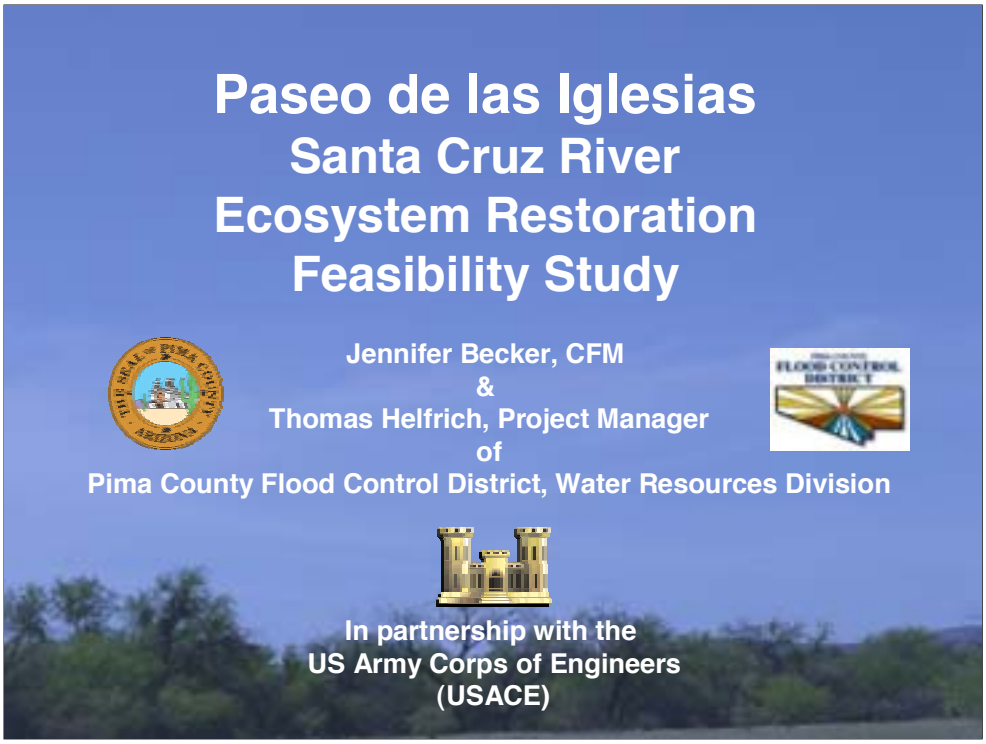

Good morning ladies and gentlemen. My name is Jennifer Becker. I'm a Program Coordinator with the Pima County Flood Control District, Water Resources Division and I will be presenting the results of the Paseo de las Iglesias Feasibility Study.

This study is a joint effort by the Pima County Flood Control District and the US Army Corps of Engineers to determine if the Federal Government can share the costs of restoring the ecosystem along the the Santa Cruz River in south-central Tucson.

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In additions to the FCD & USACE, other participating stakeholders include various departments in Pima County and City of Tucson government, Arizona Department of Game and Fish, US Fish and Wildlife, local colleges & universities, local Indian Nations, environmental organizations, consulting companies, and individual citizens and citizen groups.

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Today I would like to summarize the plan formulation process and present the findings of the study, including a description of the recommended plan to help to restore a functioning ecosystem.

This talk will include:

The study area description;

The problems addressed in this study;

Public involvement;

The study objectives and considerations;

Alternatives planning;

The recommended plan, and;

Where we go from here.

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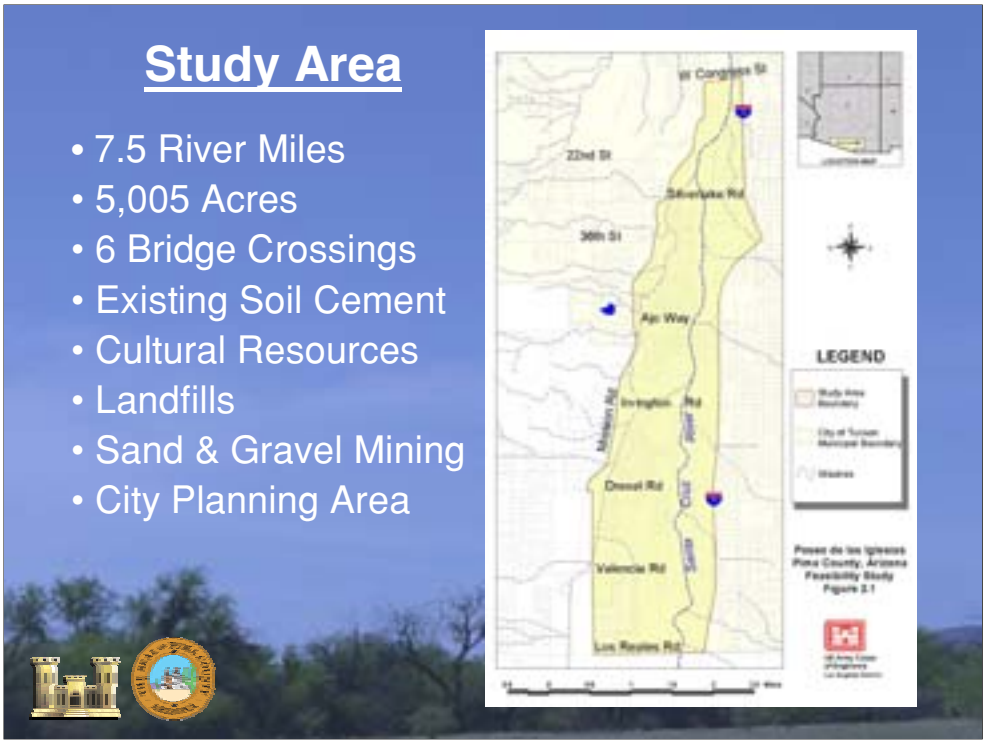

The study area is located on the Santa Cruz River and West Branch Santa Cruz River, mainly within the City of Tucson from West Congress Street upstream to Los Reales Road. It is 7.5 mile long, 5005 acres in area, and includes the tributary confluences along this reach.

This reach of the Santa Cruz River is characterized as an incised arroyo. The 100-year floodplain of the Santa Cruz River is narrow as it passes through the study area due to the effects of earlier channel straightening and down cutting by the river. Soil cement bank protection is discontinuous along the banks in the study area.

Although this is a developed urban area, the lands immediately adjacent to un-bank-protected reaches of the Santa Cruz River remain vacant due to required floodway setbacks and a predominance of ownership by public entities. In fact, over one-quarter of the study area is publicly owned. This condition offers an opportunity to accomplish important ecosystem restoration in the study area.

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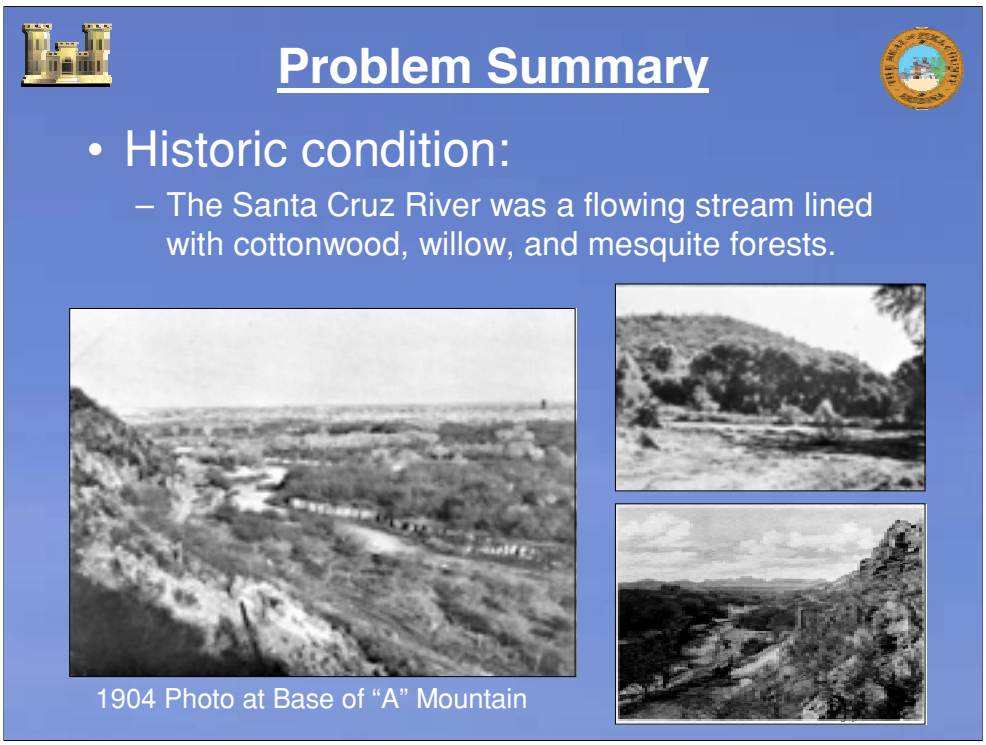

Historically this area was a lush oasis in the desert landscape.

- Water once flowed perennially in this reach of the river
- The river supported dense mesquite bosques, cottonwood-willow galleries, and cienega-marsh communities.
- Water nurtured habitat for local and migratory wildlife species, including, native fish, amphibians, birds, beaver, and others.
- The river and floodplain served as a lush wildlife corridor connecting the west slope of the Santa Rita Mountains to the Rillito River confluence and the Santa Catalinas, among other areas.

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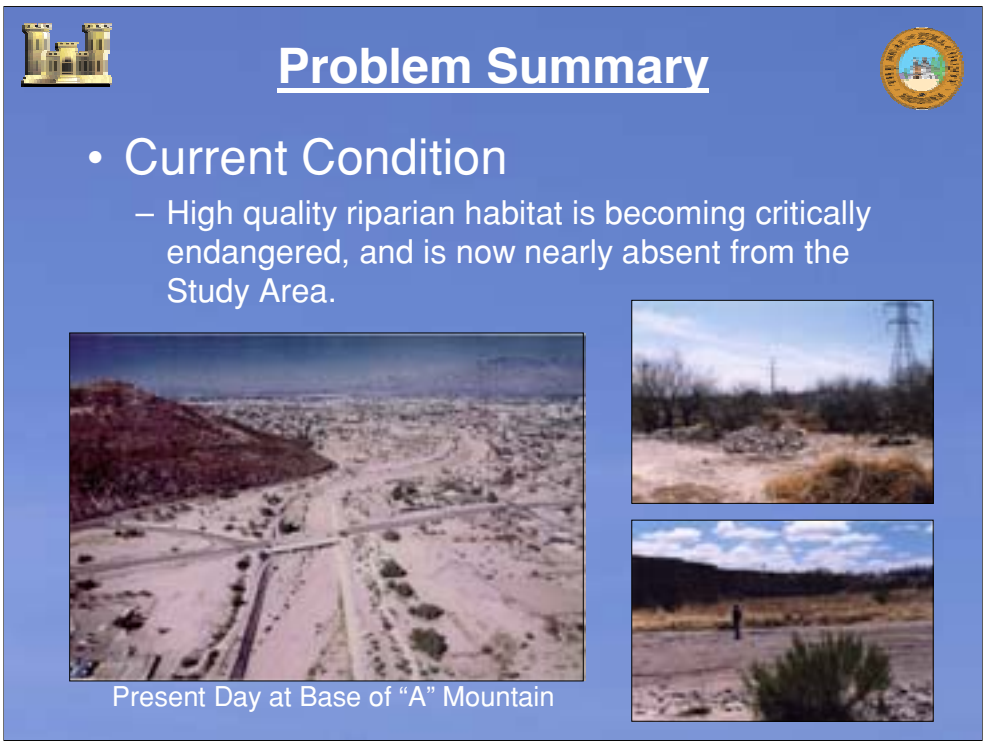

The area is now severely degraded from it's historic condition. It has suffered due to

Urban encroachment

Channel straightening

Surface water diversion

Groundwater overdraft

Unstable river banks

Loss of riparian habitat

Reductions in wildlife species diversity and number,

and the

Influx of several non-native species

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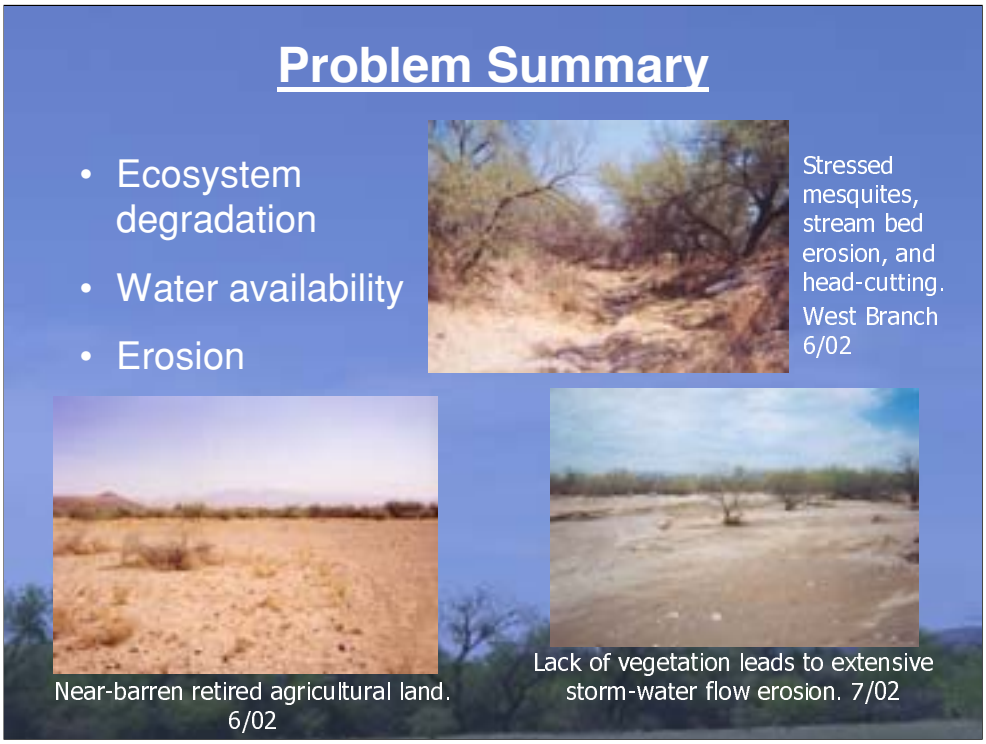

Here are some additional pictures illustrating the current conditions, showing stressed trees that no longer have access to the water table and some of the results of past agricultural uses and flood-induced topsoil erosion.

It is worth mentioning that the water table is 100-200'below the surface throughout the study area and the average rainfall is 10-12''.

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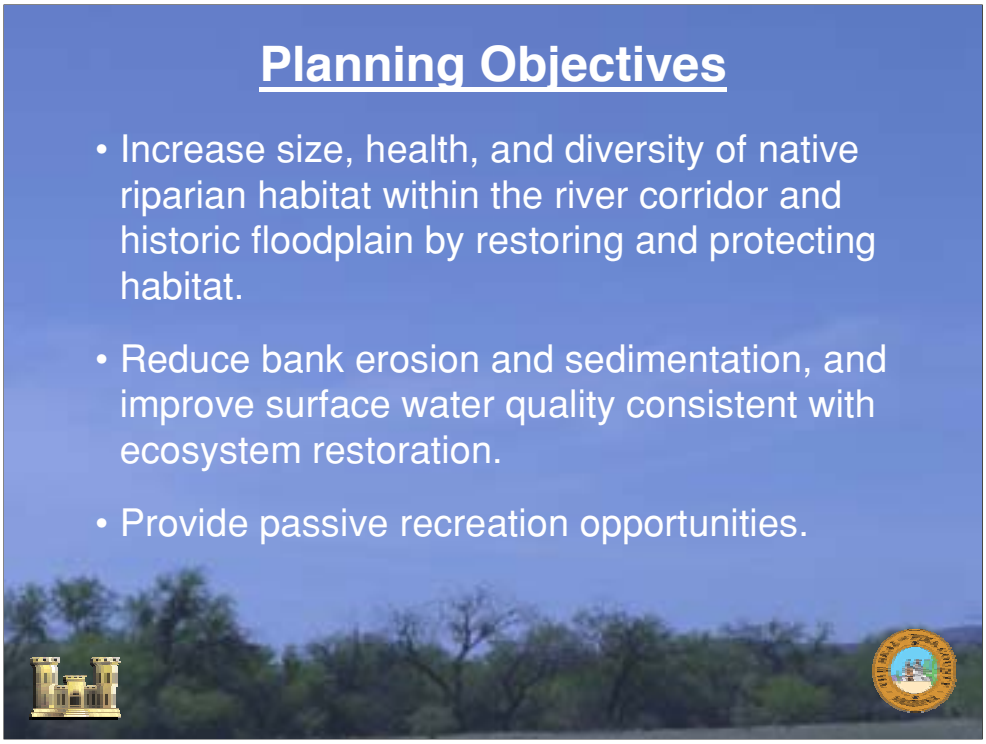
The Feasibility Study process began with a 2-day public meeting back in 2001. Since then there have been several workshops and public meetings to solicit input regarding restoration measures and desired outputs, and numerous stakeholders meeting to gather technical information and determine planning constraints.

Public concerns included loss of habitat & wildlife, water issues, invasive plants, stream bank erosion, other destructive influences, and inclusion of recreation elements in the final plan.



Planning objectives were developed. These objectives include:

•Increase size, health, and diversity of native riparian habitat within the river corridor and historic floodplain by restoring and protecting habitat.

•Reduce bank erosion and sedimentation, and improve surface water quality consistent with ecosystem restoration; and

•Provide passive recreation opportunities.

Other opportunities also exist, including:

•Controlling invasive species

•Protecting cultural resources; and

•Increasing neighborhood value & pride

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Important considerations for alternative development included:

•Land use and ownership
•Consistency with other local plans
•Proximity to known cultural and historical sites
•Maintain flood conveyance
•Vector control issues
•Availability of water, and
•Public acceptability

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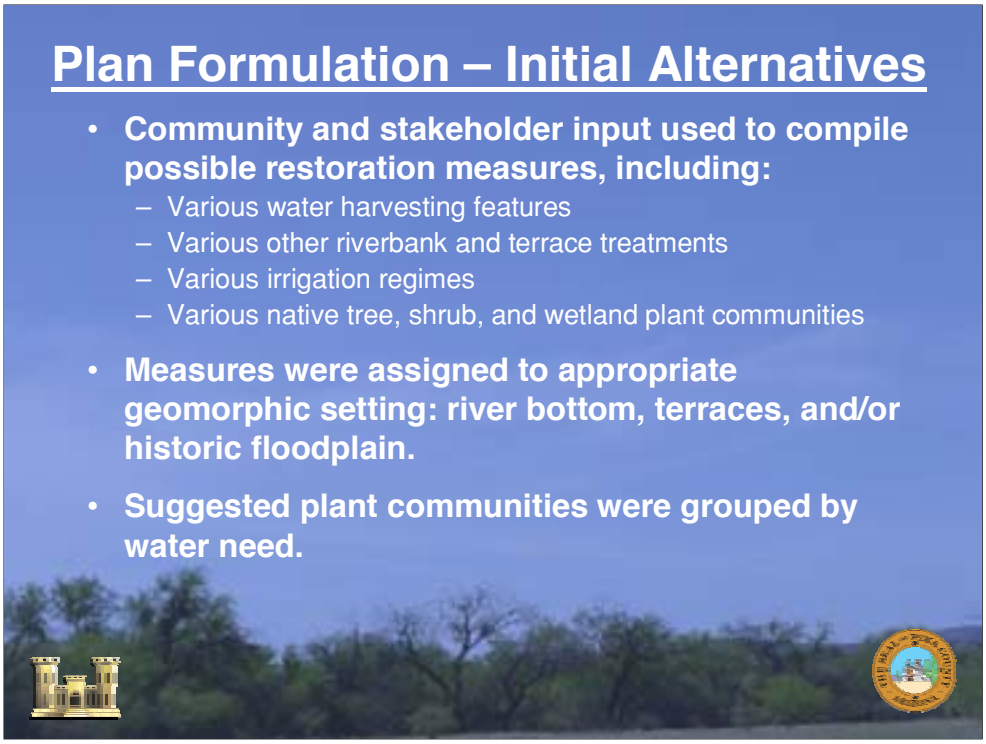

A variety of restoration measures were developed based, in part, on comments provided at the public forums. These include various methods of water harvesting, a number of different riverbank and terrace treatments, various options for irrigation, and different native tree, shrub, and wetland plant communities.

The restoration measures were assigned to one or more of the three existing hydrogeomorphic settings (river channel, terrace, and/or historic floodplain). Suggested plant species and communities were grouped into low, medium, and high water use categories.

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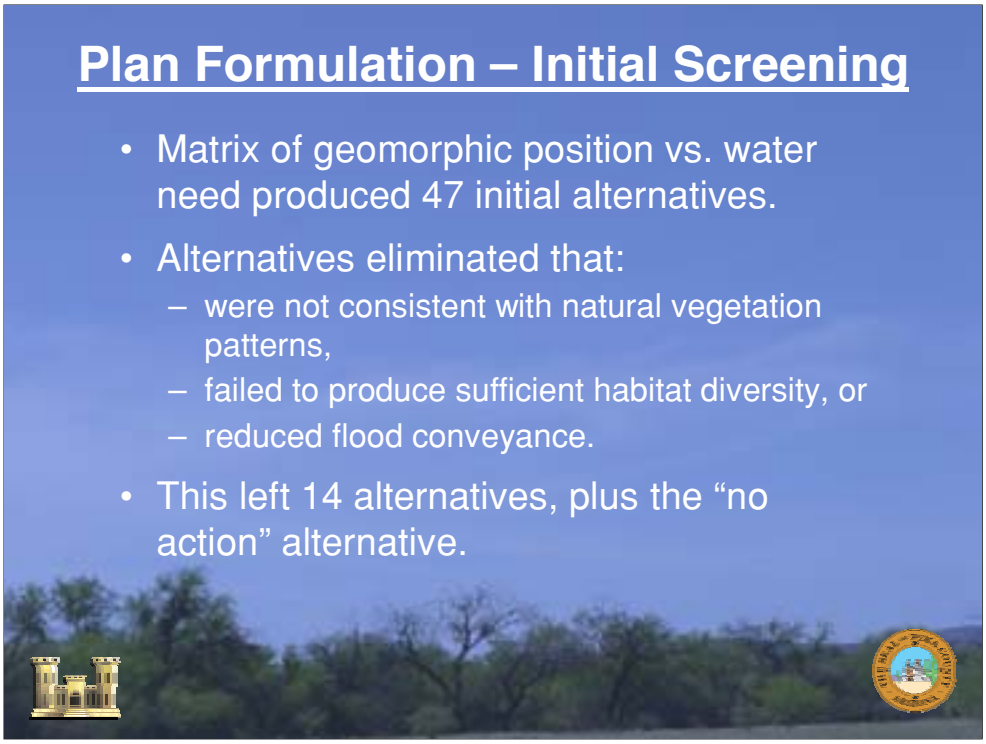

The three sets of restoration measures were combined with the low, medium, and high water use native habitat community types to create a restoration matrix that lead to the development of 47 proposed restoration alternatives, in addition to the "no action" alternative.

Alternatives that were not consistent with natural vegetation patterns, that failed to produce sufficient habitat diversity, or that reduced conveyance of flood waters were eliminated, leaving 14 alternatives, in addition to the "no action" alternative.

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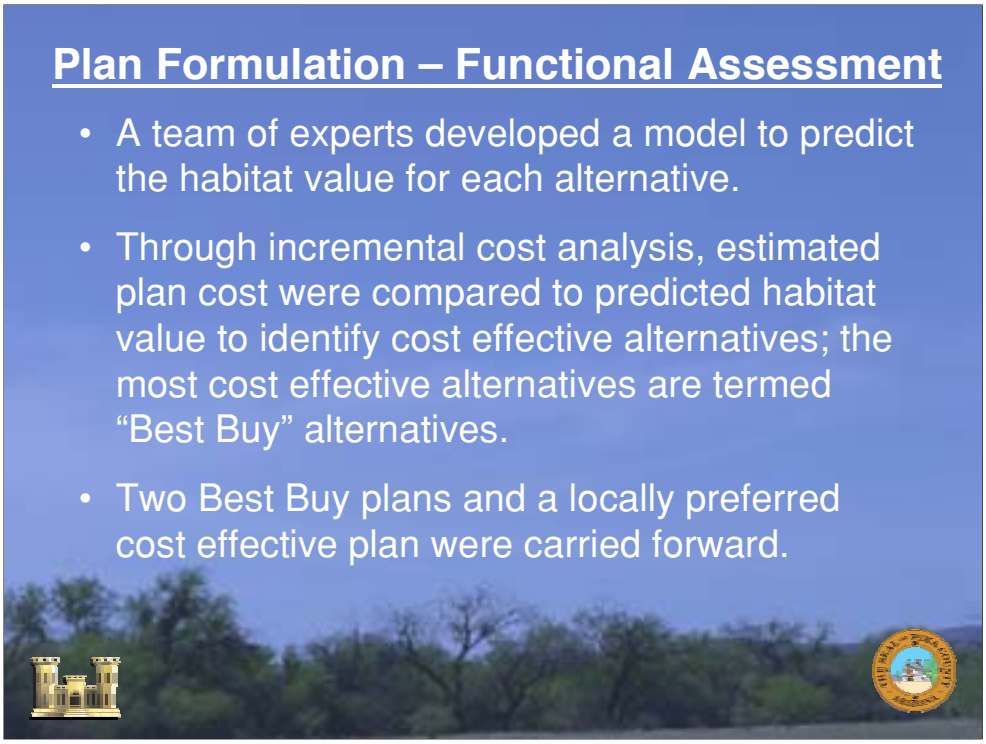

A mathematical model for measuring the functionality of riparian ecosystems was developed specifically for use in Arizona.

This was done in cooperation with scientists from the fields of biology, botany, ecology, hydrology, and geology among others. Many of the participants were from the local Tucson area.

Through incremental cost analysis, estimated plan cost were compared to predicted habitat value to identify cost effective alternatives; the most cost effective alternatives are termed "Best Buy" alternatives.

Two Best Buy plans and a locally preferred cost effective plan were carried forward. The alternatives were presented for public review at an Open House last January.

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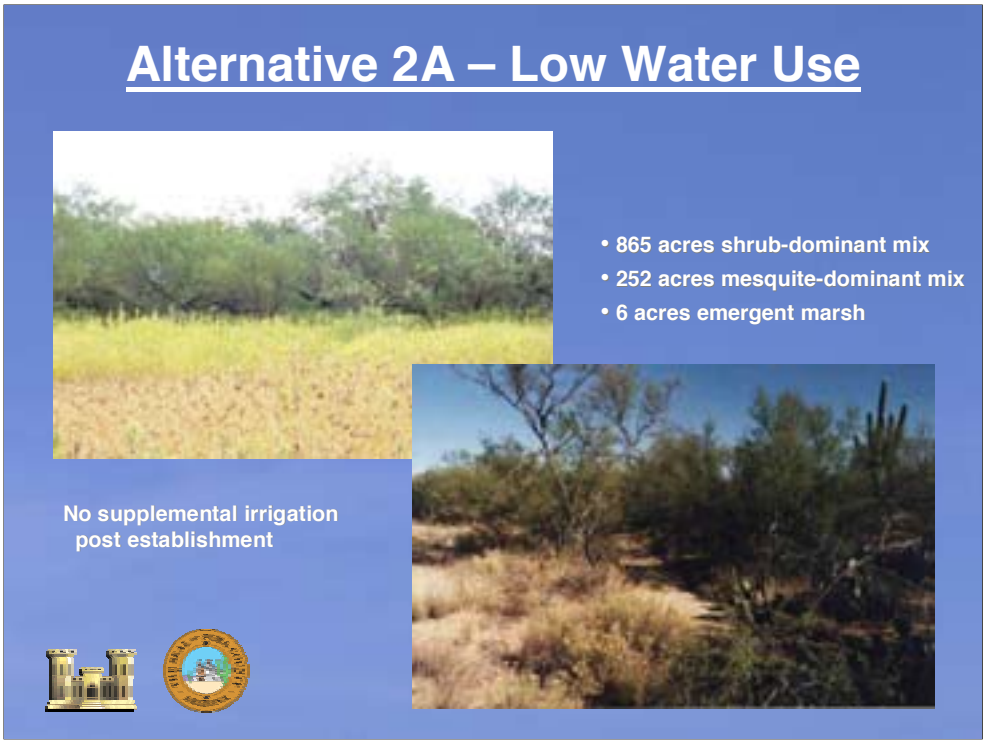

The three plans carried forward were Alternatives 2A, 3E and 4F. They all have very different water needs, so they can also be thought of as low, medium, and high water use alternatives.

Alternative 2A focuses on water harvesting techniques including soil amendment, surface grading, and construction of subsurface water harvesting basins. Steep stream banks would be laid back and vegetated.

Xeroriparian shrub communities dominate the this plan, with some mesquite, and a few areas of stream-flow dependent emergent marsh

The alternative would require establishment irrigation and could require emergency irrigation during periods of prolonged drought, although no irrigation delivery system would be installed.

Although this plan would require only 253 acre-feet of water per year and still provide improved habitat for wildlife, it would not provide the level of ecosystem restoration desired by the general public and residents within the study area.

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In addition to water harvesting and river bank treatments included in 2A, Alternative 3E includes more native mesoriparian species and provides irrigation to all planted areas.

Mesquite communities would be the dominant restored habitat type, with both mesquite and native shrub communities on upper terraces and the historic floodplain, and cottonwood-willow and marsh habitats where conditions permit.

Up to 1,925 acre-feet of irrigation will be required annually for sustainability.

This plan provides much higher level of habitat diversity and ecosystem function than 2A, and is similar to the historic habitat condition.

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Alternative 4F focuses on construction of a low flow channel with perennial water flow, in addition to irrigation, water harvesting, and surface treatments.

Implementation of these measures will allow plantings of cottonwood-willow galleries, as well as mesquite, riparian shrub, and emergent wetland communities.

Similarly to Alternative 3E, planted areas would be irrigated.

This plan provides the best habitat diversity, but it also has the highest costs and the highest water consumption – almost 9,000 acre-feet per year.

The high expected construction cost plus the commitment of water required for this alternative was considered undesirable and cost prohibitive by the local community and Pima County government, eliminating this alternative from further consideration.

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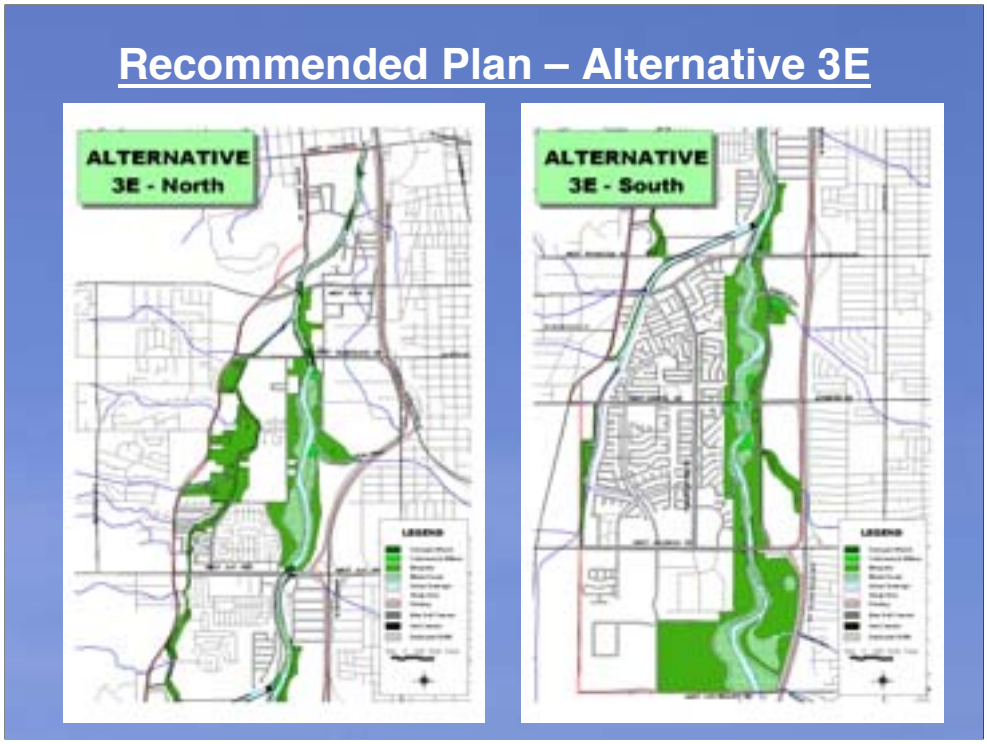

Alternative 3E, the medium water use plan, provides good habitat diversity at medium cost and water need. It has an irrigation system to assure that plants won't die as a result of drought stress. With the backing of participating citizens and Pima County government, Alternative 3E has been selected 3E to be the Recommended Plan. The Corps presented the Recommended plan for public review at a Public Meeting last month.

This slide shows the proposed plan footprint within the study area. Over 1100 acres would be planted and irrigated. Mesquite and riparian shrub communities would be planted on terraces above the low flow channel and in the historic floodplain. Emergent marsh and cottonwood-willow habitat located at stream-confluence water harvesting basins and upstream of existing grade control structures.

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This is an artists' rendition of what the Recommended Plan may look like in the future. The view is looking to the north from Ajo Way toward the northern ½ of the project area.

The reaches of steep eroded banks would be modified by cutting back into the historic floodplain to create gentler and more stable slopes. This would reestablish a hydrologic connection to the river, reduce the frequency of bank failure during intermediate flood events and should reduce the need to reestablish habitat due to washout.

Various water harvesting methods will be incorporated. In addition to surface treatments, subsurface water harvesting basins would be constructed at the confluences of 8 tributaries and upstream of 6 existing grade control structures.

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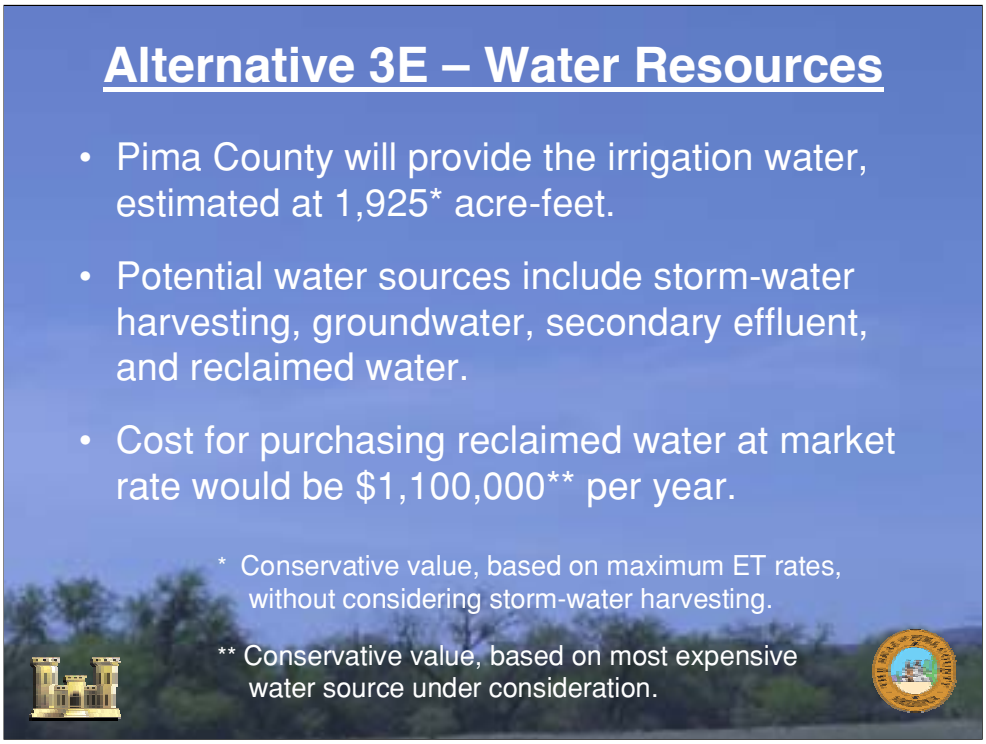

As already indicated, water availability has been an overriding issue throughout this planning process. As the local sponsor, Pima County has the responsibility of providing the water needed for the project. It is likely that the ~1900 acft calculated can be reduced after establishment, as this value was based on older conservative evapotranspiration rates, and new studies are showing reduced water need for native plant communities.

There is water available for restoration through water harvesting, use of secondary or tertiary effluent, or use of groundwater, although that is not a preferred source.

As part of the cost analysis, the USACE used a known water source with a known cost in order to compare the costs of the 14 alternatives analyzed. They used the current market rate for reclaimed water from Tucson Water, and the calculated cost is 1.1 million dollars annually.

Pima County is in no way obligated to use this water source.

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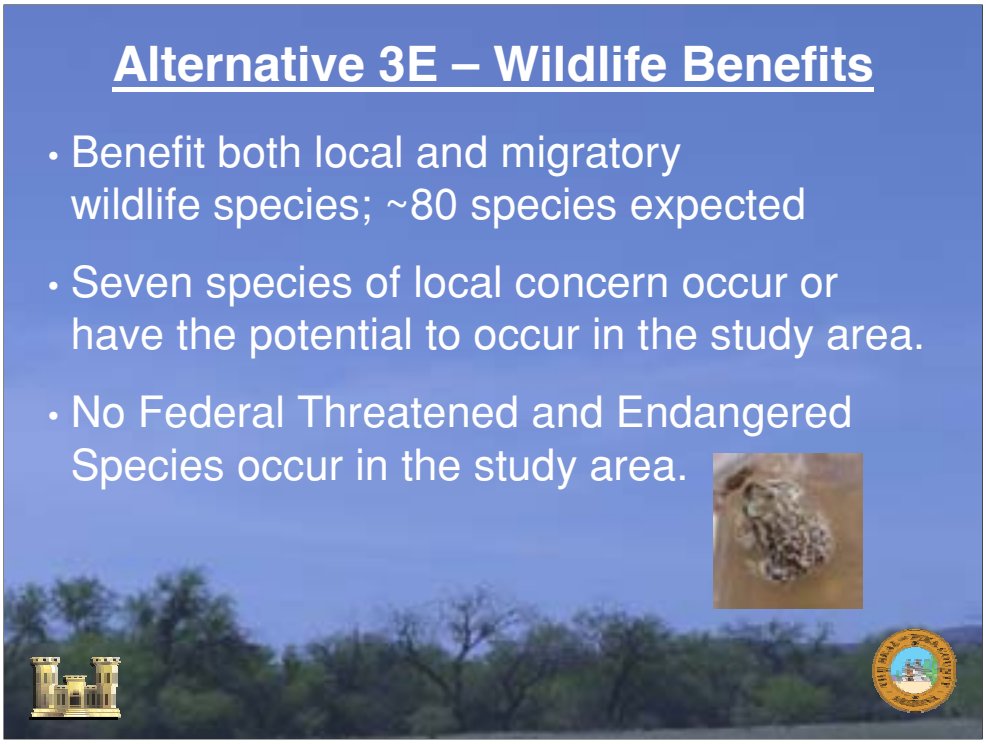

The wildlife benefits of Alternative 3E include benefits to both local and migratory wildlife species, including birds using the Pacific flyway. There is an expected increase in abundance of ~80 native wildlife species

Although no Federal Threatened or Endangered Species are known in the study area, there are seven species of local or regional concern that occur or have the potential to occur in the study area.

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It was important to develop a passive recreation plan that would encourage enjoyment of the environment while recognizing the history of the area. The recreation plan would provide better access to the area for hiking, wildlife viewing, biking, skating, and equestrian use.

Most trails will include decomposed granite surfaces paralleled by paved maintenance trails along the west side of the Santa Cruz River. Interpretive signs would provide a means to educate recreators on the natural environment and history of the area.

The plan also includes construction of a portion of the 1,200 mile Juan Bautista de Anza National Historic Trail that may eventually connect Nogales to San Francisco.

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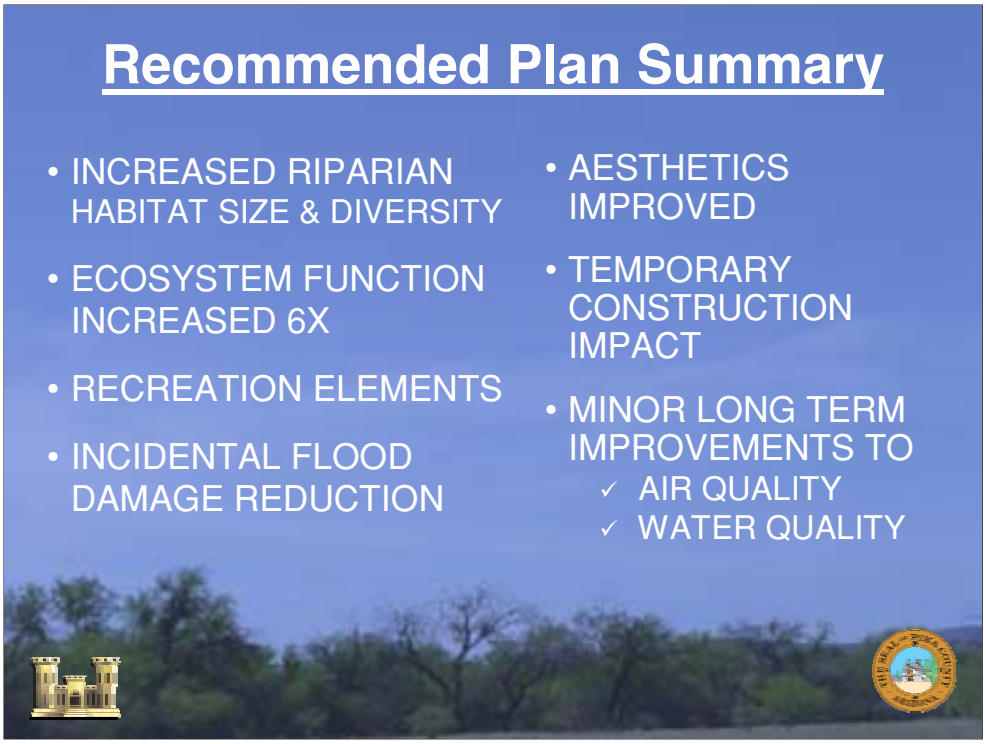
The estimated cost of construction and real estate for alt. 3E is 73 million dollars. Inclusion of costs for contingencies, engineering, management and monitoring yields a total first cost of nearly 91 million dollars. Recreation is calculated separately, and has an estimated first cost of 1.14 million dollars. It is worth mentioning here that the Corp tends to be conservative in making cost estimates, as they strive to avoid ever having to go back to Congress for additional project funding.

Cost sharing for ecosystem restoration project cost sharing is 65% federal, 35% local sponsor, so the federal share is nearly 60 million. The non-Federal share for recreation is 50% of the total first cost.

The local share of nearly 32 million would consists of 26 million for land-related contributions, and up to 5.8 million cash or other in-kind contributions. Pima County voters approved ~14 million in bond funding for ecosystem restoration and erosion risk reduction within the study area, so there the local funding source has been secured.

Pima County will have to pay the operation, maintenance, and water costs, estimated at a total 800,000 to 2-million annually, depending on the source of irrigation water.



Some of the salient points of implementing of Alternative 3E include an increase in riparian habitat size and diversity.

Ecosystem function would be expected to increase to 6X that of the "without project" condition.

Other benefits include recreational opportunities, incidental flood damage reduction, and improved aesthetics.

The anticipated impacts associated with construction activities will be temporary in nature. These impacts would be minimized based on working with the local interests, and by following local ordinances.

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Copies of the Feasibility Study are located in various libraries, and can be found on the Pima County Website. CDs can be mailed by request. The official public comment period ends on November 22, 2004.

Public comments will be integrated into the report, and the final draft will be completed early next year. Feasibility study results will be presented to Congress for project authorization as part of the 2006 Water Resources Development Act.

In the mean time, the design process will begin next year.

Construction may begin as early as mid 2008. Construction would require about three years to complete.

This concludes my talk. Are there any questions?

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