5.5.2 Altar Wash and Arivaca

The Altar Wash drains the eastern slopes of the Baboquivari Mountains as well as the western slopes of the Sierrita Mountains south of State Route 86 and extends southerly over 30 miles to Mexico near Mormon and Aguirre Lakes which are within the Buenos Aires National Wildlife Refuge It is tributary to the Brawley and Blanco Wash systems. All within unincorporated Pima County, it is comprised of 522,549 acres (816.5 square miles).

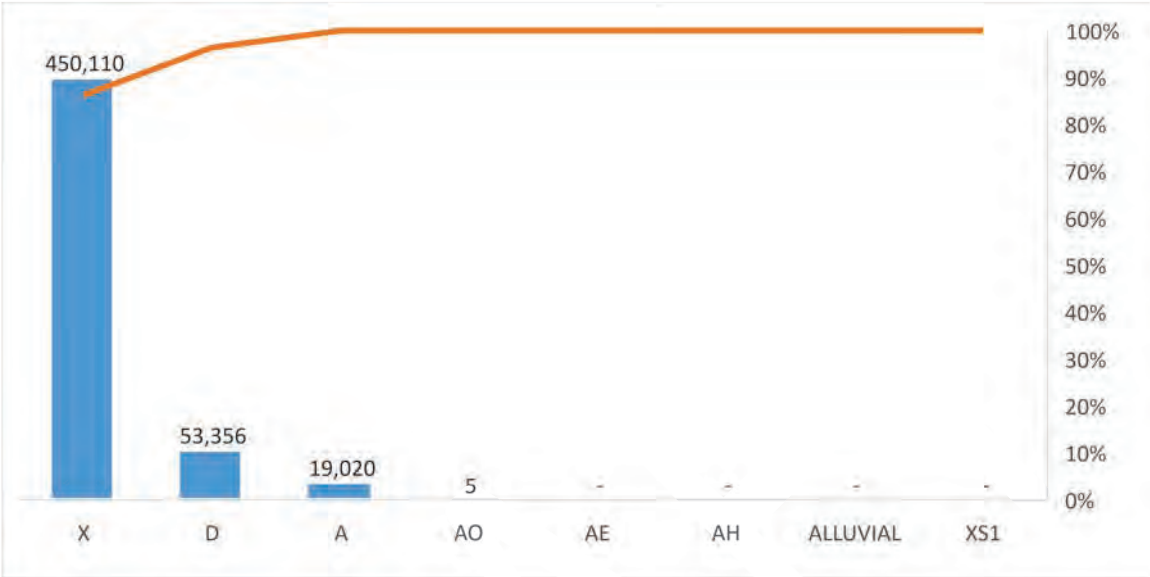
For the purposes of this plan, Arivaca Wash Watershed has also been included with the Altar Wash Watershed. This HUC 10 watershed is tributary to Altar Wash. It originates near the historic community of Ruby and passes through the small town of Arivaca. It is confluence with Altar Wash is near west Arivaca-Sasabe Road.

Figure 192 - Altar Wash Watershed Map

5.5.2.1 Flood Characteristics

There are 19,025 acres of SFHA Zone A, 1,023 acres of Special Studies Floodplains, and 85,585 acres of sheet flood area in this watershed.

Figure 193 - Altar Wash Watershed Federal Floodplain Designations



In addition to the SFHA associated with the Wash, the District has mapped much of the private land as impacted by sheet flooding in order to flag permits for further analysis. Distributory sheet flows associated with alluvial fans also affect the public lands in this watershed. As noted above, there are over 1000 acres of local Special Studies Floodplains and over 85,000 acres of District sheet flood area.

Arivaca Creek and its tributaries drain from south to north from Santa Cruz County to a midpoint in the Altar Wash distributed flow system. Major tributaries to Arivaca Creek include Cedar Creek, Amigo Wash, and Wilbur Wash. Vegetation consists primarily of desert brush on slopes. Soils on milder slopes typically consist of less permeable somewhat clayey soils. Hillsides and steeper slopes may exhibit rock outcrops and the more permeable, loamy soils. Within washes and overbanks, loamy and sandy soils are present.

Arivaca Lake is a reservoir near the Santa Cruz County line, about 6 miles southeast of the Town of Arivaca. The Arizona Department of Water Resources operates the reservoir. Arivaca Lake drains 14.0 square miles of undeveloped land, located within the Coronado National Forest. According to the dam breach analysis completed in 2008, the probable maximum precipitation for the contributing watershed is 14.1 inches over a six-hour period.

The table below provides a summary of historic USGS gaging station records.

Table 59 - USGS Gages

USGS Gaging Station	Arivaca Wash near Arivaca, AZ 09486600	Arivaca Creek at Arivaca, AZ 09486580	Arivaca Creek near Arivaca, AZ 09486590
Period of Record	1965-12-24 to 1972-07-17	1996-08-30 to 2001-12-11	2000-10-23 to 2013-08-23
Watershed Area (sq. m)	78.4	56.8	43.0
Flood Peak of Record (cfs)	15,900*	1,470	2,200
Date	12-24-1965	07-20-1998	07-25-2007
FIS Discharge (cfs)	NA	NA	NA

*Discharge affected by dam failure. Next peak discharge of 3,550 cfs occurred on 12-20-1967

This record indicates that a winter frontal storm contributed to dam failure, while other storms of record occurred during the summer monsoon.

There is one Pima County ALERT rainfall gage in this watershed. The table below shows its location and period of record.

Table 60 - ALERT Gages

Pima County Alert Gage	Arivaca - Altar Basin ID: 6370
Location (Latitude, Longitude)	(31.6044, -111.3411)
Period of Record	2001-10-19 to Present

There are no entries for this watershed on the District's Table of Regulatory Discharges (Revised October 28, 2014). Table 2 presents a discharge point from the District's GIS regulatory discharge point layer.

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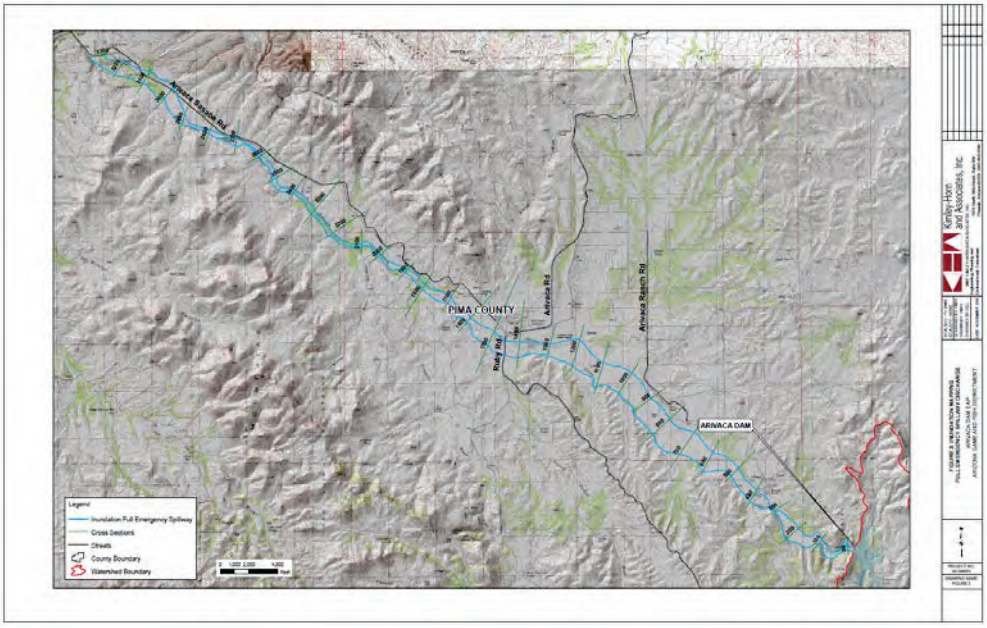
Table 61 - Regulatory Discharges

Watercourse	Regulatory Discharge, cfs 1% Return Frequency	Drainage Area, sq. miles	Source of Discharge Information
Tributary to Arivaca Creek 2 miles NW of Arivaca	3,847	Unknown	Floodplain Use Permit 07-177

The most significant hydraulic structure within this watershed is the Arivaca Reservoir. The dam crest storage capacity is 2,915 acre-feet. The primary outlet is a 12” diameter reinforced concrete pipe. A concrete trapezoidal channel functions as an emergency spillway. The outlet discharges into Cedar Creek, which drains to Arivaca Creek. The Arizona Game and Fish Department has completed an Emergency Action Plan for the dam including an inundation map, and very few residents are within the inundation limits.

A dam forms Arivaca Lake about five miles upstream of the town of Arivaca and the Arizona Department of Water Resources considers it a “significant hazard”. The Arizona Game and Fish Department has completed an Emergency Action Plan for this dam including inundation maps and very few resident are within it. The sample map below is for the full failure scenario.

Figure 194 - Arivaca Dam Inundation Map



Arivaca Creek runs along the south side of the Town of Arivaca and crosses only one major road, S. Ruby Road, where there is a low water road crossing. This road crossing may be unpassable during high flows. Just upstream of S. Ruby Road is where SFHA mapping begins.

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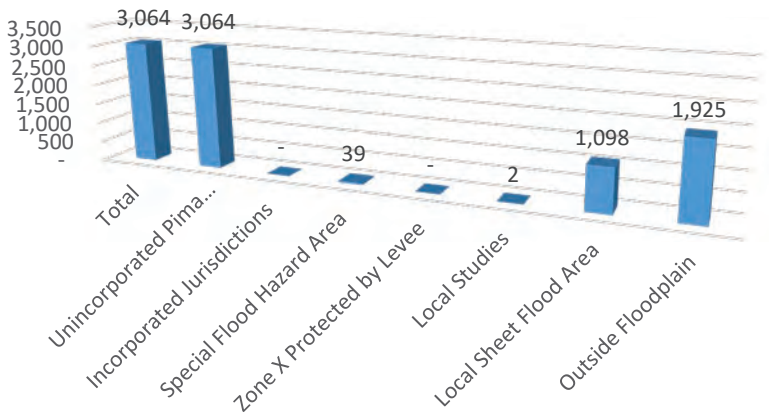
5.5.2.2 Existing Development & Infrastructure Trends

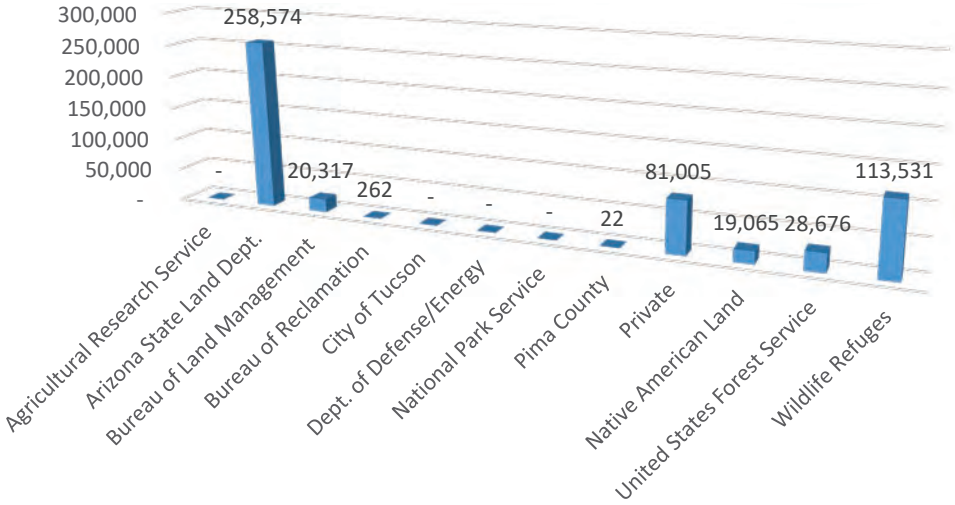
The chart below shows the distribution of residents within known floodplains, and distribution between incorporated and unincorporated areas. Arivaca watershed is rural and mostly undeveloped, the only town being the Town of Arivaca, which has a population of approximately 700 residents.

Figure 195 - Altar Wash Watershed Population Distribution



The Buenos Aires Wildlife Refuge has preserved significant portions of the upper watershed floodplains as indicated on the bar chart below. State trust land, while reserved for future development is currently mostly vacant with the exception of grazing leases and utility rights of way. It will likely remain as such into the near future due to it's remoteness. The limited extent of development supports preservation of habitat and open space without floodplain encroachment.

Figure 196 - Altar Wash Watershed Ownership in Acres



Adjacent to the Town of Arivaca the Buenos Aires Wildlife Refuge features broad grasslands, Fremont Cottonwood gallery forest along the washes and even a Cienega boardwalk.

Figure 197 - Altar Wash Watershed Land Use in Acres

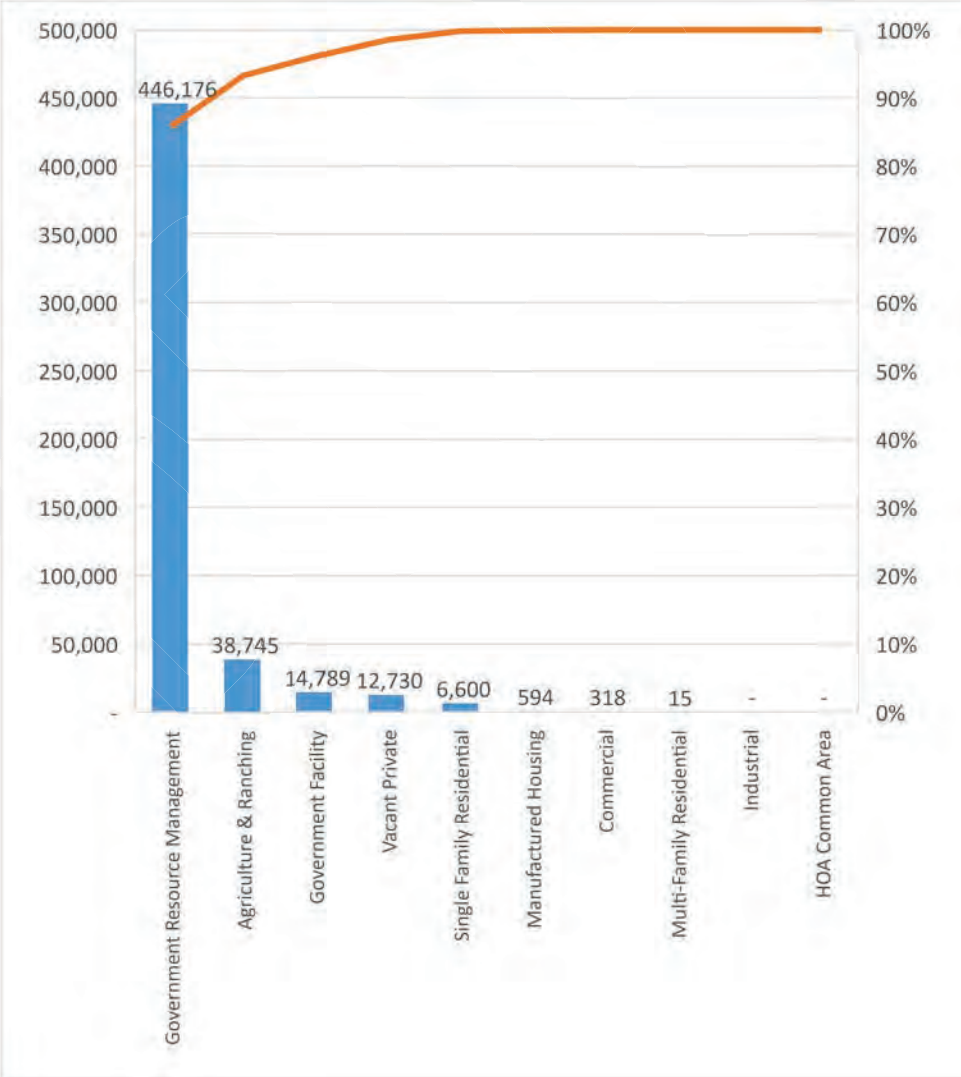
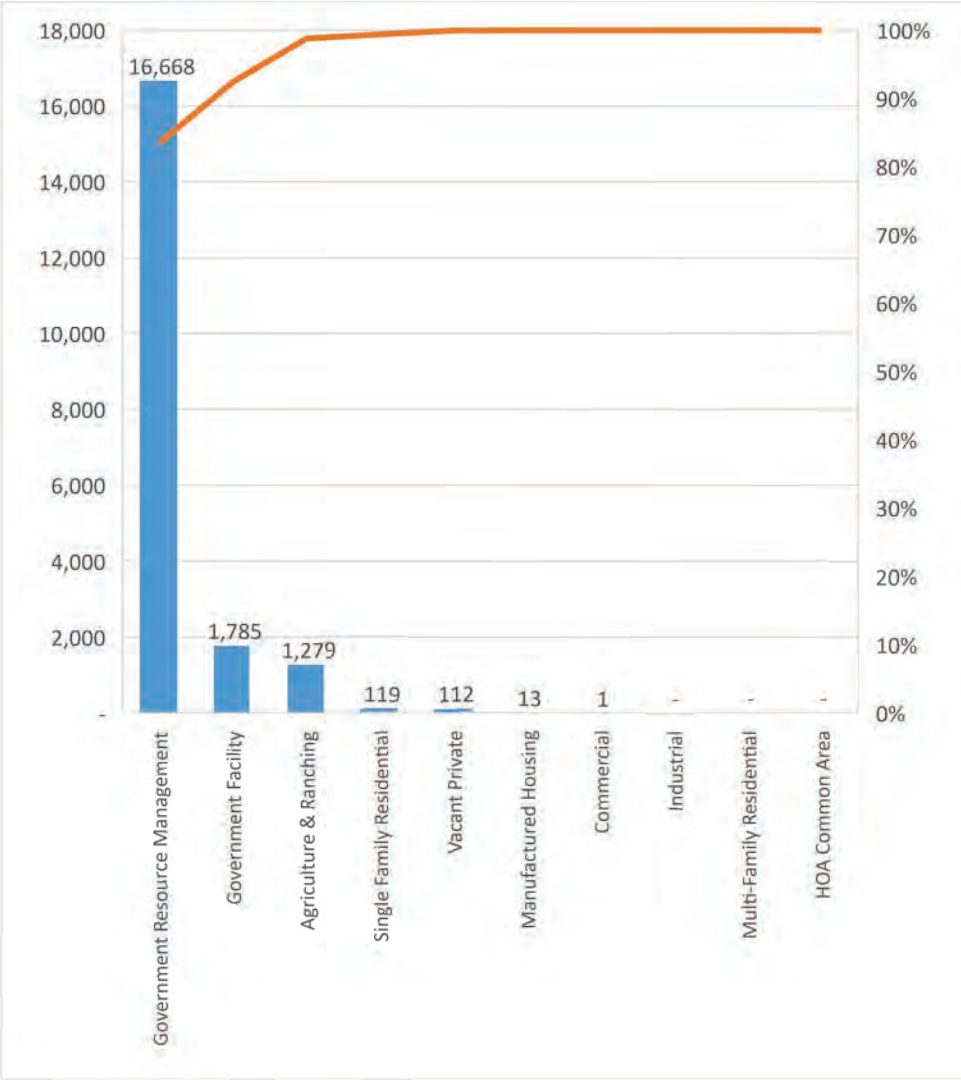
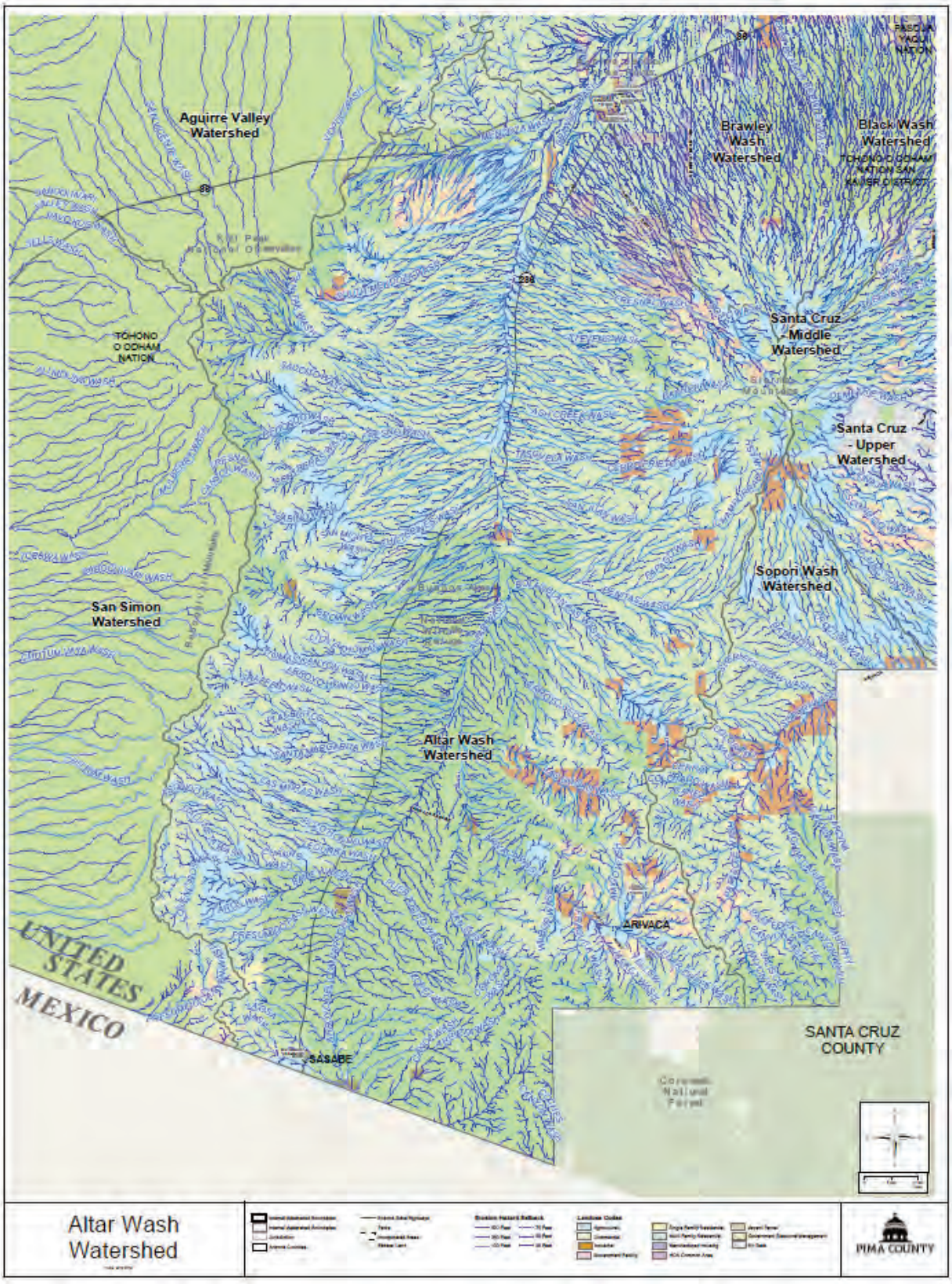


Figure 198 - Altar Wash Floodplain Land Use in Acres



While there are scattered residential and commercial areas this watershed is predominately rural. The floodplain in this watershed is mostly used for agriculture and ranching.

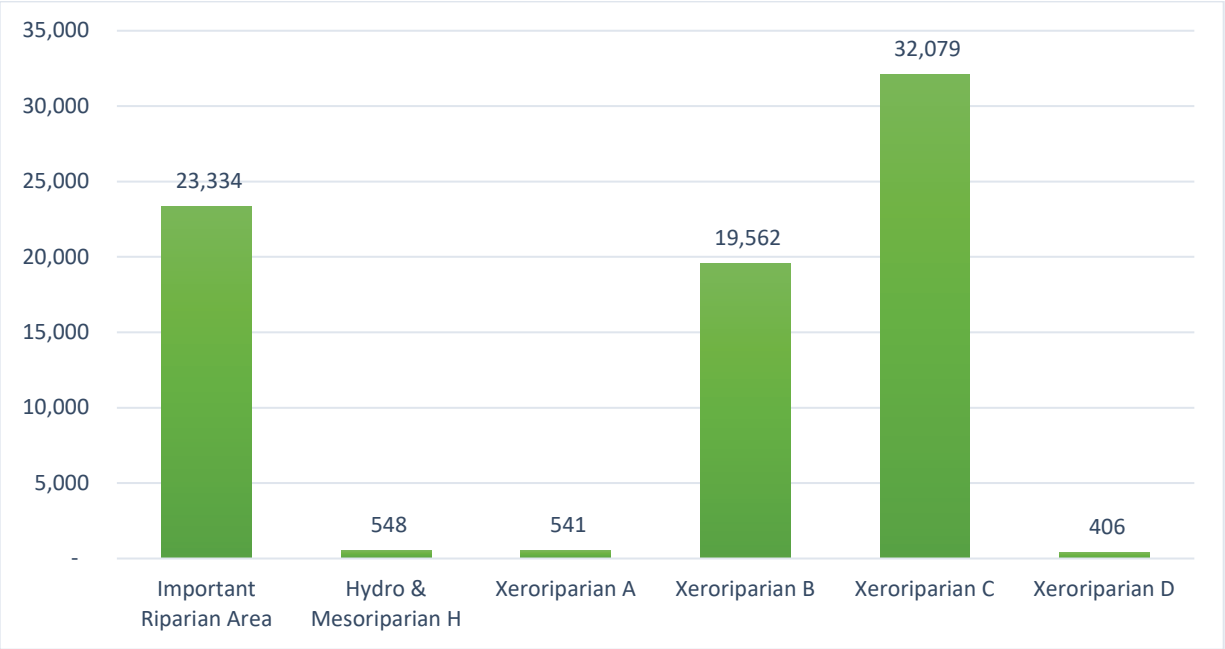
Figure 199 - Altar Wash Watershed Land Use Map



5.5.2.3 Riparian Habitat and Natural Areas

As shown the figure below there are 53,136 acres of Pima County Regulated Riparian Habitat in this watershed. The IRA designation overlays PCRRH in most cases but is reported separately due to differences in regulation. Vegetation tends toward herbaceous in piedmont and riparian areas. Creeks and tributaries support mesquite bosques, creating abundant resources for wildlife. There are also 211,308 preserved acres in this watershed, including 13,916 in regulatory floodplain.

Figure 200 - Altar and Arivaca Washes Watershed Riparian Habitat in Acres



The riparian areas are classified as Sonoran Desertscrub biome (BLP #154.1) (Harris, 2001). The Sonoran Desertscrub can be further divided into the Arizona Upland Subdivision, which is characterized by a diverse assemblage of cacti, trees and shrubs, and the Lower Colorado River Valley Subdivision, which is primarily characterized by creosotebush (*Larrea tridentata*) and bursage (*Ambrosia deltoidea*). Both plant communities are found in this watershed.

The Sonoran Desertscrub Subdivision is further classified as desert riparian shrub or xeroriparian along the washes. This vegetation community contains similar tree and shrub species found in upland sites such as paloverde, velvet mesquite, and ironwood.

Sonoran Desertscrub, Arizona Upland Subdivision (left) and Lower Colorado River Valley Subdivision (right)

A unique natural resource in this watershed is distributary flow areas that contain ephemeral water features, located in both the floodplain overbank and in-channel. These features fill with water during flood events, and due to the deposition of fine sediments, hold water for a period of time afterwards, providing a water source for wildlife.

In-channel ephemeral water (left) and floodplain overbank ephemeral water (right)

The Altar wash serves as an important wildlife corridor and provides habitat for native wildlife. It is common to see evidence of mule deer, javalina, jackrabbits, bobcat, coyote, and various amphibians and reptiles. In addition to supporting abundant vegetation and wildlife, there is evidence of prehistoric people throughout the watershed.

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Bobcat tracks (left), pot sherds (center), and juvenile Sonoran Desert toad (right)

The watershed has been impacted by human development, including flow diversions due to roads and past agricultural activities, which has led to erosion. Channelization of the main stem of the Altar wash has disconnected the floodplain from the overbank, causing vegetation die-off, although vegetation on the District's property is primarily supported by flows entering from the west and south. Other natural and human activities that threaten natural and cultural resources in the watershed include cattle grazing, invasive species, minor illegal dumping, and OHV use due to border activity (i.e., Border Patrol). As resources allow, the District will work with NRPR to actively manage these threats through placement of fencing, signage, and enforcement when required.

Bermudagrass (above) and soil erosion (right)

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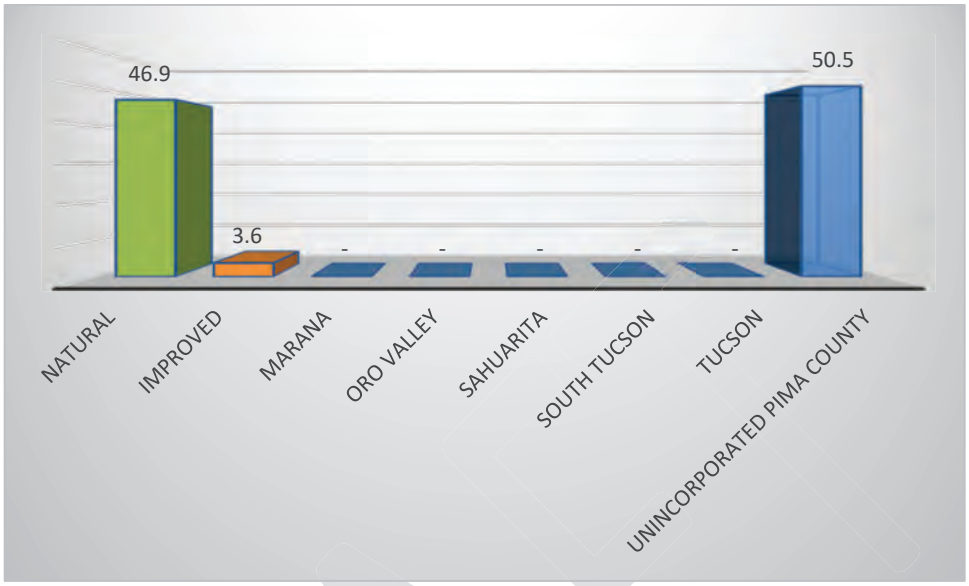
5.5.2.4 Historic Floodplain Management Approach

The figure below shows the split between natural and improved drainageways, and how many acres the District is responsible for in each jurisdiction.



Because this watershed is predominately rural, the management approach has been limited to responding to complaints regarding all weather access and managing wash erosion including head cutting as it migrates up tributaries. As noted below this has involved coordinating with local landowners as well as the Altar Valley Conservation Alliance.

The District manages 546 acres of open space lands in the Altar Wash watershed. Acquired through the Floodprone Land Acquisition Program (FLAP), the property and is located directly southwest of the community of 3-points, south of Buckelew farm and adjacent to the King 98 Ranch. Pima County Natural Resources Parks and Recreation staff manage the property for the District through a Memorandum of Understanding, which includes annual inspections to inventory infrastructure (if present), natural resources and identify threats and stressors. There are many opportunities for restoration and land stewardship projects throughout the watershed.

5.5.2.5 Needs – Capital Improvement

For each watershed; monitoring, frequently flooded structures and properties subject to damage, exposed infrastructure, and safety concerns have been described in full detail in the District's Flood Response Field Manual (April 2019). Each of the areas so identified have addresses and geodetic coordinates associated with them and District personnel have them mapped in the Geographic Information System used. For planning purposes, specific items of concern follow; the complete report is in Appendix D.

Data Gathering Needs

- No site-specific issues identified.

Frequently Flooded Structures and Properties Subject to Damage

- No site-specific issues identified.

Infrastructure

- No site-specific issues identified.

Safety Concerns

- The dam containing Arivaca Lake is deficient. (T22S R11E Sec. 07) <GIS Point ID: ARI-SAF-001>
- Arivaca Road at Proctor Wash is an at-grade crossing and may be impassable even after flow events due to sediment and debris deposits on the roadway. This location is within Santa Cruz County but Arivaca Road provides access to portions of Pima County. (T20S R12E Sec. 05) <GIS Point ID: ARI-SAF-002>
- Arivaca Road at Batamote Wash is an at-grade crossing and may be impassable even after flow events due to sediment and debris deposits on the roadway. This location is within Santa Cruz County but Arivaca Road provides access to portions of Pima County. (T20S R12E Sec. 06) <GIS Point ID: ARI-SAF-003>

The District completed no projects during the prior five years, and none planned for the next five years.

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5.5.2.6 Floodplain Management

District staff is involved with erosion control projects including those to reduce head cutting and to induce meandering in coordination with public and private landowners including within Buenos Aries National Wildlife Refuge and on ranches. The District participates in review of utility facilities including Environmental Impact Statements associated with gas pipelines. This watershed has one such pipeline running along the Altar Wash to Mexico that enters the watershed near Three Points on State Route 86. As part of monitoring for erosion at the numerous washes crossed by the Route, the developer has agreed to provide annual imagery. This imagery will improve the ability to monitor overall watershed condition in the future.

The PPI identified a need for greater presence, and detailed floodplain mapping can better define flood risk.

Arivaca Lake