FINAL
WATER TRANSFER STUDY
PHASE I REPORT

BASELINE HYDROLOGIC AND SOCIOECONOMIC PROFILES

Prepared for:

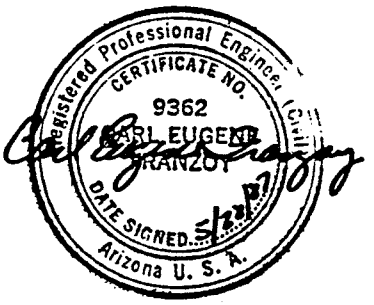
Joint Legislative Committee on Groundwater and Surface Water Exportation

and

Arizona Department of Water Resources

Prepared by:

FRANZOY COREY Engineers & Architects



In Association with:

MOUNTAIN WEST RESEARCH, INC.

and

ECONOTREND, INC.

Contract:

DWR-86/87-4500-010

April 27, 1987

Revised:

May 28, 1987

Franzoy•Corey
ENGINEERS & ARCHITECTS

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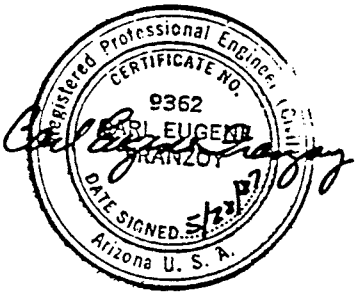

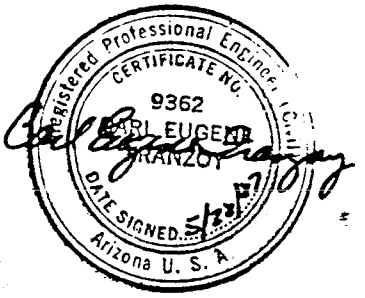

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CHAPTER 1

INTRODUCTION

1.1 PURPOSE AND SCOPE OF STUDY

In recent years, cities in the Phoenix and Tucson areas have purchased agricultural lands with the intent of transferring agricultural water rights for municipal use. The impacts of this growing trend toward "water farming" in the State's rural areas are a major concern to the Arizona Legislature.

In 1986, the Thirty-seventh Legislature responded to the water-farming concern with the passage of House Bill 2265 (Bill). The Bill mandates that a study be conducted of the hydrologic and economic effects of water transfers within Arizona. The Bill is "An Act relating to waters; providing for studies of the economic, fiscal and hydrologic impacts of groundwater and surface water exportation within this State; providing for a Joint Legislative Committee on Groundwater and Surface Water Exportation...."

The Bill also created the Joint Legislative Committee on Groundwater and Surface Water Exportation. The purpose of the Committee is to develop study guidelines and to monitor and supervise study progress.

The Water Transfer Study (Study) was designed to be used by legislators to evaluate the need for additional legislation governing the inter basin transfer of water within Arizona. The report will also be useful as a planning tool for county commissions in rural areas likely to be affected by water rights transfers.

The Arizona Department of Water Resources (Department) contracted with FRANZOY COREY in association with Econotrend and Mountain West Research (hereafter referred to as FRANZOY COREY) to assist in completing the Study. The study is divided into three phases to facilitate the Joint Legislative Committee's review.

Phase I describes the current hydrologic and socioeconomic conditions and recommends specific areas within the State for further evaluation in Phases II and III. Phase II research will identify and quantify the hydrologic and economic effects associated with water transfers. Phase III will identify potential legislative changes that could mitigate any negative effects of water transfers.

The Phase I report describes hydrologic and economic conditions within eight study areas (Figure 1.1). These areas were selected by the Department in conjunction with the Joint Legislative Committee. For each area, a chapter is presented containing a brief hydrologic summary and a short socioeconomic profile of current and projected conditions. Chapter 10 contains estimates of potential volumes of water available for inter-basin transfers. Intra-basin water transfers were not evaluated. Chapter 11 describes the framework of laws and regulations that could affect potential transfers of water within Arizona. The conclusions reached in the Phase I analysis are presented in Chapter 12 which compares the hydrologic conditions within each study area to defined selection criteria. For each area, the potential volume of transferable water is re-evaluated on the basis of water quality and the likelihood of acquiring the water rights needed for inter-basin transfer.

1.2 STUDY APPROACH

1.2.1 Evaluation Criteria

For the Phase I analysis, evaluators in the Department and FRANZOY COREY defined specific hydrologic criteria to be used to decide whether a Phase I study area should be studied further in Phase II. The Phase I analysis concentrates on quantifying potential volumes of transferable water and evaluating the engineering and legal opportunities for transporting the water to high demand areas. The maximum future unmet municipal and industrial water demands were assumed to be 120,000 acre-feet per year (this is discussed in detail in Chapter 10).

Three critical hydrologic conditions were identified. If any study area failed to meet any one of the following three conditions, the study area would not be recommended for further study in the Phase II analysis:

1. Sufficient water supplies will be retained in each study area to meet the area's municipal and industrial water demand for 100 years. The high estimate of potentially transferable water must accommodate this criterion.

2. The volume of transferable water does not include surface water unless these water rights have been completely adjudicated.

3. Practical engineering and legal solutions exist to transport the transferable water to the point of use.

Two additional guidelines were added as "soft" evaluation criteria:

4. Water with total dissolved solids (TDS) of more than 1,500 mg/L is considered unsuitable water.

5. A potential volume of transferable water that is less than 120,000 acre-feet annually is considered to be less water than is needed to supply unmet demands in the State.

Socioeconomic data are included in the Phase I report as useful background and to identify the baseline assumptions that will be used for projection and for analysis in Phase II. The socioeconomic data were not considered in the selection of areas for further study.

1.2.2 Hydrologic Methodology

The hydrologic summaries for each study area report estimated water volumes in five categories: (a) agricultural water demand, (b) municipal water demand, (c) surface water supply, (d) groundwater supply, and (e) the area water budget. Estimates of water quality were also made. The specific assumptions used to calculate these estimates are identified in the following paragraphs.

Agricultural water demand was calculated from estimates of each area's net agricultural acreage and water application rate per acre. Net agricultural acreage was derived from gross irrigated acreage, adjusted by a factor of 0.875 to account for roads, homesteads, and other non-agricultural acreage. A representative cropping pattern was derived from data for each study area, and a water application rate (expressed in acre-feet per acre) was estimated for each

crop. The water application rate considered soil and water quality, climate, and local farming practices. The cropping pattern and application rate were coupled to derive a weighted water application rate per acre.

Municipal water demand was estimated by FRANZOY COREY on the basis of the total population per study area and a 1987 per capita water usage figure that was considered typical of the area. For urban areas within AMAs, water usage was adjusted to account for the effects of increasing water conservation.

Estimates of surface water supply volumes were based on U.S. Geological Survey gaging station data for average annual water supply. Estimates of groundwater supply were based on data for groundwater in storage obtained from the U.S. Geological Survey, the U.S. Bureau of Reclamation, and the Department. Where the hydrological study areas cut across basins, FRANZOY COREY estimated the volume of groundwater in storage by using a percentage based on surface area. Groundwater levels were assumed constant throughout the groundwater basins. Recoverable groundwater was defined by the Department and FRANZOY COREY to be 50% of groundwater in storage.

A water budget represents the effect of water demand on water supply over a period of time. The budget identifies baseline water demands, incidental recharge, water supplies, and groundwater natural recharge. The basin was considered in an overdraft condition if the total demands exceeded the sum of incidental recharge, direct effluent reuse, surface water supplies, and natural recharge. Estimates derived from the calculations for water demand and water supply were used as baseline projections to complete the water budget. Assumptions used in the water budget included (a) all irrigable agricultural land would be irrigated, (b) average conditions for rainfall, water supply, and water use, and

(c) surface water supplies remain at the 1987 average condition throughout the water budget projection period.

Water quality data were obtained from U.S. Geological Survey, U.S. Bureau of Reclamation, and the Department. Water quality was evaluated on the basis of three measurements, where available: (a) the amount of Total Dissolved Solids (TDS), measured in mg/L; (b) the specific conductance values of the water, measured in micromhos/cm; and (c) fluoride concentrations, measured in mg/L.

1.2.3 Socioeconomic Methodology

The socioeconomic consequences of water transfers on rural economies depend on the extent to which each local economy relies on direct agricultural employment and agriculture-related purchases. The significance of the fiscal effects will depend on the extent to which the jurisdictions rely on property tax revenues generated by affected lands.

In this report, socioeconomic profiles and baseline projections of key variables are developed for each study area. This information is used to describe each area and to evaluate the potential socioeconomic and fiscal effects of water transfers in Phase II of the study. The baseline projections presented in this report describe anticipated socioeconomic trends and changes in the absence of water transfers. In Phase II, water transfer impacts will be assessed by comparing these Phase I projections with new projections for each study area that assume water transfers will occur.

The socioeconomic profiles for each study area were developed using the best available secondary data sources. These sources included, among other information, reports from the 1980 census, and when available, the 1985 special

census, County Business Patterns of 1984, and the most recent annual reports from the Arizona Department of Education, Arizona Department of Revenue, and Arizona Tax Research Foundation. For this reason, data contained within some of the tables may be referenced by date.

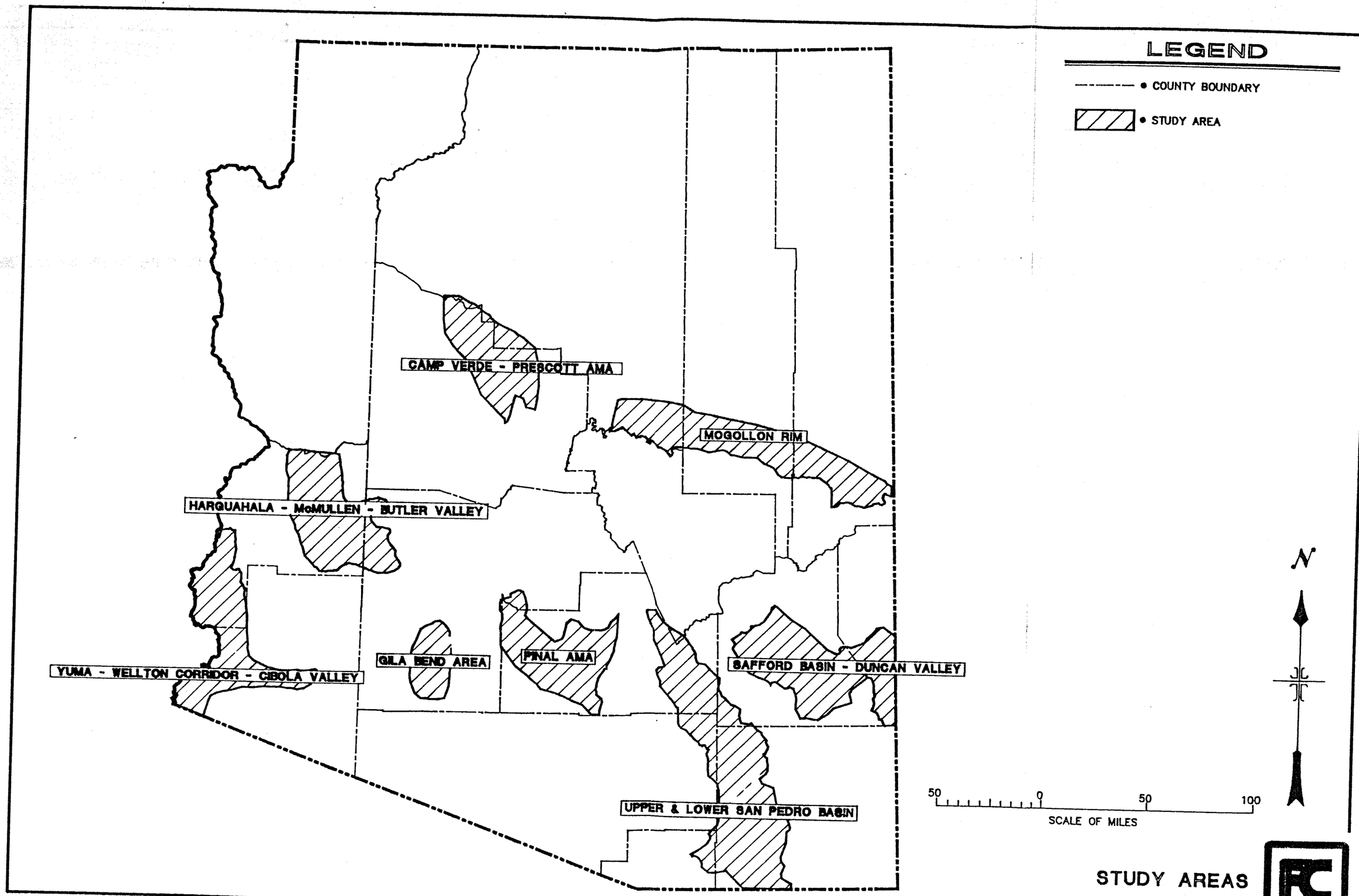
The socioeconomic profiles were adjusted to represent a 1987 baseline and baseline population and employment projections were made to the years 2010 and 2025. Baseline population and employment projections were made using Department of Economic Security assumptions about county economic growth and output from the Planning and Assessment System (PAS) Model. Where necessary, projections were extended to the year 2025 on the basis of trends evident in the data between the years 2005 and 2010.

Baseline property values, property tax revenues, and selected non-property tax revenues were projected as functions of sector-specific employment and population growth. Tax rates were assumed to remain unchanged over the projection horizon and are expressed in constant 1986 dollars.

The distinction between the primary and the secondary property valuation was maintained throughout the report. Since 1980, Arizona has operated under two distinct valuation bases for levying ad valorem property tax, the primary or limited valuation, and the secondary or full cash valuation. Taxes levied on the primary valuation are used for the maintenance and operation of counties, cities and towns, school districts, and community college districts within each county. Taxes levied on the secondary valuation are used for debt retirement, voter-approved budget overrides, and the maintenance and operation of special service districts such as sanitary, fire, and road improvement districts.

The value of agricultural production was estimated using representative gross agricultural revenues, cropping characteristics, number of acres in production, and total gross revenues over the past three years (1984-86).

Water use per employee by economic sector was estimated in two steps. First, total municipal and industrial (MI) water use per employee across all sectors was estimated. For example, an agricultural sector that employed 25% of the area labor force was assumed responsible for 25% of total MI water usage. This percentage volume of MI water was added to the total volume of water used by the economic sector. The combined water volume was divided by the number of employees in the sector to obtain water use per employee by sector expressed as gallons per day per employee.



STUDY AREAS

FIGURE 1.1

CHAPTER 2

YUMA - WELLTON CORRIDOR - CIBOLA VALLEY

2.1 GENERAL DESCRIPTION

The Yuma - Wellton Corridor - Cibola Valley study area (Figure 2.1) is a low-lying desert plain (elevation about 120 ft) that includes the lower reaches of the Gila and Colorado rivers, Martinez and Mittry lakes, and the towns of Yuma, Wellton, and Somerton. The climate is exceptionally dry with a mean annual precipitation of slightly more than 2.5 inches. Rainfall is heaviest in the summer, associated with tropical disturbances. Winter temperatures range from the low 40s to the high 60s. Summer morning temperatures average in the high 70s, afternoon temperatures average in the low 100s.

2.2 CURRENT HYDROLOGIC PROFILES

The hydrologic study area includes the Gila River drainage from Texas Hill to Dome, and the Colorado River drainage from Cibola Valley to the Mexican border. The entire area is in the Basin and Range Lowlands Water Province.

Wellton-Mohawk Area Groundwater. In the Wellton-Mohawk area, the main source of groundwater is alluvial deposits where the upper sandy and lower gravel aquifers are from 30-150 ft in aggregate thickness. Groundwater in the area occurs under unconfined conditions. Depths to groundwater in the Wellton-Mohawk area range from less than 5 ft to more than 200 ft. Most wells in the hydrologic study area are capable of producing 1,000 gal/min or more.

The quality of groundwater in the Wellton-Mohawk area is unsuitable for most uses. Specific conductance values of more than 12,000 micromhos/cm are common, and fluoride concentrations generally range from 1-10 mg/L.

Cibola Valley - Yuma Area Groundwater. In the Cibola Valley - Yuma area, the principal source of groundwater is gravel zones contained in the alluvium deposited by both the Gila and Colorado rivers. The groundwater occurs under mainly unconfined conditions. Depths to groundwater in the Cibola Valley-Yuma area range from less than 50 ft to more than 150 ft. Most wells in the hydrologic study area are capable of producing 1,000 gal/min or more.

Total dissolved solids (TDS) in the Cibola Valley-Yuma area range from less than 500 mg/L to more than 3,000 mg/L. Fluoride values generally range from 0.2-0.9 mg/L, which is acceptable for municipal use.

Groundwater Storage. Estimated groundwater in storage to a depth of 1,200 ft was about 195 million acre-feet in 1975 (Arizona Water Commission). About 146 million acre-feet of this storage is contained in the Gila River portion of the hydrologic study area where the quality is unsuitable.

Groundwater Conditions. Pumping by Mexico along the United States - Mexico border increased the gradient which caused more groundwater to flow from the United States into Mexico. The existing treaty between the United States and Mexico addressed surface water flows but did not address groundwater flows. The Minute 242 well field, constructed and operated by the U.S. Bureau of Reclamation, intercepts groundwater that would flow into Mexico and delivers the intercepted groundwater on the surface so that the United States can claim credit for water within the treaty obligations.

Areas along the Colorado and Gila rivers experience problems with high groundwater levels and require pumping to control (or lower) the groundwater levels. Local changes in groundwater levels reflect changes in the amount of applied irrigation water and drainage pumping and the study area is essentially in balance.

Surface Water Resources. Surface water in the study area is generated outside the hydrologic study area. The area's two major rivers are the Colorado and the Gila. Flow in the normally dry Gila River is controlled by flood releases from Painted Rock Dam, operated by the U.S. Army Corps of Engineers. Colorado River flows are generally based on water demands and are controlled upstream by releases from Hoover Dam, operated by the U.S. Bureau of Reclamation.

Table 2.1 shows the water budget for the hydrologic study area.

Surface water from the Colorado River is the source of nearly all irrigation water in the hydrologic study area. The surface water is obtained through contracts with the Secretary of the Interior.

Irrigation Districts. The seven irrigation districts within the study area are Cibola Valley Irrigation and Drainage District, Hilland "C" Irrigation District, North Gila Valley Irrigation District, Unit "B" Irrigation and Drainage District, Wellton-Mohawk Irrigation and Drainage District, Yuma Irrigation District, and Yuma Mesa Irrigation and Drainage District.

2.3 CURRENT SOCIOECONOMIC AND FISCAL PROFILES

The socioeconomic study area includes the communities of Yuma, Wellton, San Luis, and Somerton and their associated census divisions. The area contains three high schools, six elementary schools, and Arizona Western Junior College.

Population and School Enrollment. There were 79,087 persons living in the study area according to the 1980 census (see Table 2.2). The population is young relative to the state. In 1980, the median age was 27.8 years, compared with a median age of 29.2 years for Arizona. About 76% of the 19,164 study area children under the age of 18 were enrolled in schools.

Household Income. Income in the area is low relative to the state. The median income for study area households in 1980 was $14,900, compared with $16,448 for Arizona.

Labor Force. Unemployment in the area is higher than the state average. According to the 1980 census, 8.2% of the 29,588 residents in the area's civilian labor force were unemployed, compared to 6.7% unemployed for Arizona.

Employment. Primary industries in the area are agriculture, tourism, and defense (military facilities). Tourism was a $200 million industry for Yuma in 1985. Two military facilities operate in the area, the U.S. Army Yuma Proving Ground and the U.S. Marine Corps Air Station. The city of Yuma is a regional tourist and trading center; the economies of Wellton and Somerton are based primarily on agriculture. Area employment in 1980 by sector was about 16.0% in agriculture, about 23.0% in trade, and about 25.3% in service.

Land Ownership. The study area encompasses about 1.1 million acres, most of which is publicly owned. About 24.2% of the land is state owned, about 68.8% is owned as other forms of public land such as military reserves and wildlife refuges, and about 7.0% is privately owned.

Property Tax Base. In 1986, the area's primary net assessed value totaled about $256 million (see Table 2.3). Property was taxed at a rate of $10.17 per $100 of the primary assessment and generated more than $26 million in revenue. The secondary net assessed value was about $267 million. Property was taxed at a rate of $1.80 per $100 of the secondary assessment and generated a total of about $4.8 million in tax revenue.

Agricultural and vacant land had a primary net assessed value of over $33 million, and accounted for 12.9% of the total primary assessment. Residential property had the greatest aggregate value totalling over $74 million, or about 29% of the total primary assessment.

Property Tax Revenues. Schools were the jurisdictions most dependent on property tax revenues. Of the $26 million in revenues generated from the primary assessment in 1986, schools received over $13 million, counties about $6.2 million, and towns and cities, approximately $2 million.

Water Use per Economic Sector. Water use per employee per economic sector was estimated to be about 500 gpd per employee for all non-agricultural economic sectors.

2.4 BASELINE SOCIOECONOMIC AND FISCAL PROJECTIONS

Population and School Enrollment. The study area population is projected to grow at a moderate rate during the projection horizon (see Table 2.4). Between 1987 and 2025,

population is expected to increase at an annual compound growth rate of 1.9%, growing from about 88,700 persons in 1987 to about 181,300 by 2025. School enrollment is projected to increase from about 20,300 students in 1987 to about 40,700 by 2025.

Employment. Employment is projected to grow at a moderate rate, increasing from about 34,300 jobs in 1987 to about 70,900 by 2025. The largest employment increases are expected to occur in the trade and service industries as tourism increases in importance. Manufacturing is projected to grow slowly, and agricultural employment is expected to gradually decline through 2025.

Property Tax Base. Primary net assessed value is projected to increase from about $256 million in 1987 to about $532 million by 2025 (see Table 2.5). Property values in residential, commercial, and industrial use classes are projected to grow along with the economic expansion, but the net assessed value of agricultural and vacant lands is projected to decline over the course of the projection horizon.

Property Tax Revenues. Total property tax revenues are projected to more than double by 2025. Tax revenues based on the primary assessment are projected to increase from about $26 million to about $55 million, and tax revenues based on the secondary assessment are projected to increase from about $4.8 million to about $9.8 million.

Non-property Tax Revenues. Three key non-property tax revenue sources that could be affected by economic changes were identified, county state-shared revenues, city state-shared revenues, and city sales tax collections. The following increases are projected to occur by 2025; county state-shared revenues increase from about $3.3 million to

about $6.9 million; state-shared revenues for cities and towns increase from about $12.2 million to about $28.2 million; and city sales tax collections increase from about $5.3 million to about $14.2 million, as calculated from Table 2.5. The relatively large increase in projected city sales tax collections is due to the projected growth of tourism in the area economy.

2.5 CONCLUSIONS AND RECOMMENDATION

The Yuma - Wellton Corridor - Cibola Valley area contains the most surface water of any study area. Irrigated agriculture accounts for 157,000 acres, most of which have Colorado River water rights associated with them. Water could be transferred from the study area to other locations in Arizona through the Central Arizona Project. FRANZOY COREY recommends this area for further analysis.

TABLE 2.1
Water Transfer Study
Water Budget
Yuma - Wellton Corridor - Cibola Valley

Line	Description	Year 1987	2010	2025
1	**Water Demand (1,000 AF)**			
2				
3	Municipal	19	28	39
4	Agricultural	964	964	964
5	Industrial	-	-	-
6	Conveyance losses	-	-	-
7	(evaporation and seepage)			
8	Minute 242 pumping	193	193	193
9				
10	Total Demand	1,176	1,187	1,196
11				
12	**Incidental Recharge (1,000 AF)**			
13				
14	Muni (incl. effl. recharge)	9	15	19
15	Agricultural	318	318	318
16	Industrial	-	-	-
17	Conveyance Seepage	-	-	-
18				
19	Total Incidental Recharge	327	333	337
20				
21	**Water Supplies (1,000 AF)**			
22	Surface Water	983	994	1,003
23	Groundwater	193	193	193
24	Effluent Use (Direct)	-	-	-
25				
26	Total Supplies	1,176	1,187	1,196
27				
28	**Natural Recharge**	5	5	5
29				
30	**Overdraft (1,000 AF)**	0	0	0
31				
32	Variables			
33	Basin Population (1,000)	88.7	138.5	181.3
34	Irrigated Acreage (1,000)	156.7	156.7	156.7
35	Per Capita Muni. use (GPCD)	190	190	190
36	Avg. Crop Consump. Use (ft/yr)	4.0	4.0	4.0
37	Avg. Irrigation Efficiency	65.0%	65.0%	65.0%
38	Irrigation Recharge Factor	33.0%	33.0%	33.0%
39	Municipal Recharge Factor	50.0%	50.0%	50.0%
40	Industrial Recharge Factor	50.0%	50.0%	50.0%
41				
42	Overdraft = Line 10 minus Lines 19, 22, 24, 28			
43				
44	Water in Storage to 1,200 ft. depth (1,000 AF)			
45	AZ Water Commission (1975)	195,000	195,000	195,000
46	Recoverable groundwater	97,500	97,500	97,500

Data compiled by FRANZOY COREY, sources available upon request
MAY 1987

TABLE 2.2

SOCIOECONOMIC PROFILE
YUMA - WELLTON CORRIDOR - CIBOLA VALLEY

Economic Component	Study Area	Arizona
Population (1980)	79,087	2,718,215
Age 0 - 17 (%)	32.0	29.2
Age 18 - 64 (%)	58.0	59.6
Age 65+ (%)	10.0	11.3
Median Age	27.8	29.2
School Enrollment (1980)	19,164	652,174
Median Household Income (1980)	14,900	16,448
Less Than $5,000 (%)	12.2	12.1
$5,000 - $14,999 (%)	40.4	33.3
$15,000 - $29,999 (%)	34.0	36.4
$30,000 - $39,999 (%)	8.2	10.2
$40,000 + (%)	5.2	8.0
Civilian Labor Force (1980)	29,588	1,238,000
Unemployed (%)	8.2	6.7
Employment (1980)	27,170	1,113,270
Agriculture (%)	16.0	3.0
Construction (%)	7.4	8.3
Manufacturing (%)	6.2	14.8
Trade (%)	23.0	22.6
Services (%)	25.3	30.6
Government (%)	11.5	6.7
Other (%)	10.6	14.0
Average Firm Size (1984)	9	13
Land Ownership (000's of Acres)	1,092	
Private (%)	7.0	
Indian (%)	0.0	
Public - State (%)	24.2	
Public - Other (%)	68.8	

Data compiled by Mountain West, sources available upon request.

TABLE 2.3

PROPERTY TAX PROFILE ($000's)
YUMA - WELLTON CORRIDOR - CIBOLA VALLEY

Jurisdiction	Primary Assessment			Secondary Assessment		
	Net Assessed Valuation	Tax Rate	Revenue	Net Assessed Valuation	Tax Rate	Revenue
STUDY AREA TOTAL (1986)	256,352	10.17	26,076	266,636	1.80	4,789
Legal Classes						
2 Utilities	45,863	10.17	4,665	45,863	1.80	824
3 Commercial and Industrial	72,988	10.17	7,424	75,914	1.80	1,363
4 Agricultural and Vacant Land	33,104	10.17	3,367	36,778	1.80	661
5 Residential	74,832	10.17	7,612	76,900	1.80	1,381
6 Rental Residential	27,863	10.17	2,834	28,788	1.80	517
7 Railroads	1,698	10.17	173	2,388	1.80	43
8 Historic Property	4	10.17	0	5	1.80	0
Jurisdictions						
Arizona	256,352	0.38	974	266,636	0.00	0
Counties	256,352	2.42	6,212	266,636	0.41	1,083
Towns and Cities	142,398	1.40	2,000	142,398	1.40	0
Schools	256,352	5.14	13,168	266,636	1.39	3,706
Arizona Western	256,352	1.45	3,723	0	0.00	0

Data compiled by Mountain West, sources available upon request.

TABLE 2.4

BASELINE SOCIOECONOMIC PROJECTIONS
YUMA - WELLTON CORRIDOR - CIBOLA VALLEY

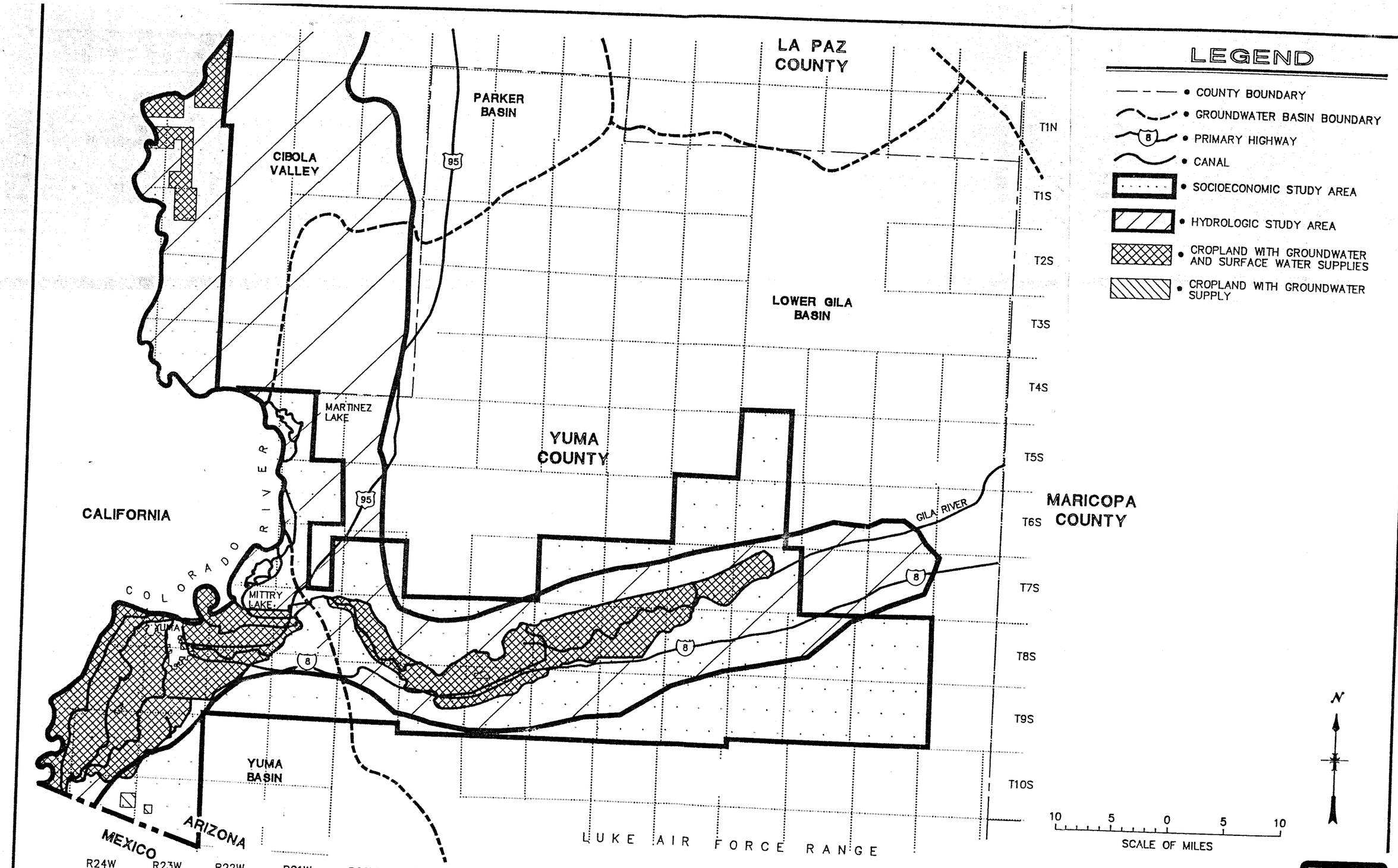
	1987	2010	2025
Population	88,700	138,500	181,300
Age 0-17 (%)	32.2	30.4	30.4
Age 18-64 (%)	54.0	52.1	52.1
Age 65+ (%)	13.7	17.5	17.5
School Enrollment	20,300	31,100	40,700
Employment	34,300	52,800	70,900
Agriculture (%)	11.1	5.6	3.5
Const. and Mfg. (%)	9.9	9.5	8.9
Trade (%)	21.1	24.2	25.3
Services (%)	23.8	29.2	32.7
Government (%)	24.6	21.6	19.1
Other (%)	9.6	10.0	10.5

TABLE 2.5

BASELINE TAX REVENUE PROJECTIONS ($000's)
YUMA - WELLTON CORRIDOR - CIBOLA VALLEY

	Primary			Secondary		
	1987	2010	2025	1987	2010	2025
Net Assessed Value	256,352	396,386	531,872	266,636	410,217	549,407
Ag. and Vacant (%)	12.9	6.5	4.1	13.8	6.9	4.4
Comm. and Indus. (%)	28.5	32.1	34.2	28.5	32.3	34.4
Residential (%)	40.1	40.5	39.5	39.6	40.2	39.3
Other (%)	18.6	20.9	22.3	18.1	20.5	21.9
Cities and Towns Total (%)	55.5	67.3	72.0	53.4	65.9	71.1
Property Tax Revenue	26,076	40,953	55,306	4,789	7,343	9,834
Arizona (%)	3.7	3.7	3.7	0.0	0.0	0.0
Counties (%)	23.8	23.4	23.3	22.3	22.3	22.3
Cities and Towns (%)	7.6	9.1	9.7	0.0	0.0	0.0
Schools (%)	50.6	49.8	49.4	77.7	77.7	77.7
Arizona Western (%)	14.3	14.0	13.9	0.0	0.0	0.0
Key Non-Property Tax Revenue	Local Government Revenues					
	20,877	35,711	49,317			
County State Shared (%)	16.0	14.4	14.0			
City State Shared (%)	58.6	58.4	57.2			
City Sales (%)	25.4	27.2	28.8			

Source: Mountain West Research, March 1987



YUMA - WELLTON CORRIDOR - CIBOLA VALLEY

FIGURE 2.1

CHAPTER 3

HARQUAHALA - MCMULLEN - BUTLER VALLEY

3.1 GENERAL DESCRIPTION

The Harquahala - McMullen - Butler Valley study area (Figure 3.1) combines four basins and watersheds north of the Gila Bend Mountains centered near the City of Salome. Yearly precipitation is about 7 inches. Winter rains are light and sporadic, summer rains usually occur during convective thunderstorms. January low temperatures are in the low 30s, afternoon temperatures are in the mid-60s. July temperatures range from the low 70s to the low 100s.

3.2 CURRENT HYDROLOGIC PROFILES

The hydrologic study area includes the Harquahala Plains, Butler Valley and major portions of Ranegras Plains, McMullen Valley, and the Clara Peak area (along and south of the Bill Williams River). The entire area is between the Gila River drainage on the south and Bill Williams River drainage on the north. The hydrologic study area is in the Basin and Range Lowlands Water Province.

Area Groundwater. The sources of groundwater are primarily alluvial basin-fill deposits in all areas, and channel deposits related to the Bill Williams River in the Clara Peak area. These deposits range in thickness from about 1,000 ft in the Clara Peak and Ranegras Plains areas to greater than 4,000 ft in McMullen Valley. In most areas the groundwater occurs under unconfined conditions; however, confined and perched conditions occur locally. Depths to groundwater range from less than 10 ft to more than 100 ft in the Clara Peak area, less than 40 ft to more than 400 ft in the Ranegras Plains and Butler Valley areas, less than

100 ft to more than 600 ft in the McMullen Valley area, and about 150 ft to more than 650 ft in the Harquahala Plains area. Most wells in the hydrologic study area are capable of producing 1,000 gal/min or more.

Water-level Declines. Water-level declines have occurred in all areas, ranging from minimal values in the Clara Peak area, to more than 250 ft and 300 ft in the McMullen Valley and Harquahala Plains areas, respectively. The Harquahala area is the only area that will receive water from the Central Arizona Project's Granite Reef Aqueduct. Because of this imported water, water-level declines in the Harquahala area should slow and may even be reversed to show water-level rises in local areas by 2025. All other areas should continue to show water-level declines at the current rates, ranging from 0.5-2.0 ft/yr.

Water Quality. The quality of water is highly variable throughout the various areas, with the exception of fluoride values which are consistently higher than the maximum allowable contaminant levels. The Ranegras area has TDS values ranging from about 460-3700 mg/L. The Harquahala area has TDS values ranging from about 400-2000 mg/L in the main aquifer, to about 1400-3500 mg/L in the perched water body. The McMullen area TDS values range from about 210-1400 mg/L. The Clara Peak area has TDS values that range from about 360-1400 mg/L. Fluoride concentrations range from about 0.3-8.3 mg/L in the McMullen area, to about 4.1-8.9 mg/L in the Ranegras area, to about 3.2-17.6 mg/L in the perched water of the Harquahala area.

Groundwater Storage. The estimated groundwater in storage to a depth of 1,200 ft was about 76 million acre-feet in 1975 (Arizona Water Commission). The individual areas ranged from an estimated 2.5 million acre-feet in the Clara Peak area to about 26 million acre-feet in the Harquahala area.

Surface Water Resources. Surface water within the hydrologic study occurs only during storm events. The streams are ephemeral.

Table 3.1 shows the water budget for the hydrologic study area.

Water Use. The City of Phoenix is considering plans to purchase approximately 14,000 acres and to lease about 2,000 acres in the McMullen Valley for the purpose of exporting 30,000 acre-feet of water per year to Phoenix.

Irrigation Districts. The two irrigation districts within the study area are the Harquahala Valley Irrigation District and Wenden Pecan Irrigation District.

3.3 CURRENT SOCIOECONOMIC AND FISCAL PROFILES

The socioeconomic study area is located in the eastern portion of La Paz County and the adjoining western portion of Maricopa County. It includes parts of the Parker and Buckeye census divisions. Salome and Wenden are the principal communities in the largely agricultural area. Two community colleges (Arizona Western and Maricopa), three high schools (Bicentennial, Parker, and Buckeye), and six elementary schools serve the area.

Population and School Enrollment. There were 3,641 persons living in the area according to the 1980 census (see Table 3.2). The median age of the population was 29.0 years, approximately the same as that for Arizona as a whole. About 73% of the study area children under the age of 18 were enrolled in schools.

Household Income. Income in the socioeconomic study area is low relative to the state. The median household income in 1980 was $13,600, almost $3,000 lower than that for Arizona.

Labor Force. Unemployment in the socioeconomic study area is not excessive when compared to the state. According to the 1980 census, 6.8% of the 1,658 residents in the area's civilian labor force were unemployed, compared with 6.7% unemployed for Arizona.

Employment. Agriculture and its support services are the mainstays of the area economy, with some income generated by winter visitors and recreational users of Alamo Lake State Park. Area employment by economic sector in 1980 was about 31.9% in agriculture, about 23.1% in construction and manufacturing, and 17.6% in services, primarily health and educational services.

Land Ownership. The study area encompasses about 1.5 million acres, most of which, about 73.9%, is publicly owned by the U.S. Bureau of Land Management. About 14.6% of the land is privately owned, and about 11.5% is state owned.

Property Tax Base. In 1986, agricultural and vacant lands were the second largest single source of property tax revenue in the area (see Table 3.3). Utilities, with a primary assessment of about $13.6 million, were the largest. The area's primary net assessed value totaled about $34 million in 1986. Property was taxed at an aggregate rate of $7.31 per $100 of the primary assessment and generated about $2.5 million in revenue. The secondary net assessed value was about $37.4 million. Property was taxed at a rate of $1.92 per $100 of the secondary assessment and generated about $0.7 million in tax revenue.

Property Tax Revenues. Schools in the socioeconomic study area received about $1.1 million in tax revenues based on the primary assessment. The county received $0.8 million and the community colleges received about $0.4 million.

Water Use per Economic Sector. Water use per employee per economic sector was estimated to be 590 gpd per employee for all non-agricultural sectors.

3.4 BASELINE SOCIOECONOMIC AND FISCAL PROJECTIONS

Population and School Enrollment. The population of the socioeconomic study area is projected to grow at a very moderate rate over the course of the projection horizon (see Table 3.4). Between 1987 and 2025, the population is projected to increase at an annual compound growth rate of approximately 1.4% per year, growing from about 3,900 persons in 1987 to about 6,500 by 2025. School enrollment is projected to increase from about 900 students in 1987 to about 1,400 by 2025.

Employment. Employment is also projected to increase from about 1,500 jobs in 1987 to about 2,600 by the year 2025. The largest employment increases are projected to be in the trade and service industries. Agricultural employment is not expected to increase during this period.

Property Tax Base. Total primary net assessed value is projected to increase from about $34 million in 1987 to almost $59 million by 2025. While residential, commercial and industrial use classes are projected to grow along with the economic expansion, the net assessed value of agricultural and vacant lands is projected to decline over the course of the projection horizon.

Property Tax Revenues. Total property tax revenues for the socioeconomic study area are projected to increase from about $2.5 million to about $4.3 million by 2025.

Non-property Tax Revenues. County state-shared revenues are projected to increase from about $0.4 million to about $0.8 million by the year 2025.

3.5 CONCLUSIONS AND RECOMMENDATION

Most of the local Harquahala - McMullen - Butler Valley water demand (estimated at 200,000 acre-feet annually, associated with 60,600 acres of irrigated agriculture) is supplied with mined groundwater. The area contains an estimated 38 million acre-feet of recoverable groundwater. The City of Phoenix has already purchased approximately 14,000 acres of land within the McMullen Valley area with the intent of transferring the water rights. Although the area is in an overdraft situation, FRANZOY COREY recommends that this area be studied further because of its potential large groundwater supply, current transfer activities, and ease of water transfer through the CAP.

TABLE 3.1
Water Transfer Study
Water Budget
Harquahala-McMullen-Butler Valley

Line	Description	Year 1987	2010	2025
1	**Water Demands (1,000 AF)**			
2				
3	Municipal	1	1	1
4	Agricultural	285	278	238
5	Industrial	-	-	-
6	Conveyance losses	-	-	-
7	(evaporation and seepage)			
8	Area Export	-	-	30
9				
10	Total Demand	286	279	269
11				
12	**Incidental Recharge (1,000 AF)**			
13				
14	Muni (incl. effl. recharge)	1	1	1
15	Agricultural	29	28	21
16	Industrial	-	-	-
17	Conveyance Seepage	-	-	-
18				
19	Total Incidental Recharge	30	29	22
20				
21	**Water Supplies (1,000 AF)**			
22	Surface Water	70	42	37
23	Groundwater	216	237	232
24	Effluent Use (Direct)	-	-	-
25				
26	Total Supplies	286	279	269
27				
28	**Natural Recharge**	2	2	2
29				
30	**Overdraft (1,000 AF)**	185	206	208
31				
32	Variables			
33	Basin Population (1,000)	4.7	6.6	7.9
34	Irrigated Acreage (1,000)	60.6	60.6	46.6
35	Per Capita Muni. use (GPCD)	190	170	150
36	Avg. Crop Consump. Use (ft/yr)	4.0	3.9	3.8
37	Avg. Irrigation Efficiency	85.0%	85.0%	85.0%
38	Irrigation Recharge Factor	10.0%	10.0%	10.0%
39	Municipal Recharge Factor	50.0%	50.0%	50.0%
40	Industrial Recharge Factor	50.0%	50.0%	50.0%
41				
42	Overdraft - Line 10 Minus Lines 19,22,24,28			
43				
44	Water in Storage to 1,200 ft. depth (1,000 AF)			
45	AZ Water Commission (1975)	73,800	69,300	66,200
46	Recoverable groundwater	35,800	31,300	28,200

Data compiled by FRANZOY COREY, sources available upon request.

TABLE 3.2

SOCIOECONOMIC PROFILE
HARQUAHALA - MCMULLEN - BUTLER VALLEY

Economic Component	Study Area	Arizona
Population (1980)	3,641	2,718,215
Age 0 - 17 (%)	28.4	29.2
Age 18 - 64 (%)	61.9	59.6
Age 65+ (%)	9.7	11.3
Median Age	29.0	29.2
School Enrollment (1980)	750	652,174
Median Household Income (1980)	13,600	16,448
Less Than $5,000 (%)	17.7	12.1
$5,000 - $14,999 (%)	37.3	33.3
$15,000 - $29,999 (%)	33.1	36.4
$30,000 - $39,999 (%)	6.4	10.2
$40,000 + (%)	5.5	8.0
Civilian Labor Force (1980)	1,658	1,238,000
Unemployed (%)	6.8	6.7
Employment (1980)	1,468	1,113,270
Agriculture (%)	31.9	3.0
Construction (%)	18.0	8.3
Manufacturing (%)	5.1	14.8
Trade (%)	12.2	22.6
Services (%)	17.6	30.6
Government (%)	3.7	6.7
Other (%)	11.5	14.0
Average Firm Size (1984)	9	13
Land Ownership (000's of Acres)	1,505	
Private (%)	14.6	
Indian (%)	0.0	
Public - State (%)	11.5	
Public - Other (%)	73.9	

Data compiled by Mountain West, sources available upon request.

TABLE 3.3

PROPERTY TAX PROFILE ($000's)
HARQUAHALA - MCMULLEN - BUTLER VALLEY

Jurisdiction	Primary Assessment			Secondary Assessment		
	Net Assessed Valuation	Tax Rate	Revenue	Net Assessed Valuation	Tax Rate	Revenue
STUDY AREA TOTAL (1986)	34,137	7.31	2,496	37,417	1.92	717
Legal Class						
2 Utilities	13,574	7.31	992	13,574	1.92	260
3 Commercial and Industrial	4,366	7.31	319	4,684	1.92	90
4 Agricultural and Vacant Land	9,729	7.31	711	11,975	1.92	230
5 Residential	3,537	7.31	259	3,740	1.92	72
6 Rental Residential	1,219	7.31	89	1,277	1.92	24
7 Railroads	1,713	7.31	125	2,167	1.92	42
Jurisdictions						
Arizona	34,137	0.38	130	37,417	0.00	0
Counties	34,137	2.32	793	37,417	0.41	140
Schools	34,137	3.29	1,124	37,417	1.37	512
Jr. / Community Colleges	34,137	1.32	449	7,242	0.08	6
Special Districts	5,173	0.00	0	11,808	0.51	60

Data compiled by Mountain West, sources available upon request.

TABLE 3.4

BASELINE SOCIOECONOMIC PROJECTIONS
HARQUAHALA - MCMULLEN - BUTLER VALLEY

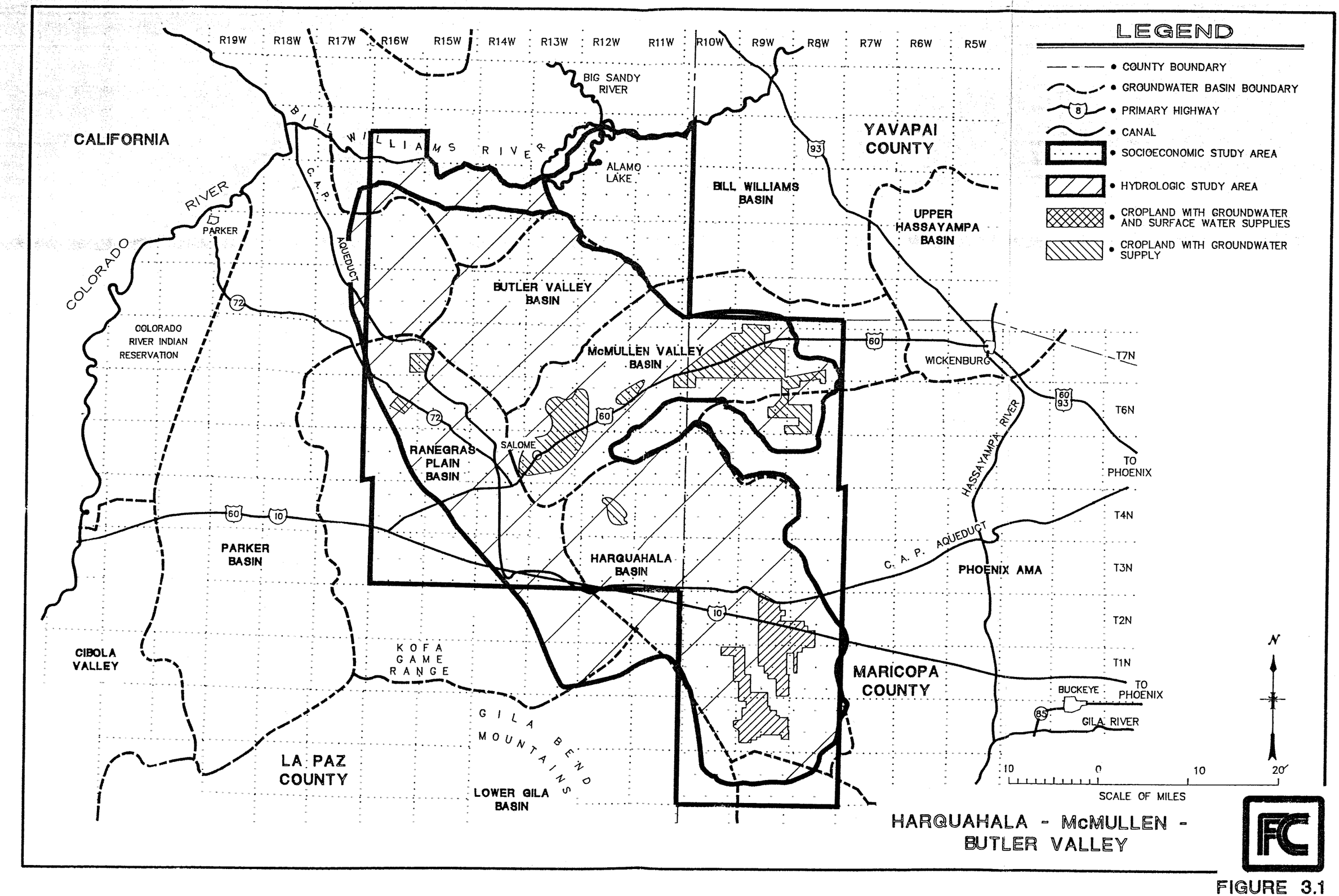
	198-	2010	2025
Population	3,900	5,300	6,500
Age 0-17 (%)	29.7	28.4	28.4
Age 18-64 (%)	52.4	53.7	53.7
Age 65+ (%)	17.9	17.9	17.9
School Enrollment	900	1,100	1,400
Employment	1,500	2,100	2,600
Agriculture (%)	30.7	21.4	17.8
Const. and Mfg. (%)	24.7	23.3	23.9
Trade (%)	13.0	12.7	13.3
Services (%)	15.0	24.1	25.3
Government (%)	4.7	3.8	3.6
Other (%)	12.0	14.6	16.1

TABLE 3.5

BASELINE TAX REVENUE PROJECTIONS ($000's)
HARQUAHALA - MCMULLEN - BUTLER VALLEY

	Primary			Secondary		
	1987	2010	2025	1987	2010	2025
Net Assessed Value	34,137	48,864	58,909	37,417	52,750	63,211
Ag. and Vacant (%)	28.5	19.9	16.5	32.0	22.7	18.9
Comm. and Indus. (%)	12.8	14.8	15.5	12.5	14.7	15.5
Residential (%)	13.9	13.5	13.5	13.4	13.2	13.3
Other (%)	44.8	51.8	54.4	42.1	49.4	52.2
Cities and Towns Total (%)	0.0	0.0	0.0	0.0	0.0	0.0
Property Tax Revenue	2,496	3,572	4,306	717	1,013	1,214
Arizona (%)	5.2	5.2	5.2	0.0	0.0	0.0
Counties (%)	31.7	31.7	31.7	20.8	20.8	20.8
Cities and Towns (%)	0.0	0.0	0.0	0.0	0.0	0.0
Schools (%)	45.0	45.0	45.0	70.8	70.8	70.8
Comm. Colleges (%)	18.1	18.1	18.1	0.0	0.0	0.0
Special Districts (%)	0.0	0.0	0.0	8.4	8.4	8.4
Key Non-Property Tax Revenue	Local Government Revenues					
	444	635	766			
County State Shared (%)	100.0	100.0	100.0			
City State Shared (%)	0	0	0			
City Sales (%)	0	0	0			

Source: Mountain West Research, March 1987.



HARQUAHALA - McMULLEN - BUTLER VALLEY

FIGURE 3.1

CHAPTER 4

VERDE RIVER - PRESCOTT AMA

4.1 GENERAL DESCRIPTION

The Verde River - Prescott AMA study area (Figure 4.1) contains two main watersheds, the Chino Valley and the Verde River Valley. Washes and creeks originating in the surrounding mountains carry flows to the valley floors and eventually to the Verde River. The range of elevations in the watershed is reflected in the vegetation, ponderosa pine on the plateau, juniper and chaparral at intermediate elevations, and cacti in the low-lying river valleys. Winter temperatures range from the teens to the high 40s or 50s. Sub-zero morning temperatures occur about twice a year. Summer temperatures fluctuate from the mid-50s to the high 80s. Rainfall averages 12 inches annually, with about 6 inches occurring during summer thunderstorms. The driest months are May and June.

4.2 CURRENT HYDROLOGIC PROFILES

The hydrologic study area includes major portions of the upper Verde River area, the Little Chino Valley portion of the Prescott AMA, and the Lower Big Chino Valley area. The entire hydrologic study area is in the Central Highlands Water Province, a transition zone between the Basin and Range and Plateau Uplands Provinces. Little and Big Chino Creeks and Granite Creek are the headwaters of the Verde River. The headwaters of the Agua Fria River occur in Prescott Valley, outside of the hydrologic study area and to the south of the Little Chino Valley.

Upper Verde River Area Groundwater. The regional aquifer in the upper Verde River area is the Verde Formation, and overlying alluvial deposits and basalt flows. Very deep wells penetrate aquifers in the Supai Formation and Redwall Limestone.

Water levels in the upper Verde River area regional aquifer range from flowing at the surface to almost 1300 ft below land surface. In most of the area, groundwater is under unconfined conditions. Confined conditions occur mainly in the Verde Formation but also may occur in the other rock units and/or alluvium. In most places, the alluvium in and along the Verde River is separated from the regional aquifer by several tens to several hundred feet of unsaturated rock. All groundwater in the area moves toward and parallel to the Verde River.

In the upper Verde River area, wells in the regional aquifer yield from about 10 to more than 1,000 gal/min. Many wells that penetrate the Verde Formation have yields of 200-300 gal/min and yields more than 1,000 gal/min have been reported. Springs issuing from the regional aquifer that sustain the base flow of the Verde River in channel or floodplain deposits generally yield less than 50 gal/min.

Little Chino Area Groundwater. The regional aquifer in the Little Chino Valley consists of alluvial deposits and interbedded basalt flows.

Depths to water in Little Chino Valley range from flowing at the surface (at and near Del Rio Springs) to more than 500 ft below land surface. Confined conditions occur primarily in the northern part of the area where a clay layer (and massive basalts) overlie the primary basalt aquifer. This clay also supports a perched aquifer. In addition, a barrier near Del Rio Springs forces groundwater flow upward

in that area. The unconfined zone in most of the valley is the mainly alluvial aquifer with local interbedded basalts. Movement of groundwater is mainly toward and parallel to Granite Creek and Little Chino Creek.

In Little Chino Valley, wells that penetrate the artesian zone of the primary basalt aquifer yield from 500 to more than 1,000 gal/min.

Lower Big Chino Valley Area Groundwater. The regional aquifer in the Lower Big Chino Valley consists of alluvial deposits and interbedded basalt flows.

Water levels in the Lower Big Chino Valley range from near land surface to more than 200 ft below land surface. Groundwater occurs under both confined and unconfined conditions. Movement of groundwater in the Lower Big Chino Valley is mainly southeasterly towards the headwaters of the Verde River, south and east of Paulden.

The lower Big Chino Valley appears to have wells capable of yielding in excess of 1,000 gal/min.

Water-level Declines. Data on water levels since the early 1950s throughout the area indicate no appreciable changes except in areas of concentrated pumping. Near the town of Chino Valley, water levels declined as much as 75 ft from 1940-82. These general conditions are expected to continue to the year 2025.

Water Quality. The regional aquifer in the Verde River area generally contains excellent quality water with median values of TDS ranging from the lower 200s to lower 400s mg/L in the rock units and 1,450 mg/L in the alluvium. Fluoride values are generally below EPA maximum contaminant levels, ranging from 0.1-0.7 mg/L for all aquifers.

Surface Water Resources. The Agua Fria River and the Verde River are the two major surface water sources in the hydrologic study area. The Agua Fria (at Mayer) flows from 0-617 cfs (cubic feet per second) with a mean of 3-5 cfs. The Verde River below Tangle Creek flows from 61-94,800 cfs with a mean of 384 cfs. The Verde River usually flows year-round, the Agua Fria River is dry more often. Peak flow volumes are generated from snow melt in both watersheds. Flash floods occur during the summer months, however, the floods contribute only minor volumes of water.

Groundwater Storage. Estimated groundwater in storage to a depth of 1,200 ft was about 47 million acre-feet in 1975 (Arizona Water Commission).

Table 4.1 shows the water budget for the hydrologic study area.

Irrigation Districts. The irrigation district within the study area is Chino Valley Irrigation District.

4.3 CURRENT SOCIOECONOMIC AND FISCAL PROFILES

The socioeconomic study area is comprised of a large portion of Yavapai County, one of the fastest growing counties in Arizona. It includes the Mingus Mountain, Prescott, and Verde Valley census divisions, and the cities and towns of Camp Verde, Chino Valley, Clarksdale, Cottonwood, Jerome, Prescott, Prescott Valley, and Sedona. The area is served by Yavapai Community College, ten school districts, and nine fire and flood control districts.

Population and School Enrollment. There were 57,511 persons living in the area according to the 1980 census (see Table 4.2). The population was considerably older than that of

Arizona as a whole, a reflection of the number of retirees now living in the area. The median age of the population was 39.0 years, compared with 29.2 years for Arizona. There were 11,855 children enrolled in area schools in 1980, about 83% of the population under the age of 18.

Household Income. Income in the socioeconomic study area is relatively low compared with that of the state. The median household income in 1980 was $13,300, more than $3,000 lower than that for Arizona.

Labor Force. Unemployment in the area is higher than the State average. According to the 1980 census, 8.1% of the 21,187 area residents in the civilian labor force were unemployed.

Employment. Ranching and copper mining were once the mainstays of the area's economy. However, as the area has grown, its economy has diversified. Now tourism, recreation, manufacturing, services, and government are the area's principal industries. Area employment by sector in 1980 was about 34.1% in services, 22.0% in trade, 11.9% in construction, and 4.6% in agriculture. The distribution of employment by sector in the area closely reflects that of the State as a whole.

Land Ownership. Much of the 1.6 million acres of land in the study area, about 57%, is publicly owned and managed by the U.S. Forest Service. About 32% is privately owned and about 11% is owned by the State.

Property Tax Base. Residential property is the largest source of property tax revenue in the socioeconomic study area (see Table 4.3). In 1986, the total primary net assessed valuation in the socioeconomic study area was about $337 million. Property was taxed at an overall rate of

$10.06 per $100 of the primary assessment and generated approximately $33.9 million in revenue. The secondary net assessed value totaled about $373 million. Property was taxed at a rate of $2.11 per $100 of the secondary assessment and generated about $7.9 million in tax revenue. Residential properties accounted for about 46% of the net primary assessment. Agricultural and vacant lands accounted for about $70.1 million, and commercial and industrial uses accounted for about $68 million in the primary assessment.

Property Tax Revenues. Schools in the socioeconomic study area received approximately $18.2 million in revenue generated from the primary assessment, and Yavapai County received $9.2 million.

Water Use per Economic Sector. Water use per employee per sector was estimated to be about 505 gpd per employee for all non-agricultural sectors.

4.4 BASELINE SOCIOECONOMIC AND FISCAL PROJECTIONS

Population and School Enrollment. The socioeconomic study area is projected to grow at a fairly high rate over the course of the projection horizon (see Table 4.4). Between 1987 and 2025 the population is projected to increase at a compound annual growth rate of approximately 2.5%, growing from 82,200 persons in 1987 to approximately 209,000 by 2025. School enrollment is projected to increase from 15,800 students in 1987 to approximately 37,600 by 2025.

Employment. Employment in the study area is projected to more than triple, growing from an estimated 24,400 jobs in 1987 to approximately 90,000 in 2025.

Property Tax Base. Primary net assessed value in the study area is projected to increase from approximately $336 million in 1987 to about $887 million by the year 2025 (see Table 4.5). Residential, commercial, and industrial properties are projected to grow during the economic expansion. The assessed values of agricultural and vacant lands are not projected to increase over the course of the projection horizon.

Property Tax Revenue. Total property tax revenues for the area are projected to almost triple by 2025. Tax revenues based on the primary assessment are projected to increase from about $33.9 million to about $90.2 million, and taxes based on the secondary assessment are projected to increase from about $7.9 million to about $21.3 million.

Non-property Tax Revenues. County state-shared revenues, city-state-shared revenues, and city sales tax collections are also projected to grow the projection horizon. City sales tax collections are projected to experience the largest proportionate increase as tourism and recreation activities become increasingly important elements in the area economy.

4.5 CONCLUSIONS AND RECOMMENDATION

Because of the current litigation surrounding water rights on the Verde River, FRANZOY COREY does not recommend this area for further study in Phase II.

TABLE 4.1
Water Transfer Study
Water Budget
Verde River - Prescott AMA

Line	Description	Year 1987	2010	2025
1	Water Demands (1,000 AF)			
2				
3	Municipal	14	27	35
4	Agricultural	48	48	48
5	Industrial	-	-	-
6	Conveyance losses	-	-	-
7	(evaporation and seepage)			
8	Other	-	-	-
9				
10	Total Demand	62	75	83
11				
12	Incidental Recharge (1,000 AF)			
13				
14	Muni (incl. effl. recharge)	7	13	18
15	Agricultural	12	12	12
16	Industrial	-	-	-
17	Conveyance Seepage	-	-	-
18				
19	Total Incidental Recharge	19	25	30
20				
21	Water Supplies (1,000 AF)			
22	Surface Water	36	36	36
23	Groundwater	26	39	47
24	Effluent Use (Direct)	-	-	-
25				
26	Total Supplies	62	75	83
27				
28	Natural Recharge	5	5	5
29				
30	Overdraft (1,000 AF)	2	9	12
31				
32	Variables			
33	Basin Population (1,000)	82.2	160.5	209.0
34	Irrigated Acreage (1,000)	9.0	9.0	9.0
35	Per Capita Muni. use (GPCD)	150	150	150
36	Avg. Crop Consump. Use (ft/yr)	4.0	4.0	4.0
37	Avg. Irrigation Efficiency	75.0%	75.0%	75.0%
38	Irrigation Recharge Factor	25.0%	25.0%	25.0%
39	Municipal Recharge Factor	50.0%	50.0%	50.0%
40	Industrial Recharge Factor	50.0%	50.0%	50.0%
41				
42	Overdraft = Line 10 minus Lines 19,22,24,28			
43				
44	Water in Storage to 1,200 ft. depth (1,000 AF)			
45	AZ Water Commission (1975)	46,800	46,700	46,600
46	Recoverable groundwater	15,000	14,900	14,800

Data compiled by FRANZOY COREY, sources available upon request
MAY 1987

TABLE 4.2

SOCIOECONOMIC PROFILE
VERDE RIVER - PRESCOTT AMA

Economic Component	Study Area	Arizona
Population (1980)	57,511	2,718,215
Age 0 - 17 (%)	24.8	29.2
Age 18 - 64 (%)	56.4	59.6
Age 65+ (%)	18.8	11.3
Median Age	39.0	29.2
School Enrollment (1980)	11,855	652,174
Median Household Income (1980)	13,300	16,448
Less Than $5,000 (%)	15.0	12.1
$5,000 - $14,999 (%)	41.2	33.3
$15,000 - $29,999 (%)	31.9	36.4
$30,000 - $39,999 (%)	7.0	10.2
$40,000 + (%)	4.9	8.0
Civilian Labor Force (1980)	21,187	1,238,000
Unemployed (%)	8.1	6.7
Employment (1980)	19,461	1,113,270
Agriculture (%)	4.6	3.0
Construction (%)	11.9	8.3
Manufacturing (%)	8.1	14.8
Trade (%)	22.0	22.6
Services (%)	34.1	30.6
Government (%)	6.6	6.7
Other (%)	12.7	14.0
Average Firm Size (1984)	6	13
Land Ownership (000's of Acres)	1,609	
Private (%)	31.9	
Indian (%)	0.0	
Public - State (%)	10.9	
Public - Other (%)	57.2	

Data compiled by Mountain West, sources available upon request.

TABLE 4.3

PROPERTY TAX PROFILE ($000's)
VERDE RIVER - PRESCOTT AMA

Jurisdiction	Primary Assessment			Secondary Assessment		
	Net Assessed Valuation	Tax Rate	Revenue	Net Assessed Valuation	Tax Rate	Revenue
STUDY AREA TOTAL (1986)	336,524	10.06	33,863	372,763	2.11	7,860
Legal Class						
1 Mines / Timber	84	10.06	8	84	2.11	2
2 Utilities	39,194	10.06	3,944	39,194	2.11	826
3 Commercial and Industrial	68,167	10.06	6,859	77,753	2.11	1,640
4 Agricultural and Vacant Land	70,067	10.06	7,051	86,817	2.11	1,831
5 Residential	127,478	10.06	12,827	134,661	2.11	2,839
6 Rental Residential	27,239	10.06	2,741	29,114	2.11	614
7 Railroads	4,274	10.06	430	5,115	2.11	108
8 Historic Property	21	10.06	2	25	2.11	1
Jurisdictions						
Arizona	336,524	0.38	1,279	372,763	0.00	0
Yavapai County	336,524	2.73	9,196	372,763	0.41	1,536
Towns and Cities	154,647	0.40	621	168,561	0.40	675
Schools	336,524	5.41	18,210	372,763	0.83	3,075
Yavapai Community College	336,524	1.24	4,179	0	0.00	0
Special Districts	336,524	0.11	378	143,453	1.79	2,574

Data compiled by Mountain West, sources available upon request.

TABLE 4.4

BASELINE SOCIOECONOMIC PROJECTIONS
VERDE RIVER - PRESCOTT AMA

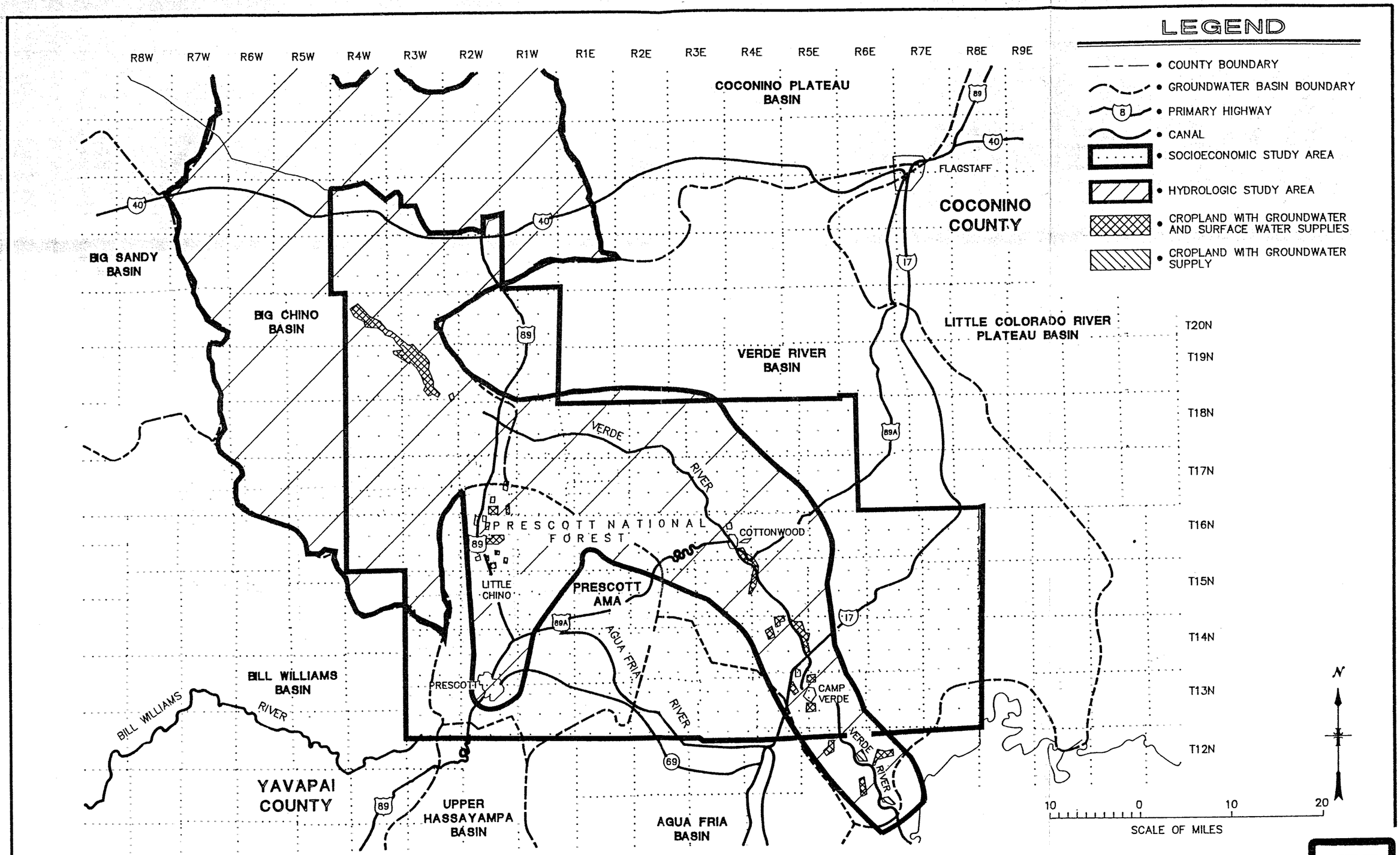
	1987	2010	2025
Population	82,200	160,500	209,000
Age 0-17 (%)	24.1	22.3	22.3
Age 18-64 (%)	54.7	57.1	57.1
Age 65+ (%)	21.3	20.6	20.6
School Enrollment	15,800	28,900	37,600
Employment	24,400	54,000	90,000
Agriculture (%)	4.2	1.9	1.1
Const. and Mfg. (%)	24.1	18.7	16.2
Trade (%)	23.3	27.9	31.9
Services (%)	29.9	35.3	35.5
Government (%)	6.6	7.0	7.2
Other (%)	11.8	9.2	8.0

TABLE 4.5

BASELINE TAX REVENUE PROJECTIONS ($000's)
VERDE RIVER - PRESCOTT AMA

	Primary			Secondary		
	1987	2010	2025	1987	2010	2025
Net Assessed Value	336,524	624,948	887,406	372,763	682,984	966,769
Ag. and Vacant (%)	20.8	11.2	7.9	23.3	12.7	9.0
Comm. and Indus. (%)	20.3	24.7	29.2	20.9	25.8	30.5
Residential (%)	46.0	48.3	44.3	43.9	46.8	43.1
Other (%)	12.9	15.8	18.6	11.9	14.7	17.4
Cities and Towns Total (%)	46.0	64.6	70.2	45.2	62.1	68.6
Property Tax Revenue	33,863	63,349	90,153	7,860	14,861	21,287
Arizona (%)	3.8	3.7	3.7	0.0	0.0	0.0
Counties (%)	27.2	27.0	26.9	19.5	18.9	18.7
Cities and Towns (%)	1.8	2.6	2.8	8.6	11.4	12.5
Schools (%)	53.8	53.4	53.3	39.1	37.9	37.5
Comm. College (%)	12.3	12.2	12.2	0.0	0.0	0.0
Special Districts (%)	1.1	1.1	1.1	32.8	31.7	31.4
Key Non-Property Tax Revenue	Local Government Revenues					
	16,783	36,119	50,395			
County State Shared (%)	22.1	19.0	19.4			
City State Shared (%)	70.0	71.2	68.2			
City Sales (%)	8.0	9.8	12.4			

Source: Mountain West Research, March 1987.



CAMP VERDE - PRESCOTT AMA

FIGURE 4.1

CHAPTER 5

MOGOLLON RIM

5.1 GENERAL DESCRIPTION

The Mogollon Rim study area (Figure 5.1) is located north of the Mogollon Rim in northeast Arizona. The area includes ponderosa pine forest near Show Low City and flat, high-desert mesas that drain into the Little Colorado River north of Snowflake. In Show Low City, winter temperatures range from the upper teens to the mid-40s. Summer temperatures range from the mid-50s to the mid-80s. Precipitation averages 15.5 inches annually. More than half of the winter precipitation occurs as snow, which averages 40 inches annually.

5.2 CURRENT HYDROLOGIC PROFILES

The hydrologic study area includes the Concho, St. Johns and White Mountain areas in Apache County and the Chevelon, Holbrook, Snowflake, and Canyon Diablo areas of southern Navajo and Coconino counties. All of the area is above the Mogollon Rim in the mountainous areas of northeast Arizona. The Little Colorado River and its major tributaries, Silver, Chevelon, and Clear creeks drain the area.

Area Groundwater. The major source of groundwater is the Coconino aquifer, which includes the lower portions of the Kaibab Limestone, the Coconino Sandstone and the upper portions of the Supai Formation. To a lesser extent on an area-wide basis, river alluvium, volcanic rocks and sedimentary rocks above and below the Coconino aquifer provide groundwater to local areas. The Coconino aquifer attains a maximum thickness ranging from about 730 ft in southern Apache County to about 900 ft in southern Navajo and Coconino counties. Groundwater in the Coconino is

mostly unconfined to semi-confined, but is perched or confined locally. Water levels range from several feet above land surface (artesian wells) to more than 2,500 ft below land surface north of Flagstaff. Wells that penetrate underlying limestone aquifers can have water levels more than 2,500 ft to 3,000 ft below land surface. Wells that are located in alluvial deposits near-surface or in volcanics have relatively shallow water levels. Most wells in the Coconino aquifer are capable of producing 1,000 gal/min or more.

Water-level Declines. Water-level declines in the Coconino aquifer are directly related to areas of concentrated pumping. The Holbrook-Joseph City and Snowflake-Shumway areas in southern Navajo County have experienced long-term declines of more than 50 ft. In southern Apache County, many areas show seasonal water-level fluctuations in response to pumping but negligible long-term changes. Concentrated pumping for power plants near St. Johns and Springerville will result in long-term water-level declines. Pumping in southern Coconino County has not resulted in significant declines in water levels. Significant areas of concentrated pumping such as for power plants or greatly expanded urban pumping will strongly impact water levels by the year 2025. Other areas will show negligible long-term declines.

Water Quality. TDS values vary considerably within the study area and depend on the source of water. In southern Apache County, TDS values from the Coconino aquifer generally range from less than 125 mg/L to about 1,000 mg/L. TDS concentrations increase in a northerly direction to more than 64,000 mg/L. In southern Navajo County is a similar situation. Water from the Coconino aquifer has TDS values ranging from less than 350 mg/L in the southern part of the area to as much as 68,000 mg/L in the northern part of the area. In southern Coconino County, TDS values from the

Coconino aquifer generally are less than 500 mg/L. The only portion of the hydrologic study area that has fluoride values exceeding the EPA maximum contaminant level is the area surrounding St. Johns.

Groundwater Storage. Groundwater in storage in the Coconino aquifer underlying the study area totals about 86 million acre-feet. This value was estimated assuming an average saturated thickness ranging from about 320 ft to 400 ft, an average specific yield of five percent, and an area of roughly 7,600 square miles.

Surface Water Resources. The Little Colorado River flows at Woodruff range from 0-25,000 cfs, with a mean of 43 cfs. The Little Colorado River source water originates from surfacing groundwater, snow melt, and to a very minor extent, summer storms.

Table 5.1 shows the water budget for the hydrologic study area.

Irrigation Districts. The two irrigation districts within the study area are Show Low Water Conservation District and Show Low Irrigation Company.

5.3 CURRENT SOCIOECONOMIC AND FISCAL PROFILE

The socioeconomic study area is comprised of portions of Navajo and Apache counties on the northern side of the Mogollon Rim, and a small adjacent portion of Coconino County. It includes the Snowflake and Eager-Springerville census divisions, and the towns of Show Low City, Lakeside, Pinetop, Snowflake, Taylor, Eager, and Springerville. The area is served by Northland Junior College. There are nine school districts and eight fire and flood control districts.

Population and School Enrollment. There were 25,901 persons living in the area according to the 1980 census (see Table 5.2). The population is relatively young. In 1980, the median age was 22.2 years, as compared with 29.2 for Arizona. About 9,100 children, approximately 90% of the population under 18 years of age, were enrolled in area schools in 1980.

Household Income. Study area household income is slightly higher than that for the state as a whole. The median household income in 1980 was $16,900, compared with $16,448 for Arizona.

Labor Force. Unemployment in the socioeconomic study area is relatively high. According to the 1980 census, 9.6% of the 9,916 area residents in the civilian labor force were unemployed.

Employment. Tourism, recreation, forest products, mining, and ranching are the principal economic industries in the study area. Show Low City and Pinetop-Lakeside also serve as the regional trade and services centers for the southern portion of Navajo County and portions of southern Apache County. Area employment by economic sector in 1980 was 27.5% in manufacturing and construction, 24.3% in services, and 21.5% in trade. Agriculture accounts for 7.9% of employment.

Land Ownership. The study area encompasses about 2.3 million acres, much of which is managed by the U.S. Forest Service. About 53.5% of the land is owned as other public land, 16.6% is state owned, 22.5% is privately owned, and 7.4% is Indian land.

Property Tax Base. In 1986, the largest source of property tax revenue in the area was utilities. (see Table 5.3). The

1986 total net primary assessment was about $455 million. Property was taxed at a rate of $5.77 per $100 of the primary assessment and generated about $26.3 million in revenue. The secondary net assessed value totaled about $498 million, was taxed at a rate of $1.64 per $100 of the secondary assessment, and generated about $8.2 million in revenue. Utilities account for more than $280 million in primary net assessed value due largely to the presence of the Springerville Generating Station. Residential properties account for $63.2 million, and commercial and industrial property $57.8 million in primary net assessed value.

Property Tax Revenues. Schools in the socioeconomic study area received $12.8 million in revenue from property tax on the primary net assessment, and the counties received $10.8 million.

Water Use per Economic Sector. Water use per employee per economic sector was estimated to be about 590 gpd per employee for all non-agricultural sectors.

5.4 BASELINE SOCIOECONOMIC AND FISCAL PROJECTIONS

Population and School Enrollment. The socioeconomic study area is projected to grow at a relatively moderate rate during the projection period (see Table 5.4). The population is projected to grow at an annual compound growth rate of 1.7% per year, increasing from about 28,100 in 1987 to about 52,600 by 2025. School enrollment is projected to grow from about 9,300 to approximately 16,000 over the projection horizon.

Employment. Employment is projected to approximately double in this period. The largest increase is projected for the trade and service sectors. Construction employment is

projected to decline and agricultural employment to remain relatively constant over the projection horizon.

Property Tax Base. Net primary assessed value is projected to grow from approximately $455 million in 1987 to about $685 million by the year 2025 (see Table 5.5). Residential, commercial, and industrial use classes are projected to grow during the economic expansion. The net assessed value of agricultural and vacant lands is not projected to increase.

Property Tax Revenues. Property tax revenues are projected to increase from about $26.3 million to about $42.1 million by the year 2025.

Non-property Tax Revenues. County state-shared revenues, city state-shared revenues, and city sales tax collection are also projected to grow over the projection horizon. County state-shared revenues are projected to increase from $5.5 million to $8.2 million, city state-shared revenues are projected to increase from $4.0 million to $8.4 million, and city sales tax collections are projected to increase from $3.6 million to $8.4 million, as calculated from Table 5.5. The relatively large size of the growth in city sales tax collections is due to the projected growth in tourist and recreational activities in the socioeconomic study area.

5.5 CONCLUSIONS AND RECOMMENDATION

The physical infrastructure to transfer water is not clearly evident, but the water rights may become an issue if the Salt River system is used to transfer water. FRANZOY COREY recommends this area for further study in Phase II because the justifications to eliminate this area from further study are not strong.

TABLE 5.1
Water Transfer Study
Water Budget
Mogollon Rim

Line	Description	Year 1987	2010	2025
1	**Water Demands (1,000 AF)**			
2				
3	Municipal	5	7	9
4	Agricultural	28	28	28
5	Industrial	–	–	–
6	Conveyance losses	–	–	–
7	(evaporation and seepage)			
8	Other Demands	–	–	–
9				
10	Total Demand	33	35	37
11				
12	**Incidental Recharge (1,000 AF)**			
13				
14	Muni (incl. effl. recharge)	2	4	4
15	Agricultural	6	6	6
16	Industrial	–	–	–
17	Conveyance Seepage	–	–	–
18				
19	Total Incidental Recharge	8	10	10
20				
21	**Water Supplies (1,000 AF)**			
22	Surface Water	0	0	0
23	Groundwater	33	35	37
24	Effluent Use (Direct)	–	–	–
25				
26	Total Supplies	33	35	37
27				
28	**Natural Recharge**	112	112	112
29				
30	**Overdraft (1,000 AF)**	0	0	0
31				
32	Variables			
33	Basin Population (1,000)	28.1	43.1	52.6
34	Irrigated Acreage (1,000)	5.5	5.5	5.5
35	Per Capita Muni. use (GPCD)	150	150	150
36	Avg. Crop Consump. Use (ft/yr)	4.0	4.0	4.0
37	Avg. Irrigation Efficiency	80.0%	80.0%	80.0%
38	Irrigation Recharge Factor	20.0%	20.0%	20.0%
39	Municipal Recharge Factor	50.0%	50.0%	50.0%
40	Industrial Recharge Factor	50.0%	50.0%	50.0%
41				
42	Overdraft = Line 10 Minus Lines 19, 22, 24, 28			
43				
44	Water in Storage for the Coconino Aquifer (1,000 AF)			
45	AZ Water Commission (1975)	86,000	86,000	86,000
46	Recoverable groundwater	43,000	43,000	43,000

Data compiled by FRANZOY COREY, sources available upon request.
MAY 1987

TABLE 5.2

SOCIOECONOMIC PROFILE
MOGOLLON RIM

Economic Component	Study Area	Arizona
Population (1980)	25,901	2,718,215
Age 0 - 17 (%)	39.1	29.2
Age 18 - 64 (%)	54.1	59.6
Age 65+ (%)	6.8	11.3
Median Age	22.2	29.2
School Enrollment (1980)	9,126	652,174
Median Household Income (1980)	16,900	16,448
Less Than $5,000 (%)	11.3	12.1
$5,000 - $14,999 (%)	14.5	33.3
$15,000 - $29,999 (%)	40.6	36.4
$30,000 - $39,999 (%)	10.3	10.2
$40,000 + (%)	6.3	8.0
Civilian Labor Force (1980)	9,916	1,238,000
Unemployed (%)	9.6	6.7
Employment (1980)	8,960	1,113,270
Agriculture (%)	7.9	3.0
Construction (%)	14.7	8.3
Manufacturing (%)	12.8	14.8
Trade (%)	21.5	22.6
Services (%)	24.3	30.6
Government (%)	4.2	6.7
Other (%)	14.6	14.0
Average Firm Size (1984)	8	13
Land Ownership (000's of Acres)	2,270	
Private (%)	22.5	
Indian (%)	7.4	
Public - State (%)	16.6	
Public - Other (%)	53.5	

Data compiled by Mountain West, sources available upon request.

TABLE 5.3

PROPERTY TAX PROFILE ($000's)
MOGOLLON RIM

Jurisdiction	Primary Assessment			Secondary Assessment		
	Net Assessed Valuation	Tax Rate	Revenue	Net Assessed Valuation	Tax Rate	Revenue
STUDY AREA TOTAL (1986)	455,302	5.77	26,286	497,512	1.64	8,182
Legal Class						
2 Utilities	280,083	5.77	16,170	280,083	1.64	4,606
3 Commercial and Industrial	57,801	5.77	3,337	64,377	1.64	1,059
4 Agricultural and Vacant Land	43,143	5.77	2,491	66,360	1.64	1,091
5 Residential	63,191	5.77	3,648	74,143	1.64	1,219
6 Rental Residential	9,148	5.77	528	10,532	1.64	173
7 Railroads	1,933	5.77	112	2,013	1.64	33
8 Historic Property	3	5.77	0	3	1.64	0
Jurisdictions						
Arizona	455,302	0.38	1,730	497,512	0.00	0
Counties	455,302	2.37	10,788	497,512	0.34	1,672
Towns and Cities	71,922	0.00	0	88,282	0.00	0
Schools	455,302	2.82	12,819	497,512	1.12	5,550
Jr / Community Colleges	161,450	0.59	949	197,297	0.00	0
Special Districts	0	0.00	0	148,904	0.64	960

Data compiled by Mountain West, sources available upon request.

TABLE 5.4

BASELINE SOCIOECONOMIC PROJECTIONS
MOGOLLON RIM

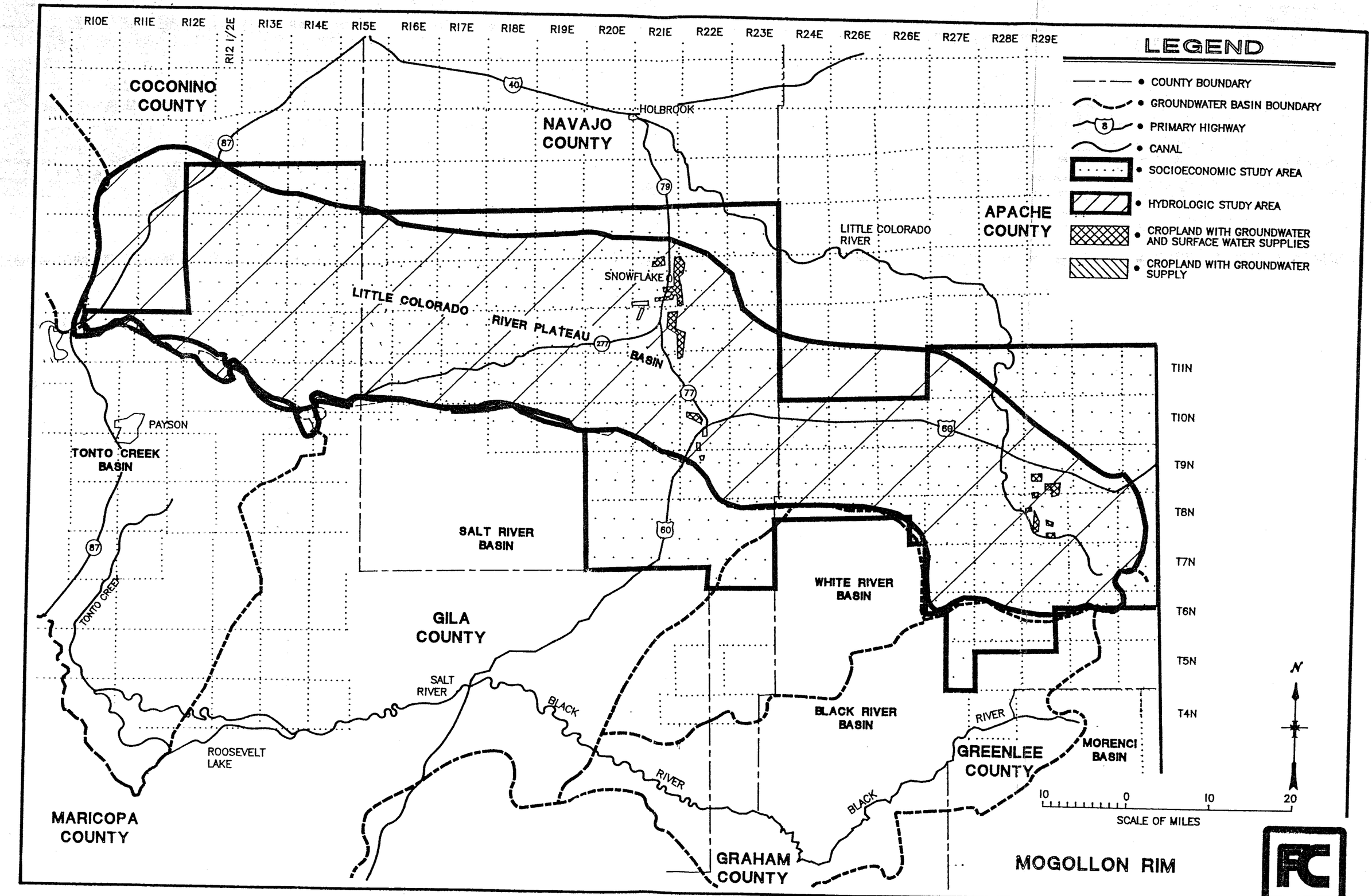
	1987	2010	2025
Population	28,100	43,100	52,600
Age 0 - 17 (%)	35.9	33.2	33.2
Age 18-64 (%)	54.5	55.0	55.0
Age 65+ (%)	9.6	11.7	11.7
School Enrollment	9,300	13,100	16,000
Employment	11,300	16,700	22,800
Agriculture (%)	6.4	4.3	3.2
Const. and Mfg. (%)	32.4	29.1	30.2
Trade (%)	20.3	23.4	23.6
Services (%)	23.9	26.6	27.6
Government (%)	3.7	3.6	3.2
Other (%)	13.2	13.1	12.2

TABLE 5.5

BASELINE TAX REVENUE PROJECTIONS ($000)
MOGOLLON RIM

	Primary			Secondary		
	1987	2010	2025	1987	2010	2025
Net Assessed Value	455,302	608,240	684,638	497,512	660,439	744,843
Ag. and Vacant (%)	9.5	7.1	6.3	13.3	10.0	8.9
Comm. and Indus. (%)	12.7	14.4	17.7	12.9	14.8	18.1
Residential (%)	15.9	18.2	19.8	17.0	19.7	21.3
Other (%)	61.9	60.3	56.2	56.7	55.5	51.7
Cities and Towns Total (%)	15.8	29.5	35.6	17.7	33.1	48.8
Property Tax Revenue	26,286	37,422	42,122	8,182	11,855	15,629
Arizona (%)	6.6	6.2	6.2	0.0	0.0	0.0
Counties (%)	41.0	38.5	38.5	20.5	20.4	20.4
Cities and Towns (%)	0.0	0.0	0.0	0.0	0.0	0.0
Schools (%)	48.8	45.8	45.8	67.8	67.9	67.9
Arizona Western (%)	3.6	9.5	9.5	0.0	0.0	0.0
Special Districts (%)	0.0	0.0	0.0	11.7	11.7	11.7
Key Non-Property Tax Revenue	Local Government Revenues					
	13,098	20,042	25,046			
County State Shared (%)	41.7	36.4	32.8			
City State Shared (%)	30.6	33.4	33.5			
City Sales (%)	27.7	30.2	33.7			

Source: Mountain West Research, March 1987.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T4N
COCONINO COUNTY
NAVAJO COUNTY
APACHE COUNTY
GILA COUNTY
MARICOPA COUNTY
GREENLEE COUNTY
GRAHAM COUNTY
HOLBROOK
SNOWFLAKE
PAYSON
LITTLE COLORADO RIVER
LITTLE COLORADO RIVER PLATEAU BASIN
TONTO CREEK BASIN
SALT RIVER BASIN
WHITE RIVER BASIN
BLACK RIVER BASIN
MORENCI BASIN
TONTO CREEK
SALT RIVER
ROOSEVELT LAKE
BLACK RIVER
BLACK RIVER
MOGOLLON RIM
40
87
79
277
77
69
60
87
LEGEND
COUNTY BOUNDARY
GROUNDWATER BASIN BOUNDARY
PRIMARY HIGHWAY
CANAL
SOCIOECONOMIC STUDY AREA
HYDROLOGIC STUDY AREA
CROPLAND WITH GROUNDWATER AND SURFACE WATER SUPPLIES
CROPLAND WITH GROUNDWATER SUPPLY
N
10 0 10 20
SCALE OF MILES

FIGURE 5.1

CHAPTER 6

PINAL AMA

6.1 GENERAL DESCRIPTION

The Pinal AMA study area (Figure 6.1) is a flat desert valley (elevation about 1,400 ft) located between the Casa Grande and Sacaton mountains (elevations about 2,400 ft). Annual precipitation is about 8 inches. Winter temperatures range from the low 40s to the mid-60s. Summer temperatures range from the high 60s to above 110 degrees.

6.2 CURRENT HYDROLOGIC PROFILES

The hydrologic study area includes the major agricultural areas of the Pinal Active Management Area (AMA). The area is located within the Basin and Range Lowlands Water Province, characterized by northwest-southeast and east-west trending alluviated basins largely encompassed by similarly trending mountain ranges.

Area Groundwater. The major source of groundwater is from thick basin-fill deposits. An upper unit of about 1,200 ft maximum thickness is underlain by a thick, fine-grained unit at least 2,300 ft thick locally. This fine-grained unit contains interbedded primary and secondary accumulations of evaporites. The fine-grained unit is underlain by a conglomeritic unit. The entire basin-fill sequence varies in thickness from 0 ft along the basin peripheries to more than an estimated 9,000 ft south of Eloy. Groundwater in the upper unit is generally unconfined; however, perched or semi-perched conditions also occur. The fine-grained unit is considered an aquiclude, but thin sandy sub-units yield minor quantities of water. Groundwater in the lower conglomerate is generally confined, but is also unconfined where the fine-grained unit does not directly overlie it.

Depths to groundwater range from about 100 ft to more than 500 ft within the hydrologic study area. Most wells in the hydrologic study area are capable of producing 1,000 gal/min or more.

Water-level Declines. Since 1923, water levels along the eastern portion of the hydrologic study area have declined from about 50 ft to more than 300 ft. Within the same time frame, water levels along the western portion of the hydrologic study area have declined from about 50 ft to nearly 500 ft. The imminent introduction of CAP water into the hydrologic study area should arrest, if not reverse, these severe declines. Water levels in 2025 should be no lower than present levels, and will probably be higher.

Water Quality. Specific conductance, a direct function of total dissolved solids (TDS), apparently increases from south to north along the eastern portion of the hydrologic study area. This increase may be attributable to penetration of evaporites and improper construction of the wells, or from the degraded quality of the perched water. In any event, the range of available specific conductance data is about 400-3,500 micromhos/cm. In the western portion, the range of available specific conductance data is about 400-5,400 micromhos/cm, with a similar apparent increase from south to north. Fluoride concentrations range from 0.2-4 mg/L. In the hydrologic study area much of the groundwater exceeds the 1.4 mg/L EPA maximum contaminant level for public water supplies.

Groundwater Storage. Estimated groundwater in storage to a depth of 1,200 ft in the entire Lower Santa Cruz Basin was about 91 million acre-feet in 1975 (Arizona Water Commission). Estimated groundwater in storage to a depth of 1,000 ft in an area approximately the same as the hydrologic study area was about 44 million acre-feet in 1964 (Bureau of Reclamation, 1976).

Surface Water Resources. The Gila and Santa Cruz rivers and Santa Rosa Wash are main sources of surface water to the area. The Santa Cruz River and Santa Rosa Wash are ephemeral and flow only during large storms. The majority of the source waters for the Gila River originate in east-central Arizona and west-central New Mexico. The Gila River is controlled by San Carlos Dam and almost all releases from the dam have been for downstream rises. Except during rare flood events, the entire Gila River is diverted for beneficial uses at Ashurst-Hayden Dam. Downstream of Ashurst-Hayden Dam, the Gila River is ephemeral.

Table 6.1 shows the water budget for the hydrologic study area.

Irrigation Districts. The four irrigation districts within the study area are Central Arizona Irrigation and Drainage District, HoHoKam Irrigation and Drainage District, San Carlos Irrigation and Drainage District, and Maricopa-Stanfield Irrigation and Drainage District.

6.3 CURRENT SOCIOECONOMIC AND FISCAL PROFILES

The socioeconomic study area is comprised of a large portion of Pinal County. It includes the Casa Grande, Coolidge, Eloy, Florence, and parts of the Maricopa-Stanfield census divisions. The area contains Pinal County Junior College, 11 school districts, and 5 fire and flood control districts.

Population and School Enrollment. There were 48,460 persons living in the socioeconomic study area according to the 1980 census (see Table 6.2). The median age of the area population is 26.7 years, which is younger than that of Arizona. About 13,850 children (nearly 82% of the area population under the age of 18 years) were enrolled in school in 1980.

Household Income. Income in the socioeconomic study area is relatively low. The median household income in 1980 was about $12,900, compared with about $16,450 for Arizona.

Labor Force. Unemployment in the socioeconomic study area is relatively high. According to the 1980 census, about 8.6% of the 18,335 area residents in the civilian labor force were unemployed.

Employment. Agriculture is the principal economic activity in the area. Casa Grande, the largest city in Pinal County, serves as a regional center for surrounding agricultural communities. Casa Grande is pursuing an aggressive economic recruitment and diversification program to take advantage of its location in the State's "central corridor". Area employment by economic sector in 1980 was about 17.5% in agriculture and mining, about 17.2% in trade and about 29.7% in services.

Land Ownership. The study area encompasses about 1.7 million acres, most of which is privately owned. About 38.2% of the land is privately owned, about 27.1% is state-owned, and about 25.5% is Indian land.

Property Tax Base. In 1986, the primary net assessed value in the socioeconomic study area totaled $205 million with agricultural lands the largest source of property tax revenue (see Table 6.3). Property was taxed at a rate of $9.41 per $100 of the primary assessment and generated approximately $19.3 million in revenue. The secondary net assessed value was about $220 million. Property was taxed at a rate of $1.78 per $100 of the secondary assessment and generated about $3.9 million in tax revenue. Agricultural and vacant lands were the largest use class, followed by utilities, commercial and industrial, and residential uses.

Property Tax Revenues. Schools in the area received $8.2 million in revenue from property taxes based on the primary assessment. The county received $5.6 million and towns and cities received $0.9 million.

Water Use per Economic Sector. Water use per employee per economic sector was estimated to be about 540 gpd per employee for all non-agricultural sectors.

6.4 BASELINE SOCIOECONOMIC AND FISCAL PROJECTIONS

Significant growth is projected for the study area (see Table 6.4). The population is projected to grow at an annual compound rate of 2.6% between 1987 and 2025, increasing from about 59,000 persons to about 151,000 by 2025. School enrollment is projected to grow from about 14,200 students in 1987 to almost 34,000 by 2025.

Employment. The area economy is projected to almost triple in size, and shift its orientation from agriculture to manufacturing. Total employment is projected to increase from approximately 19,900 jobs to 58,500 by 2025. Agricultural employment is projected to decline from almost 15% to about 4% while manufacturing employment is projected to increase from 25% to about 40%.

Property Tax Base. Primary net assessed value in the socioeconomic study area is projected to increase from about $205 million in 1987 to about $519 million by the year 2025 (see Table 6.5). Commercial, industrial, and residential property values are projected to grow along with the economic expansion. The net assessed value of agricultural and vacant lands is projected to decline during the projection period.

Property Tax Revenues. Total property tax revenues are projected to more than double by 2025. Tax collections based on the primary assessment are projected to increase from about $19.3 million to $50 million and taxes based on the secondary assessment are projected to increase from $3.9 to $9.8 million during this time span.

Non-property Tax Revenues. County state-shared revenues, city state-shared revenues, and city sales tax collections are also projected to grow. County state-shared revenues are projected to increase from $2.5 million to $6.2 million, city state-shared revenues are projected to increase from $8.4 million to $24.9 million, and city sales tax collections are projected to increase from $4.1 million to $13.4 million, as calculated from Table 6.5.

6.5 CONCLUSIONS AND RECOMMENDATION

The Pinal AMA area has the largest overdraft condition of any study area and the overdraft condition is projected to remain high even with implementation of stringent conservation measures. By 2025, the overdraft rate is expected to decrease from the current annual rate of 1,073,000 acre-feet to 430,000 acre-feet as mandated by the Pinal AMA water management plan. This reduction would enable the area to meet the study's minimum 100-year supply criterion.

The area has an estimated 32.3 million acre-feet of recoverable groundwater. Water rights in the area already have been transferred. The City of Mesa acquired approximately 12,000 acres of land in this area specifically for its water rights. FRANZOY COREY recommends this area for further study in Phase II both because a precedent for water transfer has been established in the area and because of the large volume of recoverable groundwater.

TABLE 6.1
Water Transfer Study
Water Budget
Pinal AMA

Line	Description	Year 1987	2010	2025
1	**Water Demands (1,000 AF)**			
2				
3	Municipal	12	23	25
4	Agricultural	1,423	1,205	974
5	Industrial	-	-	-
6	Conveyance losses	-	-	-
7	(evaporation and seepage)			
8	Area Export	-	-	36
9				
10	Total Demand	1,435	1,228	1,035
11				
12	**Incidental Recharge (1,000 AF)**			
13				
14	Muni (incl. effl. recharge)	6	12	13
15	Agricultural	213	145	97
16	Industrial	-	-	-
17	Conveyance Seepage	-	-	-
18				
19	Total Incidental Recharge	219	157	110
20				
21	**Water Supplies (1,000 AF)**			
22	Surface Water	92	532	445
23	Groundwater	1,343	696	590
24	Effluent Use (Direct)	-	-	-
25				
26	Total Supplies	1,435	1,228	1,035
27				
28	**Natural Recharge**	26	26	26
29				
30	**Overdraft (1,000 AF)**	1,098	513	454
31				
32	Variables			
33	Basin Population (1,000)	59.0	120.8	151.1
34	Irrigated Acreage (1,000)	284.5	260.0	230.0
35	Per Capita Muni. use (GPCD)	186	170	150
36	Avg. Crop Consump. Use (ft/yr)	4.0	3.8	3.6
37	Avg. Irrigation Efficiency	80.0%	82.0%	85.0%
38	Irrigation Recharge Factor	15.0%	12.0%	10.0%
39	Municipal Recharge Factor	50.0%	50.0%	50.0%
40	Industrial Recharge Factor	50.0%	50.0%	50.0%
41				
42	Overdraft = Line 10 Minus Lines 19, 22, 24, 28			
43				
44	Water in Storage to 1,200 ft. depth (1,000 AF)			
45	AZ Water Commission (1975)	77,800	63,700	56,500
46	Recoverable groundwater	32,300	18,200	11,000

Data compiled by FRANZOY COREY, sources available upon request.

TABLE 6.2

SOCIOECONOMIC PROFILE
PINAL AMA

Economic Component	Study Area	Arizona
Population (1980)	48,460	2,718,215
Age 0 - 17 (%)	35.2	29.2
Age 18 - 64 (%)	55.7	59.6
Age 65+ (%)	9.1	11.3
Median Age	26.7	29.2
School Enrollment (1980)	13,846	652,174
Median Household Income (1980)	12,900	16,448
Less Than $5,000 (%)	18.8	12.1
$5,000 - $14,999 (%)	39.0	33.3
$15,000 - $29,999 (%)	32.8	36.4
$30,000 - $39,999 (%)	5.4	10.2
$40,000 + (%)	4.0	8.0
Civilian Labor Force (1980)	18,335	1,238,000
Unemployed (%)	8.6	6.7
Employment (1980)	16,725	1,113,270
Agriculture (%)	17.5	3.0
Construction (%)	5.3	8.3
Manufacturing (%)	10.0	14.8
Trade (%)	17.2	22.6
Services (%)	29.7	30.6
Government (%)	12.1	6.7
Other (%)	8.2	14.0
Average Firm Size (1984)	11	13
Land Ownership (000's of Acres)	1,659	
Private (%)	38.2	
Indian (%)	25.5	
Public - State (%)	27.1	
Public - Other (%)	9.2	

Data compiled by Mountain West, sources available upon request.

TABLE 6.3

PROPERTY TAX PROFILE ($000's)
PINAL AMA

Jurisdiction	Primary Assessed Revenue			Secondary Assessed Revenue		
	Net Assessed Valuation	Tax Rate	Revenue	Net Assessed Valuation	Tax Rate	Revenue
STUDY AREA TOTAL (1986)	204,621	9.41	19,251	220,220	1.78	3,924
Legal Class						
1 Mines / Timber	1,750	9.41	165	1,750	1.78	31
2 Utilities	53,685	9.41	5,051	53,685	1.78	957
3 Commercial and Industrial	47,122	9.41	4,433	50,212	1.78	895
4 Agricultural and Vacant Land	60,579	9.41	5,699	70,720	1.78	1,260
5 Residential	39,201	9.41	3,688	41,062	1.78	732
6 Rental Residential	832	9.41	78	959	1.78	17
7 Railroads	1,446	9.41	136	1,827	1.78	33
8 Historic Property	6	9.41	1	7	1.78	0
Jursidictions						
Arizona	204,621	0.38	778	220,220	0.00	0
Pinal County	204,621	2.73	5,591	220,220	0.41	907
Towns and Cities	88,993	1.02	912	94,695	0.07	66
Schools	204,621	4.03	8,243	220,220	1.14	2,515
Pinal Co. Jr. College	204,621	1.57	3,215	220,220	0.07	158
Special Districts	204,621	0.25	512	25,830	1.07	277

Data compiled by Mountain West, sources available upon request.

TABLE 6.4

BASELINE SOCIOECONOMIC PROJECTIONS
PINAL AMA

	1987	2010	2025
Population	59,000	120,800	151,100
Age 0 - 17 (%)	31.7	30.9	28.9
Age 18 - 64 (%)	55.7	55.9	55.9
Age 65+ (%)	12.7	15.2	15.2
School Enrollment	14,200	27,200	34,000
Employment	19,900	39,100	58,500
Agriculture (%)	14.8	6.0	3.5
Const. and Mfg. (%)	24.6	35.0	40.0
Trade (%)	20.0	17.7	17.3
Services (%)	20.8	26.9	27.5
Government (%)	11.4	7.6	6.1
Other (%)	8.5	6.7	5.7

TABLE 6.5

BASELINE TAX REVENUE PROJECTIONS ($000)
PINAL AMA

	Primary			Secondary		
	1987	2010	2025	1987	2010	2025
Net Assessed Value	204,621	369,568	518,924	220,220	389,761	543,569
Ag. and Vacant (%)	29.6	13.2	8.1	32.1	14.6	9.1
Comm. and Indus. (%)	23.0	29.3	32.7	22.8	29.6	33.2
Residential (%)	19.6	22.2	19.8	19.1	22.1	19.8
Other (%)	27.8	35.4	39.4	26.0	33.8	37.9
Cities and Towns Total (%)	43.5	60.6	65.2	43.0	59.0	64.3
Property Tax Revenue	19,251	35,416	49,978	3,924	6,987	9,764
Arizona (%)	4.0	4.0	3.9	0.0	0.0	0.0
Counties (%)	29.0	28.5	28.4	23.1	23.0	22.9
Cities and Towns (%)	4.7	6.4	6.9	1.7	2.3	2.5
Schools (%)	42.8	42.1	41.9	64.2	63.7	63.6
Arizona Western (%)	16.7	16.4	16.3	4.0	4.0	4.0
Special Districts (%)	2.8	2.6	2.6	7.0	7.0	7.0
Key Non-Property Tax Revenue	Local Government Revenues					
	15,018	32,803	44,470			
County State Shared (%)	16.3	13.5	14.0			
City State Shared (%)	56.1	59.3	55.9			
City Sales (%)	27.6	27.2	30.1			

Source: Mountain West Research, March 1987.

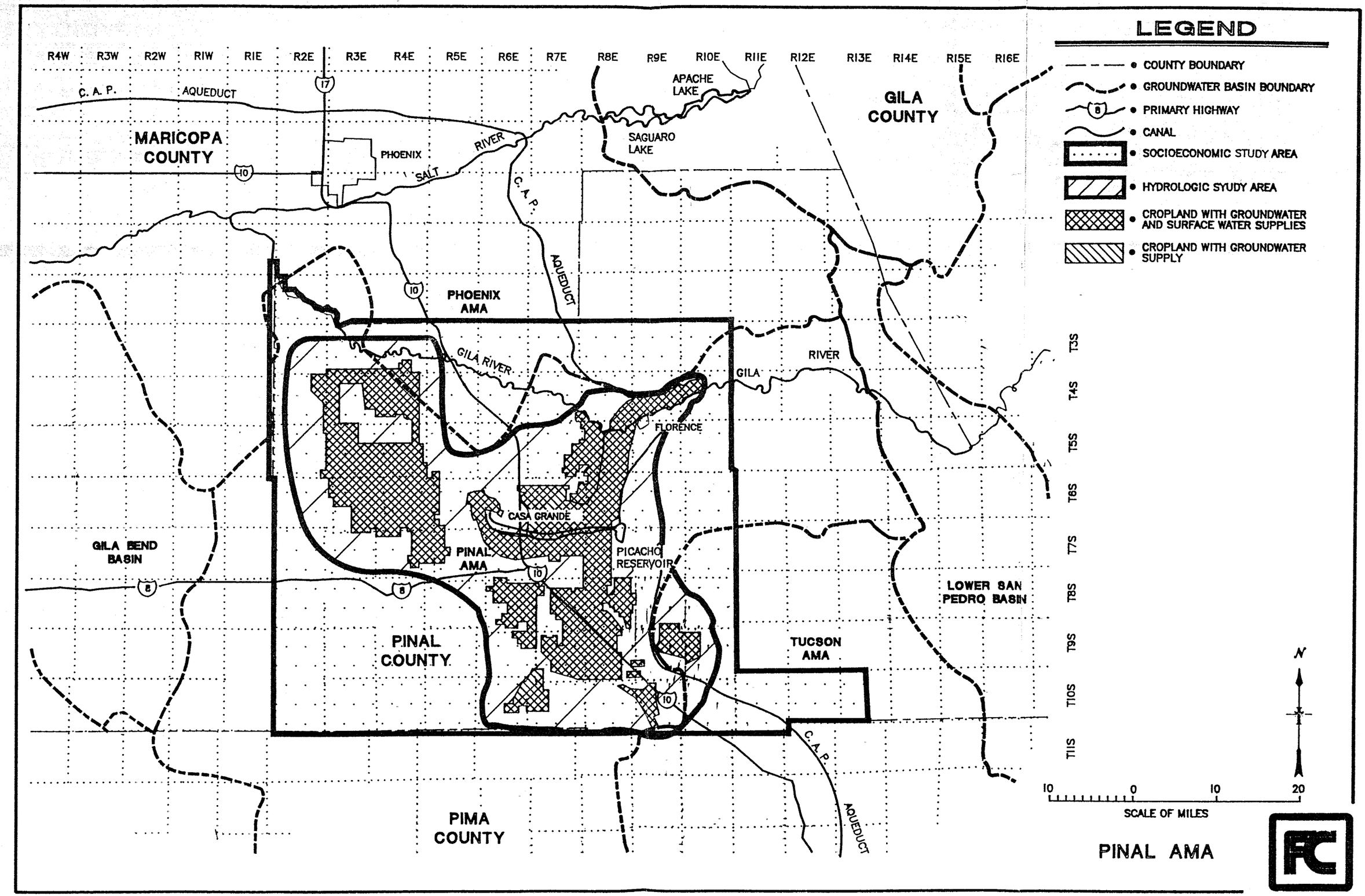

LEGEND
COUNTY BOUNDARY
GROUNDWATER BASIN BOUNDARY
PRIMARY HIGHWAY
CANAL
SOCIOECONOMIC STUDY AREA
HYDROLOGIC SYUDY AREA
CROPLAND WITH GROUNDWATER AND SURFACE WATER SUPPLIES
CROPLAND WITH GROUNDWATER SUPPLY
R4W R3W R2W RIW RIE R2E R3E R4E R5E R6E R7E R8E R9E RIOE RIIE RI2E RI3E RI4E RI5E RI6E
T3S T4S T5S T6S T7S T8S T9S TIOS TIIS
C. A. P. AQUEDUCT
MARICOPA COUNTY
PHOENIX
SALT RIVER
C. A. P. AQUEDUCT
APACHE LAKE
SAGUARO LAKE
GILA COUNTY
PHOENIX AMA
GILA RIVER
GILA RIVER
FLORENCE
CASA GRANDE
PICACHO RESERVOIR
PINAL AMA
GILA BEND BASIN
PINAL COUNTY
TUCSON AMA
LOWER SAN PEDRO BASIN
C. A. P. AQUEDUCT
PIMA COUNTY
N
10 0 10 20
SCALE OF MILES
PINAL AMA

FIGURE 6.1

CHAPTER 7

GILA BEND

7.1 GENERAL DESCRIPTION

The Gila Bend study area (Figure 7.1) is a desert plain in central-southwest Arizona. High terrain is limited to the Gila Bend Mountains and the Sand Tank Mountains. Annual precipitation averages 5.5 inches. Winter temperatures range from the low 40s to the high 60s or low 70s. Summer temperatures range from the high 60s to above 110 degrees.

7.2 CURRENT HYDROLOGIC PROFILES

The hydrologic study area is concentrated along the Gila River floodplain and contains the largely agricultural towns of Cotton Center and Theba. The Gila River basin is a wide desert plain in the Basin and Range Lowlands Water Province. The Gila River enters the area at Gillespie Dam, flows south, and then flows west to the basin outlet at Painted Rock Dam.

Area Groundwater. The main source of groundwater is alluvial deposits consisting primarily of unconsolidated to moderately consolidated clay, silt, sand, and gravel. This unit is more than 2,000 ft thick in the central part of the basin. Near Theba, upper and lower water-bearing units are separated by a fine-grained unit that ranges in thickness from a few feet to about 900 ft. In most places, the water in the main water-bearing unit occurs under unconfined conditions. Near Theba, the middle fine-grained unit causes general confined conditions in the lower water-bearing units. Apparent perched water conditions occur northwest of Gila Bend because of local fine-grained interbeds within the main water-bearing unit. Depths to groundwater range from

about 20 ft to more than 500 ft. Most wells in the hydrologic study area are capable of producing 1,000 gal/min or more.

Water-level Declines. In the period 1952-64, the area from Gila Bend to Gillespie Dam showed declines of about 20-80 ft, while the area around Theba showed levels unchanged to an increase of 20 ft. In the period 1966-73, the area downstream of Gillespie Dam showed increases of up to 60 ft, and around Gila Bend and Theba declines of 10-20 ft. In the period 1973-79, the area upstream of Gila Bend showed increases ranging up to 60 ft, with the area east and south of Gila Bend and around Theba showing declines of up to about 15 ft and increases of about 20 ft, respectively. Any change in water levels in the hydrologic study area is very responsive to wet-and-dry cycles and availability of Gila River surface water. Accordingly, it is estimated that water levels in the year 2025 will be within about 20 ft of present levels.

Water Quality. The specific conductance values occurring in the Gila River floodplain, extending from Gillespie Dam to west of Gila Bend and Theba, ranged from about 1,800-8,200 micromhos/cm. High values of specific conductance (to 8,500 micromhos/cm) occurring east and north of Theba probably represent water from the perched zone. Fluoride concentrations in the hydrologic study area generally exceed the maximum contaminant level of 1.4 mg/L, ranging from 0.5 mg/L at Cotton Center to values over 6.0 mg/L near Gila Bend and northwest of Theba. Generally, the values ranged from 1.5-6.2 mg/L, averaging about 4.0 mg/L.

Groundwater Storage. Estimated groundwater in storage to a depth of 1,200 ft in the entire Gila Bend Basin was about 60 million acre-feet in 1975 (Arizona Water Commission). Estimated groundwater in storage to a depth of 1,000 ft in

an area including the Gila River floodplain, Gila Bend, Theba, and Citrus Valley was about 22 million acre-feet in 1964 (Bureau of Reclamation, 1976).

Surface Water Resources. The Gila River at Gillespie Dam flows nearly year-round. Source waters for the Gila River at Gillespie Dam are irrigation return flows and effluent. The Gila River below Gillespie is ephemeral. Also located within the hydrologic study area is Painted Rock Dam. Painted Rock Dam, operated by the U.S. Corps of Engineers, is a large flood control reservoir with about 2.5 million acre-feet of storage. The dam controls a 50,910 square mile drainage area.

Table 7.1 shows the water budget for the hydrologic study area.

Irrigation Districts. There are no irrigation districts within the Gila Bend area.

7.3 CURRENT SOCIOECONOMIC AND FISCAL PROFILES

The socioeconomic study area is comprised of the Town of Gila Bend and the remainder of the Gila Bend census division. Six school districts levy taxes in the area.

Population and School Enrollment. There were 4,884 persons living in the area according to the 1980 census (see Table 7.2). The population was relatively young with a median age of 24.2 years old. About 1,200 children (nearly 70% of the area population under the age of 18) were enrolled in school in 1980.

Household Income. Income in the socioeconomic study area is relatively low. The median household income in 1980 was $13,100, as compared to $16,448 for Arizona.

Labor Force. Unemployment in the socioeconomic study area is about average for the state. According to the 1980 census, about 6.0% of the 1,763 residents in the civilian labor force were unemployed.

Employment. Agriculture is the principal economic activity in the socioeconomic study area. The Gila Bend area is the second largest producer of cattle in Arizona. Area employment by economic sector in 1980 was about 26.3% in agriculture, about 15.0% in trade, and about 21.7% in services. Directly south of Gila Bend is the Gila Bend Air Force Auxiliary Range which employs about 225 military and 108 civilian personnel.

Land Ownership. The study area encompasses about 865,000 acres, most of which is public land. About 78% of the land is "other public" land, primarily managed by the U.S. Bureau of Land Management. In 1980, private land represented about 13% of all study area land.

Property Tax Base. Agricultural lands were the second largest source of property tax revenue in the socioeconomic study area (see Table 7.3). The 1986 primary net assessed value totaled about $37.7 million. Property was taxed at a rate of $6.21 per $100 of the primary assessment and generated approximately $2.3 million in revenue. The secondary net assessed value totaled about $40.7 million, was taxed at a rate of $1.19 per $100 of the secondary assessment, and generated about $0.5 million in tax revenue. Utilities account for $14.3 million and agriculture $13.1 million in primary net assessed value.

Property Tax Revenues. Schools in the area received $1.2 million in tax revenues based on the primary assessment.

Water Use per Economic Sector. Water use per employee per economic sector was estimated to be about 560 gpd per employee for all non-agricultural sectors.

7.4 BASELINE SOCIOECONOMIC AND FISCAL PROJECTIONS

Population and School Enrollment. Growth in the socioeconomic study area is projected to be moderate during the projection period (see Table 7.4). The population is projected to grow at an annual compound rate of 1.5% per year increasing from about 5,000 persons in 1987 to 8,800 by 2025. School enrollment is projected to grow from 1,100 students in 1987 to 1,900 by 2025.

Employment. The economy of the socioeconomic study area is projected to expand slightly with employment declines in agriculture offset by moderate growth in the construction, manufacturing, trade, and service sectors. Overall, employment is projected to grow from 1,600 jobs in 1987 to 3,000 by the year 2025.

Property Tax Base. Primary net assessed value in the socioeconomic study area is projected to increase from approximately $37.7 million in 1987 to about $65 million by the year 2025 (see Table 7.5). The assessed value of agricultural and vacant land is projected to decline. Residential, commercial, and industrial property are projected to increase moderately during the projection period.

Property Tax Revenues. Total property tax revenues for the socioeconomic study area are projected to increase from about $2.3 million in 1987 to about $4.2 million by the year 2025.

Non-property Tax Revenues. County state-shared revenues, city state-shared revenues, and city sales tax collections are also projected to increase modestly. County state-shared revenues are projected to increase from $0.5 million to $0.7 million, city state-shared revenues are projected to increase from $0.8 million to $1.4 million, and city sales tax collections are projected to increase from $0.3 million to $0.7 million, as calculated from Table 7.5.

7.5 CONCLUSIONS AND RECOMMENDATION

Although the water quality is very poor (1,400-3,800 mg/L of TDS), it can be improved through blending with higher quality water. The physical infrastructure to transfer water is not clearly evident but potential engineering and legal problems exist. FRANZOY COREY recommends further study of this area in Phase II because the justifications to eliminate this area from further study are weak.

TABLE 7.1
Water Transfer Study
Water Budget
Gila Bend

Line	Description	Year 1987	2010	2025
1	**Water Demands (1,000 AF)**			
2				
3	Municipal	1	1	1
4	Agricultural	187	187	187
5	Industrial	–	–	–
6	Conveyance losses	–	–	–
7	(evaporation and seepage)			
8	Other Demands	–	–	–
9				
10	Total Demand	188	188	188
11				
12	**Incidental Recharge (1,000 AF)**			
13				
14	Muni (incl. effl. recharge)	0	1	1
15	Agricultural	28	28	28
16	Industrial	–	–	–
17	Conveyance Seepage	–	–	–
18				
19	Total Incidental Recharge	28	29	29
20				
21	**Water Supplies (1,000 AF)**			
22	Surface Water	152	152	152
23	Groundwater	36	36	36
24	Effluent Use (Direct)	–	–	–
25				
26	Total Supplies	188	188	188
27				
28	**Natural Recharge**	10	10	10
29				
30	**Overdraft (1,000 AF)**	0	0	0
31				
32	Variables			
33	Basin Population (1,000)	5.0	6.9	8.8
34	Irrigated Acreage (1,000)	39.8	39.8	39.8
35	Per Capita Muni. use (GPCD)	150	170	150
36	Avg. Crop Consump. Use (ft/yr)	4.0	4.0	4.0
37	Avg. Irrigation Efficiency	85.0%	85.0%	85.0%
38	Irrigation Recharge Factor	15.0%	15.0%	15.0%
39	Municipal Recharge Factor	50.0%	50.0%	50.0%
40	Industrial Recharge Factor	50.0%	50.0%	50.0%
41				
42	Overdraft = Line 10 Minus Lines 19, 22, 24, 28			
43				
44	Water in Storage to 1,200 ft. depth (1,000 AF)			
45	AZ Water Commission (1975)	60,000	60,000	60,000
46	Recoverable groundwater	30,000	30,000	30,000

Data compiled by FRANZOY COREY, sources available upon request.

TABLE 7.2

SOCIOECONOMIC PROFILE
GILA BEND AREA

Economic Component	Study Area	Arizona
Population (1980)	4,884	2,718,215
Age 0 - 17 (%)	35.0	29.2
Age 18 - 64 (%)	59.0	59.6
Age 65+ (%)	6.0	11.3
Median Age	24.2	29.2
School Enrollment (1980)	1,200	652,174
Median Household Income (1980)	13,100	16,448
Less Than $5,000 (%)	16.3	12.1
$5,000 - $14,999 (%)	40.9	33.3
$15,000 - $29,999 (%)	28.8	36.4
$30,000 - $39,999 (%)	7.6	10.2
$40,000 + (%)	6.4	8.0
Civilian Labor Force (1980)	1,763	1,238,000
Unemployed (%)	6	6.7
Employment (1980)	1,657	1,113,270
Agriculture (%)	26.3	3.0
Construction (%)	10.4	8.3
Manufacturing (%)	10.6	14.8
Trade (%)	15.0	22.6
Services (%)	21.7	30.6
Government (%)	11.0	6.7
Other (%)	5.0	14.0
Average Firm Size (1984)	7	13
Land Ownership (000's of Acres)	865	
Private (%)	13.2	
Indian (%)	0.3	
Public - State (%)	8.9	
Public - Other (%)	77.6	

Data compiled by Mountain West, sources available upon request.

TABLE 7.3

PROPERTY TAX PROFILE ($000's)
GILA BEND AREA

Jurisdiction	Primary Assessment			Secondary Assessment		
	Net Assessed Valuation	Tax Rate	Revenue	Net Assessed Valuation	Tax Rate	Revenue
STUDY AREA TOTAL (1986)	37,729	6.21	2,342	40,656	1.19	483
Legal Class						
1 Mines / Timber	0	6.21	0	0	1.19	0
2 Utilities	14,271	6.21	886	14,271	1.19	170
3 Commercial and Industrial	5,726	6.21	355	6,034	1.19	72
4 Agricultural and Vacant Land	13,102	6.21	813	15,077	1.19	179
5 Residential	2,424	6.21	150	2,675	1.19	32
6 Rental Residential	1,572	6.21	98	1,749	1.19	21
7 Railroads	635	6.21	39	850	1.19	10
Jurisdictions						
Arizona	37,729	0.38	143	40,656	0.00	0
Maricopa County	37,729	1.45	547	40,656	0.22	89
Towns and Cities	5,085	1.15	58	5,479	0.00	0
Schools	37,729	3.06	1,155	40,656	0.88	359
Maricopa Co. Jr. College	37,729	0.66	249	40,656	0.08	33
Special Districts	37,729	0.50	189	272	0.86	2

Data compiled by Mountain West, sources available upon request.

TABLE 7.4

BASELINE SOCIOECONOMIC PROJECTIONS
GILA BEND AREA

	1987	2010	2025
Population	5,000	7,000	8,800
Age 0 - 17 (%)	32.2	30.4	30.4
Age 18-64 (%)	54.1	52.1	52.1
Age 65+ (%)	13.7	17.5	17.5
School Enrollment	1,100	1,500	1,900
Employment	1,600	2,300	3,000
Agriculture (%)	23.8	12.7	8.2
Const. and Mfg. (%)	20.4	21.1	20.3
Trade (%)	18.0	22.1	23.7
Services (%)	20.4	26.7	30.7
Government (%)	11.8	11.1	10.1
Other (%)	5.6	6.3	6.9

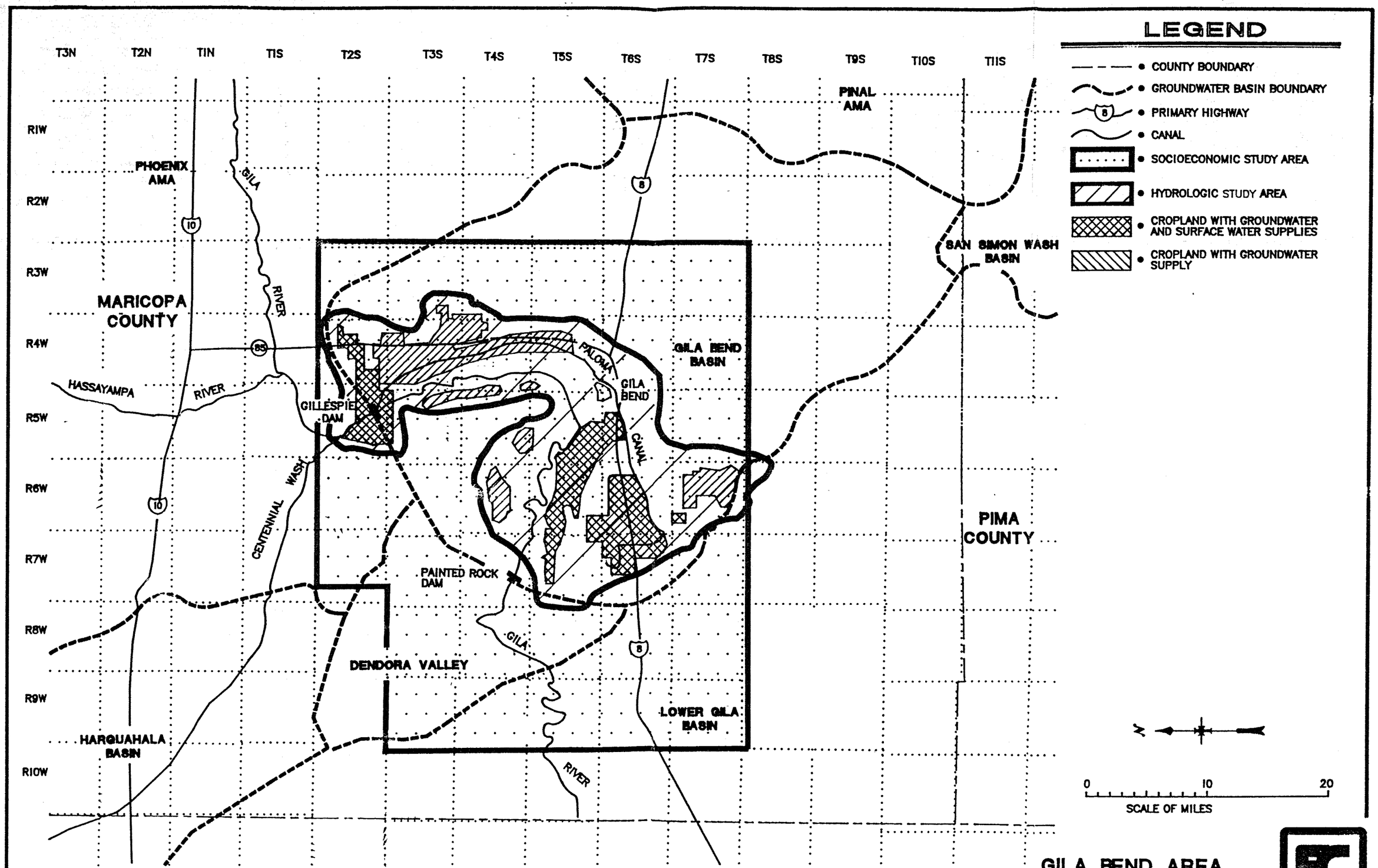
TABLE 7.5

BASELINE TAX REVENUE PROJECTIONS ($000)
GILA BEND AREA

	Primary			Secondary		
	1987	2010	2025	1987	2010	2025
Net Assessed Value	37,729	50,841	64,977	40,656	53,851	68,275
Ag. and Vacant (%)	34.7	19.9	13.2	37.1	21.7	14.5
Comm. and Indus. (%)	15.2	19.2	21.1	14.8	19.1	21.2
Residential (%)	10.6	10.8	10.8	10.9	11.3	11.3
Other (%)	39.5	50.0	54.9	37.2	47.9	53.0
Cities and Towns Total (%)	13.5	30.7	39.9	13.5	29.8	39.2
Property Tax Revenue	2,342	3,257	4,230	483	638	809
Arizona (%)	6.1	5.9	5.8	0.0	0.0	0.0
Counties (%)	23.3	22.7	22.3	18.6	18.6	18.5
Cities and Towns (%)	2.5	5.5	7.1	0.0	0.0	0.0
Schools (%)	49.3	47.8	47.0	74.5	74.6	74.7
Arizona Western (%)	10.7	10.3	10.1	6.9	6.8	6.8
Special Districts (%)	8.1	7.8	7.7	0.0	0.0	0.0

Key Non-Property Tax Revenue	Local Government Revenues		
	1,437	2,151	2,882
County State Shared (%)	31.5	28.4	27.1
City State Shared (%)	50.0	49.1	48.4
City Sales (%)	18.4	22.6	24.6

Source: Mountain West Research, March 1987.



GILA BEND AREA

FIGURE 7.1

CHAPTER 8

UPPER AND LOWER SAN PEDRO BASIN

8.1 GENERAL DESCRIPTION

The Upper and Lower San Pedro Basin study area (Figure 8.1) follows the river as it flows south to north from the border of Mexico to its confluence with the Gila River near Winkleman. The watershed includes parts of Mexico and the Huachuca and Santa Rita mountains. Colder air settles in the low-lying valley causing winter temperatures to range from the upper 40s to the mid-50s. Summer temperatures range from the low 50s to the low 100s, fluctuating somewhat with the elevation. Precipitation in the valley area is lower than in the surrounding mountains, and averages about 12 inches annually.

8.2 CURRENT HYDROLOGIC PROFILES

The hydrologic study area includes the Upper and Lower San Pedro Basins within the Basin and Range Lowlands Water Province.

Area Groundwater. The major sources of groundwater are from floodplain alluvium and thick basin-fill deposits. The floodplain deposits are from 40-150 ft thick, comprised of mostly sand and gravel. The basin-fill deposits are divided into upper and lower parts; the upper part consists of mostly fine-grained deposits and the lower part consists of gravel, sandstone, and siltstone beds. The upper part ranges from about 300-800 ft in thickness and the lower part ranges from several tens of feet to over 1,000 ft in thickness.

Groundwater generally occurs under unconfined conditions in the floodplain alluvium and under confined and unconfined conditions in the basin-fill deposits. Flowing wells occur in three general areas, Palominas-Hereford, St. David-Benson, and Mammoth. Water levels range from a few feet above land surface to more than 600 ft below ground surface.

Water-level Declines. Since the late 1960s water levels have declined less than 10 ft throughout the area, except for near Sierra Vista and Fort Huachuca where declines are more significant due to concentrated pumpage.

Water Quality. Total dissolved solids (TDS) values in the area range from 200-2500 mg/L in the Upper Basin to about 200-1500 mg/L in the Lower Basin. Fluoride values range from 0.1-5.9 mg/L in the Upper Basin and from 0.3-6.1 mg/L in the Lower Basin. Fluoride concentrations exceeded the EPA maximum contaminant level more frequently in the Lower Basin than in the Upper Basin.

Groundwater Storage. Estimated groundwater in storage to a depth of 1,200 ft was about 78 million acre-feet in 1975 (Arizona Water Commission). About 48 million acre-feet were estimated for the Upper Basin and about 30 million acre-feet for the Lower Basin.

Surface Water Resources. The San Pedro River, a major tributary of the Gila River, drains the area. The San Pedro River at Charleston is ephemeral with flow ranging up to 98,000 cfs. A small portion of the irrigation water supply is diverted from the river.

Table 8.1 shows the water budget for the hydrologic study area.

Irrigation Districts. The two irrigation districts within the study area are the St. David Irrigation District and the Pomerene Water Users Association.

8.3 CURRENT SOCIOECONOMIC AND FISCAL PROFILES

The socioeconomic study area is comprised of portions of five counties, Gila, Pinal, Pima, Cochise, and Santa Cruz. It overlaps seven census divisions and contains ten cities and towns. It also contains sixteen school districts, two junior colleges, and eight special districts.

Population and School Enrollment. There were 66,268 persons living in the area according to the 1980 census (see Table 8.2). The population was slightly younger than that of Arizona as a whole with a median age of 28.1 years old. Nearly 15,900 children (about 72% of the area population under the age of 18) were enrolled in school in 1980.

Household Income. Annual median household income in the area is about equal to that of Arizona. In 1980, the median household income of the socioeconomic study area was $16,500 compared with $16,448 for Arizona.

Labor Force. Unemployment in the socioeconomic study area is relatively high. According to the 1980 census, about 9.2% of the 23,100 area residents in the civilian labor force were unemployed.

Employment. In 1980, agriculture, mining, and defense (military facilities) were the key economic sectors in the study area. Many of Arizona's largest copper mines are located in the area. Fort Huachuca, near Sierra Vista employs more than 5,000 civilians. Area employment by economic sector in 1980 was about 17% in agriculture, 17% in trade, 25% in services, and 19% in government.

Land Ownership. The study area encompasses about 1.9 million acres, most of which is publicly owned. About 39% of the land is state owned, about 31% is privately owned, and about 28% is other public land, most of which is managed by the U.S. Bureau of Land Management and U.S. Forest Service.

Property Tax Base. The 1986 primary net assessed value totaled about $203 million (see Table 8.3). Property was taxed at a rate of $9.95 per $100 of the primary assessment and generated approximately $20 million in revenue. The secondary net assessed value totaled about $218 million, was taxed at a rate of $2.18 per $100 of the secondary assessment, and generated about $4.8 million in tax revenue. Residential was the land use class with the greatest aggregate value, followed closely by commercial and industrial land.

Property Tax Revenues. Schools in the area received $8.9 million in tax revenues based on the primary assessment, counties received $7.1 million and towns received $2.6 million.

Water Use per Economic Sector. Water use per employee per economic sector was estimated to be about 530 gpd per employee for all non-agricultural sectors.

8.4 BASELINE SOCIOECONOMIC AND FISCAL PROJECTIONS

Population and School Enrollment. Strong growth is projected to occur during the projection period (see Table 8.4). The population of the area is projected to increase at an annual compound rate of 2.2%, increasing from about 72,000 persons in 1987 to about 164,400 by the year 2025. School enrollment is projected to grow from about 15,300 students to about 31,200 by 2025.

Employment. The economy of the socioeconomic study area is projected to expand on the strength of increased manufacturing and service industry employment. The agricultural sector is projected to grow more slowly than the economy as a whole. Total employment is projected to increase from about 25,400 jobs to about 68,500 by the year 2025.

Property Tax Base. Total primary net assessed value in the socioeconomic study area is projected to increase from approximately $203 million in 1987 to about $549 million by the year 2025 (see Table 8.5). The assessed value of agricultural and vacant land is projected to grow modestly. The values of residential, commercial, industrial, and other (mining) properties are projected to increase during the projection period.

Property Tax Revenues. Property tax revenues for the socioeconomic study area are projected to increase from about $20.0 million to about $55.5 million by 2025.

Non-property Tax Revenues. County state-shared revenues, city state-shared revenues, and city sales tax collections are all expected to grow during the projection period. County state-shared revenues are projected to increase from $2.4 million to $6.6 million, city state-shared revenues are projected to increase from $10.4 million to $26.8 million, and city sales tax collections are projected to increase from $2.6 million to $9.1 million, as calculated from Table 8.5.

8.5 CONCLUSIONS AND RECOMMENDATION

Currently the Upper and Lower San Pedro Basin area is essentially in hydrologic balance. As the population grows,

however, the demand is expected to more than exceed the supply and worsen the overdraft condition. Although the San Pedro and the Gila rivers could be used to transport water out of the area, uncertainty surrounds the surface water rights. FRANZOY COREY does not recommend this area for further study in Phase II.

TABLE 8.1
Water Transfer Study
Water Budget
Upper and Lower San Pedro Basin

Line	Description	Year 1987	2010	2025
1	**Water Demands (1,000 AF)**			
2				
3	Municipal	15	28	35
4	Agricultural	93	93	93
5	Industrial	-	-	-
6	Conveyance losses	-	-	-
7	(evaporation and seepage)			
8	Other Demands	-	-	-
9				
10	Total Demand	108	121	128
11				
12	**Incidental Recharge (1,000 AF)**			
13				
14	Muni (incl. effl. recharge)	8	14	17
15	Agricultural	19	19	19
16	Industrial	-	-	-
17	Conveyance Seepage	-	-	-
18				
19	Total Incidental Recharge	27	33	36
20				
21	**Water Supplies (1,000 AF)**			
22	Surface Water	5	5	5
23	Groundwater	103	116	123
24	Effluent Use (Direct)	-	-	-
25				
26	Total Supplies	108	121	128
27				
28	**Natural Recharge**	74	74	74
29				
30	**Overdraft (1,000 AF)**	2	9	13
31				
32	Variables			
33	Basin Population (1,000)	72.3	131.5	164.4
34	Irrigated Acreage (1,000)	18.5	18.5	18.5
35	Per Capita Muni. use (GPCD)	190	190	190
36	Avg. Crop Consump. Use (ft/yr)	4.0	4.0	4.0
37	Avg. Irrigation Efficiency	80.0%	80.0%	80.0%
38	Irrigation Recharge Factor	20.0%	20.0%	20.0%
39	Municipal Recharge Factor	50.0%	50.0%	50.0%
40	Industrial Recharge Factor	50.0%	50.0%	50.0%
41				
42	Overdraft = Line 10 minus Lines 19, 22, 24, 28			
43				
44	Water in Storage to 1,200 ft. depth (1,000 AF)			
45	AZ Water Commission (1975)	78,000	77,900	77,700
46	Recoverable groundwater	39,000	38,900	38,700

Data compiled by FRANZOY COREY, sources available upon request.

TABLE 8.2

SOCIOECONOMIC PROFILE
UPPER AND LOWER SAN PEDRO BASIN

Economic Component	Study Area	Arizona
Population (1980)	66,268	2,718,215
Age 0 - 17 (%)	33.2	29.2
Age 18 - 64 (%)	59.7	59.6
Age 65+ (%)	7.1	11.3
Median Age	28.1	29.2
School Enrollment (1980)	15,894	652,174
Median Household Income (1980)	16,500	16,448
Less Than $5,000 (%)	16.2	12.1
$5,000 - $14,999 (%)	40.9	33.3
$15,000 - $29,999 (%)	39.9	36.4
$30,000 - $39,999 (%)	7.6	10.2
$40,000 + (%)	6.4	8.0
Civilian Labor Force (1980)	23,100	1,238,000
Unemployed (%)	9.2	6.7
Employment (1980)	20,967	1,113,270
Agriculture (%)	17.3	3.0
Construction (%)	6.1	8.3
Manufacturing (%)	7.6	14.8
Trade (%)	16.6	22.6
Services (%)	24.5	30.6
Government (%)	19.4	6.7
Other (%)	8.5	14.0
Average Firm Size (1984)	7	13
Land Ownership (000's of Acres)	1,865	
Private (%)	30.6	
Indian (%)	2.0	
Public - State (%)	39.2	
Public - Other (%)	28.2	

Data compiled by Mountain West, sources available upon request

TABLE 8.3

PROPERTY TAX PROFILE ($000's)
UPPER AND LOWER SAN PEDRO BASIN

Jurisdiction	Primary Assessment			Secondary Assessment		
	Net Assessed Valuation	Tax Rate	Revenue	Net Assessed Valuation	Tax Rate	Revenue
STUDY AREA TOTAL (1986)	202,691	9.95	20,168	218,198	2.18	4,758
Legal Class						
1 Mines / Timber	30,362	9.95	3,021	30,362	2.18	662
2 Utilities	22,377	9.95	2,227	22,377	2.18	488
3 Commercial and Industrial	53,663	9.95	5,340	56,141	2.18	1,224
4 Agricultural and Vacant Land	25,535	9.95	2,541	32,663	2.18	712
5 Residential	54,295	9.95	5,402	58,287	2.18	1,271
6 Rental Residential	15,052	9.95	1,498	16,681	2.18	364
7 Railroads	1,407	9.95	140	1,685	2.18	37
8 Historic Property	2	9.95	0	2	2.18	0
Jurisdictions						
Arizona	202,691	0.38	770	218,198	0.00	0
Counties	202,691	3.51	7,117	218,198	0.39	853
Towns and Cities	93,394	0.82	770	93,953	0.23	220
Schools	202,691	4.38	8,871	218,198	1.61	3,508
Jr. / Comm. Colleges	171,478	1.52	2,606	185,912	0.02	35
Special Districts	4,923	0.67	33	15,536	0.92	143

Data compiled by Mountain West, sources available upon request.

TABLE 8.4

BASELINE SOCIOECONOMIC PROJECTIONS
UPPER AND LOWER SAN PEDRO BASIN

	1987	2010	2025
Population	72,200	131,500	164,400
Age 0 - 17 (%)	30.4	26.9	26.9
Age 18 - 64 (%)	57.3	58.5	58.5
Age 65+ (%)	12.3	14.6	14.6
School Enrollment	15,300	25,000	31,200
Employment	25,400	46,700	68,500
Agriculture (%)	5.1	4.0	2.3
Const. and Mfg. (%)	19.1	24.0	26.8
Trade (%)	18.4	19.2	19.9
Services (%)	20.7	27.9	31.3
Government (%)	18.2	12.9	10.4
Other (%)	18.5	11.9	9.3

TABLE 8.5

BASELINE TAX REVENUE PROJECTIONS ($000)
UPPER AND LOWER SAN PEDRO BASIN

	Primary			Secondary		
	1987	2010	2025	1987	2010	2025
Net Assessed Value	202,691	386,472	548,982	218,198	410,794	578,741
Ag. and Vacant (%)	12.6	7.6	5.0	15.0	9.1	6.1
Comm. and Indus. (%)	26.5	29.7	33.0	25.7	29.3	32.7
Residential (%)	34.2	32.6	28.7	34.4	33.2	29.5
Other (%)	26.7	30.0	33.3	24.9	28.4	31.7
Cities and Towns Total (%)	46.1	61.2	66.1	43.1	59.3	64.9
Property Tax Revenue	20,168	38,936	55,528	4,758	9,114	12,914
Arizona (%)	3.8	3.8	3.7	0.0	0.0	0.0
Counties (%)	35.3	34.9	34.7	18.0	17.6	17.5
Cities and Towns (%)	3.8	4.9	5.4	4.6	6.3	6.8
Schools (%)	44.0	43.4	43.3	73.7	72.4	72.0
Arizona Western (%)	12.9	12.8	12.7	0.7	0.7	0.7
Special Districts (%)	0.2	0.2	0.2	3.0	3.0	3.0
Key Non-Property Tax Revenue	Local Government Revenues					
	15,333	31,249	42,469			
County State Shared (%)	15.9	14.8	15.5			
City State Shared (%)	67.3	66.8	63.0			
City Sales (%)	16.8	18.3	21.5			

Source: Mountain West Research, March 1987.

LEGEND

- COUNTY BOUNDARY
- GROUNDWATER BASIN BOUNDARY
- PRIMARY HIGHWAY
- CANAL
- SOCIOECONOMIC STUDY AREA
- HYDROLOGIC STUDY AREA
- CROPLAND WITH GROUNDWATER AND SURFACE WATER SUPPLIES
- CROPLAND WITH GROUNDWATER SUPPLY

T4S T5S T6S T7S T8S T9S T10S T11S T12S T13S T14S T15S T16S T17S T18S T19S T20S T21S T22S T23S

R25E R24E R23E R22E R21E R20E R19E R18E R17E R16E R15E R14E

SAFFORD BASIN

GRAHAM COUNTY

ARAVAIPA CANYON BASIN

WILCOX BASIN

TOMBSTONE

UPPER SAN PEDRO BASIN

BENSON

SIERRA VISTA

SAN PEDRO RIVER

DRIPPING SPRING WASH BASIN

LOWER SAN PEDRO BASIN

SAN MANUEL

SAN RAFAEL BASIN

CIENEGA CREEK BASIN

GILA RIVER

GILA COUNTY

PINAL COUNTY

TUCSON AMA

PIMA COUNTY

SANTA CRUZ COUNTY

MEXICO

10 0 10 20

SCALE OF MILES

N

UPPER & LOWER SAN PEDRO BASIN

FIGURE 8.1

CHAPTER 9

SAFFORD BASIN - DUNCAN VALLEY

9.1 GENERAL DESCRIPTION

The Safford Basin - Duncan Valley study area (Figure 9.1) is located in the San Simon Valley in the southeastern corner of Arizona. The valley is surrounded by the Pinaleno (Graham), Gila, and White mountains. Annual precipitation averages 8.5 inches, but winter precipitation occurs mostly in the southwest portion of the area on the windward side of the Pinaleno Mountains. Summer precipitation generally falls evenly in the area. Winter temperatures range from the low 30s to the mid-60s. Summer temperatures range from the low 60s to the mid-90s.

9.2 CURRENT HYDROLOGIC PROFILES

The hydrologic study area includes the major agricultural areas along the Gila River in the Safford and Duncan Valley basins. The Gila River and its major tributaries, the San Simon and San Francisco rivers, drain the area.

Area Groundwater. A sparse amount of data indicates the major source of groundwater is from alluvial deposits that underlie the river valleys of the San Simon and Gila rivers. The major occurrence of these deposits is apparently limited to depths of about 100 ft. A fine-grained sequence underlies the alluvial deposits to depths of 700 ft to 800 ft or more. Thin sandy beds occur in this sequence. The primary occurrence of groundwater is unconfined in the upper deposits, with confined conditions occurring in the fine-grained deposits. Available data indicate groundwater depths range from about 10 ft to 160 ft. This same data suggests that long term water levels essentially are

unchanged, responding to wet-and-dry cycles of the Gila River.

Water Quality. Total dissolved solids (TDS) are relatively high, ranging from 1,000-10,000 mg/L. There are no data on fluoride concentrations.

Groundwater Storage. Estimated groundwater in storage to a depth of 1,200 ft as of 1975 (Arizona Water Commission) in the Safford Basin was about 15 million acre-feet, and in the Duncan Valley Basin, about 19 million acre-feet.

Surface Water Resources. The Gila River almost always flows year-round. Flows range from 0-100,000 cfs at the Calva gaging station. Most of the Gila River flow originates as snowmelt. While summer storms can produce large flood peaks, the volumes of water produced are generally small. A majority of the area's water supply originates from the Gila River.

Table 9.1 shows the water budget for the hydrologic study area.

Irrigation Districts. The three irrigation districts within the study area are Franklin Irrigation District, Gila Valley Irrigation District, and Duncan Valley Irrigation District.

9.3 CURRENT SOCIOECONOMIC AND FISCAL PROFILE

The socioeconomic study area includes portions of Graham and Greenlee counties, and the communities of Safford, Thatcher, and Duncan. Portions of six school districts, a junior college district and five special districts are located within the study area.

Population and School Enrollment. There were 18,462 persons living in the area according to the 1980 census (see Table 9.2). The median age of the population was 27.3 years, slightly younger on average than that of Arizona. About 4,480 children, nearly 70% of the population under the age of 18 years old, were enrolled in school in 1980.

Household Income. Income in the socioeconomic study area is relatively low. The median household income in 1980 was $13,700, compared with $16,448 for Arizona.

Labor Force. In 1980, unemployment in the socioeconomic study area was relatively low. According to the 1980 census, about 5.3% of the 6,945 area residents in the civilian labor force were unemployed.

Employment. Agriculture was the mainstay of the economy in this area in 1980. Trade and service establishments in the area tend to be small and locally oriented. Area employment by economic sector in 1980 was about 21.3% in agriculture, 27.2% in services, primarily health and education, and 20.3% in trade.

Land Ownership. The study area encompasses about 1.0 million acres, most of which is publicly owned. About 50.9% of the land is "other" public land managed primarily by the U.S. Bureau of Land Management, about 22.5% is state owned, about 9.5% is Indian land, and 17.1% is privately owned.

Property Tax Base. The 1986 primary net assessed value about totaled $48.4 million (see Table 9.3). Property was taxed at a rate of $6.74 per $100 of the primary assessment and generated approximately $3.3 million in revenue. The secondary net assessed value totaled about $50.2 million, was taxed at a rate of $2.57 per $100 of the secondary assessment, and generated about $1.3 million in tax revenue.

Residential property was the largest use class, followed closely by commercial and industrial uses, and by utilities.

Property Tax Revenues. Schools received $1.5 million in tax revenues generated by the primary assessment and the counties received approximately $1 million.

Water Use per Economic Sector. Water use per employee per economic sector was estimated to be about 420 gpd per employee for all non-agricultural sectors.

9.4 BASELINE SOCIOECONOMIC AND FISCAL PROJECTIONS

Population and School Enrollment. Moderate growth is projected over the course of the projection horizon (see Table 9-4). The population is projected to grow at a compound annual rate of 1.2%, increasing from about 18,000 persons in 1987 to 28,600 by the year 2025. School enrollment is projected to grow from about 4,500 students to about 5,500 by 2025.

Employment. The area economy is projected to expand gradually as manufacturing, trade, and service activities increase. Agricultural employment is not projected to grow. Total employment is projected to increase from about 6,400 jobs to 9,200 by 2025.

Property Tax Base. Primary net assessed values in the socioeconomic study area are projected to increase from approximately $48 million in 1987 to about $73 million by 2025 (see Table 9.5).

Property Tax Revenues. Property tax revenues based on the primary assessment are projected to increase from about $3.3 million to about $4.9 million by 2025.

Non-property Tax Revenues. County state-shared revenues, city state-shared revenues, and city sales tax collections are also projected to increase. County state-shared revenues are projected to increase from $0.6 million to $0.9 million, city state-shared revenues are projected to increase from $2.6 million to $4.5 million, and city sales tax collections are projected to increase from $4.2 million to $7.1 million, as calculated from Table 9.5.

9.5 CONCLUSIONS AND RECOMMENDATION

The Safford Basin - Duncan Valley area has two unresolved water rights issues. First, the Gila River Indian Community is engaged in litigation to reopen the Gila Decree (Globe Equity 59). Second, the U.S. Bureau of Reclamation is studying potential exchanges of Gila River water for CAP water to satisfy the demands of CAP water users along the Upper Gila River and in New Mexico. Because of these uncertainties, FRANZOY COREY does not recommend this area for further study in Phase II.

TABLE 9.1
Water Transfer Study
Water Budget
Safford Basin-Duncan Valley

Line	Description	Year 1987	2010	2025
1	**Water Demands (1,000 AF)**			
2				
3	Municipal	3	4	5
4	Agricultural	198	198	198
5	Industrial	-	-	-
6	Conveyance losses	-	-	-
7	(evaporation and seepage)			
8	Other Demands	-	-	-
9				
10	Total Demand	201	202	203
11				
12	**Incidental Recharge (1,000 AF)**			
13				
14	Muni (incl. effl. recharge)	2	2	2
15	Agricultural	46	46	46
16	Industrial	-	-	-
17	Conveyance Seepage	-	-	-
18				
19	Total Incidental Recharge	48	48	48
20				
21	**Water Supplies (1,000 AF)**			
22	Surface Water	122	122	122
23	Groundwater	79	80	81
24	Effluent Use (Direct)	-	-	-
25				
26	Total Supplies	201	202	203
27				
28	**Natural Recharge**	35	35	35
29				
30	**Overdraft (1,000 AF)**	0	0	0
31				
32	Variables			
33	Basin Population (1,000)	18.0	24.7	28.6
34	Irrigated Acreage (1,000)	37.2	37.2	37.2
35	Per Capita Muni. use (GPCD)	150	150	150
36	Avg. Crop Consump. Use (ft/yr)	4.0	4.0	4.0
37	Avg. Irrigation Efficiency	75.0%	75.0%	75.0%
38	Irrigation Recharge Factor	23.0%	23.0%	23.0%
39	Municipal Recharge Factor	50.0%	50.0%	50.0%
40	Industrial Recharge Factor	50.0%	50.0%	50.0%
41				
42	Overdraft = Line 10 Minus Lines 19, 22, 24, 28			
43				
44	Water in Storage to 1,200 ft. depth (1,000 AF)			
45	AZ Water Commission (1975)	33,800	33,800	33,800
46	Recoverable groundwater	16,900	16,900	16,900

Data compiled by FRANZOY COREY, sources available upon request.

TABLE 9.2

SOCIOECONOMIC PROFILE
SAFFORD BASIN - DUNCAN VALLEY

Economic Component	Study Area	Arizona
Population (1980)	18,462	2,718,215
Age 0 - 17 (%)	34.9	29.2
Age 18 - 64 (%)	54.0	59.6
Age 65+ (%)	11.1	11.3
Median Age	27.3	29.2
School Enrollment (1980)	4,480	652,174
Median Household Income (1980)	13,700	16,448
Less Than $5,000 (%)	16.7	12.1
$5,000 - $14,999 (%)	37.9	33.3
$15,000 - $29,999 (%)	32.6	36.4
$30,000 - $39,999 (%)	7.6	10.2
$40,000 + (%)	5.2	8.0
Civilian Labor Force (1980)	6,945	1,238,000
Unemployed (%)	5.3	6.7
Employment (1980)	6,579	1,113,270
Agriculture (%)	21.3	3.0
Construction (%)	7.8	8.3
Manufacturing (%)	5.6	14.8
Trade (%)	20.3	22.6
Services (%)	27.2	30.6
Government (%)	10.1	6.7
Other (%)	7.7	14.0
Average Firm Size (1984)	7	13
Land Ownership (000's of Acres)	1,032	
Private (%)	17.1	
Indian (%)	9.5	
Public - State (%)	22.5	
Public - Other (%)	50.9	

Data compiled by Mountain West, sources available upon request.

TABLE 9.3

PROPERTY TAX PROFILE ($000's)
SAFFORD BASIN - DUNCAN VALLEY

Jurisdiction	Primary Assessment			Secondary Assessment		
	Net Assessed Valuation	Tax Rate	Revenue	Net Assessed Valuation	Tax Rate	Revenue
STUDY AREA TOTAL (1986)	48,419	6.74	3,261	50,218	2.57	1,290
Legal Class						
1 Mines / Timber	23	6.74	2	23	2.57	1
2 Utilities	9,906	6.74	667	9,906	2.57	254
3 Commercial and Industrial	11,886	6.74	801	12,027	2.57	309
4 Agricultural and Vacant Land	8,501	6.74	573	9,439	2.57	242
5 Residential	13,895	6.74	936	14,279	2.57	367
6 Rental Residential	3,213	6.74	216	3,357	2.57	86
7 Railroads	995	6.74	67	1,187	2.57	30
Jurisdictions						
Arizona	48,419	0.38	184	50,218	0.00	0
Counties	48,419	2.03	983	50,218	0.00	0
Towns and Cities	28,292	0.37	104	29,024	0.00	0
Schools	48,419	3.06	1,481	50,218	2.21	1,109
Jr. College	37,568	1.36	509	39,174	0.14	56
Special Districts	0	0.00	0	21,417	0.58	125

Data compiled by Mountain West, sources avialable upon request.

TABLE 9.4

BASELINE SOCIOECONOMIC PROJECTIONS
SAFFORD BASIN - DUNCAN VALLEY

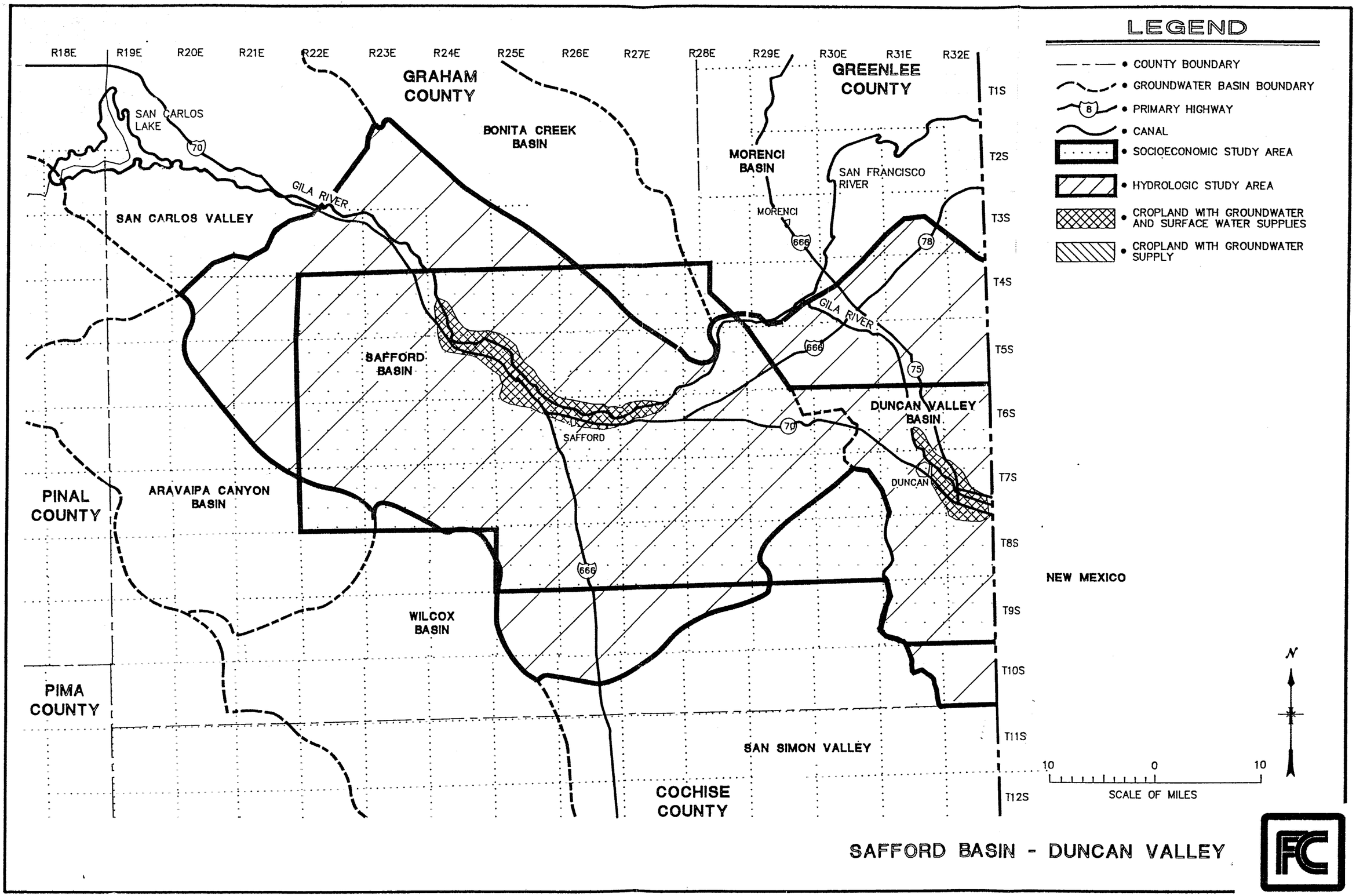
	1987	2010	2025
Population	18,000	24,700	28,600
Age 0 - 17 (%)	34.0	27.0	27.0
Age 18 - 64 (%)	55.4	58.6	58.6
Age 65+ (%)	10.6	14.4	14.4
School Enrollment	4,500	4,800	5,500
Employment	6,400	7,900	9,200
Agriculture (%)	24.5	19.8	17.0
Const. and Mfg. (%)	9.4	10.0	10.2
Trade (%)	18.8	20.4	21.0
Services (%)	27.9	31.6	34.6
Government (%)	11.7	11.3	10.8
Other (%)	7.7	6.9	6.4

TABLE 9.5

BASELINE TAX REVENUE PROJECTIONS ($000)
SAFFORD BASIN - DUNCAN VALLEY

	Primary			Secondary		
	1987	2010	2025	1987	2010	2025
Net Assessed Value	48,419	62,336	72,718	50,218	64,442	75,034
Ag. and Vacant (%)	17.6	13.6	11.7	18.8	14.6	12.6
Comm. and Indus. (%)	24.5	25.4	26.6	23.9	24.9	26.1
Residential (%)	35.3	37.6	37.2	35.1	37.5	37.2
Other (%)	22.6	23.3	24.5	22.1	23.0	24.1
Cities and Towns Total (%)	58.4	64.0	66.4	57.8	62.3	64.9
Property Tax Revenue	3,261	4,212	4,920	1,290	1,675	1,951
Arizona (%)	5.6	5.6	5.6	0.0	0.0	0.0
Counties (%)	30.2	30.0	30.0	0.0	0.0	0.0
Cities and Towns (%)	3.2	3.5	3.6	0.0	0.0	0.0
Schools (%)	45.4	45.3	45.2	86.0	85.0	85.0
Arizona Western (%)	15.6	15.6	15.6	4.3	5.5	5.5
Special Districts (%)	0.0	0.0	0.0	9.7	9.5	9.5
Key Non-Property	Local Government Revenues					
Tax Revenue	4,210	5,966	7,130			
County State Shared (%)	13.8	12.5	12.2			
City State Shared (%)	61.2	63.2	62.5			
City Sales (%)	25.0	24.2	25.3			

Source: Mountain West Research, March 1987.



SAFFORD BASIN - DUNCAN VALLEY

FIGURE 9.1

CHAPTER 10

POTENTIAL WATER TRANSFER VOLUMES

High, medium, and low estimates of potential water transfer volumes were made for each study area in consultation with the Department of Water Resources. These estimates will be used in Phase II and Phase III of the study. The methods used to derive these estimates are presented as part of the Phase I report to allow for Joint Legislative Committee review.

Estimates were determined independently for each of the eight study areas. The factors considered were (a) the available water supply, (b) the physical infrastructure available for water transfers, (c) the unmet urban water demands within the metropolitan areas, and (d) land already purchased with the intent of transferring water. Transfer costs, socioeconomic conditions, and the political environment were not considered in this preliminary Phase I analysis.

Special conditions, such as a drought that might affect the water supplies, or a prolonged depression in Arizona's agricultural sector, were not included in the analysis.

Available supply was estimated on the basis of present agricultural water uses and recoverable groundwater for all study areas.

The area's infrastructure refers to the systems that exist to physically move the water from the study area basin to the point of use. Non-structural alternatives (such as water exchanges), coupled with existing water transportation

facilities, were also considered as part of the infrastructure available for moving the water. For example, water from the Pinal AMA might be transferred to the Phoenix area by exchanging CAP waters intended for the Pinal AMA for a guaranteed equivalent-amount reduction in groundwater pumping within the Pinal AMA. That is, a Phoenix area water user might divert CAP water intended for a Pinal AMA user while the Pinal AMA user would agree to reduce his pumping in the Pinal AMA by that amount. The two limiting factors in this scenario are the CAP system capacity and the user's CAP water allocation.

Unmet urban water demands for the year 2025 were derived using data from the Association of Municipal Water Users, the City of Tucson, and the Department. The Department and FRANZOY COREY estimated the maximum water volume that could be transferred to the Phoenix and Tucson areas (in 2025) is 120,000 acre-feet and 0 acre-feet per year, respectively. It was assumed that the CAP system can support an annual exchange of 120,000 acre-feet to Phoenix.

Water volumes dedicated for transfer from the study area through existing purchase agreements were accommodated in the estimates by assuming that these volumes would constitute the minimum low estimate of potential water transfer volumes.

Table 10-1 shows the high, medium, and low estimates of potential water transfer volumes for each area.

The low-volume estimate was defined to be about 50% of the high-volume estimate. The medium-volume estimate was defined to be about 75% of the high-volume estimate.

TABLE 10.1
Potential Water Transfer Volumes
Units = 1,000 acre-feet

Area	High	Med	Low
1 Yuma - Wellton Corridor - Cibola Valley	120	90	60
2 Harquahala - McMullen - Butler Valley	120	90	60
3 Verde River - Prescott AMA	120	90	60
4 Mogollon Rim	120	90	60
5 Pinal AMA	120	90	60
6 Gila Bend	120	90	60
7 Upper and Lower San Pedro Basin	120	90	60
8 Safford Basin - Duncan Valley	120	90	60

Source: FRANZOY COREY and Arizona Department of Water Resources

CHAPTER 11

EXISTING STATUTES

The transportation of water and the transfer of water rights in Arizona are governed by several statutes, depending on the source and use of the water. Sources of water fall into three broad categories - Colorado River water, other surface water and groundwater.

Colorado River water is, as the name implies, water flowing in the Colorado River. Surface water subject to appropriation is defined by statute to mean the water of all sources, flowing in streams, canyons, ravines, or other natural channels, or in definite underground channels, whether perennial or intermittent flood, waste or surplus water, and of lakes, ponds, and springs on the surface (ARS §45-131.4).

Groundwater is all water under the surface of the earth except water flowing in underground streams with ascertainable beds and banks (ARS §45-101.4).

Colorado River water is under the jurisdiction of the Secretary of the Interior (Secretary). Each user of Colorado River water has a contract with the Secretary. It is clear that the approval of the Secretary would be required to purchase a Colorado River water right and to transport the water for use at a new location. The rules governing such a transfer are unclear because no private parties have attempted such a transfer. The only known transfer of Colorado River water to central Arizona, other than the Central Arizona Project, was as a result of a settlement of Indian claims to water involving an Act of

Congress. The extent to which State law might apply to the purchase of a Colorado River water right and transportation of the water to a new location is unknown.

The use of other surface water in Arizona is governed by the doctrine of prior appropriation, often described as the "first in time, first in right" doctrine. The first legal user of the water has the prior right.

The transportation or transfer of other surface waters within Arizona are governed by statute. Any change in the place of use requires that the person seeking the change apply for a sever and transfer as required by A.R.S. §45-172. A change in the use of surface water is governed by A.R.S. §45-146. These statutes require, among other things, the approval of the Director of the Department of Water Resources for severing and transferring or changing the use of surface waters.

The withdrawal, use, and transportation of groundwater is regulated by the Groundwater Code, A.R.S. §§45-401 through 45-655. The code establishes Active Management Areas (AMAs) which require the active management of groundwater resources within certain geographic areas. The rules governing the transportation and transfer of use of groundwater differ within and outside of AMAs.

Outside of AMAs there is generally no limit on the quantities and use of groundwater nor on the place of use. The right to use groundwater, however, is subject to provisions of the code, A.R.S. §§45-541 through 45-545. A person may withdraw groundwater outside an AMA and transport it for use at a different location, but if the groundwater is transported between sub-basins or away from a groundwater basin the transportation is subject to payment of damages. To recover damages, the injured party would have to file a lawsuit.

The code contains stringent restrictions on the use and transfer of groundwater within AMAs. Of particular relevance are the grandfathered water rights provisions, A.R.S. §§45-461 through 45-482. These provisions establish the right of any potential user to use water, define the quantities that may be used, and regulate the manner in which groundwater rights may be transported or changed in use.

Grandfathered water rights are classified as irrigation grandfathered rights, type 1 non-irrigation grandfathered rights, and type 2 non-irrigation grandfathered rights.

Irrigation grandfathered rights are appurtenant, or attached, to land. An irrigation grandfathered right is owned by the owner of the land to which it is appurtenant and may be leased for an irrigation use along with the land to which it is appurtenant. An irrigation grandfathered right may be conveyed only with the land to which it is appurtenant. If an irrigation grandfathered right is conveyed for a non-irrigation use, it becomes a type 1 non-irrigation grandfathered right.

Groundwater withdrawn pursuant to a type 1 non-irrigation grandfathered right may generally be used for any non-irrigation purpose on the land to which it is appurtenant or any other land.

The owner of a type 1 non-irrigation grandfathered right may convey the right only for a non-irrigation use and only with the land to which it is appurtenant. If a type 1 non-irrigation right is conveyed, the full amount of the right is conveyed.

Groundwater may be withdrawn pursuant to a type 2 non-irrigation grandfathered right only from a location within the same AMA in which the certificate was issued. The groundwater may generally be used for any non-irrigation purpose at any location. It is unclear whether water received or withdrawn pursuant to a type 2 non-irrigation grandfathered right may be sold as water for use on other land. The owner of a type 2 non-irrigation right may generally convey the right for any non-irrigation use.

Interstate transfers of water are neither specifically prohibited nor allowed under Arizona law. Any interstate transfers, however, must meet all other statutory requirements.

CHAPTER 12

CONCLUSIONS AND RECOMMENDATIONS

Evaluators compared the hydrologic conditions within each study area to the selection criteria identified in Chapter 1. On the basis of this comparison, five study areas are recommended for further analysis in Phase II. Brief summaries of the conclusions reached during the Phase I analysis are presented in this chapter. Tabular summaries of the baseline hydrologic projections for the year 2025 and the socioeconomic profiles and projections are provided in Tables 12.1 and 12.2.

Phase II analysis will identify and quantify the hydrologic and socioeconomic effects of water transfers. The specific hydrologic conditions which will be evaluated in Phase II are groundwater decline, excessive well drawdown, overdraft, and subsidence. The socioeconomic analysis will evaluate the possible effects of water transfers on population, student enrollment, employment, land ownership, water use by economic sector, land use (and assessed value and tax revenues), economic production, and capital debt reduction within the areas' irrigation districts.

12.1 AREAS RECOMMENDED FOR FURTHER STUDY

12.1.1 YUMA - WELLTON CORRIDOR - CIBOLA VALLEY

The Yuma - Wellton Corridor - Cibola Valley area contains the most annually renewable surface water of any study area. Most of the irrigated agricultural lands have Colorado River water rights associated with them. Water could be transferred from the study area to other locations in

Arizona through the Central Arizona Project. FRANZOY COREY recommends this area for further analysis.

12.1.2 HARQUAHALA - MCMULLEN - BUTLER VALLEY

Most of the local Harquahala - McMullen - Butler Valley water demand is supplied with mined groundwater. The area contains an estimated 35.8 million acre-feet of recoverable groundwater. The City of Phoenix already has purchased approximately 14,000 acres of land within the McMullen Valley area with the intent of transferring the water rights. Although the area is in an overdraft situation, FRANZOY COREY recommends that this area be studied further because of its potential large groundwater supply, current transfer activities, and ease of water transfer through the CAP.

12.1.3 PINAL AMA

The Pinal AMA area has the largest overdraft condition of any study area and the overdraft condition is projected to remain high even with implementation of stringent conservation measures. By 2025, the overdraft rate is expected to decrease from the current annual rate of 1,098,000 acre-feet to 454,000 acre-feet as mandated by the Pinal AMA water management plan.

The area has an estimated 32.3 million acre-feet of recoverable groundwater. Water rights in the area already have been transferred, the City of Mesa acquired approximately 12,000 acres of land in this area specifically for its water rights. FRANZOY COREY recommends this area for further study in Phase II both because a precedent for water transfer has been established in the area and because of the large volume of recoverable groundwater.

12.1.4 MOGOLLON RIM

The physical infrastructure to transfer water is not clearly evident but the water rights may become an issue if the Salt River system is used to transfer water. FRANZOY COREY recommends this area for further study in Phase II because the justifications to eliminate this area from further study are not strong.

12.1.5 GILA BEND

The Gila Bend area is in hydrologic balance. Although the water quality is very poor (1,400-3,800 mg/L of TDS), poor water quality can be improved through blending with higher quality water. The physical infrastructure to transfer water is not clearly evident but potential engineering and legal problems exist. FRANZOY COREY recommends further study of this area in Phase II because the justifications to eliminate this area from further study are not strong.

12.2 STUDY AREAS NOT RECOMMENDED FOR PHASE II EVALUATION

12.2.1 VERDE RIVER - PRESCOTT AMA

Currently the Verde River - Prescott AMA area is essentially in hydrologic balance. As the population grows, however, the demand is expected to more than exceed the supply and worsen the overdraft condition. Because of current litigation surrounding water rights on the Verde River, FRANZOY COREY does not recommend this area for further study in Phase II.

12.1.2 UPPER AND LOWER SAN PEDRO BASIN

Currently the Upper and Lower San Pedro Basin area is essentially in hydrologic balance. As the population grows,

however, the demand is expected to more than exceed the supply and worsen the overdraft condition. Although the San Pedro and the Gila rivers could be used to transport water out of the area, uncertainty surrounds the surface water rights. FRANZOY COREY does not recommend this area for further study in Phase II.

12.1.3 SAFFORD BASIN - DUNCAN VALLEY

The Safford Basin - Duncan Valley area has two water rights issues that are unresolved. First, the Gila River Indian Community is engaged in litigation to reopen the Gila Decree (Globe Equity 59). Second, the U.S. Bureau of Reclamation is studying potential exchanges of Gila River water for CAP water to satisfy the demands of CAP water users along the Upper Gila River and in New Mexico. Because of these uncertainties, FRANZOY COREY does not recommend this area for further study in Phase II.

TABLE 12.1
Baseline Hydrologic Profiles for 2025 Conditions

Area	Annual Water Demand (1,000 AF)	Annual Surf. Water Supplies (1,000 AF)	Annual Groundwater Pumpage (1,000 AF)	Annual Area Overdraft (1,000 AF)	Annual Irrigated Agriculture (1,000 Acres)	Recoverable Groundwater[a/] (1,000 AF)	Annual Max. Potential Water Trans. (1,000 AF/YR)
1 - Yuma-Wellton Corridor-Cibola Valley	1,196	1,003	193	0	157	97,500	120
2 - Harquahala-McMullen-Butler Valley	269	37	232	208	47	28,200	120
3 - Verde River-Prescott AMA	83	36	47	12	9	14,800	120
4 - Mogollon Rim	37	0	37	0[b/]	6	43,000	120
5 - Pinal AMA	1,035	445	590	454	230	11,000	120
6 - Gila Bend	188	152	36	0[b/]	40	30,000	120
7 - Upper and Lower San Pedro Basin	128	5	123	13	19	38,700	120
8 - Safford Basin-Duncan Valley	203	122	81	0	37	16,900	120

NOTES: AF refers to acre-feet.

Data compiled by FRANZOY COREY, sources available upon request

[a/] Based on 1975 conditions; recoverable groundwater is estimated at 50% of groundwater in storage to a depth of 1,200 ft

[b/] Basin in hydrologic balance or surplus condition