RECLAMATION

Managing Water in the West

Draft Environmental Assessment for the Construction of a Temporary Project to Reuse up to 7,000 Acre Feet Annually of Effluent at a Groundwater Savings Facility in Pima County

U.S. Department of the Interior
Bureau of Reclamation
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Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Acronyms

Acronym	Explanation
ADWR	Arizona Department of Water Resources
AFA	Acre Feet Annually or Per Year
AGFD	Arizona Game and Fish Department
ANWRF	Agua Nueva Water Reclamation Facility
AWSA	Arizona Water Settlements Act
AZDEQ	Arizona Department of Environmental Quality
CAP	Central Arizona Project
CEQ	President's Council on Environmental Quality
CFR	Code of Federal Regulations
CMID	Cortaro-Marana Irrigation District
CWA	Clean Water Act
DOI	Department of Interior
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FWS or USFWS	U.S. Fish and Wildlife Service
GIS	Geographical Information Systems
GSF	Groundwater Savings Facility
IGA	Intergovernmental Agreement
ITA	Indian Trust Assets
LTSC	Long Term Storage Credit
MBTA	Migratory Bird Treaty Act
MDWID or Metro Water	Pima County and Metropolitan Domestic Water Improvement District
mg/L	milligrams per liter
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	Natural Resources and Conservation Service
P.L.	Public Law
Reclamation	Bureau of Reclamation
SAWRSA	Southern Arizona Water Rights Settlement Act
SCR	Santa Cruz River
Secretary	Secretary of the Interior
TES	Threatened and Endangered Species
TRWRF	Tres Rios Water Reclamation Facility
TSS	Total Suspended Solids
USGS	United States Geological Survey
WRF	Water Reclamation Facility
WRRC	Water Resources Research Center
YBC	Yellow-Billed Cuckoo

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1.1 Introduction

The Bureau of Reclamation (Reclamation) has prepared an Environmental Assessment (EA) to analyze the potential environmental impacts for construction of a temporary project that would reuse up to 7,000 acre feet annually (AFA) of effluent from Pima County's Tres Rios Water Reclamation Facility (WRF) at a Groundwater Savings Facility (GSF). Reclamation would receive long term storage credits from the Arizona Department of Water Resources (ADWR) as a result of the project. The water treatment facility is located on Ina Road where an above ground pipeline would be constructed and connected to an existing manhole for transmission through existing pipelines and canals to the GSF. The EA also evaluates the impacts of several inter-governmental agreements and partnerships needed to implement the project. The Proposed Action is a temporary project that will assist Reclamation in meeting some of its obligations under current water settlement laws.

In order to meet legal obligations Reclamation must examine a full range of projects and alternatives. A permanent solution will be developed in the future so that Reclamation can meet its firming requirements. However, the scope and timing is unknown at this time. Any proposal for a permanent reuse of effluent will be evaluated in future National Environmental Policy Act (NEPA) analysis.

This EA was prepared in accordance with the NEPA, Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), and Department of the Interior (DOI) NEPA regulations (43 CFR 46). Reclamation is the lead Federal agency as defined in 43 CFR 46.225-46.230.

1.2 Background

In 1982, Congress passed the Southern Arizona Water Rights Settlements Act (P.L. 93-293, as amended) (SAWRSA), then in 2004 the Arizona Water Settlement Act (P.L. 108-451) (AWSA) which restated and amended the original settlement. As a result, SAWRSA and AWSA require Reclamation to finance the annual delivery of up to 66,000 AFA of Central Arizona Project (CAP) water to the Tohono O'odham Nation and to "firm" 28,200 AFA of CAP Non-Indian Agricultural priority water.

The "Firming Program" is described in Section 105 of the AWSA. The program ensures that 60,648 AFA of the non-Indian agricultural priority water will be delivered during water shortages in the same manner as CAP Municipal and Industrial priority water. Firming is defined as long term storage that may be used to mitigate the impacts of Colorado River shortages. Storing effluent in a GSF is one example of a method that can be used to meet these obligations.

The Secretary of the Interior (Secretary) and the City of Tucson entered into a contract to provide for delivery of 28,200 AFA of reclaimed water in October 1983 as part of SAWRSA (307(a)(1)(A)). The contract is the basis for the Secretary to meet firming obligations.

Several other methods of firming can also be used. A Managed Underground Storage Facility Permit allows for water to be discharged to a naturally water-transmissive area such as a streambed that allows the water to percolate into the aquifer without the assistance of a constructed device. A Constructed Underground Storage Facility Permit allows for water to be stored in an aquifer by using some type of constructed device, such as an injection well or percolation basin. A GSF is the direct delivery of water to crops on an existing farm instead of pumping groundwater (ADWR 2015) to obtain 100% long term storage credits using a GSF. Reclamation receives at best 50% credit recharging in a Managed USF, and the amount of credit depends upon how well the water infiltrates into the ground.

In 1998, Reclamation completed an Environmental Assessment and Finding of No Significant Impact to obtain a permit (No. 73-545943.0200) to store about 4,650 acre-feet a year into the Santa Cruz River Managed Underground Storage Facility (USF). Reclamation obtains Long Term Storage Credits (LTSC) with this arrangement. Reclamation often earns even less than 50%, since in recent years, percentages have dropped below 30% annually because of low infiltration rates.

Reclamation has obtained a permit for the Proposed Action of storing the water in a GSF (No. 73-538100.0800), and would earn 100% long term storage credit for the GSF water since it's used 'in lieu' of pumping groundwater.

The State of Arizona has grown rapidly in recent decades, with most of that growth concentrated in the Sun Corridor which connects Tucson, Phoenix, and central Yavapai County. Current projections suggest that Pima County will grow by approximately 1.3 million by 2035 with expectations that most of the growth will be within the City of Tucson and the Towns of Marana and Sahuarita (Pima County 2014). With growth brings land and road developments and greater demands for water that will result in future loss, degradation, and fragmentation of wildlife habitat. Water resources within the southwest U.S. continue to be stressed at record levels, and other non-federal entities within the Tucson area are currently evaluating the reuse of their effluent within the Santa Cruz River

Reclamation will need to continue to pursue ways to firm the required 28,200 AFA non-Indian Agriculture water to be delivered in accordance with SAWRSA and AWSA. Currently, Reclamation has no foreseeable future project to remove any more effluent. However, since the legal obligations remain, a future project could be needed to effectively comply. If such an event were to occur, it would be necessary to conduct appropriate NEPA as part of the planning and decision making process.

The Federal Highways Administration and Arizona Department of Transportation have been planning to widen the section of I-10 along the same corridor as the Proposed Action. The bridge at Ina Road is scheduled to be removed and relocated, and two force main sewer lines are planned to be installed very close to the proposed above ground pipeline. Since the EA for the project has not been released for public comment and finalized, it is impossible to ascertain the exact impacts to the human environment as a result of this foreseeable project. However, if the EA is released prior to the publication of this document, Reclamation will incorporate the potential cumulative impacts to the Santa Cruz River, wildlife, and riparian habitat. Reclamation will be monitoring the condition of the site during construction and post-construction to mitigate impacts.

1.3 Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to construct a temporary project to obtain 100% long term storage credit to meet Reclamation's firming obligations. The credits could also be sold to provide revenue for the Cooperative Fund set up by the AWSA to provide for water deliveries. The credits could also be used for recovery purposes.

The project is needed because Reclamation is required to meet firming obligations under SAWRSA and the AWSA. Reclamation must continue to find new ways to efficiently meet its firming obligations; and obtaining 100% credit for its effluent is one way to accomplish this.

1.4 Project Location

The Proposed Action is located at the Tres Rios WRF in Pima County near Interstate 10 and Ina Road. Instead of discharging to the Santa Cruz River, the effluent would leave the facility on the northwest side using the temporary pipeline and connect to an existing manhole South of Ina Road. The manhole connects to an existing pipeline that leads to the Cortaro-Marana Irrigation District (CMID) canal, and ultimately to the GSF. The water would cross Ina Road and flow toward Interstate 10 where it crosses the highway near West Massingale Road and discharges into the canal. Figures 1.1 and 1.2 show the Project Location and construction areas.

Figure 1.1 Project Location

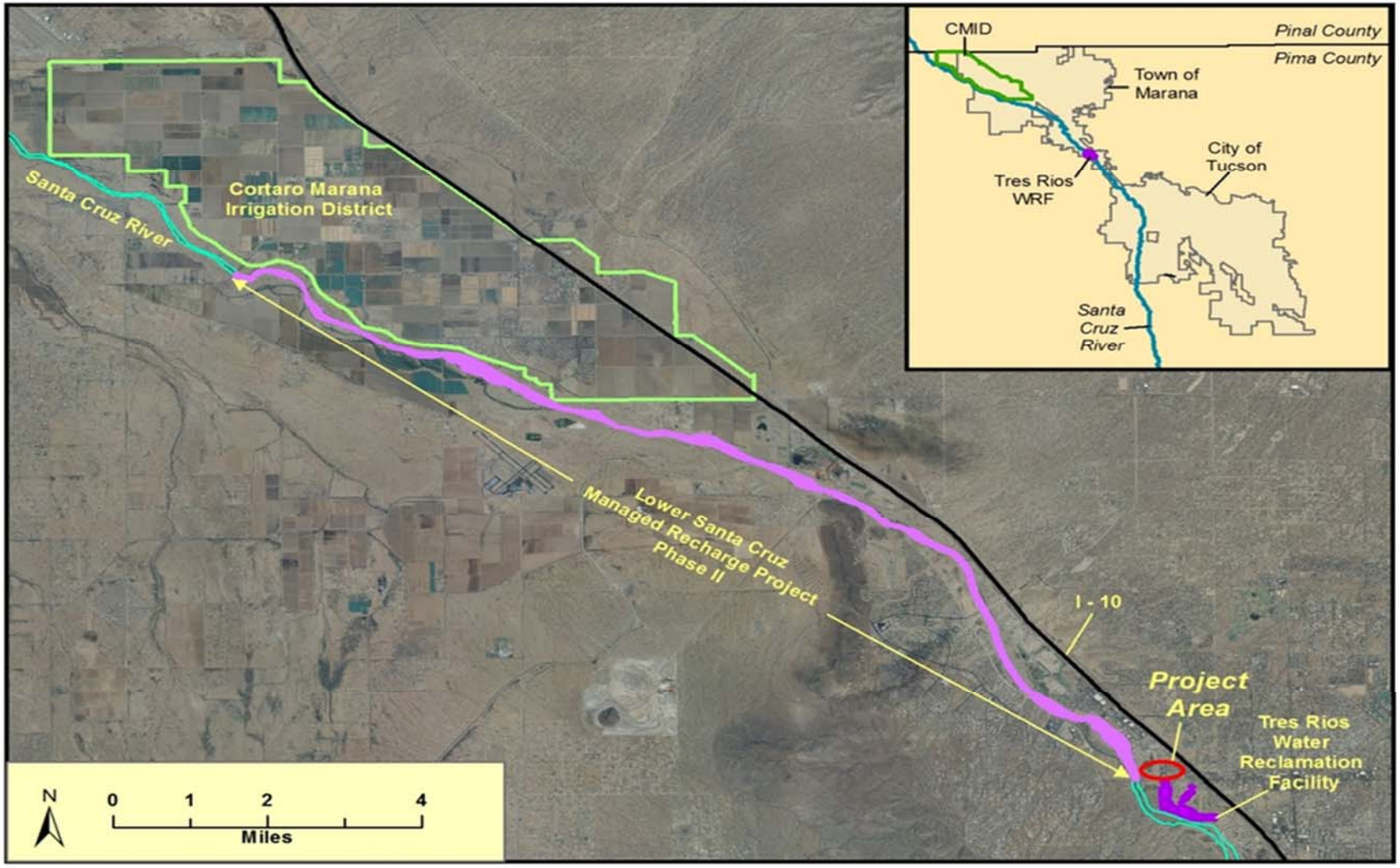


Figure 1.2 Proposed Construction Area

2.0 Description of the Proposed Action and Alternatives

2.1 Proposed Action

Reclamation proposes to enter into Inter-Governmental Agreements (IGA) with CMID, Pima County, and The temporary project would deliver up to 7,000 AFA to Metro Water and would last no longer than five (5) years. The effluent is currently discharged into the Santa Cruz River but the proposal would divert it directly from the Tres Rios WRF, and deliver it to a GSF north of the water reclamation facility.

The IGAs include cost sharing, operation, and maintenance responsibilities for the construction of approximately 1,100 linear feet of above ground pipeline. In order for the WRF to continue to use the maintenance road on the proposed project site, approximately 25 feet of the pipeline would need to be buried about 4 feet deep. Existing infrastructure connects to an irrigation pipeline that flows to the CMID canal and directly to the GSF. Reclamation has obtained a permit (No. 73-538100.0800) from ADWR to store the water at the GSF. The Facility Permit authorizes CMID to accept effluent in lieu of pumping groundwater on a gallon-for-gallon substitute basis. Parties that provide effluent water in conformance with the requirements of the CMID Facility Permit would earn LTSCs pursuant to A.R.S. § 45-852. Reclamation would obtain Long Term Storage Credits using its established account (LTS #70-411200.0000). The IGAs designate who amongst the Parties would provide Operation and Maintenance, and describes the responsibilities of all parties involved.

The project is temporary and would be in place for a maximum of five years because there is a planned project with the Arizona Department of Transportation (ADOT) and Federal Highways Administration (FHA) for the widening of Interstate 10 that includes renovation of the canals, removal of the existing pipeline, removal of the bridge that crosses I-10 at Ina Road, and relocation of two force main sewer lines directly adjacent to the Reclamation's proposed pipeline. The relocation of the utilities would not interrupt the Reclamations Proposed Action. However, the removal of the bridge and the existing pipeline would end the temporary project since the infrastructure that delivers the water to the CMID canal would no longer exist. The EA for the ADOT/FHA project is underway but there is no completion date available. Once the I-10 project begins, Reclamation would need to decide upon the best course of action to meet legal requirements under SAWRSA and AWSA since the infrastructure for the temporary project would be removed. It is possible that planning for a future project to uphold our legal commitments would need to occur. At this time no project has been identified. Therefore, this EA is written with the caveat that future projects could occur and appropriate NEPA analysis would be required to plan and execute them.

2.2 No Action Alternative

Under the No Action Alternative, the temporary project would not be implemented. All of the effluent would continue to discharge to the Santa Cruz River. There would be no construction of an above ground pipeline, no reuse of Reclamation's available effluent, and partial collection of long term storage credits to be used for water deliveries or sold to obtain money for the Cooperative Fund. Further, Reclamation could fail to meet its legal requirements.

3.0 Affected Environment, Environmental Consequences and Cumulative Effects

The Council on Environmental Quality regulations provides direction on conducting the NEPA process. The regulations require that all Federal actions are examined within the context of past, present, and foreseeable future actions to determine overall impacts to the human environment. This directive can be found in 40 CFR 1508.7, 1508.25, and the DOI regulation 43 CFR part 46.115, and Reclamation 516 Departmental Manual 14.

3.1 Resources Eliminated from Further Study

Some resources were eliminated from further study in this EA because they were not present or there were no impacts to them as a result of the implementation of the proposed action. Those resources and the reason for elimination are detailed below and include Socio-Economics, Indian Trust Assets, and Wild and Scenic Rivers.

Socio-Economics and Environmental Justice

Executive Order 12898 provides protection to low income and minority populations against disproportionately high and adverse human health or environmental effects of Federal actions. The proposed action would not take place in areas where minorities and low-income populations and communities could realize disproportionate health or environmental effects. Therefore, this topic has been eliminated from further analysis.

Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in assets held in trust by the U.S. Government for Native American tribes or individual Native Americans. These assets can be real property or intangible rights including but not limited to lands, minerals, water rights, hunting rights, money and other natural resources. The trust responsibility is that all Federal agencies take actions reasonably necessary to protect ITAs. There are no known ITAs within the Proposed Action area. Therefore, ITAs have been eliminated from further study in this EA.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968 (P.L. 90-542) designated the initial components of the National Wild and Scenic River System and established procedures for including other rivers or reaches that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values and preserve them in a free-flowing condition. The Act applies to waters designated, or eligible for designation as wild and scenic. The Santa Cruz River is an effluent dominated ephemeral stream and is not designated as a Wild and Scenic River. Therefore, the resource was eliminated from further study in this EA.

Air Quality

Congress established much of the basic structure of the Clean Air Act in 1970, and made major revisions to the Act in 1977 and again in 1990. As a result of the law, the Environmental Protection Agency established the National Ambient Air Quality Standards (NAAQS) for criteria pollutants. The project area is considered non-attainment on some days for large particulate matter called PM10. PM 10 refers to particulates that are larger than 10 microns, an example is dust. The Proposed Action is expected to have some ground disturbance, but it will not require an air permit. Therefore, no impacts to air quality are expected to occur, so air quality has been eliminated from further study in this EA.

Wetlands

Executive order 11990 requires Federal agencies, in carrying out their land management responsibilities to take action that would minimize the destruction, loss, or degradation of wetlands; and take action to preserve and enhance the natural and beneficial values of wetlands. No wetlands are anticipated to be affected by the implementation of the Proposed Action.

Floodplain and Floodplain Management

Executive Order 11988 encourages Federal agencies to avoid, where practicable alternatives exist, the short and long term adverse impacts associated with development in existing floodplains. Federal agencies are required to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare, restore, and preserve the natural and beneficial values served by floodplains. It is not anticipated that the Proposed Action area will affect any floodplains that may be within or adjacent to the service area.

3.2 Climate Change

On December 18, 2014, the CEQ released revised draft guidance for public comment that describes how Federal departments and agencies should consider the effects of greenhouse gas emissions and climate change in their NEPA reviews. The revised draft guidance emphasizes that agency analyses should be commensurate with projected greenhouse gas emissions and climate impacts, and should employ appropriate quantitative or qualitative analytical methods to ensure useful information is available to inform the public and the decision-making process in distinguishing between alternatives and mitigations. It recommends that agencies consider 25,000 metric tons of carbon dioxide equivalent emissions on an annual basis as a reference point for quantitative analysis of greenhouse gas. The proposed temporary project would not exceed the 25,000 metric tons of carbon dioxide.

3.2.1 Climate Change Current Condition

The Bureau of Reclamation's mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. Climate change poses a fundamental challenge to Reclamation's mission. Changes occurring now are altering the historical weather and streamflow patterns that framed the development of water and power systems across the west. Communities across the west are facing increasing problems with water availability and drought, flooding, and increased risks of forest fires. As a result of the SAWRSA and the AWSA, Reclamation is charged with firming water supplies in order to manage water resources for future use.

3.2.2 Climate Change Environmental Consequence

The Proposed Action would assist Reclamation keep diversity and flexibility in its water management capabilities, while capitalizing on the reuse of effluent and successful partnerships to increase the longevity and security of water resources. Therefore, while difficult to actually quantify the effects of the removal up to 7,000 acre-feet annually from the Santa Cruz River on overarching climate change, the reuse of effluent has been identified by Reclamation as a reliable method of sustaining water resources for the future. The proposed action would not measurably contribute to overall greenhouse gas emissions or climate change.

3.2.3 Climate Change – No Action Alternative

Under the No Action Alternative, the water would remain in the Santa Cruz River, which is an effluent driven ephemeral river. The No Action Alternative would not contribute to climate change.

3.3 Biological Resources - Vegetation

The proposed project would reuse up to 7,000 acre-feet of treated effluent that is discharged into the Lower Santa Cruz River which currently supports and provides habitat for a variety of wildlife and plant species. The effluent-dependent reach is dominated by cottonwood-willow and sustains roughly 300 acres of riparian woodland. Open water, weedy fields, and abundant natural vegetation make this part of the river an important stop-over for migrating birds, including waterfowl and raptors, and provides habitat for bird species that have declined in other parts of Pima County due to past land-use change.

3.3.1 Vegetation Current Conditions

The Project Area encompasses three primary vegetation communities: a) Arizona Upland Subdivision Sonoran Desertscrub; b) Lower Colorado River Subdivision Sonoran Desertscrub; and c) riparian habitats. Descriptions are provided below and follow Brown (1994) and other sources. Pima County uses a variation of Brown's (1994) biotic

communities where some of the names are different and the vegetation mapping is more refined (Novak Environmental, Inc. 2001).

Arizona Upland Subdivision of the Sonoran Desertscrub

The Arizona Upland Subdivision of the Sonoran Desert is also known as the Arizona Desert, Paloverde Cacti Desert, and *Cercidium-Opuntia* Desert. Approximately 90% of the Arizona Upland Subdivision is on slopes, broken ground, and multi-dissected sloping planes (Brown 1994). Average annual precipitation ranges between 7 and 16 inches. Summer rainfall accounts for 30 to 60 percent of the annual total. Winter precipitation ranges from 10 to 40 percent of the annual total. T he vegetation of the Arizona Upland Subdivision most often takes on the appearance of a scrubland or low woodland of leguminous trees with intervening spaces held by one to several open layers of shrubs and perennial succulents and columnar cacti (Brown 1994). Vegetation within the subdivision includes its characteristic trees: foothill palo verde (*Cercidium microphyllum*), blue palo verde (*Parkensonia florida*), mesquite (*Prospois* spp.), and catclaw acacia (*Acacia greggii*). Cacti in this subdivision include several species of cholla (*Opuntia* spp.), saguaro (*Canegiea gigantean*), and pincushion (*Mammillaria* spp.), to name a few.

Lower Colorado River Subdivision of the Sonoran Desertscrub

The Lower Colorado River Subdivision is the largest and most arid of the Sonoran Desert subdivisions, but it also makes contact with the remaining subdivisions as well as the Mohave Desert and with California coastal scrub. Average annual precipitation ranges between 1.4 to 11.3 inches (Brown 1994). The combination of high temperature and low precipitation creates intense competition between plants for scarce water resources. Plant growth is typically both open and simple and is often found scattered along drainages. The numerous and irregular shaped drainages often give an illusion of trees and shrubs forming a homogeneous community (Brown 1994). Commonly found species include western honey mesquite (*Prosopis glandulosa* var. *torreyana*), blue palo verde, ironwood (*Olneya tesota*), and desert willow (*Chilopsis linearis*). Species in more arid parts of the subdivision include creosotebush (*Larrea tridentate*), ocotillo (*Fouquieria splendens*), brittlebush (*Encelia farinose*) and white bursage (*Ambrosia dumosa*).

Riparian Communities

Portions of the project area fall within and alongside the Santa Cruz River which is categorized by Pima County as an Important Riparian Area (Pima County 2011). Most of the river is categorized as ephemeral with a few reaches exhibiting perennial characteristics because of effluent releases at various locations. Desert riparian communities are found along perennial stream and river systems; and are considered the most productive ecosystem in North America (Zaimes et al. 2007). In the southwest United States, they are found on less than 2% of the total land area with only an estimated 113,000 hectares found in Arizona (Pase and Layser 1977; Ffolloitt et al. 2004). While they cover such a small portion of the landscape, 80% of all vertebrates rely on riparian

ecosystems at some stage of their life (DeBano et al. 2003). They serve a variety of important roles such as: 1) act as movement corridors and habitat for wildlife, 2) enhance fish habitat, 3) filter and retain sediments and nutrients from runoff and floods, 4) stabilize stream banks, 5) store water and recharge subsurface aquifers, and 6) reduce runoff (DeBano et al. 2003; Zaimes et al. 2007).

Xeroriparian communities are similar but are associated with ephemeral streams and rivers. Ephemeral systems only flow in response to storm events but function in a manner similar to perennial systems (Zaimes et al. 2007). Xeroriparian communities typically contain species found in adjacent upland habitats, but they are larger and occur at higher densities. Pima County categorizes xeroriparian habitat into classifications A, B, C, and D which is based on the total volume of vegetation; Xeroriparian A has the greatest volume (Pima County 2011).

Santa Cruz River Area – Riparian Vegetation

Historically, the Santa Cruz River functioned as a natural ephemeral and perennial system that is now perennial at various reaches due to discharges of treated effluent from three treatment plants within the US and Mexico. A study by Harris Environmental Group, Inc. (2013) evaluated herbaceous and woody vegetation along the lower Santa Cruz River to determine baseline conditions prior to sewage treatment improvements. Surveys spanned 40-kilometers (25-miles) from a reach adjacent to Columbus Park to just south of Trico-Marana Road. Through the study area the width of the main channel ranged from 8-10 meters (26-66 feet) with a floodplain that spans 80-500+ m (262-1640+ ft.) wide. Embankments are found at various locations along the river and were typically constructed of man-made soil cement that constricts the width of the floodplain to approximately 100 m (HEG 2013).

Results of Site Visits July 2-14, 2015

During a site visit in July 2014, growth of cottonwood-willow riparian vegetation along with forbs and grasses showed a noticeable improvement in their condition near Ina Road. Prior to improvements in water quality, vegetation structure was approximately 10% forest and 90% open (HEG 2013). A follow up survey of the area some time later may yield different results with open areas being replaced by grasslands, shrublands, and woodlands. It is believed that infiltration improved growing conditions at that location by making water more accessible by saturating the soil. Existing riparian habitat and other areas suitable for growing are primarily close to the channel because infiltration of effluent percolates down into the aquifer rather than out into the floodplain.

Among the eight sites that were surveyed, an average of 18.88 species were documented per site during streamside herbaceous surveys, 10.96 per transect, and 3.49 per quadrant (HEG 2013). Species richness varied across all sites with the least observed at the Columbus Dry site (Control Site) and the most at the Sunset Road site. If the Columbus Dry site is excluded then species richness ranges from 11 to 12.67 species per transect. The Columbus Dry site was selected as the control site because it is not influenced by

treated wastewater. Within woody belt-transects a total of 13 herbaceous species were observed, including five species not observed in streamside surveys (HEG 2013). The average Wetland Indicator Status (WIS) for all sites was 3.38. The Tangerine Road site had the lowest WIS at 2.67 while the Columbus Dry site had the highest at 4.93. A low WIS indicates a higher number of species adapted to wetland conditions were observed. The Columbus Dry site which is not influenced by effluent had the most upland species present (HEG 2013).

The depth to ground water along the river from Ina Road to Trico Road varies but has recorded depths that currently range from 107 to 208 ft., which is too deep for trees and other vegetation. Typical ground water depth for cottonwood-willow systems are less than 5 meters (16.4 feet) while saltcedar can reach a depth of 9 meters (30 feet) (Stromberg 1993; USDA 2012). Existing riparian vegetation along portions of the river channel may remain stable and possibly improve or even become established in open areas as long as adequate soil moisture is within 5 meters of the surface, particularly during the growing season

When analyzing for woody species, Goodding's willow (*Salix gooddingii*) was observed having the highest average plant and stem density of all species across all sites with estimates of just under 5,000 plants/ha and just over 5,000 stems/ha. The observed data collected on the site visits indicate the density could be somewhat misleading because it was a result of hundreds of 6-inch tall single stemmed saplings observed at the Sunset Road site, many which will never reach maturity (HEG 2013). The second highest was saltcedar (*Tamarix ramosissima*) with estimates of approximately 300 plants/ha and >1000 stems/ha. The singlewhorl burrorbush (*Hymenoclea monogyra*) was found to have the highest density of shrubby plants with 825 plants/ha (HEG 2013). When data was analyzed by functional groups, the highest density observed was by upland and facultative wetland species with estimates of 1473 and 1426 plants/ha. By stem density, facultative wetland species had the highest with 1550 stems/ha followed by upland species with 1250 stems/ha (HEG 2013).

Gooding's willow was observed to have the greatest basal area at 3.7 m^2/ha followed by saltcedar with 1.2 m^2/ha. Saltcedar also had the greatest dead species basal area with 0.04 m^2/ha followed by Gooding's willow with 0.03 m^2/ha. By functional groups, facultative wetland species had the greatest basal area with 3.9 m^2/ha while facultative upland species had the least with 0.9 m^2/ha (HEG 2013).

Across all sites the highest average percent of canopy closure was by Athel tamarix (*Tamarix aphylla)* with 6.1%, followed by Gooding's willow and *T. ramosissima* with 4.04 and 3.69% (HEG 2013). When analyzing the data by strata, open areas covered 68.4% of the total survey area, followed by shrublands with 17.5%, grasslands with 9.1%, woodlands with 3.8%, and forests with 1.3%. Open areas had the highest percent structure type at all but one site, while forest cover was only observed at the Ina Road site (HEG 2013).

The reported results vary across all sites and some may not provide a clear picture of conditions through the study area, and the influence of effluent discharge on plant diversity, stem density, and basal area. By evaluating the results and understanding that it is an effluent dominated system, it is not surprising to see that riparian habitat along the river is highly fragmented (non-contiguous) and variable. At times there are locations along the river where vegetation is either absent or extremely sparse, which was observed along the 25-mile study area (HEG 2013). That can be a result of various factors such as water quality, topography, flow, and ground infiltration

3.3.2 Vegetation - Environmental Consequences and Cumulative Effects

Most of the pipeline alignment from the water treatment facility to the existing manhole occurs on previously disturbed areas and/or a dedicated Right-of-Way with little to no vegetation that is beneficial to wildlife.

The reuse of up to 7,000 AFA of effluent for long term storage credits would be directed into a Groundwater Savings Facility and not discharged into the Santa Cruz River. The volume of water within the river has shifted significantly in recent years since the quality of effluent has improved (Table 3.1) (Galyean 1996; ACE 2010; Pima County 2012).

In 2014, the approximate volume of effluent recorded at the Cortaro Road and Trico Road gauge stations was 40,500 and 10,000 AFA. In early March 2014, the Trico Road gauge started recording a decline in surface flow that quickly transitioned to a complete absence of flow (0 CFS/Cubic Feet Per Second)(Figure 3.1). Since then, surface flow became periodic with the last steady flow concluding a t the end of January 2015. Recent flows recorded at the Trico Road gauge have primarily been the result of storm events. Data from 2013 was excluded because facility upgrades that changed the quality and volume of discharged effluent made it unreliable.

The 2014 effluent flow distance estimates (Table 3.2) were generated by comparing annual and monthly average infiltration rates. The various infiltration rates were calculated by dividing the amount of effluent that had infiltrated between the Ina Road and Trico Road gage by the estimated distance of 17.9 miles. When flows did not reach the Trico Road stream gage, the calculated infiltration rate was lower than the actual infiltration rate. Without frequent and accurate records of flow distances a precise calculation of the infiltration rate is not possible.

There are no expected differences in flow distance for January, November, and December because no effluent deliveries are anticipated to be made during those months. Flow distance slightly varies for the remaining nine months with an average base flow distance of 20.4 miles and an average decrease in distance of approximately 5.04 miles when the 7,000 AFA is diverted. In order to evaluate impacts as best as possible under natural conditions, a surface flow end point recorded approximately 14.65 miles downstream of the Tres Rios WRF during June 2015 was selected. The end point was chosen after surveying the river and recording the front of the surface flow and a transition between healthy to dead riparian vegetation. Selecting an end point further up or downstream

would not provide a realistic analysis of potential impacts. Riparian vegetation north of the selected end point was not included in the analysis because it was already dead.

The riparian vegetation along the Santa Cruz River was mapped (Figure 3.2) from the Tres Rios WRF to the selected endpoint. Riparian vegetation was only mapped if it was: 1) within 30 feet of primary and secondary channels, and 2) was part of a continuous tract of riparian vegetation that started within 30 feet of a channel. Riparian vegetation that was mapped mostly includes cottonwood, willow, saltcedar, and mesquite. The total area of riparian vegetation along the effluent dominated reach was calculated to be approximately 137.6 acres. That reach of the river can be broken up into two parts, the 5-mile Impact Zone which was calculated to contain 74.9 acres of riparian habitat and the Upstream Intact Zone which contains 62.7 acres. The Impact Zone identifies the area expected to be impacted from the reuse of effluent. The Upstream Intact Zone is the area expected to remain intact after the effluent is reused.

While the impact zone is only approximately 5.04 miles in length, it contains 54% of riparian habitat along the 14.65 mile effluent dominated reach of the river. The Impact Zone contains broad channels that support continuous wide patches of habitat. Along the Upstream Impact Zone, habitat is more narrow and patchy with 3.75 miles of the river almost void of tall woody vegetation. It is unknown why that reach of the river does not support as much riparian habitat since the channel morphology appears to be pretty similar. Historically it may have had lower rates of infiltration when compared to the Impact Zone, or the soils are in some way less suitable for growth.

Pima County and Tucson Water are evaluating the feasibility of diverting 6,000 AFA of effluent from the Agua Nueva WRF to an artificial recharge facility. Utilizing a recharge facility would allow the continuation of well pumping to meet peak demand while banking their water resources for future system needs. This action could adversely affect vegetation along the river by decreasing the amount of available water and contributing to a reduction in the density of vegetation.

Table 3.1 Effluent flow and losses from reuse, infiltration, evapotranspiration, and diversions

	Tres Rios WRF	Trico Road Outflow
2012	42,750 AFA	19,500 AFA
2014	40,500 AFA	10,000 AFA
2015	36,000 AFA	0 AFA

Figure 3.1 Recorded surface flows at the USGS gauge at Trico Road

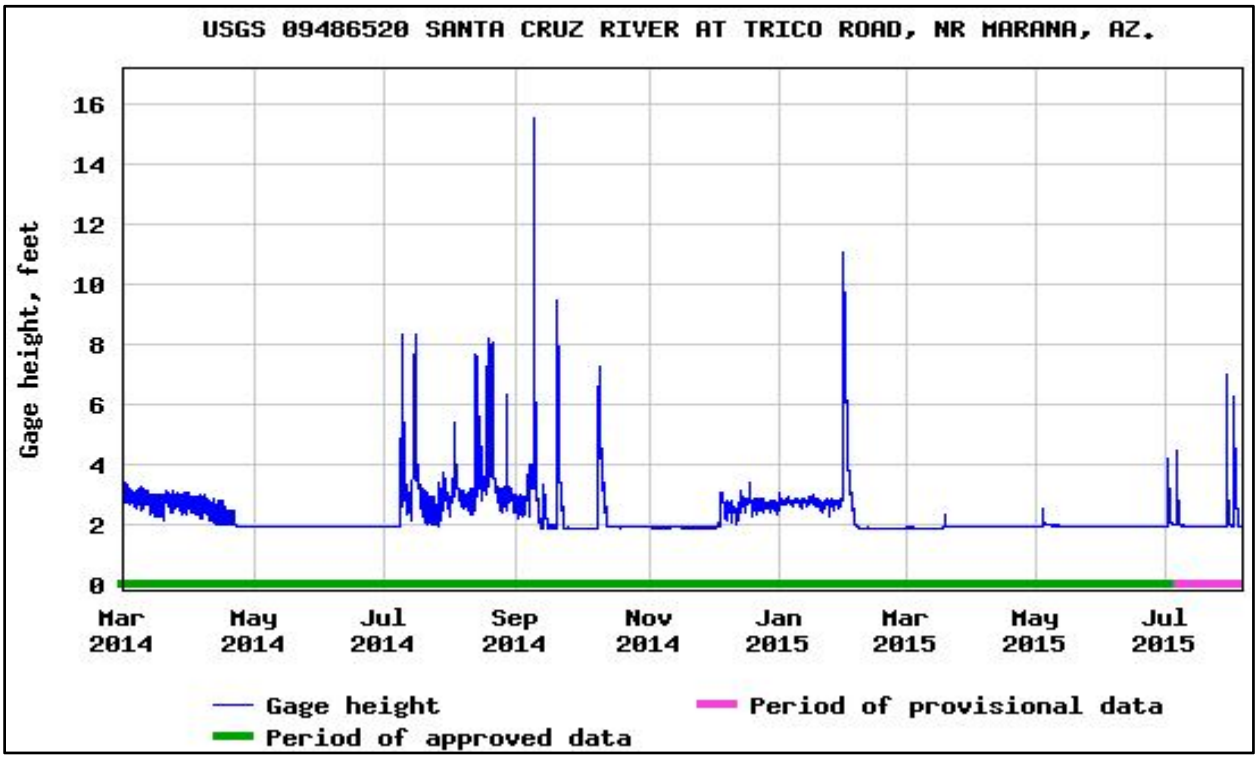
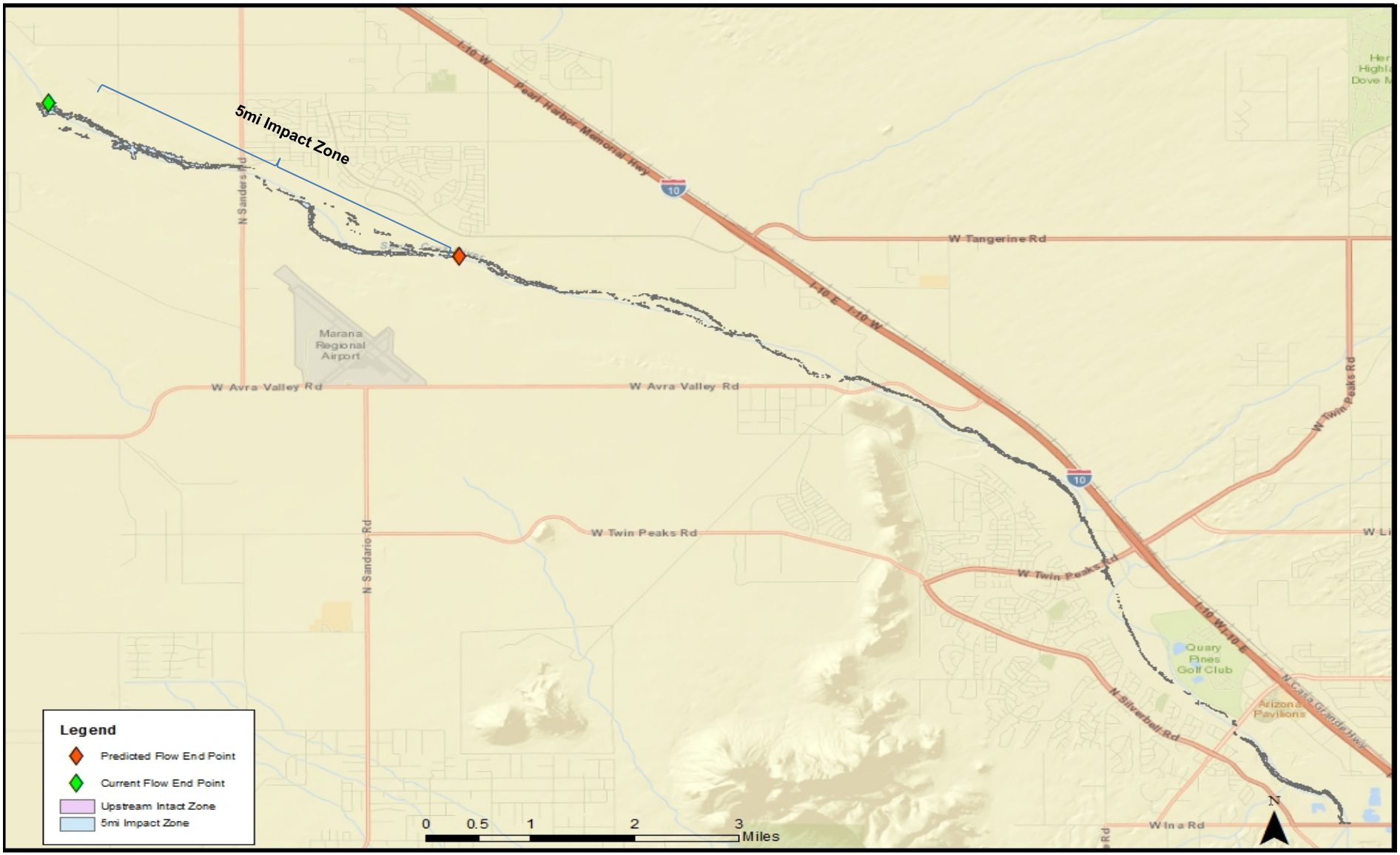


Table 3.2 Average length of surface flow past Ina Road in 2014 and an estimated difference when 7,000 AFA is diverted elsewhere

	2014 Estimate (mi)	7,000 AFA Diversion (mi)	Difference (mi)
January	37.85	37.85	0.00
February	31.26	26.16	5.11
March	25.35	20.41	4.94
April	19.35	14.54	4.81
May	15.94	10.78	5.16
June	16.28	11.37	4.91
July	19.68	14.52	5.16
August	21.11	15.38	5.73
September	17.97	12.91	5.06
October	17.09	12.57	4.52
November	16.35	16.35	0.00
December	18.85	18.85	0.00

Figure 3.2 Riparian vegetation recorded from the outlet of the Tres Rios WRF to the surface flow end point



3.3.3 No Action Alternative Vegetation

Under the No Action alternative, Reclamation would not remove up to 7,000 AFA and the vegetation would likely stay the same. There would be no impacts to vegetation from the No Action alternative.

3.4 Biological Resources - Fish and Wildlife

3.4.1 Wildlife Current Conditions

Common bird species that may occur in the Project area include the mourning dove (*Zenaida macroura*), red-winged blackbird (*Agelaius phoeniceus*), killdeer (*Charadrius vociferus*), yellow warbler (*Setophaga petechia*), song sparrow (*Melospiza melodia*), and cooper's hawk (*Accipiter cooperii*). In addition to resident species, the Sonoran Desert provides wintering and migratory habitat for various bird species including the lazuli bunting (*Passerina amoena*), western kingbird (*Tyrannus verticalis*), and orange-crowned warbler (*Oreothlypis celata*).

The Sonoran Desert also exhibits a wide diversity of mammal species. Three rabbit species occur throughout this region: the desert cottontail (*Sylvilagus audubonii*), blacktailed jackrabbit (*Lepus californicus*), and antelope jackrabbit (*Lepus alleni*). Other typical desert mammals include the highly desert-adapted Merriam's kangaroo rat (*Dipodomy merriami*), ubiquitous white-throated woodrat (*Neotoma albigula*), coyote (*Canis latrans*), and collared peccary (*Pecari tajacu*).

Common lizards in the Project area include the zebra-tailed lizard (*Callisaurus draconoides*), tiger whiptail (*Aspidoscelis tigris*) and side-blotched lizard (*Uta stansburiana*). The variety of small mammals provides an abundant prey source for snakes including the coachwhip (*Masticophis flagellum picues*), western diamond-back rattlesnake (*Crotalus atrox*), and gophersnake (*Pituophis catenifer*). Amphibians known to the area include the western spadefoot toad (*Spea hammondii*), bullfrog (*Rana catesbeiana*), and Colorado River toad (*Bufo alvarius*).

Wildlife Movement Corridors and Linkages

As a result of population growth and development in Arizona, identifying and preserving wildlife movement corridors have become a priority. In 2011, the Pima County Wildlife Connectivity Workgroup held a workshop where stakeholders and experts in wildlife management and land-use planning mapped important wildlife linkages and areas of known wildlife movement (AGFD 2012). Data acquired from the workshop was used to develop The Pima County Wildlife Connectivity Assessment: Report on Stakeholder Input (AGFD 2012). This report identified the Santa Cruz River as a riparian movement area for bats, birds, bobcats (*Lynx rufus*), mountain lions (*Puma concolor*), raccoons (*Procyon lotor*), and deer (*Odocoileus hemionus*). This movement area also provides suitable habitat and migratory movements for many other species. Current and future

threats include agriculture, exotic species, residential development, and lining the river with concrete (AGFD 2012).

Santa Cruz River Area – Aquatic Macroinvertebrate Community

A study by Aquatic Consulting and Testing (ACT 2013) evaluated the structure and function of the aquatic macroinvertebrate community within the lower Santa Cruz River prior to sewage treatment improvements. Four monitoring sites were selected to assess a variety of conditions such as stream and habitat characterization, the Hilsenhoff Biotic Index, water quality, and periphyton community diversity (ACT 2013). The channel stability of all four sites was characterized as good, but they had a habitat rating that ranged from 11.5 to 18.54 indicating impaired conditions. Periphyton community diversity was categorized as low with only seven genera of algae found at three of the four monitoring sites. The Hilsenhoff Biotic Index was extremely high at all sites indicating severe organic pollution and the Biological Integrity Index also indicated impaired conditions (ACT 2013).

3.4.2 Environmental Consequences and Cumulative Effects to Fish and Wildlife

The reuse of 7,000 AFY of effluent is expected to impact existing riparian vegetation and the resident and migratory wildlife that rely on it. Birds and other species that are capable of migrating long distances would be impacted the least because they can attempt to find suitable habitat elsewhere. Populations of species that are less mobile such as small mammals, reptiles, and amphibians will be impacted the greatest and will substantially decline or disappear.

While not protected under the ESA, there is a colony of 7,000 to 20,000 cave myotis (*Myotis velifer*) and Mexican free-tailed bats (*Tadarida brasiliensis*) that roost under the Ina Road Bridge. The bridge is scheduled to be replaced in 2016 by an ADOT/FHA project because it has been deemed structurally unsound. The new bridge will incorporate bat boxes that will provide the same roosting conditions that are found in the existing bridge. To temporarily mitigate the loss of roosting habitat, two bat boxes will be installed under the nearby Cortaro Road Bridge.

Both bat species are insectivorous and a loss of riparian habitat further downstream may result in a decline of available food. That loss may be compensated by foraging in neighboring washes, residential areas, golf courses, parks, or the agricultural fields found further north and west. Mexican free-tailed bats are known to travel 25 km in an evening to forage (McWilliams 2005). It is not known how far cave myotis will travel to forage, but individuals of a large colony may have to travel long distances because of competition for daily food (Kunz 1974).

The proposed temporary project is expected to cause minor and not significant impacts to wildlife and their habitat. Its contribution to cumulative impacts will be minimal but incremental to greater impacts brought on by current and future population growth and development. Human development and disturbance can impact wildlife by causing direct

loss or degradation of habitat. Those impacts will be compounded with current and future water demands, and climate change is anticipated to make things worse. There could be indirect or cumulative affects due to foreseeable future projects and other agencies removing water from the Santa Cruz River like the ADOT/FHA and Tucson Water projects.

3.4.3 No Action Alternative Fish and Wildlife

Under the No Action Alternative Reclamation would not remove up to 7,000 AFA from the Santa Cruz River. Effluent would continue to be discharged into the Santa Cruz River and fish and wildlife and riparian vegetation would continue to benefit. If the No Action Alternative was chosen, there would be no direct impacts to migratory birds and other wildlife by Reclamation.

3.5 Biological Resources-Threatened and Endangered Species (TES)

When Congress passed the Endangered Species Act (ESA) in 1973, the purpose was to protect and recover imperiled species. There are recognized TES within the project area. The yellow-billed cuckoo is the only species covered by ESA that has been found where Ina Road crosses the lower Santa Cruz River, but recently detected individuals were recorded as migratory and not residents.

3.5.1 TES Current Conditions

The Endangered Species Act (ESA) provides protection for plants and animals that are currently in danger of extinction (endangered) and those that may become extinct in the foreseeable future (threatened). Section 7 of this law requires federal agencies to ensure that all federally associated activities do not have adverse impacts on the continued existence of threatened or endangered species or designated critical habitat that are important in conserving those species.

A compilation of federally listed, proposed, and candidate species that occur in Pima County (Table 3.3) was retrieved from the U.S. Fish and Wildlife Service (FWS 2015). Pima County lists 19 species as endangered or threatened, 1 candidate, and 2 which have Conservation Agreements. Section 7 of the ESA requires consideration of only listed and proposed species.

Table 3.3 - Federally listed, proposed and candidate TES

Species	Federal Status	Habitat	Determination of Presence of Suitable Habitat in Project Area
MAMMALS			
Jaguar (*Panthera onca*)	E	Found in Sonoran desertscrub up through subalpine conifer forest.	Unlikely to occur. The project area does not provide suitable habitat and appropriate prey densities.

Species	Federal Status	Habitat	Determination of Presence of Suitable Habitat in Project Area
Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)	E	Desert scrub habitat with agave and columnar cacti present as food plants.	Unlikely to occur. Project area does not support columnar cacti and agave. The closest foraging area is approximately 6-miles east.
Ocelot (*Leopardus pardalis*)	E	Desert scrub in Arizona. Humid tropical and subtropical forests, and savannahs in areas south of the U.S.	Unlikely to occur. The species is extremely rare and the project area does not provide suitable habitat.
Sonoran pronghorn (*Antilocapra americana sonoriensis*)	E	Broad intermountain alluvial valleys with creosote-bursage and palo verde-mixed cacti associations.	Unlikely to occur. The project area does not provide suitable habitat and is well outside of its current range.
BIRDS			
California least tern (*Sterna antillarum browni*)	E	Open, bare or sparsely vegetated sand, sandbars, gravel pits, or exposed flats along shorelines of inland rivers, lakes, reservoirs, or drainage systems.	Unlikely to occur. The project area is within an ephemeral river that does not provide suitable habitat.
Masked bobwhite (*Colinus virginianus ridgewayi*)	E	Desert grasslands with diversity of dense native grasses, forbs, and brush.	Unlikely to occur. The project area does not fall within desert grasslands.
Mexican spotted owl (*Strix occidentalis lucida*)	T	Nests in canyons and dense forests with multilayered foliage structure.	Unlikely to occur. The project area is not within a canyon or dense old growth forests.
Southwestern willow flycatcher (Empidonax traillii extimus)	E	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	May occur. There is no large block of dense riparian vegetation consisting of cottonwood, willow, or saltcedar. Closest breeding population is 37-miles away on the San Pedro River.
Yellow-billed Cuckoo (Coccyzus americanus)	T	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries).	May occur. Individuals were recorded 5.5 and 8-miles north and 4 to 13-miles south of the project area.
FISH			
Desert pupfish (Cyprinodon macularius)	E	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	Unlikely to occur. There are no springs or other suitable water sources in the project area.
Gila chub (*Gila intermedia*)	E	Pools, springs, cienegas, and streams.	Unlikely to occur. There are no springs or other suitable water sources in the project area.

Species	Federal Status	Habitat	Determination of Presence of Suitable Habitat in Project Area
Gila topminnow (*Poeciliopsis occidentalis occidentalis*)	E	Small streams, springs, and cienegas vegetated shallows.	Unlikely to occur. There are no springs or other suitable water sources in the project area.
AMPHIBIANS and REPTILES			
Chiricahua leopard frog (*Lithobates chiricahuensis*)	T	Restricted to springs, livestock tanks, and streams in upper portion of watersheds that are free from nonnative predators or where marginal habitat for nonnative predators exists.	Unlikely to occur. There are no springs or other reliable water sources free from nonnative predators.
Northern Mexican Gartersnake (*Thamnophis eques megalops*)	T	Cienegas, stock tanks, large-river riparian woodlands and forests, streamside gallery forests.	Unlikely to occur. There are no springs or large-river riparian woodlands and adjacent areas have been heavily disturbed or developed. The last record on the Santa Cruz River near the project area was in 1912.
Sonoyta mud turtle (*Kinosternon sonoriense longifemorale*)	C	Ponds and streams.	Unlikely to occur. They depend on permanent water and the nearest population is in Organ Pipe Cactus National Monument.
PLANTS			
Acuna cactus (*Echinomastus erectocentrus var. acunensis*)	E	Well drained knolls and gravel ridges in Sonoran desertscrub.	Unlikely to occur. Primarily found associated with palo-verdes and saguros on slopes up to 30%.
Huachuca water Umbel (*Lilaeopsis schaffneriana ssp. recurva*)	E	Cienegas, perennial low gradient streams, wetlands.	Unlikely to occur. No springs are found within or near the project area
Kearney's blue star (*Amsonia kearneyana*)	E	West-facing drainages in the Baboquivari Mountains.	Unlikely to occur. Found in the Baboquivari Mountains on the Tohono O'odam Nation.
Nichol Turk's head cactus (*Echinocactus horizonthalonius var. nicholii*)	E	Unshaded microsites in Sonoran desertscrub on dissected alluvial fans at the foot of limestone mountains and on inclined terraces and saddles on limestone mountain sides.	Unlikely to occur. Historically found along the Vekol and Waterman Mountains.
Pima pineapple Cactus (*Coryphantha scheeri var. robustispina*)	E	Sonoran desertscrub or semi-desert grassland communities.	Unlikely to occur. Mostly found on flat ridgetops and areas with less than 10-15% slope. Hilly areas, drainages, and riparian areas are considered unsuitable habitat.

Species	Federal Status	Habitat	Determination of Presence of Suitable Habitat in Project Area
Gooddings onion (*Allium gooddingii*)	CA	Shaded sites on north trending drainages, on slopes, or in narrow canyons, within mixed conifer and spruce fir forests.	Unlikely to occur. The project area is not found within or near a conifer and spruce-fir zone.
INVERTEBRATES			
San Xavier Talussnail (*Sonorella eremita*)	CA	Inhabits a deep, northwest facing limestone rockslide.	Unlikely to be occur. Known to only be found on a single hill called Mineral Hills in Pima County.
CRITICAL HABITAT			
Southwestern willow flycatcher	E		No critical habitat for the SWFL is found within the action area. Critical habitat is found further south on the Santa Cruz River in Santa Cruz County.
Yellow-billed Cuckoo	T		No critical habitat has been designated. The closest proposed critical habitat on the Santa Cruz River is approximately 51 miles south in Santa Cruz County.

CA: Conservation Agreement. To implement the means for protection and long-term viability through a proactive conservation program.
C: Candidate. Plant and animal taxa considered for possible addition to the List of Endangered and Threatened Species. These are taxa for which the Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions.
E: Endangered. Any species which is in danger of extinction throughout all or a significant portion of its range.
T: Threatened. Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

3.5.2 Yellow-billed Cuckoo (YBC) Current Conditions

The YBC was listed as Threatened on October 3, 2014 (79 FR 59991) by the U.S. Fish and Wildlife Service. It is a medium-sized bird about 30 cm in length, and weighing about 60 grams. It has a slender, long-tailed profile, with a fairly stout and slightly down-curved bill, which is blue-black with yellow on the basal half of the lower mandible (FWS 2001). Plumage is grayish-brown above and white below, with rufous primary flight feathers. The tail feathers are boldly patterned with black and white below. The legs are short and bluish-gray, and adults have a narrow, yellow eye-ring. Juveniles resemble adults, except the tail patterning is less distinct, and the lower bill may have little or no yellow. Males and females differ slightly, as males tend to have a slightly larger bill (FWS 2001).

They are riparian obligates that nest primarily in willows and prefer to forage in cottonwoods but also utilize stands of saltcedar. Along the lower Colorado River and the Bill Williams River, cuckoos preferred habitat patches in excess of 120-m in width and 10-ha in area with dense understory foliage and high humidity (Gaines and Laymon 1984). In Arizona cuckoos are generally found along lowland drainages that support a combination of cottonwood, willow, velvet ash, Arizona walnut, mesquite, and saltcedar that form multi-structured woodlands (Corman 2005).

Their historic range extended from southern British Columbia to the Rio Grande River in northern Mexico, and east to the Rocky Mountains. They migrate north in late June and early July after wintering in South America from Venezuela to Argentina. Like other riparian obligate species, their range has severely been reduced during the past 80 years, and is extirpated from British Columbia, Washington, Oregon, and possibly Nevada (Reclamation 2008).

Current threats to the cuckoo are the continued loss, degradation, and fragmentation of riparian habitat in the western United States (FWS 2001). It is estimated that 90-95% of riparian habitat in Arizona has been lost, 90% in New Mexico, 90-99% in California, and more than 70% nationwide (FWS 2001). Individuals were recorded in 2002, 2007, 2010, and 2011 at distances of 5.5 and 8 miles north of the project area and 4.0, 4.3, and 13.3 miles south, but riparian vegetation at those locations and nearby do not meet the minimum criteria for suitable breeding habitat. Records indicate they were likely migrating through the area (Sabra Tonn, Arizona Game and Fish Department [AGFD], pers. comm. 2014; and Susan Sferra, U.S. Fish and Wildlife Service [FWS], pers. comm. 2015).

3.5.3 Yellow-billed Cuckoo - Environmental Consequences and Cumulative Effects

The YBC is known to have utilized two locations within the action area as migratory stop over habitat. The proposed project which would divert up to 7,000 AFA of effluent would cause the loss of 74.9 acres of riparian habitat along a distance of approximately 5.04 miles. While dead trees along that stretch of the river would remain in place for a number of years, they would still provide migratory habitat for YBCs and other species, but it would be poor quality habitat until succession by upland vegetation occurs. Until that happens, YBCs migrating through the proposed project area would either use the area briefly or avoid it altogether.

The action area is not found within proposed critical habitat, and therefore will not adversely affect any proposed critical habitat. Construction activities associated with the project will be located away from the river and will not result in any physical harm to YBCs. Therefore, Reclamation has determined that the proposed project may affect, but will not likely adversely affect the YBC. A Biological Assessment (BA) was submitted to the USFWS to request concurrence with this determination. The BA is currently being analyzed and results of the consultation are expected to be available before the analysis is complete. Reclamation would be responsible for any specific mitigation if it is determined that the proposed project would adversely affect the YBC. Since the area is

not included as proposed critical habitat, Reclamation expects USFWS to concur with the determination that the action would not likely adversely affect the species.

3.5.4 Southwestern Willow Flycatcher – Current Conditions

The southwestern subspecies of the willow flycatcher (SWFL) was listed as endangered, effective March 29, 1995 (60 FR 10694). Critical Habitat designation was made on July 22, 1997 (62 FR 39129), with a correction on August 20, 1997 (62 FR 44228). On May 11, 2001, the 10th Circuit Court of Appeals set aside designated Critical Habitat. In 2003, the 10th Circuit Court ruled that USFWS must re-propose critical habitat within a year and complete a final designation by September 30, 2005 (Memorandum Opinion, U.S. District Court, New Mexico, September 2003). Critical Habitat was re-proposed on October 12, 2004 (69 FR 60706), with comments due by May 31, 2005. Critical habitat was designated on October 19, 2005 (70 FR 60886). There is no critical habitat in the project area.

The SWFL is a neotropical migrant that breeds in the southwestern United States and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948; Stiles and Skutch 1989; Ridgely and Tudor 1994; Howell and Webb 1995). Declines in the distribution and abundance of flycatchers in the Southwest are attributed to habitat loss and modification caused by impacts of dams and reservoirs, stream diversions and groundwater pumping, channelization and bank stabilization, riparian vegetation control, livestock grazing, agricultural development, urbanization, and recreation (USFWS 2002).

In Arizona, the historical range of the willow flycatcher included all major watersheds. Recent surveys have documented SWFLs along the Big Sandy, Bill Williams, Colorado, Gila, Hassayampa, Little Colorado, Salt, San Francisco, San Pedro, Santa Cruz, Santa Maria, Tonto Creek, and Verde River systems (FWS 2002).

The SWFL breeds in riparian habitats along rivers, streams, or other wetlands, where patchy to dense trees and shrubs are established, usually near or adjacent to surface water or saturated soil (USFWS 2002). Plant species composition and height vary across the geographical range of this species, but occupied habitat usually consists of a mosaic of dense patches of vegetation, often interspersed with small openings, open water, or shorter/sparser vegetation. Dense vegetation usually occurs within the first 10 to 13 feet above ground. Willow flycatchers can occupy habitat within 3 to 5 years of a flood event (Paradzick and Woodward 2003). Periodic flooding and habitat regeneration are important to the recovery of this species.

In Arizona, SWFLs now nest predominantly in saltcedar. Saltcedar-dominated stands mimic the riparian woodlands structure of willow in many areas where willow has declined (FWS 2002). Ninety percent of SWFL nests found between 1993 and 2000 in Arizona were in saltcedar (Paradzick and Woodward 2003). Of 462 willow flycatcher nests monitored in Arizona in 2004, 298 were in saltcedar, 129 were in Goodding willow, 24 were in Fremont cottonwood, and the remaining nests were in other tree species (Munzer et al. 2005).

3.5.5 Southwestern Willow Flycatcher – Environmental Consequences and Cumulative Effects

There have been no detections of SWFLs on the Santa Cruz River near the project area. The closest known breeding population is 37-miles away on the San Pedro River (Sabra Tonn, Arizona Game and Fish Department [AGFD], pers. comm. 2014). While riparian vegetation on the river does not provide ideal conditions, it is considered good migratory habitat for SWFLs. When the existing riparian vegetation dies it will end up becoming poor quality habitat, but still usable for migrating individuals. Eventual succession by upland vegetation will be slow but it will provide migratory habitat of a reasonable quality.

Construction activities will not occur near the river channel or any riparian habitat. The action area is not within critical habitat and there will be no adverse affect or potential for physical harm to SWFLs. Therefore, Reclamation has determined that the proposed project may affect, but will not likely adversely affect the SWFL. The SWFL was included in the consultation with the USFWS and a response is expected by final publication of this EA. Cumulative effects could include the ADOT/FHA I-10 widening project as well as the Tucson Water projects and general housing in the action area.

3.5.6 No Action Alternative

Under the No Action Alternative, the beneficial effects of effluent discharge into the Santa Cruz River would continue. There would not be a reduction in effluent discharged into the Santa Cruz River that would result is the decline and degradation of riparian habitat.

3.7 Land Use and Soils

3.7.1 Land use Current Conditions

The Santa Cruz River has perennial and intermittent stream flow for more than 22 miles through 3,500 acres of hydro-mesoriparian habitat, a deciduous riparian forest, and a mesquite bosque. The project area is effluent dominated, receiving discharges from both the Agua Nueva WRF and the Tres Rios WRF.

The river is associated with a wide variety of land uses which include grazing, mining, urbanization, and groundwater pumping (Weedman, 1996). Land uses around the Santa Cruz River from Avra Valley Road to Trico Road include a major transportation corridor, Interstate 10 and the railroad, an active and a closed landfill, industrial area and agriculture. In addition, a number of facilities, both upstream and downstream from Tucson, have NPDES permits allowing discharges into the Santa Cruz River (Pima Assoc of Governments, 2002).

Much of the Santa Cruz River is also channelized and bank protected, and is crossed by numerous bridges. Future plans for this resource should take into consideration that other

demands for this water, such as increased reuse, may decrease the amount available for additional proposed uses (Pima Assc. Of Governments, 2002).

3.7.2 Land Use Environmental Consequences and Cumulative Effects

The Proposed Action will capture water from the water reclamation facility in order to deliver it to a GSF to be used on existing agricultural fields in lieu of groundwater. The land use associated with the property will not change. The Proposed Action would not change current land use, but could have a positive impact on the groundwater sustainability by using reclaimed water instead of pumping groundwater for watering crops.

3.7.3 Land Use No Action Alternative

If the No Action Alternative is chosen there would be no change in land use. Groundwater pumping in the area would not be offset. Subsequent impacts as a result of the No Action Alternative could lower ground water levels to an unattainable depth, and could also increase subsidence in the area.

3.7.4 Soils Current Conditions

The Tucson basin is a broad alluvial valley bounded by mountain ranges. Regional topography is dominated by basin-margin mountains and alluvial fans which have developed along their boundaries. The higher alluvium areas grade gradually into flat lands as they near the center of the basin. The Project lies in proximity of the Santa Cruz River, which lies east of the Tucson Mountains at the base of an adjoining alluvial fan, and continues northwesterly along the center of the basin.

The term soil is used to describe material on the 'thin skin of the Earth's crust and that has been under the influence of certain physical and biological processes" (Hindricks, 1985). Soils have four main constituents: "mineral and organic matter, air and water" (Hindricks, 1985).

In his book, *Arizona Soils*, Hindricks discusses soil classifications, and indicates that the United States Department of Agriculture Soil Conservation Service developed soil surveys between 1951 and 1975. This classification system is now used universally across the United States because "expanding soil survey programs demanded more precise definitions of soil properties than were possible with previous soil classification systems" (Hindricks, 1985). Since the time of the first soil surveys, the National Conservation Resource Service (NRCS) has expanded and provided much more detail and a publically accessible web soil survey database. This EA used the online web soil survey to classify and evaluate soils. The Geographical Information Systems (GIS) database can be found:

http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

The Custom Soil Resource Report for the Tucson-Avra Valley Area, Arizona Proposed Construction Site can be found in its entirety in the administrative record and is available

upon request. Soil surveys are made to provide information about the soils in specific areas to aid in the planning of projects in the area. Soil scientists conducted the reviews and observed steepness, length and shape of slopes, patterns of drainages; the kinds of crops and native plants and the types of bedrock. The proposed project construction site delineated three separate soil types. Brazito sandy loam (Bt) makes up 1.2% of the area, Comoro sandy loam (Cm) makes up 3.3% of the project area, and Grabe loam (Gh) accounts for 95.4% of the construction area. Grabe loam, is by far the dominant soil found in the proposed project construction area. This soil is typically found on flood plains, is moderately alkaline, well drained and considered by be good farmland if irrigated and either protected from flooding or not frequently flooded during the grown season. A map of the soil types is below in figures 3.3.

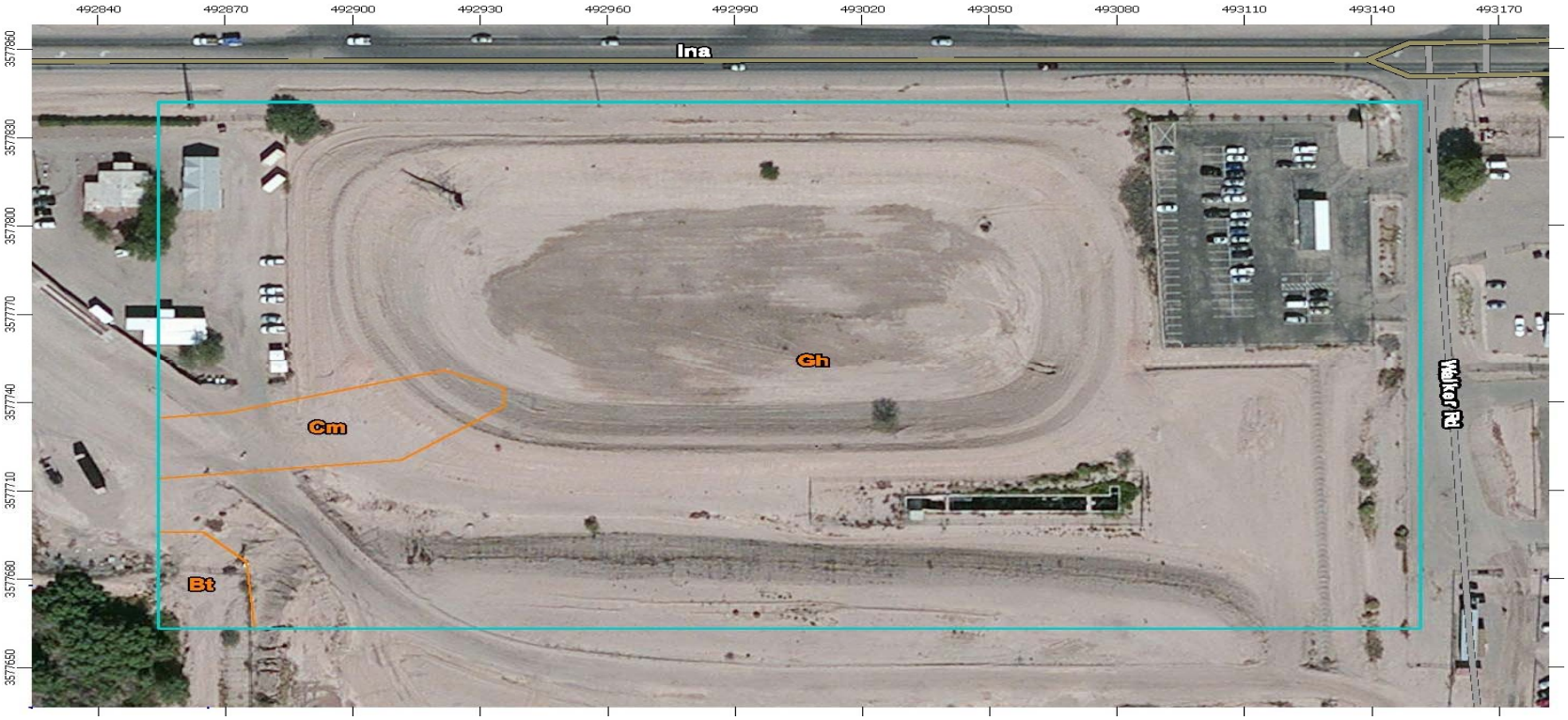
3.7.5 Soils Environmental Consequences and Cumulative Effects

The construction of the pipeline would be above ground; therefore little removal of soil is expected. It is anticipated that some grading or smoothing of areas and the built up of others to ensure proper flow of the water through the above ground pipeline would be necessary, but these effects would be temporary and short term. A Storm Water Pollution Prevention Plan under the Arizona General Construction Permit would not be required. Therefore, no significant environmental impacts to soil are expected as a result of the proposed action. The effluent would be piped through existing facilities all the way to the GSF, and no other soil disturbance is expected. However, the ADOT/FHA project currently plans to place two underground force main sewer lines within feet of Reclamation's proposed project. The action should not impact the quality of the soil, unless borrow or asphalt material is brought in to over the proposed pipelines. It is expected that the project will slightly grade parts of the project area, but not remove any soil, and the underground portion of the pipeline will be backfilled with the existing soil. It is currently unknown if ADOT/FHA intends to bring soil from outside the area into the project area. Soil disturbance in the project area would continue to occur from the WRF operations, ADOT construction, Pima County maintenance activity for the site.

3.7.6 Soils No Action Alternative

Under the no action alternative, no soil would be disturbed, and therefore there would be no impacts to soils.

Figure 3.3 - Map of Project Area (NRCS 2014)



Map Unit	Map Unit	Acres in AOI	Percent of AOI
Bt	Brazito sandy loam	0.2	1.2%
Cm	Comoro sandy loam	0.4	3.3%
Gh	Grabe loam	12.6	95.4%
Totals for Area of Interest		**13.2**	**100.0%**

3.8 Water Resources

The Santa Cruz River is located in southern Arizona and northern Mexico within the Basin and Range Province. Its headwaters originate in the San Rafael Valley between the Coronado National Forest's Canelo Hills to the north, the Patagonia Mountains to the west and the Huachuca Mountains to the east. The Santa Cruz River flows south for approximately 14 miles to the Mexico border near Lochiel, Arizona. After entering Mexico the river continues south, but then turns 180 degrees to the north, and re-enters the United States 5 miles east of Nogales. The river continues on a northerly route to its confluence with the Gila River, just northwest of Maricopa, Arizona (AZDEQ/EPA, 2014).

Historically, portions of the Santa Cruz River flowed perennially or year round. Agricultural surface water diversions, associated erosion, and groundwater pumping ultimately dried up the SCR in the Tucson region making it an ephemeral stream, flowing in response to storm events. In the Tucson region, ADEQ designates the SCR as an effluent dependent river. SCR surface water flows and habitat are heavily dependent on treated effluent discharges from the Agua Nueva and the Tres Rios WRFs. Wastewater treatment is regulated by ADEQ and treated effluent must meet established standards prior to discharge to the river.

The U.S. Geological Survey (USGS) maintains two stream gages that measure flow on the SCR in the vicinity of the proposed project. The USGS 09486500 SCR at Cortaro, Arizona stream gage is located upstream from the ERDP and the USGS 09486520 SCR at Trico Road, near Marana, Arizona stream gage is located downstream. Over the past 10 years, annual average SCR stream flows at the Cortaro gage ranged from 74 cfs to 139 cfs. SCR flow is dependent on treated effluent releases from the wastewater reclamation facilities and flow rates fluctuate diurnally based on regional water use.

3.8.1 Water Quality Current Conditions

The Clean Water Act (P.L. 92-500) passed in 1970 established the basic structure for regulating discharges of pollutants into the Nation's rivers, lakes, estuaries, and coastal waters. Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers regulates the discharge of dredged and/or fill material into waters of the U.S. including wetlands.

There will be no discharges and the storage of the water will use existing infrastructure. Therefore the Clean Water Act and compliance under section 404 are not anticipated to be affected.

The surface of saturated sediments can accumulate and promote the growth of microorganisms such as algae and bacteria (Case 2012). Their buildup can result in the accumulation of cell biomass, extracellular polysaccharides (biofilms), and metabolic waste products that reduce permeability of the surface layer. Biofilms develop when bacteria and other microorganisms attach to the surface by building an extracellular polysaccharide matrix, which can form continuous impenetrable layers and/or fill interstitial spaces within sediment (Baveye and Valocchi 1989; Case 2012). Their growth, composition, and activity are influenced by environmental factors such as dissolved oxygen, organic carbon, nutrients, and ions (Storey et al. 1999).

A study by Case (2012) found that reaches of the Santa Cruz River with low nutrient concentrations were shown to have conductivity that was 1.4-3.1 times higher than reaches with elevated concentrations, and that infiltration rates increased further away from treatment plants. Observations attributed the clogging to microbial/biofilm growth, physiochemical properties, and accumulation of fine sediments in interstitial spaces. The strongest correlation to clogging was percent fine sediment, but improved water quality would also help infiltration (Case 2012).

Under ordinary conditions, flows along the Santa Cruz River near Tucson have been approximately 40-km long, but only 6-km long following storm events (Lacher 1996). The sudden infiltration following storm events is likely a result of high velocity and turbid flows that scour the surface and disrupt clogged sediments. Scouring of the surface and drought helps improve infiltration but clogging can quickly resume once normal effluent flows return (Eisenmann et al. 1999). An impact believed to be related to clogging along the river was a multi-species tree die-off in 2005 (Case 2012). While little is known about the die-off, the lack of infiltration during the hot summer months along with drought may have deprived the trees of much needed water.

Poor water quality and reduced infiltration is what led to the establishment of over 20 miles of discontinuous riparian habitat. Since water quality improved, there has been a die off from the USGS gauge at Trico Road to the current flow end point found northwest of North Sanders Road. While water quality has improved, there will continue to be events where infiltration is reduced and surface flows travel further downstream, but those events will likely be much shorter and more infrequent. Improved infiltration where surface water is present may help offset habitat losses further downstream by stimulating growth of new riparian vegetation where it is marginally present or absent.

3.8.2 Water Quality Environmental Consequences and Cumulative Effects

The Arizona Department of Water Resources (ADWR) encourages the use of renewable water supplies, particularly Arizona's entitlement to Colorado River water, instead of groundwater through a flexible and effective regulatory program for the underground storage, savings and replenishment of water. Using renewable supplies helps reduce groundwater pumping which has significantly depleted some aquifers. The recharge program restricts the type of direct reuse of reclaimed water based on its class. Class A reclaimed water can have a direct reuse for various practices such as irrigating food crops, recreational impoundments, and fire protection systems. Class B reclaimed water can be used for surface irrigation on an orchard or vineyard, golf course irrigation, and dust control. Pima County has applied for a Class A reclaimed water permit, which is being reviewed at the time of this publication. If the Arizona Department of Environmental Quality permit is obtained prior to final publication the permit number will be annotated in the final Environmental Assessment. Pima County Tres Rios is actively pursuing a permit that will classify the effluent as A under Arizona state law. This will allow the water to be used on any crop, including food crops. The water could not be used on any food crop if the quality testing fails. The final permit is expected to be issued by the time this EA is ready for signature.

3.8.3 Water Quality - No Action Alternative

Under the No Action Alternative, there would be no impacts to water quality and the water would continue to discharge from the Tres Rios WRF to the Santa Cruz River.

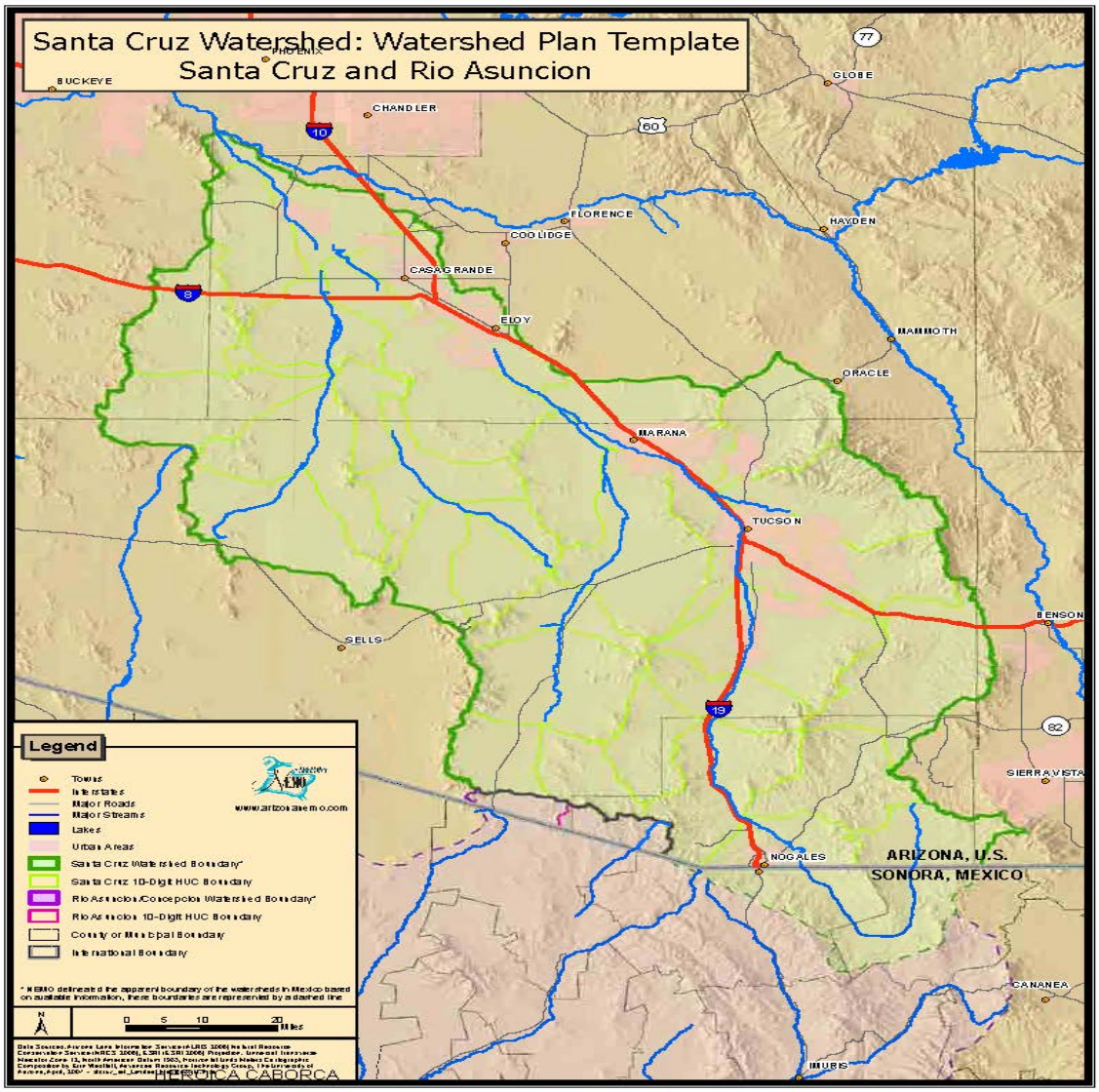


Figure 3.4 - Map of Santa Cruz Watershed

http://www.epa.gov/region9/water/watershed/pdf/map-santa-cruz.pdf

3.9 Hydrology Current Condition

This section characterizes the hydrology conditions of the lower Santa Cruz River. The information below is based primarily on a report titled "Water in the Tucson Area: Seeking Sustainability" prepared by the Water Resources Research Center (WRRC 1999) of the University of Arizona and several reports prepared by the Pima Association of

Governments for the Pima County Comprehensive Plan (Pima County 2014) and the Sonoran Desert Conservation Plan (Pima County 2001).

The Tucson Basin and the Santa Cruz River

Nearly all of the city of Tucson and its surrounding communities are located within the Tucson Basin. This broad valley is ringed by a number of mountain ranges that provide the origins for the numerous watercourses that transect the basin. Many of these rivers, creeks, and washes become tributaries that lead to the Santa Cruz River. Originating in Mexico and entering the state of Arizona approximately 65 miles south of downtown Tucson near the city of Nogales, the Santa Cruz River is one of the few rivers in the region that flows in generally a south to north direction. The water of the river has long served as a vital source of life for people, wildlife, and a robust riparian plant community. This green ribbon that traverses the Sonoran Desert has historically been the primary artery for sustaining life and economic development in the Tucson Basin. Located in the eastern portion of the Tucson Basin, Pantano Wash originates as Rincon Creek draining the Rincon Mountains. Tanque Verde Creek runs westward through the valley that separates the Rincon Mountains and the Santa Catalina Mountains. Pantano Wash and Tanque Verde Creek join near Craycroft Road to form the Rillito River, one of the largest tributaries of the Santa Cruz River. The Rillito River connects with the Santa Cruz River inside the study area, near Orange Grove Road. An additional waterway, the Canada del Oro Wash also joins the Santa Cruz River slightly further to the north. The Santa Cruz River, the Rillito River, and the Canada del Oro Wash combine to drain a majority of the flows within the Tucson Basin.

The Santa Cruz River is now an ephemeral stream that flows mainly as a result of seasonal storm events. Occasionally, during years of heavy precipitation, some water in the Santa Cruz River can flow north to reach the Gila River west of Phoenix, then continue to the Colorado River and the Gulf of California. As the Santa Cruz River flows past the study area to north, the channel gradient diminishes somewhat, with the channel eventually becoming a series of braided and discontinuous channels. As a result, during most years, flood flows spread out and deposit sediments before reaching the Gila River. Two water treatment facilities are located on the Santa Cruz River within the study area, the Agua Neuvo WRF and the Tres Rios WRF. The Agua Nueva WRF was established in 1951 and serves the urban Tucson area that lies southerly of the Rillito Creek. The Tres Rios WRF was established in 1977 and serves the northern parts of the Tucson metropolitan area, Oro Valley, and a major portion of the Town of Marana. Effluent released from the facilities provides a perennial source of flow in a portion of the Santa Cruz River.

Effluent Conditions and Losses

Infiltration rates for 2012 and 2014 were determined as a function of reach length in miles to be approximately 4.0 af/mile/day (ACE 2010), while evaporation was estimated by multiplying the average annual evaporation rate of 6.3 feet/year by the open water surface area (Galyean 1996). Consumptive use was based on the area of existing

cottonwood-willow and riverbottom wetland areas by consumptive rates of 8.0 feet/year and 6.0 feet/year respectively. Total infiltration rate for 2012 and 2014 was 25,500 af and 31,000 af at approximately 52% and 68% (Figure 3.5 and 3.6). The total infiltration rate for 2015 is estimated to be up around 89% at approximately 7af/mi/day.

In 2012 effluent discharges at the Agua Nueva and Tres Rios WRFs were approximately 24,500 AFA each (Pima County 2012). Both WRFs recently underwent upgrades and expansion to improve effluent quality while changing treatment capacity at Tres Rios to 50 million gallons a day (from 37.5 mgd) and to 32 mgd (from 41 mgd) at Agua Nueva. A plant interconnect pipeline was constructed between both facilities allowing transfer of effluent to Tres Rios where sufficient excess capacity exists. The plant interconnect will also be used to transfer raw sludge to Tres Rios for treatment.

Other entities evaluating the withdrawal of their effluent from the Santa Cruz River present a foreseeable impact to wildlife and their habitat. The extent of that impact depends on how much effluent they can reuse and what will be left in the river to maintain habitat. Currently Pima County and Tucson Water are evaluating the feasibility of diverting 6,000 AFA of effluent from the Agua Nueva WRF to an artificial recharge facility. Utilizing a recharge facility will allow them to continue their current management practices of using well pumping to meet peak demand while banking their water resources for future system needs. Effluent from the Agua Nueva WRF now only makes it to the Cortaro Road gage during January, February, and December with an approximate flow of 10.2 af/day. The remainder of the year the flow stops approximately 5.03 miles downstream from the Agua Nueva WRF, which is 0.56 miles upstream of the Ina Road Bridge. Future discharges from that water reclamation facility will continue to maintain the 5.03 miles of surface flow. Currently Pima County and Tucson water only plan to remove the 6,000 AFY of effluent when there is excess above that base flow, expecting to maintain the existing 35.9 acres of riparian habitat along that reach of the river (Figure 3.7). However, there is no agreement that guarantees the existing surface flow will be maintained within the river. Future conditions may change causing Pima County and Tucson Water to divert more effluent away from the river. If that would happen the quantity and quality of riparian habitat between the Agua Nueva WRF would decrease

The planned reuse of effluent would actually make some positive impact because it would replace groundwater pumping. Unfortunately, that small positive impact is outweighed by the inevitable loss of riparian habitat. While that reach of the Santa Cruz River functions as a non-natural perennial system, the discharge of effluent into the river for the past several decades has created hundreds of acres of quality riparian habitat. Resident and migratory wildlife that utilize those areas will either be forced elsewhere or they will eventually decline or disappear. Over time as the lack of water takes its toll, biotic conditions along the impacted areas would transition to an upland community as was seen at the non-effluent dependent Columbus Dry site (HEG 2013).

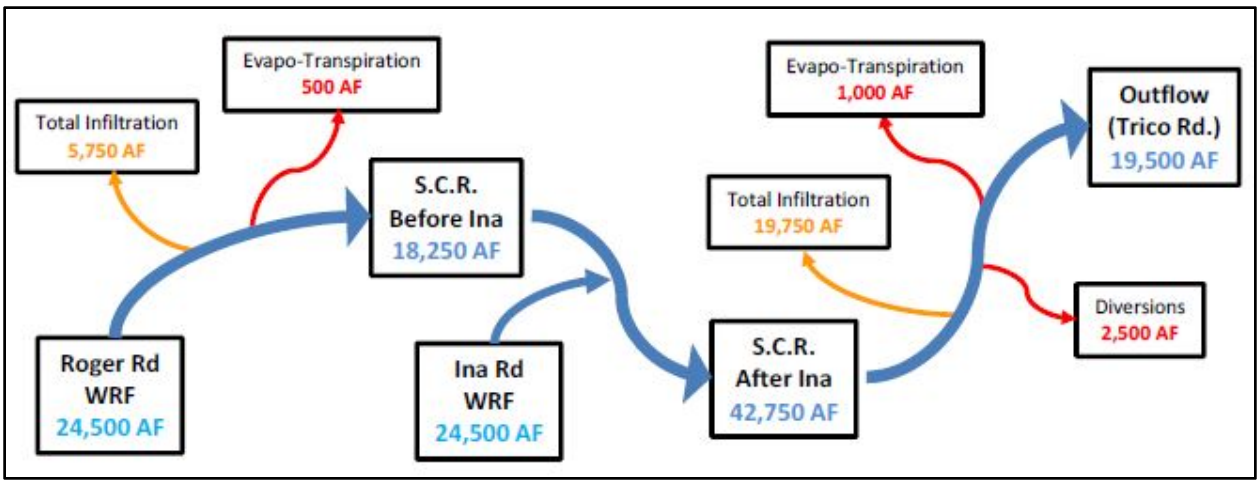


Figure 3.5 Flow conditions and losses along the lower Santa Cruz River in 2012

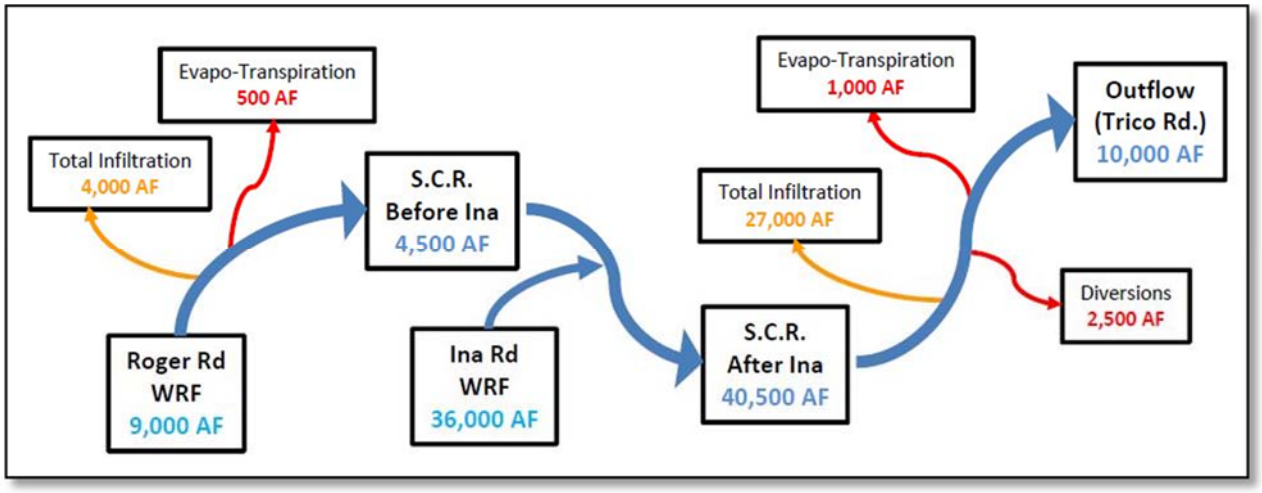


Figure 3.6 - Flow conditions and losses along the lower Santa Cruz River in 2014

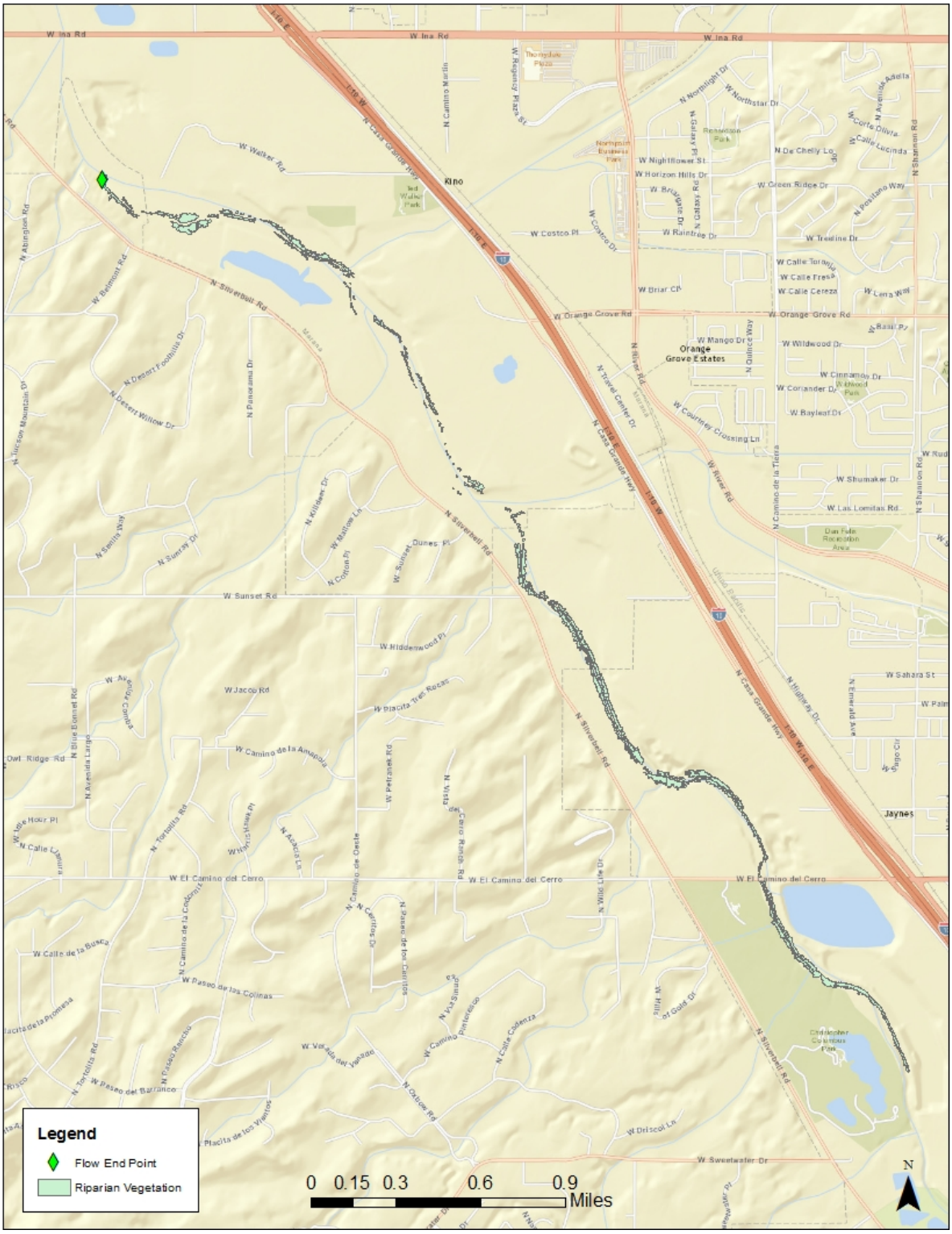


Figure 3.7 - Riparian vegetation recorded from the outlet of the Agua Nueva WRF to the surface flow end point.

Groundwater Aquifers

The Tucson Basin can be divided into four geologic units, the Pantano Formation, Tinaja Beds, Fort Lowell Formation, and recent surficial deposits. These four units are hydrologically connected to varying degrees and are the units that form the main aquifer in the Tucson Basin. Surficial deposits consist of clay, sand, and rock that have washed from the surrounding mountains and accumulated over the past several thousands of years. Groundwater is stored in the open spaces between the particles of sand and rock within these formations. The alluvial basin fill deposits contain the groundwater supply throughout the region. It is this groundwater aquifer that supplies the metropolitan and rural water needs in the area including domestic, industrial, and agricultural water demands.

Surficial alluvial deposits in the river along Ina Road consist of unconsolidated sand, sandy gravel, and gravel that generally reach a depth of less than 100 feet. In channel deposits serve as infiltration paths for storm water flows to recharge the deeper basin-fill units. Areas outside of the main river channel typically consist of over-bank flood deposits made of silty-clayey to gravelly sandy loams. These over-bank flood deposits generally range from 10 to 20 feet thick. Over-bank flood deposits adjacent to the river channel contribute little to the infiltration and recharge of the basin fill units. The hydraulic characteristics of these surficial alluvial deposits are important for any potential recharge and habitat restoration efforts. The Fort Lowell Formation consists of unconsolidated to moderately consolidated silty sands to clayey silts that are 300 to 400 feet thick throughout most of the basin. These deposits thin towards the margins of the basin. No outcrops of this formation are found within the study area. The Fort Lowell Formation is a highly permeable unit which supplies most of the groundwater used in the Santa Cruz River Basin. Well yields from this formation typically range from 500 to 1,500 gallons per minute. The Tinaja Beds form a major part of the aquifer in the Santa Cruz River Basin and range from sandstones and conglomerates to clayey siltstones and mudstones. At the edges of the basin the Tinaja Beds range from several hundred feet to at least 2,000 feet thick. In the center of the basin, the beds may be as much as 5,000 feet thick. Well yields from within this formation range from less than 100 gallons per minute in the finer-grained layers to over 600 gallons per minute from the more permeable coarse-grained layers.

The Pantano Formation consists of well- to poorly consolidated sandstones, conglomerates, silty sandstones, mudstones, and gypsiferous mudstones in the Santa Cruz River Basin. Because of the great depth to this formation in the center of the basin as well as relatively low well yields, the Pantano Formation is not widely used as a source of groundwater. Those wells that have been completed within the Pantano Formation typically yield several hundred gallons per minute. The distance from land surface to the water table is termed “depth to water.” The present depth to water in the Tucson area ranges from less than 50 feet to more than 700 feet. In certain parts of the Tucson Mountains, it is as much as 900 feet. Groundwater movement in the subbasin is from the mountain-front recharge areas towards the central axis of the valley, continuing on

towards the north and northwest, parallel to the Santa Cruz River flow channel. The flow rate is on average only about a few hundred feet per year, or a foot or two per day.

Since 1940, groundwater levels have declined more than 200 feet in portions of the Tucson Basin. Groundwater levels have declined over 150 feet in the southern Avra Valley, near the northern portion of the Tres Rios del Norte study area. Groundwater levels continue to decline at a rate of four to five feet per year in some portions of the basin. Water levels near Ina Road currently range from approximately 100 to 250 feet below the land surface, but are shallowest south of Avra Valley Road and deepest further north. Extensive groundwater pumpage for irrigation and municipal uses has caused long-term groundwater-level declines throughout much of the Santa Cruz River Basin. Recently, replacement of agricultural pumping with Central Arizona Project (CAP) water has resulted in water level rises north of Avra Valley Road. However, when compared to historic data, the water table has shown a net decline. These long-term water-level declines have resulted in aquifer compaction and associated land subsidence of up to 0.5 feet in the Santa Cruz River Basin.

3.9.2 Hydrology and Water Resources Environmental Consequences and Cumulative Effects

As mentioned previously, the Santa Cruz River is perennial at various reaches due to discharge of treated effluent from two treatment plants. The factors that have the greatest influence on flow within those reaches are the locations of wastewater reclamation facilities and their discharge, infiltration of effluent within the river, vegetation consumption use, and evapotranspiration.

3.9.3 Hydrology and Water Resources No Action Alternative

Under the No Action Alternative, the upgraded water quality would stay the same. However, there are other owners of effluent discharged from the Tres Rios WRF, and Reclamation could lose an opportunity to assist with meeting our firming obligations under the SAWRSA and AWSA.

3.10 Cultural Resources

The Natural Historic Preservation Act (NHPA) (P.L. 89-665) of 1966, as amended, establishes a program for the preservation of historic properties throughout the United States. It preserves our Nation’s historic heritage and cultural foundations. Section 106 of the NHPA stipulates that agencies must take into account the effect of any proposed Federal or federally assisted undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places.

3.10.1 Cultural Resources Current Conditions

Reclamation conducted a Class I literature review of to identify previous projects and recorded cultural resources within a half mile of the proposed project area (Jelinek 2015).

The literature review identified 57 archaeological projects and 27 archaeological sites within a half-mile of the proposed project. However, only one site was identified within the boundary of the project area, Las Capas (AZ AA:12:111[ASM]).

Las Capas is described as a prehistoric occupation site dating primarily to the San Pedro phase of the Early Agricultural period (ca. 1200-800 B.C.). The site consists of numerous pithouses, pits, hearths, canal segments, and activity areas. In addition, human remains have been recorded at the site. Las Capas has been determined eligible for inclusion in the National Register of Historic Places under Criterion D.

Las Capas was first recorded in 1979 as part of the Canada del Oro Sewer Project (1976-1.ASM) and has been rerecorded during survey a total of six times. Las Capas also has been subjected to six testing projects, three data recovery projects, and six monitoring projects. Most recently, the site was investigated intensely as part of Pima County's Ina Road Regional Wastewater Reclamation Facility Expansion and Upgrades Project (Vint and Nials 2015; Whitney et al. 2015). Between 2008 and 2009, and again between 2012 and 2013, Desert Archaeology conducted Phase I and Phase II data recovery as Las Capas (Vint and Nials 2015). Excavations across the site resulted in the identification of more than 5,500 features, of which 3,455 were excavated or tested, as well as the recovery of approximately 113,000 artifacts and 7,300 samples.

The proposed project area is situated partly within the western portion of Las Capas and skirts the boundary of Locus I, where the retention basin is located. In October 2009, Desert Archaeology excavated eight trenches within Locus I; however, only T303 and T306 yielded any cultural material. A pit (F25002) was identified on the eastern end of T303, with a biface nearby, while flaked stone was recovered in the western edge of the trench (Whitney et al. 2015). A second pit was identified in T306 (F25001).

Following completion of Phase I investigations at Locus I, and consultation with affiliated Tribes and the Arizona State Historic Preservation Office (SHPO), the Pima County archaeologist recommended archaeological monitoring for future excavations within the retention basin (Locus I). Locus I was not subjected to Phase II data recovery (Whitney et al. 2015).

3.10.2 Cultural Resources Environmental Consequences and Cumulative Effects

Because the project is taking place within the boundaries of a known archaeological site, Reclamation has determined that this project will have an adverse effect on historic properties. Given the scale of previous investigations at Las Capas, the limited amount of cultural deposits identified during Phase I investigations in Locus I (the retention basin), the recommendations of the Pima County archaeologist, and the previous concurrence of the Arizona SHPO, Reclamation recommended monitoring of all ground disturbing activities during the construction of the proposed pipeline.

Monitoring will be conducted following Arizona state guidelines and regulations. A project-specific permit from the Arizona State Museum will be obtained prior to construction, referencing Pima County's repository agreement, as any artifacts recovered during monitoring would be from County land. Given that ground disturbance will be limited, Reclamation does not anticipate that any subsurface deposits will be encountered. However, should cultural remains be identified during construction, ground disturbing activities will be halted until the monitor assesses the discovery and records it. The monitor will notify the Bureau of Reclamation, Pima County, and the Arizona State Museum of the discovery within 24 hours. In the event that the discovery is small, such as an artifact(s), a pit, or a hearth, the monitor shall excavate the discovery entirely and document the results so that construction may proceed. A monitoring report shall be provided to the Bureau of Reclamation, Arizona State Museum, Pima County, Arizona SHPO, and affiliated Tribes following completion of the project.

In the event that human remains are encountered, construction shall cease and Reclamation, Arizona State Museum, and Pima County will be notified so that cultural groups who claim cultural affinity to them can make appropriate arrangements for the disposition and reburial of the remains. The human remains will be removed from the site by a professional archaeologist pending consultation and review with the Arizona State Museum, Pima County, and affiliated groups.

Reclamation submitted a report to the Arizona SHPO with these findings and received concurrence on November 13, 2015. Pima County also agreed with these findings in November 16, 2015 letter. Additionally, Reclamation sent consultation letters regarding its recommendations to the following culturally affiliated Tribes: Ak-Chin Indian Community, Gila River Indian Community, Hopi Tribe, San Carlos Apache Tribe, Salt River Pima-Maricopa Indian Community, Tohono O'odham Nation, White Mountain Apache Tribe, and Pascua Yaqui Tribe. The Tohono O'odham Nation, the Hopi Tribe, and the White Mountain Apache Tribe provided responses and did not object to monitoring. Subsequent refinement of the project design expanded the area in which concrete pads would be placed and introduced the possibility of burying a portion of the pipeline partially within the already disturbed berm of the retention basin. Reclamation will submit a follow-up letter addressing these changes and requesting monitoring as a mitigation strategy to all consulting parties. Reclamation will not undertake any ground disturbing activities until the Arizona SHPO concurs with the changes.

3.10.3 Cultural Resources No Action Alternative

If the No Action Alternative is chosen as the best decision, Reclamation would not need to consult with the SHPO or the Tribes, because there would be no ground disturbance and the water would continue to be discharged into the river. No adverse impacts to cultural resources would occur under the No Action alternative.

4.0 List of Preparers

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Eve Halper, Planning Division, Department of the Interior, Bureau of Reclamation, Lower Colorado Region, Phoenix Area.

Frank (Eric) Holler (retired) Planning Division, Department of the Interior, Bureau of Reclamation, Lower Colorado Region, Phoenix Area Office.

Lauren Jelinek, Archaeologist, Environmental Division, Department of the Interior, Bureau of Reclamation, Lower Colorado Region, Phoenix Area Office

Jeff Riley, P.E. Supervisory Engineering Design, Department of the Interior, Bureau of Reclamation, Lower Colorado Region, Phoenix Area Office.

5.0 Agencies and Persons Consulted

5.1 Persons Consulted:

John McGlothlen, Environmental Protection Specialist, Bureau of Reclamation
Alexander Smith, Deputy Area Manager, Bureau of Reclamation
Lawrence Marquez, Arizona Water Settlement Act Manager, Bureau of Reclamation
Katherine Verburg, Department of the Interior Solicitor (retired)

5.2 Agencies Consulted:

An electronic copy of this Draft EA has been posted for public viewing and comment on reclamation's Phoenix Area Office website at www.usbr.gov/lc/phoenix. Emails of the Notice of Availability and EA were distributed to the following entities:

1. Arizona Department of Water Resources
2. Bureau of Indian Affairs
3. Central Arizona Water Conservation District
4. Arizona Game and Fish Department
5. U.S. Fish and Wildlife Service
6. City of Tucson
7. Metropolitan Domestic Water Improvement District
8. Cortaro-Marana Irrigation District
9. Pima County Regional Wastewater Reclamation Department
10. Tohono O'odham Nation

6.0 Reference List

40 CFR Part 1500-1508 Regulations for the Implementation of the National Environmental Policy Act. (2005). (Original Work Published 1970, amended 1986).

43 CFR Part 46 Department of the Interior Office of the Secretary. Implementation of the national Environmental Policy Act (NEPA) of 1969. (2008).

AGFD (Arizona Game and Fish Department). (2012). The Pima County Wildlife Connectivity Assessment: Report on Stakeholder Input.

Aquatic Consulting and Testing. (2013). Santa Cruz River Macroinvertebrate Study. Tempe, Arizona, USA.

Arizona Water Settlements Act, P.L. 108-451. (2004, December)

Audubon Organization Yellow-billed Cuckoo. (2014, September). Coccyzua americanus. http://birds.audubon.org/birds/yellow-billed-cuckoo

Baveye, P. and A. Valocchi, (1989). An evaluation of mathematical models of the transport of biologically reacting solutes in saturated soils and aquifers. Water Resources Research 25:413-1421.

Baveye, P., P. Vandevivere, B. Hoyle, P. DeLeo & D. de Lozada, (1998). Environmental impact and mechanisms of the biological clogging of saturated soils and aquifer materials. Critical Reviews in Environmental Science and Technology. 28:123-191.

Berry, T. 2014. Pima County Regional Wastewater Reclamation Department. Personal communication. (2014 September).

Bouwer, H. (2002). Artificial recharge of groundwater: hydrogeology and engineering. Hydrogeology Journal 10:121-142.

Brown, D.E. (1994). Biotic Communities, Southwestern United States and Northwestern Mexico. University of Utah Press.

Case, N. (2012). Environmental Controls on Clogging in Effluent-Dominated Waterways. MS Thesis, Arizona State University, Tucson, Arizona, USA.

Corman, T.E (2005). Yellow-billed cuckoo. In: Corman, T. E., and Wise-Gervais (editors), The Arizona Breeding Bird Atlas. University of New Mexico Press, Albuquerque, USA.

Debano, L.F., J.N. Rinne, and M.B. Baker, Jr. (2003). Management of natural resources in riparian corridors. Journal of the Arizona-Nevada Academy of Science. 35:58-70

Eisenmann, H., P. Burgherr & E. Meyer, (1999). Spatial and temporal heterogeneity of an epilithic streambed community in relation to the habitat templet. Canadian Journal of Fisheries and Aquatic Sciences 56:1452-1460.

Ffolliott, P.F., M.B. Baker, Jr., L.F. DeBano, and D.G. Neary. (2004). Introduction. In: Baker M.B. et al. (eds.), Riparian areas of the Southwestern United States: Hydrology, ecology and management. CRC Press. Boca Raton, FL. pp. 1-9.

Galyean, K. 1996. Infiltration of Wastewater Effluent in the Santa Cruz River Channel, Pima County, Arizona. Water-Resources Investigations Report 96-4021, U.S. Geological Survey, Tucson, Arizona.

Gebler, J., (1998). Water Quality of Selected Effluent-Dependent Stream Reaches in Southern Arizona as Indicated by Concentrations of Periphytic Chlorophyll and Aquatic-Invertebrate Communities. Water-Resources Investigations Report 98-4199, USGS.

Gaines, D. and Laymon, S.A. (1984). Decline, status and preservation of the yellow-billed cuckoo in California. Western Birds 15:49-80.

HEG (Harris Environmental Group). (2013). Lower Santa Cruz River Riparian Vegetation 2013 Survey Report. Tucson, Arizona, USA.

Hindricks, David M. (1985). Arizona Soils, College of Agriculture University of Arizona.

Jelinek, Lauren E. 2015.Cultural Resources Clearance for the Construction of a Temporary Project to Reuse Effluent for Tres Rios' Water Reclamation Facility at a Ground Water Savings Facility, Tucson, Pima County, Arizona. DI-BR-PXAO-ICRS-2015-029. Ms on file at Bureau of Reclamation, Phoenix Arizona Office, Glendale, Arizona.

Lacher, L, (1996). Recharge characteristics of an effluent dominated stream near Tucson, Arizona. Doctoral dissertation, Dept. of Hydrology and Water Resources, University of Arizona, Tucson, Arizona, U.S.A.

Novak Environmental, Inc.(2001). Regulated Riparian Habitat Mitigation Standards and Implementation Guidelines. Supplement to Title 16, Chapter 16.54 of the Watercourse and Riparian Habitat Protection and Mitigation requirements. Prepared for Pima County Department of Transportation and Flood Control District.

Pase, C.P. and E.F. Layser. (1977). Classification of riparian habitat in the southwest. In: R.R. Johnson and D.A. Jones (tech. coord.). Importance, Preservation and Management of Riparian Habitat: a Symposium. USDA Forest Service General Technical Report RM-43. Tucson, AZ. pp. 5-9.

Pima County Association of Governments. (2002, April). The Water Quality of Priority Streams in Pima County Prepared for the Pima County Comprehensive Plan and Sonoran Desert Conservation Plan. http://rfcd.pima.gov/reports/pdfs/wqpriority_streams.pdf

Pima County. (2001). Sonoran Desert Conservation Plan. Pima County, Arizona, USA.

Pima County. (2011). Protecting our land, water, and heritage: Pima County's voter-supported Conservation Efforts. Pima County, Arizona, USA.

Pima County. (2012). Effluent Generation and Utilization Report: Pima County Regional Wastewater Reclamation Department. Pima County, Arizona, USA.

Pima County. (2014). Pima County Comprehensive Plan. Pima County, Arizona, USA.

Sferra, S. (2015, October). Western yellow-billed cuckoo lead, U.S. Fish and Wildlife Service. Personal communication October.

Stromberg, J. (1993). Fremont Cottonwood-Goodding Willow Riparian Forests: A review of their ecology, threats, and recovery potential. Jornal of the Arizona-Nevada Academy of Science 27:97-110.

Storey R., R. Fulthorpe & D. Williams, (1999). Perspectives and predictions on the microbial ecology of the hyporheic zone. Freshwater Biology 41:119-130.

Tonn, S. (2014, July). Heritage Data Management System Program Supervisor, Arizona Game and Fish Department. Personal communication July.

United States. Army Corps of Engineers (ACOE).(2010, January). Tres Trios del Norte, Draft Feasibility Report, Ecosystem Restoration Feasibility Study. Los Angeles District.

United States Department of Agriculture (USDA). (2012). Field Guide for Managing Saltcedar in the Southwest. Southwestern Region, Albuquerque, New Mexico, USA.

United States Department of the Interior, Bureau of Reclamation Departmental Manual Part 516. (1998). Protection and Enhancement of Environmental Quality.

United .States Department of the Interior, Bureau of Reclamation NEPA Handbook. (2002, February).

United States Department of the Interior, Bureau of Reclamation. (2012, April). Enhanced Recharge Demonstration Project, Increaseing Treated Effluent Recharge Rates in the Santa Cruz River, Tuscon, Arizona.

United States Department of the Interior Bureau of Reclamation. (2008). Species Accounts for the Lower Colorado River Multi-Species Conservation Program. Available at: http://www.lcrmscp.gov/reports/2008/species_accounts_sep08.pdf

United Department of the Interior, United States Fish and Wildlife Service (USFWS). (2001). General Species Information. Yellow- Billed Cuckoo. Empidonax traillii extimus.

United States Geological Survey.(2015, March). Santa Cruz River at Trico Road, NR Marana, AZ. http://waterdata.usgs.gov/az/nwis/current?type=flow

Vint, James M. and Fred L. Nials (editors) (2015). The Anthropogenic Landscape of Las Capas, an Early Agricultural Irrigation Community in Southern Arizona. Anthropological Papers No. 50. Archaeology Southwest, Tucson, Arizona.

Weedman, D., (1996). Status Review of Gila Chub, *Gila intermedia,* in the United States and Mexico, Technical Report 91, Nongame and Endangered Wildlife Program, Arizona Game and Fish Department

Wharton, G., J. Cotton, R. Wotton, J. Bass, C. Heppell, M. Trimmer, I. Sanders & L. Warren, (2006). Macrophytes and suspension-feeding invertebrates modify flows and fine sediments in the Frome and Piddle catchments, Dorset (UK). Journal of Hydrology 330:171-184.

Whitney, Gregory J., Robert J. Sinensky, George L. Tinseth, Barry Price-Steinbrecher, and Jessica Smith (2015). Las Capas Archaeological Project: Field Methods, the Retention Basin, and Extramural Feature Descriptions. Technical Report No. 2014-01. Desert Archaeology, Tucson, Arizona.

WRRC (Water Resources Research Center). (1999). Water in the Tucson Area: Seeking Sustainability. University of Arizona Press, Tucson, Arizona, pp. 1-55.

Zaimes, G., M. Nichols, and D. Green. . Crimmins, M., D. Green, M. Nichols, and G. Zaimes (editors). (2007). Defining Arizona's Riparian Areas and 1-69.

Appendix A - Summary Environmental and Cultural Resources Laws, Rules, Regulations, and Instructions Considered

National Environmental Policy Act of 1969, as amended (NEPA) (P.L. 91-190)

This law requires Federal agencies to evaluate the potential consequences of major Federal actions. An action becomes "Federalized" when it is implemented by a Federal agency, wholly or partially funded with Federal monies, or requires authorization from a Federal agency. The intent of NEPA is to promote consideration of environmental impacts in the planning and decision-making processes prior to project implementation. NEPA also encourages full public disclosure of the proposed action, any action alternatives, potential environmental effects, and mitigation.

This EA is being made available for public review and comment. Based upon the assessment, Reclamation has made a preliminary determination that a Finding of No Significant Impact is appropriate. However, any public comments received during the public review comment period will be carefully considered before a final decision is made that an environmental impact statement is not warranted. This EA was prepared in accordance with NEPA requirements.

Fish and Wildlife Coordination Act (FWCA) (P.L. 85-624)

The FWCA provides a procedural framework for the consideration of fish and wildlife conservation measures in federal water resource development projects. Coordination with the Fish and Wildlife Service (FWS) is required on all federal water development projects. The effects of the CAP were originally addressed in an amended FWCA report prepared by the FWS in 1989. This proposed project results in no new water diversions or impoundments, nor does it result in development of or diversion of water into a water body. No further coordination pursuant to the FWCA is anticipated.

Endangered Species Act of 1973 (ESA) (P.L. 93-205)

The ESA provides protection for plants and animals that are currently in danger of extinction (endangered) and those that may become extinct in the foreseeable future (threatened). Section 7 of this law requires federal agencies to ensure that all federally associated activities do not have adverse impacts on the continued existence of threatened or endangered species or designated areas (critical habitat) that are important in conserving those species. Reclamation has concluded the Proposed Action would not affect any federally listed species and that a separate Biological Assessment does not need to be prepared.

The Migratory Bird Treaty Act (MBTA) of 1918, as amended

The MBTA implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. The MBTA prohibits the take, possession, import, export, transport, selling, or purchase of any migratory bird, their eggs, parts, or nests. No migratory bird species are anticipated to be affected adversely as part of this action.

Wild and Scenic Rivers Act of 1968 (P.L. 90-542)

This law designated the initial components of the National Wild and Scenic River System. It established procedures for including other rivers or reaches of rivers that possess outstanding scenic, recreational, geologic, fish-and-wildlife, historic, cultural, or other similar resources, and preserving these rivers in a free-flowing condition. The Act applies to waters designated, or eligible for designation, as wild and scenic. The Santa Cruz River is not designated as wild and scenic.

Wilderness Act of 1964 (P.L. 88-577, as amended)

This act established the National Wilderness Preservation System to be comprised of federally owned areas designated by Congress as "wilderness areas," to be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and provide for the protection of these areas and preserve the wilderness character. The project area contains no areas that are designated wilderness areas, or are eligible for designation.

Clean Water Act (CWA) (P.L. 92-500, as amended)

This law established the basic structure for regulating discharges of pollutants into the nation's rivers, lakes, estuaries, and coastal waters. Under Section 404 of the CWA, the U.S. Army Corps of Engineers (Corps) regulates the discharge of dredged and/or fill material into waters of the U.S. including wetlands. In addition, a Section 401 water quality certification and 402 Arizona Pollutant Discharge Elimination System permit are required for activities that discharge pollutants to waters of the U.S. The project will not discharge any effluent directly into a water of the U.S., therefore CWA 401 water quality certification and 402 or 404 permits are not required.. Further, there will be no changes to current ongoing agricultural activities which would be subject to compliance under the CWA.

National Historic Preservation Act of 1966, as amended (NHPA) (P.L. 89-665)

All areas to be served CAP water as a result of this proposed action already have been subjugated and have been subject to irrigation. The proposed action would not result in changes to existing land use; therefore no effect to cultural resources is expected to occur.

Farmland Protection Policy Act (P.L. 97-98)

This law requires identification of proposed actions that would adversely affect any lands classified as prime and unique farmlands and minimizes the unnecessary and irreversible conversion of farmland to nonagricultural uses. The U.S. Department of Agriculture's Natural Resources and Conservation Service administers this act. There will be no changes to current agricultural activities as a result of this proposed action; therefore, no effect to any lands classified as prime and unique farmlands are expected to occur.

Executive Order 11988 (Floodplain Management)

This Presidential directive encourages Federal agencies to avoid, where practicable alternatives exist, the short- and long-term adverse impacts associated with floodplain development. Federal agencies are required to reduce the risk of flood loss and minimize the impacts of floods on human safety, health and welfare; and restore and preserve the natural and beneficial values served by floodplains in carrying out agency responsibility. The proposed action would not affect floodplains or increase the risk of floods.

Executive Order 12898 (Environmental Justice) (EO 12898)

This executive order requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of Federal actions on minority and/or low-income populations. Low-income populations include communities or individuals living in proximity to one another and meeting the U.S. Census Bureau statistical thresholds for poverty. Minority populations are identified where the percentage of minorities in the affected area exceeds 50 percent, or where the minority population percentage of the affected area is meaningfully greater than the minority population's percentage of a much broader area. No adverse effects to low income or minority populations are expected as a result of the implementation of the proposed action.

Executive Order 11990 (Wetlands) (EO 11990)

EO 11990 requires federal agencies, in carrying out their land management responsibilities, to take action that would minimize the destruction, degradation of wetlands; and take action t o preserve and enhance the natural and beneficial values of wetlands. There are no wetlands in the project area that would be affected.

Department of Interior, Secretarial Order, Indian Trust Assets (ITAs)

ITAs are legal interests in assets held in trust by the U.S. government for Native American tribes or individuals. These assets can be real property or intangible rights and include water rights, hunting rights, money, lands, minerals, and other natural resources. The trust responsibility requires that all Federal agencies take actions reasonably necessary to protect ITAs. No ITAs are expected to be impacted by the proposed action.