motor vehicles. Within the

CAAG District, Gila County has not implemented a countywide air quality control program, and is therefore presently under the direct jurisdiction of the State of Arizona. However, Pinal County has established an air quality control district designed to alleviate the overall quantity of air pollution in an effort to comply with the requirements of the NAAQS.

According to the Federal Clean Air Act Amendment of 1990, any area or region that fails to meet the national primary or secondary ambient air quality standards for the individual pollutant classified above is officially classified as a nonattainment area. Within the CAAG District, there are several areas that exceed minimal particulate matter (PM<sub>10</sub>) and sulfur dioxide (SO<sub>2</sub>) pollutant levels as established by the Environmental Protection Agency. Within Gila County, a smaller region in the northern section of the county which includes the Town of Payson, and the extreme southern region of the county encompassing the communities of Hayden and Winkelman have been classified as suspended particulate matter (PM<sub>10</sub>) nonattainment areas; whereas the southern region of Gila County which includes the Communities of Globe and Miami has been classified as a sulfur dioxide (SO<sub>2</sub>) nonattainment area. Within Pinal County, the region that encompasses the City of Apache Junction; and the eastern section of Pinal County which includes the communities of Superior and Kearny have been classified as suspended particulate (PM<sub>10</sub>) nonattainment areas. Also, the region immediately south of the Gila County communities of Hayden and Winkelman, as well as the Community of San Manuel, located in Pinal County, have been classified as sulfur dioxide (SO<sub>2</sub>) nonattainment areas.

PM<sub>10</sub> nonattainment within the Payson region has been attributed to seasonal wood burning activities, and the Arizona Department of Environmental Quality, Office of Air Quality, is presently preparing a plan that would ultimately reduce particulate suspension by regulating activities associated with wood burning stoves. PM<sub>10</sub> nonattainment within the City of Apache Junction is mainly attributable to motor vehicle exhaust generated from the Metropolitan Phoenix Area, and the resuspension of road dust by traffic; whereas nonattainment within the southern region of Gila County, and the eastern region of Pinal County, is the direct result of mining activities that generate suspended particulate materials. SO<sub>2</sub> nonattainment within southern Gila and eastern Pinal Counties is the direct result of copper smelter activities.

The EPA reviewed the current air quality standards for ground-level ozone (commonly known as smog) and particulate matter (or PM) in 1997. Based on scientific evidence, revisions have been made to both standards. The new 8-hour ozone standard is more stringent and will replace the 1-hour standard once current non-attainment areas attain that standard, while the new PM-2.5 standards will be in addition to the existing PM-10 standards. As required by law, EPA, in conjunction with the State Department of Environmental Quality, are currently designating potential State non-attainment boundaries for the new ozone standards. If the new ozone standard is not implemented, a recent federal ruling will allow each state one year to re-establish conformity for ozone non-attainment areas in those states.

## **ENDANGERED PLANTS AND ANIMALS**

The Endangered Species Act was passed during 1973 in an effort to curtail the declining number of plant and animal species located throughout the United States. At present, the U.S. Fish and Wildlife Service is responsible for assessing native habitats in accordance with the Endangered Species Act to determine which species are facing steady declines, or that are in imminent danger of extirpation or extinction. In addition, the agency is also responsible for closely monitoring and protecting various

species from decline, and ensuring their continued survival and recovery. As a result of the Endangered Species Act, in 1975 the Arizona Game and Fish Department developed a list of threatened native wildlife located within the State of Arizona, which is inclusive of both species and subspecies, and identifies all plants and wildlife as belonging to extinct, endangered, threatened, or candidate categories. Most threatened wildlife species throughout the state are listed because of significant losses and threats to native populations. Many of these listed species within the state have also been placed upon the U.S. Fish and Wildlife Service's federal register as threatened or endangered.

According to the Arizona Game and Fish Department, an endangered species is defined as being in imminent jeopardy of extinction or extirpation if immediate conservation efforts are not initiated; whereas threatened species are defined as being in imminent jeopardy of becoming endangered, and possess exterior threats which have resulted in lower overall populations than previously exhibited. Candidate species contain known or suspected threats to their immediate habitats. Although substantial population declines from historical levels have not been documented, the majority of candidate species are typically in jeopardy of becoming threatened or endangered.

At the back of this Chapter, a composite list has been compiled for federally and state classified endangered, threatened, and candidate animal and plant species native to the CAAG District. The U.S. Fish and Wildlife Service classifies all endangered plant species in the same order as endangered animal species. However, in accordance with the Arizona Plant Law, the Arizona Game and Fish Department identifies all endangered plant species as belonging to highly safeguarded, or salvage restricted categories. Highly safeguarded plant species are in imminent danger of extinction throughout all or a significant portion of their range. Such species are categorized at the federal level as endangered, threatened, or contain candidate species that are soon to be designated as threatened. Salvage restricted plant species are not immediately classified as endangered or threatened, but are listed at the federal level as candidate species.

The U.S. Fish and Wildlife Service, along with the Arizona Department of Game and Fish, are committed to conserving various habitats throughout the State of Arizona that contain animal and plant species that are threatened with possible extinction. The excavation of lands for construction or other development related activities within the CAAG District are subject to the location and protection of these particular plant and animal species that have been identified as belonging to the endangered, threatened, or candidate categories.

## **CONCLUSION: ENVIRONMENTAL ASSETS**

The primary environmental assets within the CAAG District consist of the region's broad open spaces and aesthetic natural landscapes; numerous recreation and historical sites; favorable climatic conditions; low population densities; favorable air quality levels throughout much of the District; and the abundance of riparian areas and perennial streams located throughout both Gila and Pinal Counties, which are being considered for protection under the Wild and Scenic Rivers Act. The preservation of these particular qualities are of considerable importance in maintaining a high quality of life factor for residents of the District.

The CAAG District maintains direct access to quality CAP (Central Arizona Project) water allotments for industrial development, and the growth of key agricultural crops which are of considerable importance to the economy of Pinal County. Although the increasing costs of CAP water allotments is

an issue of immediate concern, continued reliance upon CAP water allotments derived from the Colorado River will ultimately reduce the overall reliance upon the region's natural groundwater reserves. In addition to agricultural issues, many governmental entities throughout the District have made a consortive effort in planning for long-term solid waste management in an effort to reduce potential environmental hazards, and to comply with the rules and regulations of the Environmental Protection Agency.

## **CONCLUSION: ENVIRONMENTAL PROBLEMS**

As mentioned throughout this chapter, the areas of immediate environmental concern to the CAAG District include several isolated air quality nonattainment areas; regions containing groundwater contamination; quality of drinking water; and the potential endangerment or extinction of various plant and animal species. Surface and groundwater areas which have been identified as potentially dangerous to local populations and environments are in the process of being isolated, or are in a status of rectification. However, approximately 78 percent of all public and private water systems within the District are not in compliance with the Environmental Protection Agency's drinking water standards. This is a matter which has not shown any form of improvement over the past five to ten years. However, it has been determined that through the enforcement of increasingly stringent monitoring procedures by the Arizona Department of Environmental Quality, more public and private drinking water systems will conform to a status of full compliance throughout these decade. In addition, conservation efforts initiated through the U.S. Fish and Wildlife Service, and the Arizona Department of Game and Fish will continue to be enforced in an effort to prevent the extinction of plant and animal species native to both Gila and Pinal Counties.

**HISTORIC PROPERTIES AND SITES ON THE NATIONAL REGISTER**  
(Within Gila County)

<b>LOCATION</b>	<b>YEAR LISTED</b>
<b><u>Fort Apache Indian Reservation</u></b>	
Black River Bridge (Community of Carrizo)	1988
Kinishba Ruins (Community of Whiteriver)	1966
Salt River Canyon Bridge (Community of Carrizo)	1988
<b><u>City of Globe (and vicinity)</u></b>	
Besh-Ba-Gowah Archaeological Site	1984
Dominion Hotel	1978
Elks Building	1987
Gila County Courthouse	1975
Gila Pueblo	1977
Gila Valley Bank & Trust Building	1987
Globe Commercial and Civic Multiple Resource Center	1986
Globe Downtown Historic District	1987
Globe Mine Rescue Station	1990
U.S. Post Office & Courthouse	1985
Holy Angels Church	1983
International House	1988
Old Dominion Library	1981
Pinal Ranger Station	1993
St. John's Episcopal Church	1977
<b><u>Town of Miami (and vicinity)</u></b>	
Bullion Plaza School	2001
Cordova Avenue Bridge	1989
Inspiration Avenue Bridge	1989
Keystone Avenue Bridge	1989
Miami Avenue Bridge	1989
Miami Community Church	2005
Reppy Avenue Bridge	1988
Soderman Building	2000
<b><u>Town of Payson (and vicinity)</u></b>	
Houston Mesa Ruins (Shoofly Village Ruins)	1986
Natural Bridge Lodge	1986
Ox Bow Inn	2004
<b><u>San Carlos Indian Reservation</u></b>	
Coolidge Dam (San Carlos Lake Vicinity)	1981
<b><u>Tonto National Forest</u></b>	
Alfred Jason Randall House (Pine)	2000
Archaeological Site AR-03-12-06-1130 (Punkin Center)	1989

Archaeological Site AR-03-12-06-1131 (Punkin Center)	1989
Casa Bandolero (Punkin Center) AZ U:4:54(ASU)	1989
Cline Terrace Platform Mound (Punkin Center)	1989
Diamond Point Lookout Cabin (Tonto Village)	1988
Fossil Creek Bridge (Strawberry)	1988
Indian Point Ruin (Punkin Center) AZ U:4:10 (ASM)	1989
Miller, Pryor, House (Pine)	2004
Oak Creek Platform Mound (Punkin Center)	1989
Park Creek Platform Mound (Punkin Center)	1989
Perkins Store (Young)	1999
Pine Community Center Historic District	2004
Pine Historic District	1997
Pleasant Valley Ranger Station (Young)	1993
Roosevelt Dam National Historic Landmark (Roosevelt)	1963
Rye Creek Ruin Platform Mound	1995
Salt River Bridge (Roosevelt)	1988
Schoolhouse Point (Roosevelt)	1989
Strawberry School	2005
Theodore Roosevelt Dam National Register District	1998
Tonto National Monument Archaeological District	1966
Tonto National Monument, Upper Ruin AZ U:8:048 (Roosevelt)	1989
Tonto National Monument, Lower Ruin AZ U:8047A (Roosevelt)	1989

**Town of Winkelman (and vicinity)**

Winkelman Bridge	1988
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**HISTORIC PROPERTIES AND SITES ON THE NATIONAL REGISTER**  
(Within Pinal County)

<b>LOCATION</b>	<b>YEAR LISTED</b>
<b><u>City of Apache Junction (and vicinity)</u></b>	
Hieroglyphic Canyon Site	1994
<b><u>City of Casa Grande (and vicinity)</u></b>	
Bayless, Earl, House	1985
Baylis, Wilbur O./Grasty House	1985
Bien/McNatt House	1985
Building at 121 N. Florence St.	2002
Building at 400 E. Third St.	2002
Casa Grande Dispatch	2002
Casa Grande Hospital	2002
Casa Grande Hotel	1985
Casa Grande Stone Church	1978
Casa Grande Union High School and Gymnasium	1986
Casa Grande Woman's Club Building	1979
Central Creditors Association Building	1985
Church of the Nazarene	2002
Cox, William, Building	1999
Cruz Trading Post	1985
Day, Judge William T., House	1985
First Baptist Church	2002
Fisher Memorial Home	1985
House at 222 W. Ninth St.	2002
House at 317 E. Eighth St.	2002
House at 320 W. Eighth St.	2002
House at 323 W. Eighth St.	2002
House at 59 N. Brown Ave.	2002
House at 736 C. Center Ave.	2002
House at 1105 N. Lehmberg Ave.	2002
Johnson's Grocery Store	1985
Laundry Building	1985
Lehmberg, Dr. H. B., House	1985
Lincoln Hospital	2002
Loss, John C., House	1992
Mandell & Meyer Building	2002
Meehan/Gaar House	1985
Paramount Theater	1985
Peralta Rock Site	1979
Period Revival House	1985
Pioneer Market	1985
Prettyman's Meat Market & Grocery/Brigg's Jeweler	1985
S.S. Blinky Jr. Building	2002
Saint Anthony's Church & Rectory	1985

Shonessy Building/Don Chun Wo Store	1985
Shonessy House	1985
Southern Pacific Railroad Depot	2002
Southern Pacific Railroad Depot	1985
Souva-Cruz House	1985
Stone Bungalow	1985
Stone Warehouse	1985
Templeton, Benjamin, House	2002
Valley National Bank	2002
Vasquez House	1985
Wards Variety Store	1985
White House, Building	1985
Wilbur, Walter, House	2002
Wilson, C. J. (Blinky), House	1985
Women's Club Building	1985

### **Community of Catalina**

Rancho Solano	1995
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### **City of Coolidge (and vicinity)**

Casa Grande Ruins National Monument	1966
Coolidge Woman's Club	1990
Grewe Site AZ U:2:2	2001

### **Town of Florence (and vicinity)**

Adamsville Ruin	1970
Araiza House	1986
Arball, Ramon, House	1986
Avenenti, Encarnacion, House	1987
Ballou-Foreman House	1986
Brockway, Dr. George M. & Esther A., House	2004
Butte Cochran Charcoal Ovens	1975
Carminatti-Perham House	1986
Coker, Elmer, House	1986
Colton, Albert & Freeman, H. H., House	1986
Devine, Ed & Lottie, House	1986
Douglass, James S. Melquides E., House	2004
Encinas-Cordova House	1986
Fields House	1986
First Florence Courthouse	1974
First Presbyterian Church of Florence	1994
Florence Townsite Historic District	1982
Florence Union High School	1987
Fulbright, Thomas, House	1996
Harvey-Niemeyer House	1986
Henry, C. D., House	1986
House at 1506 Central St.	1986
Huffman, Dr. George, House	1986
Kilcrease, V.W., Building	2002

Kochsmeier, Henry & Anna, House	2002
Kratzka, Gus, House	1985
Littlefield, Inez & Davis, Bea, House	1986
Lorona, Andronico, Second House	1986
Manjarres House	1987
McGee, James & Mary, House	2004
Moorehouse, R. H., Dairy Complex	1986
Pierson, Adrian, House	1987
Pinal County Courthouse	1978
Price, W. Y., House	1986
Truman-Randall House	1987
Warner, P. C., First House	1986
Westerman-King, Building	1986

**Florence Junction Area**

Queen Creek Bridge	1988
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**Gila River Indian Reservation**

C. H. Cook Memorial Church (Sacaton)	1975
Ha-Ak Va-Ak Intaglio (Sacaton)	1979
Hohokam-Pima National Monument	1974
Hohokam Platform Mound Communities (Santa Cruz River)	1989
Sacaton Dam Bridge (Sacaton)	1988
San Tan Canal Bridge (Sacaton)	1988
Snaketown National Historic Landmark	1964

**Community of Kelvin (and vicinity)**

Kelvin Bridge	1988
Mineral Creek Bridge	1988

**Community of Oracle (and vicinity)**

Acadia Ranch	1984
All Saints Church	1984
American Flag Post Office and Ranch Headquarters	1979
Kannally Ranch	1979
La Casa del High Jinks	1996
Rancho Linda Vista	1999

**Community of Picacho**

McClellan Wash Archaeological District	1989
Picacho Pass Skirmish Site-Overland Mail Co. Stage Station	2002

**Community of Randolph**

Verdugo Homestead Historic District	2001
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**Community of Red Rock**

Los Robles Archaeological District	1989
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**Town of Superior (and vicinity)**

Boyce Thompson Southwestern Arboretum	1976
Devil's Canyon Bridge	1988
Magma Hotel	1994
Queen Creek Bridge	1988

**Town of Winkelman**

Camp Grant Massacre	1998
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**FEDERAL CLASSIFICATION OF ENDANGERED ANIMAL SPECIES**  
(Within Gila County)

**ENDANGERED**

Birds

American Peregrine Falcon

Reptiles

Sonoran Desert Tortoise

Fish

Gila Topwinnow

Razorback Sucker

**THREATENED**

Birds

Mexican Spotted Owl

Bald Eagle

Amphibians

Chiricahua Leopard Frog

**CANDIDATE**

Amphibian

Arizona Toad

Lowland Leopard Frog

Mammals

Great Western Mastiff Bat

Southwestern River Otter

California Leaf-Nosed Bat

Occult Little Brown Bat

Birds

Northern Goshawk

Reptiles

Narrow Headed Garter Snake

Fish

Gila Chub

Gila Roundtail Chub

**FEDERAL CLASSIFICATION OF ENDANGERED ANIMAL SPECIES**  
(Within Pinal County)

**ENDANGERED**

Birds

Southwestern Willow Flycatcher  
American Peregrine Falcon  
Yuma Clapper Rail

Mammals

Sonoran Pronghorn  
Lesser Long-Nosed Bat

Fish

Desert Pupfish  
Gila Topminnow

Reptiles

Sonoran Desert Tortoise

**THREATENED**

Fish

Loach Minnow  
Spikedace

Birds

Bald Eagle

**CANDIDATE**

Amphibians

Lowland Leopard Frog

Mammals

Mexican Long-Tongued Bat  
California Leaf-Nosed Bat  
Yellow-Nosed Cotton Rat

Birds

Northern Grey Hawk  
Cactus Ferruginous Pygmy-Owl

Fish

Gila Roundtail Chub

**STATE CLASSIFICATION OF ENDANGERED ANIMAL SPECIES**  
(Within Gila County)

**ENDANGERED**

Amphibians

Western Barking Frog

Birds

Bobolink

Fish

Razorback Sucker

Mammals

Southwestern River Otter

**THREATENED**

Amphibians

Chiricahua Leopard Frog

Birds

Mexican Spotted Owl

Bald Eagle

Fish

Gila Chub

Gila Roundtail Chub

Gila Topminnow

**CANDIDATE**

Amphibians

Lowland Leopard Frog

Birds

Northern Goshawk

Common Black Hawk

American Peregrine Falcon

Mammals

Western Red Bat

California Leaf-Nosed Bat

Reptiles

Sonoran Desert Tortoise

Narrow-Headed Garter Snake

**STATE CLASSIFICATION OF ENDANGERED ANIMAL SPECIES**  
(Within Pinal County)

**ENDANGERED**

Birds

Southwestern Willow Flycatcher

Mammal

Sonoran Pronghorn  
Lesser Long-Nosed Bat

Fish

Desert Pupfish

**THREATENED**

Birds

Northern Gray Hawk  
Yuma Clapper Rail  
Yellow-Billed Cuckoo  
Bald Eagle

Mammals

Mexican Long-Tongued Bat

Fish

Gila Roundtail Chub  
Spikedace  
Gila Topminnow  
Loach Minnow

**CANDIDATE**

Amphibians

Lowland Leopard Frog

Mammals

Western Red Bat  
Southern Yellow Bat  
California Leaf-Nosed Bat  
Spotted Bat

Birds

Common Black Hawk  
Black-Bellied Whistling-Duck  
American Peregrine Falcon  
Mississippi Kite  
Western Least Bittern  
Thick-Billed Kingbird

Reptiles

Sonoran Desert Tortoise

**FEDERAL CLASSIFICATION OF ENDANGERED PLANT SPECIES**  
(Within Gila County)

**ENDANGERED**

Arizona Agave  
Arizona Hedgehog Cactus

**CANDIDATE**

Hohokam Agave  
Tonto Basin Agave  
Sierra Ancha Fleabane  
Apache Buckwheat  
Fish Creek Rock Daisy  
Supine Bean  
Blumer's Dock

**FEDERAL CLASSIFICATION OF ENDANGERED PLANT SPECIES**  
(Within Pinal County)

**ENDANGERED**

Nichol's Turk's Head Cactus  
Arizona Hedgehog Cactus

**CANDIDATE**

Hohokam Agave  
Acuna Cactus  
Needle-Spined Pineapple Cactus  
Parish Alkali Grass

**STATE CLASSIFICATION OF ENDANGERED PLANT SPECIES**  
(Within Gila County)

**HIGHLY SAFEGUARDED**

Arizona Agave  
Hohokam Agave  
Tonto Basin Agave  
Arizona Bugbane  
Arizona Hedgehog Cactus  
Blumer's Dock

**SALVAGE RESTRICTED**

Toumey Agave  
Bigelow Onion  
Apache Buckwheat  
Golden Barrel Cactus  
Flannel Bush  
Varied Fishhook Cactus  
Supine Bean

**STATE CLASSIFICATION OF ENDANGERED PLANT SPECIES**  
(Within Pinal County)

**HIGHLY SAFEGUARDED**

Hohokam Agave  
Nichol's Turk's Head Cactus  
Arizona Hedgehog Cactus  
Acuna Cactus  
Parish Alkali Grass

**SALVAGE RESTRICTED**

Toumey Agave  
Needle-Spined Pineapple Cactus  
Golden Barrel Cactus  
Flannel Bush  
Counter Clockwise Fishhook Cactus  
Thornber Fishhook Cactus  
Varied Fishhook Cactus  
Organ Pipe Cactus  
Tumamoc Globeberry