# CHAPTER 3.0
# AFFECTED ENVIRONMENT

## 3.1 INTRODUCTION

Chapter 3 describes the environmental components of BLM-administered Federal lands within the planning area that would potentially be affected by implementation of the alternatives proposed and impacts described in the PRMP/FEIS. Key environmental components include:

- Air, Water and Soil Resources
- Vegetation Resources
- Fish and Wildlife Resources
- Wild Horse and Burro Management
- Wildland Fire Management
- Cultural Resources
- Paleontological Resources
- Visual Resources
- Wilderness Characteristics Management
- Livestock Grazing Management
- Mineral Resources
- Recreation Management
- Travel Management
- Lands and Realty Management
- Special Designations
- Public Health and Safety
- Social and Economic Conditions
- Environmental Justice

Information sources and analysis data utilized to write this chapter were obtained from directly related past RMPs, Management Framework Plans, Plan Amendments, and various other management planning documents from BLM. Information and data were also collected from many other related planning documents and research publications prepared by various Federal and State agencies, universities, and private publications pertaining to the resources found within the planning area. The purpose of this chapter is to provide a description of key resources found

within the existing environment of the planning area, which will be used as a baseline to evaluate and assess the impact of the five resource management alternatives. Descriptions and analysis of the impacts themselves are presented in Chapter 4, Environmental Consequences.

The CEQ regulations implementing NEPA direct agencies to reduce excessive paperwork by "incorporating by reference" relevant prior documents (40 CFR 1500.4(j)). BLM LUPs, along with supplements or documents tiered to those original LUPs, frequently present more detailed information on the affected environment of the BLM-administered public lands than can be presented in this PRMP/FEIS. Therefore, in an effort to reduce paperwork, the affected environment sections of the LUPs, supplemental, or tiered documents listed below are incorporated by reference.

USDOI BLM

| | |
|---|---|
| 1982 | *FEIS, Proposed Grazing Management Program for the Lower Gila North EIS Area. Yuma, Mohave, Yavapai, and Maricopa Counties, Phoenix District, Arizona* |
| 1983 | *Lower Gila North Management Framework Plan. Lower Gila North Resource Area, Arizona* |
| 1987a | *Yuma District RMP and FEIS. Yuma District, Arizona* |
| 1987b | *Lower Gila South Final Wilderness EIS* |
| 1988a | *Lower Gila South RMP and FEIS. Phoenix District, Arizona* |
| 1988b | *Lower Gila South RMP Monitoring Plan* |
| 1990b | *Lower Gila South RMP—Goldwater Amendment* |
| 1992b | *Yuma District RMP Amendment* |
| 1994b | *A Final Arizona Statewide Wild and Scenic Rivers Legislative EIS* |
| 1994c | *Five Year Monitoring Program Planning Update for the Yuma RMP 1986-1991* |
| 1994d | *Yuma District (Bill Williams) RMP Amendment* |
| 1994e | *Yuma District (Havasu) RMP Amendment* |
| 1996a | *Yuma District (Lands) RMP Amendment* |
| 1997a | *Statewide Amendment for Standards and Guides (Arizona Standards for Rangeland Health and Guidelines for Grazing Administration)* |
| 2002b | *North Baja EIS and Yuma District RMP Amendment* |
| 2004c | *Arizona Statewide LUP Amendment for Fire, Fuels, and Air Quality* |
| 2005c | *Amendment to the Lower Gila North Management Framework Plan and the Lower Gila South RMP* |

## 3.1.1 DESCRIPTION OF PLANNING AREA

The planning area encompasses 1.3 million acres along the lower Colorado River in southwest Arizona and southeast California. It is configured in an area 155 miles long and up to 90 miles wide (see Chapter 1, Section 1.2, for additional planning area description). Northeastern portions of the planning area are in close proximity (less than 60 miles) to the Phoenix metropolitan area. The western boundary, approximately 150 miles east of San Diego, generally parallels the Colorado River to the west and includes land in California. The planning area is located in the counties of Yuma, La Paz, and Maricopa in Arizona and counties of Imperial and Riverside in California. The planning area boundary encompasses 5,035,000 acres of land with mixed ownerships. Within these counties, 1,318,000 acres, or 26 percent, are administered by BLM. Planning area acres and the percentage of BLM-administered lands within each county are presented in Table 3-1.

**Table 3-1**
**Planning Area Acres within Arizona and California Counties**

| Location | Total County Area (acres) | YFO Administered Area (acres) | YFO administered Acres as a Percent of Total County Area |
|---|---|---|---|
| **Arizona** | | | |
| La Paz | 2,880,000 | 660,800 | 22.9 |
| Maricopa | 5,904,600 | 89,400 | 1.5 |
| Yuma | 3,534,100 | 520,900 | 14.7 |
| **California** | | | |
| Imperial | 2,942,100 | 28,800 | 1.0 |
| Riverside | 4,608,000 | 18,100 | 0.4 |
| Total | 19,868,800 | 1,318,000 | 6.6 |

Adjacent land jurisdictions occupy approximately 5,034,983 acres within three Arizona and two California counties in the planning area. These land jurisdictions include AGFD, Arizona State Lands, Luke Air Force–BMGR, BLM Field Offices (Lake Havasu, Lower Sonoran, El Centro, Palm Springs, Hassayampa, and Needles), Reclamation, CDFG, Cibola NWR, Cocopah Indian Reservation, CRIT, Fort Yuma–Quechan Indian Reservation, Imperial NWR, Kofa NWR, MCAS–Yuma, YPG, and private land including regional irrigation districts. Approximately 26 percent of the acreage in the planning area (1.3 million acres) is BLM-administered land (Map 1-1). The majority, 89 percent, of BLM-administered land in the five counties is located within Yuma (676,156 acres) and La Paz (514,757 acres) counties, Arizona.

# 3.2 AIR, WATER, AND SOIL RESOURCES

## 3.2.1 AIR QUALITY

The existing air resource environment in the planning area may be characterized according to identification of the existing sources of air pollution in the region; the climatology of the region, which regulates the transport of emissions; and the existing air quality within the region. These three topics are discussed in the following sections.

### A. CLIMATE

The planning area is located within the Lower Colorado River Valley subdivision of the Sonoran Desert, which is classified as a dry tropical climate characterized by hot summers, mild winters, low rainfall, high evaporation rates, and low humidity (Brown 1994). According to the Arizona Climate Summaries produced by the Western Regional Climate Center, mean maximum summer temperatures in the planning area range from 110° Fahrenheit at Mohawk to 104° Fahrenheit at Kofa Mine and Salome, Arizona. Mean minimum winter temperatures range from 33° Fahrenheit at Salome to 46° Fahrenheit at Kofa Mine (Western Regional Climate Center 2005).

The Sonoran Desert is characterized by a bimodal precipitation pattern (rainy season in both the winter and summer). The higher elevations in the planning area experience greater amounts of precipitation than lower elevations. Mean monthly precipitation varies from 0.06 to 1.4 inches throughout the year in Salome and from 0.01 to 0.5 inch in Yuma Valley (Western Regional Climate Center 2005). Because of the combination of high temperatures and low precipitation, the Lower Colorado River Valley is the driest subdivision of the Sonoran Desert (Brown 1994).

Prevailing wind directions are generally from the north in the fall and winter months, from the west-northwest and west in the spring, and from the south-southeast in the summer months. Wind speeds average 7.8 miles per hour annually (Western Regional Climate Center 2005).

### B. AIR QUALITY

The CAA, enacted in 1970 and amended in 1990, authorized the Environmental Protection Agency (EPA) to set air quality standards and regulate emissions of pollutants into the air to protect human health and the environment from the effect of airborne pollution. The CAA authorized the EPA to achieve this objective by setting air quality standards and regulate emissions of pollutants into the air. EPA has established emission standards for mobile (e.g., automobile) and stationary (e.g., factories) sources for pollutant emissions. These controls are implemented in Arizona through EPA and the ADEQ.

The EPA has established National Ambient Air Quality Standards for seven pollutants: $PM_{10}$ (particulate matter less than 10 microns in diameter), $PM_{2.5}$ (particulate matter less than 2.5 microns in diameter), carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, and lead. The standards for these pollutants are shown in Table 3-2. If the standards are violated in an area, that area is designated as being in “non-attainment” for that pollutant, and the State must develop a

plan for bringing that area back into "attainment." The State of Arizona has adopted the EPA standards for six of the seven pollutants, with the particulate matter less than 2.5 microns in diameter standard only recently being promulgated by EPA. All areas within the planning area boundaries meet these standards, with the exception of particulate matter.

**Table 3-2**
**Federal and State Ambient Air Quality Standards (µg/m$^3$)**

| Pollutant | Averaging Time | Federal (NAAQS) | Arizona (AAAQS) | California (CAAQS) |
|---|---|---|---|---|
| $PM_{10}$ | 24-Hour | 150 | 150 | 50 |
| | Annual | 50[a] | 50 | 30 |
| $PM_{2.5}$ | 24-Hour | 65[b] | -- | -- |
| | Annual | 15[c] | -- | -- |
| Sulfur Dioxide | Hourly | -- | -- | 655 (0.25) |
| | 3-Hour | 1,300 (0.5)[d] | 1,300 (0.5)[d] | -- |
| | 24-Hour | 365 (0.14) | 365 (0.14) | 105 (0.04) |
| | Annual | 80 (0.03) | 80 (0.03) | -- |
| Nitrogen Dioxide | Hourly | -- | -- | 470 (0.25) |
| | Annual | 100 (0.053) | 100 (0.053) | -- |
| Ozone | Hourly | 235 (0.12)[e] | 235 (0.12) | 180 (0.09) |
| | 8-Hour | (0.08)[f] | -- | -- |
| Carbon Monoxide | Hourly | 40,000 (35) | 40,000 (35) | 20,000 |
| | 8-Hour | 10,000 (9) | 10,000 (9) | 10,000 |
| Lead | 90-Day | -- | -- | 1.5 |
| | Quarterly | 1.5 | 1.5 | -- |

*Notes:* Annual standards are never to be exceeded. Other standards are not to be exceeded more than once a year. The numbers in parentheses are in parts per million.
NAAQS = National Ambient Air Quality Standards; AAAQS = Arizona Ambient Air Quality Standards
CAAQS = California Ambient Air Quality Standards
$PM_{10}$ = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
[a] To attain this standard, the expected annual arithmetic mean $PM_{10}$ concentration at each monitor within an area must not exceed 50 µg/m$^3$.
[b] To attain this standard, the three-year average of the 98$^{th}$ percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 65 µg/m$^3$.
[c] To attain this standard, the three-year average of the annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community oriented monitors must not exceed 15 µg/m$^3$.
[d] Secondary standard.
[e] The one-hour NAAQS will no longer apply to an area one year after the effective date of the designation of that area for the eight-hour ozone NAAQS. The effective designation data for La Paz and Yuma Counties in Arizona is October 18, 2000.
[f] To attain this standard, the three-year average of the fourth-highest daily maximum eight-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 parts per million.

The best available data on concentrations of criteria air pollutants relevant to the planning area are discussed in the *Air Quality Baseline Report* (USDOI BLM 2005e).

## C. EMISSIONS FROM ACTIVITIES ON PUBLIC LANDS

The planning area includes lands which do not meet the air quality standards for particulate matter and are in non-attainment for $PM_{10}$ in the City of Yuma, Yuma County, Arizona. The primary sources of $PM_{10}$ pollutants in the non-attainment area are windblown dust and human

activity. While windblown dust is generated in undisturbed areas, it is much more prevalent where the natural soils have been disturbed by human activity. Windblown dust emanates from agricultural fields, miscellaneous disturbed areas, unpaved roads, and urban disturbed areas. Other human activities contributing to particulate emissions include travel on paved and unpaved roads, and operation of permitted sources.

Primary activities within the planning area that generate air pollutants include prescribed burns, recreational travel on and off roads and trails, road construction, site preparation, mining, and livestock animals. Also, emissions from inside as well as outside the planning area are generated by mobile sources (primarily motor vehicles), stationary or point sources (including commercial and industrial operations), and area sources (primarily from agricultural operations, including burning of field residues).

Emission inventory data used to characterize the planning area was obtained from the EPA Air Data website. The most recent data available from this source at the time of this writing was 1999 data. Table 3-3 presents 1999 total annual air pollutant emissions for each county within the planning area. As the majority of the planning area is contained within Yuma and La Paz counties in Arizona, a detail of source category emissions in these counties for 1999 has been provided in Table 3-4.

**Table 3-3**
**1999 Emissions by County (tons per year)**

| State | County Name | VOC | $NO_X$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| Arizona | La Paz | 2,493 | 3,085 | 22,739 | 169 | 3,207 | 1,133 |
| Arizona | Yuma | 8,506 | 10,438 | 58,214 | 572 | 12,850 | 3,254 |
| Arizona | Maricopa | 131,054 | 153,301 | 861,574 | 8,460 | 102,028 | 31,615 |
| California | Imperial | 11,738 | 15,694 | 86,766 | 791 | 24,918 | 7,519 |
| California | Riverside | 46,147 | 48,903 | 313,079 | 2,536 | 40,740 | 14,795 |

*Source:* EPA Air Data
VOC = volatile organic compound; $NO_X$ = the sum of nitrogen dioxide ($NO_2$) and nitric oxide (NO) concentrations
CO = carbon monoxide (CO); $SO_2$ = sulfur dioxide ($SO_2$)
$PM_{10}$ = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter

**Table 3-4**
**1999 Emissions by Source Group (tons per year)**

| Source Group | VOC | $NO_X$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| **Yuma County** | | | | | | |
| Fuel Combustion—Electric Utilities | 20 | 372 | 202 | 10 | 19 | 19 |
| Industrial Fuel Combustion | 9 | 586 | 79 | 39 | 11 | 8 |
| Other Fuel Combustion | 88 | 273 | 228 | 8 | 46 | 45 |
| Other Industrial Processes | 0 | 0 | 0 | 0 | 92 | 44 |
| Waste Disposal and Recycling | 162 | 37 | 824 | 5 | 168 | 158 |
| Highway Vehicles | 3,391 | 5,583 | 39,166 | 202 | 163 | 127 |
| OHVs | 1,359 | 3,438 | 12,203 | 267 | 195 | 174 |
| Miscellaneous Sources | 279 | 148 | 5,512 | 41 | 12,156 | 2,680 |

**Table 3-4**
**1999 Emissions by Source Group (tons per year)**
**(cont.)**

| Source Group | VOC | $NO_X$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| **La Paz County** | | | | | | |
| Fuel Combustion—Electric Utilities | 0 | 0 | 0 | 0 | 0 | 0 |
| Industrial Fuel Combustion | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Fuel Combustion | 28 | 19 | 97 | 0 | 13 | 13 |
| Other Industrial Processes | 0 | 0 | 0 | 0 | 4 | 0 |
| Waste Disposal and Recycling | 8 | 4 | 119 | 0 | 12 | 12 |
| Highway Vehicles | 970 | 2,286 | 14,039 | 73 | 63 | 50 |
| OHVs | 684 | 579 | 2,512 | 51 | 58 | 53 |
| Miscellaneous Sources | 301 | 161 | 5,969 | 44 | 3,057 | 1,004 |

*Source:* EPA Air Data
VOC = volatile organic compound; $NO_X$ = the sum of nitrogen dioxide ($NO_2$) and nitric oxide (NO) concentrations
CO = carbon monoxide (CO); $SO_2$ = sulfur dioxide ($SO_2$); $PM_{10}$ = particulate matter less than 10 microns in diameter; $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter

As seen in Tables 3-3 and 3-4, the majority of emissions in Yuma and La Paz counties are attributed to highway vehicles, OHV, and miscellaneous sources. The most predominant sources within the "miscellaneous sources" category are prescribed burning, road construction, and fugitive dust.

## D. EMISSIONS FROM ACTIVITIES WITHIN THE YUMA $PM_{10}$ NON-ATTAINMENT AREA

Yuma, Arizona experienced an exceedance of the 24-hour National Ambient Air Quality Standards for $PM_{10}$ on August 18, 2002. The Yuma area is currently a moderate non-attainment area for $PM_{10}$. If the August 18, 2002 reading is not flagged as a natural or exceptional event, the exceedance would be considered a violation and result in the Yuma area being reclassified to a non-attainment area (Map 3-1).

ADEQ has flagged the exceedance as attributable to a high wind natural event under EPA's 1996 Natural Events Policy and ADEQ's 1999 *Air Quality Exceptional and Natural Events Policy. Emission estimates for 1999 and 2016*, provided in the *Technical Support Document, Yuma Natural Events Action Plan* (ADEQ 2004), are summarized in Table 3-5. For a detailed discussion of the major sources of $PM_{10}$ in the Yuma $PM_{10}$ non-attainment area see the technical support document.

**Table 3-5**
**Yuma $PM_{10}$ Non-attainment Area Emissions Summary**

| Emission Source | 1999 Annual Emissions (tons) | 2016 Annual Emissions (tons) |
|---|---|---|
| Agricultural and Prescribed Burning | 40.7 | 34.1 |
| Agricultural Tilling | 3,572.0 | 3,572.0 |
| Agricultural Cultivation and Harvesting | 15.7 | 15.7 |
| Windblown Dust | 130,331.0 | 127,046.0 |
| Unpaved Roads – Re-entrained Dust | 10,183.0 | 5,537.0 |
| Paved Roads | 3,419.0 | 5,839.0 |
| Road Construction | 6,761.0 | 10,702.0 |
| General Building Construction | 53.8 | 87.7 |
| Aircraft | 15.5 | 16.4 |
| Unpaved Airstrips | 1.0 | 1.1 |
| Stationary Sources | 77.0 | 119.0 |
| Railroad Locomotives | 17.0 | 15.0 |
| Total | 154,487.0 | 152,985.0 |

*Source:* ADEQ 2004
*Note:* With the exception of windblown dust, all emission estimates are for the Yuma County portion of the non-attainment area.

## E. SUMMARY OF EXISTING AIR QUALITY

With the exception of the Yuma $PM_{10}$ non-attainment area, air quality in the planning area is generally excellent. ADEQ has taken several steps to improve the $PM_{10}$ air quality in the Yuma non-attainment area with the goal of having the region reclassified as an attainment area.

# 3.2.2 WATER RESOURCES

## A. GROUNDWATER

The ADWR designates the boundaries of groundwater basins within the State of Arizona. Portions of the Parker, Ranegras Plain, Lower Gila, Western Mexican Drainage basins, and the Harquahala Irrigation Non-expansion Area are within the planning area. The entire Yuma basin is within the planning area. The Western Mexican Drainage basin lies totally within the BMGR and the Cabeza Prieta NWR and thus is outside the scope of this planning document (Map 3-2) (ADWR 2004a).

The planning area encompasses a small portion of land along the California side of the Colorado River. In California, the groundwater basins that occur adjacent to the Colorado River within the planning area boundary are, from north to south, Rice Valley; Quien Sabe Point Valley, which shares its entire border with the Colorado River Indian Reservation; Palo Verde Valley; Palo Verde Mesa; Arroyo Seco Valley; and Yuma Valley (Map 3-2).

BLM manages lands directly adjacent to the Colorado River. In some places, no alluvium exists that could provide sustainable aquifer material. The water levels in alluvial deposits of the above-mentioned basins are in direct response to flow in the Colorado River (California

Department of Water Resources 2003). Descriptions of the groundwater basins in the planning area are presented below.

### 1. Yuma Basin (Arizona)

The Yuma basin discussion is derived from Overby (1997). Cenozoic basin fill alluvium composes the groundwater reservoir in the Yuma basin. Based on measurements taken in 1992, water levels are relatively shallow ranging from a few feet below land surface near the Gila and Colorado rivers to over 300 feet below land surface in the Yuma desert. Generally, water levels ranged from six to eight feet below land surface to more than 20 feet below land surface in the valleys. Near BLM-administered land in the Laguna and Gila mountains, water levels ranged from nine feet to 33 feet below land surface north of U.S. Interstate Highway 8 (I-8). Deeper water levels exist south of I-8, as the land elevation rises to what is known as the Upper Mesa. Not many wells exist in this area along the Gila Mountains. Near the International Boundary with Mexico in the southwest portion of the Yuma basin, water levels ranged from 90 to 111 feet below land surface.

Comparison of 1992 data and 1960 data shows that water levels in the Yuma basin have changed very little except along the International Boundary where water levels have decreased approximately 20 to 25 feet. This is in response to pumping from a well field east of San Luis, Arizona. The groundwater from this well field is delivered to Mexico.

Water from the Colorado River is the source of almost all groundwater recharge in the Yuma basin. The Gila River is also a source of short-term recharge during periods of flooding. Groundwater is a source of irrigation water only in the South Gila Valley and in small areas outside the established irrigation districts and on Yuma Mesa. The City of Yuma obtains its drinking water almost exclusively from the Colorado River (City of Yuma 2005). Groundwater is used for domestic drinking water supply east of the City of Yuma and by individual RV and mobile home parks. Groundwater may be used in sand and gravel operations on BLM-administered land.

Because recharge occurs mainly by Colorado River water, either directly or from irrigation returns, groundwater throughout the basin has total dissolved solids concentrations greater than 500 milligrams per liter, with many wells exceeding concentrations of 1,000 milligrams per liter. While not necessarily a health risk, high total dissolved solids may limit the use of such groundwater as a drinking water source based on aesthetic qualities such as taste, odor, and color.

### 2. Harquahala Basin and Irrigation Non-expansion Area

Discussion of the Harquahala basin and Irrigation Non-expansion Area is derived from Hedley (1990). The Harquahala basin is a typical alluvium-filled structural basin of the Sonoran Desert Basin and Range Province. The alluvium comprises heterogeneous deposits of clay, silt, sand, and gravel. The thickness of the alluvium varies from 0 foot at the mountain fronts to perhaps as much as 5,000 feet. Groundwater occurs in a regional aquifer within the alluvium in an unconfined condition. In the spring of 1989, depth to water in the regional aquifer ranged from 199 feet to 654 feet below land surface. The basin historically experienced major water level

declines beginning in the 1950s resulting in the designation of the basin as an Irrigation Non-expansion Area.

Irrigation is the primary use of groundwater in the Harquahala Irrigation Non-expansion Area. Wells and irrigated land are mostly on private land and land administered by the Arizona State Land Department. Little depth to water information exists closer to the mountain fronts (under land administered by BLM). Shallower depth to water might be expected in these areas, but the resource may also be limited due to the thinning of the alluvium.

Moderately high concentrations of dissolved fluoride and high concentrations of dissolved solids in parts of the basin cause the groundwater to be not suitable for drinking purposes without treatment.

### 3. Ranegras Plain Basin

Source material for the Ranegras Plain basin discussion is from Johnson (1990). Groundwater in the Ranegras Plain basin primarily occurs in Tertiary and Quaternary alluvium comprising clay, volcanics, conglomerate, and smaller amounts of sand and gravel. Groundwater in the basin generally flows to the northwest toward the Town of Bouse. Depth to water in the center of the basin, north of U.S. Interstate Highway 10 (I-10), generally ranged from 175 to 300 feet below land surface. I-10 forms the northern boundary of the planning area in this basin. The majority of the land in the basin south of I-10 is administered by BLM. There are little groundwater data available south of I-10. A review of well registration records indicates that water levels are probably in excess of 200 feet below land surface in this area (ADWR 2004a).

North of I-10, irrigation is the primary use of groundwater in the Ranegras Plain basin. There is a small amount of private land and land administered by the Arizona State Land Department south of I-10, where irrigation is also the primary use of groundwater. Some commercial/light industrial use occurs along I-10. Livestock watering is the primary use of groundwater on BLM-administered land within this basin.

### 4. Parker Basin

Little published information exists regarding groundwater conditions throughout the Parker basin. The Parker groundwater basin extends along the Colorado River from above the northwest boundary of the planning area roughly to Imperial Dam. The eastern boundary of the basin abuts the Ranegras Plain basin and runs through the Kofa NWR and along the Chocolate Mountains to the Colorado River near Imperial Dam. The basin includes the Cibola Valley and La Posa Plains sub-basins. The Cibola Valley sub-basin comprises the southern portion of the Parker basin along the Colorado River. Groundwater in this sub-basin is generally in hydraulic connection to the river. The La Posa Plains sub-basin may be considered an “internal” basin, separated from direct impact by flow in the Colorado River.

The CRIT Reservation covers most areas adjacent to the Colorado River from the northern boundary of the planning area to I-10. The majority of BLM-administered lands within the basin are in the La Posa Plain sub-basin surrounding the Town of Quartzsite, and in a narrow strip along Highway 95 between the YPG and the Kofa NWR. The remainder of BLM-administered land is limited to near the Colorado River in the Cibola Valley sub-basin.

In the northern part of the basin, the Colorado River alluvium overlies the Miocene Bouse Formation. It is reported that the Bouse Formation and the Colorado River alluvium constitute the main aquifer in the Parker Valley (Tucci 1982). Groundwater within the Colorado River alluvium is in hydraulic connection with and responds to changes in flow of the river. Near the river, water levels may be expected to be only several feet below the land surface. River water is the main source of agricultural irrigation. Drainage ditches lower the water table beneath cropland and maintain it at sufficient depths to reduce waterlogging and damage to crops (Owen-Joyce 1988). Further away from the river, groundwater is used as a domestic drinking water source, primarily in the Town of Quartzsite, Arizona. Groundwater is also used in sand and gravel and other mining operations in the Parker basin.

Most of the La Posa Plain sub-basin is undeveloped, with the Town of Quartzsite being an obvious exception. The Town of Quartzsite's population in 2002 was reported at 3,430. The influx of winter visitors causes the population to approach a temporary peak of 250,000. The town supplies drinking water to its population from two wells. One well draws water from 600 feet and the other from 1,000 feet below land surface (Quartzsite 2005). BLM provides water to the La Posa LTVA south of the Town of Quartzsite through a well located in the southeast portion of the LTVA.

The ADWR maintains water level index wells near the Town of Quartzsite. The water level in one well west of town near I-10 measured 494 feet below land surface in 2003. The water level had declined 10 feet over the past 10 years. The water level in a well six miles south measured 138 feet below land surface in 2004. The water level has declined 18 feet in the past 13 years (Overby 2005).

### 5. Lower Gila Basin

There is no recent publication describing the groundwater resource in the Lower Gila basin. Conditions are considered relatively stable precluding additional investigations (Overby 2005). Groundwater use in the Lower Gila basin is concentrated in the Wellton-Mohawk area immediately adjacent to the Gila River. The primary source of groundwater is imported irrigation water. The main water-bearing unit comprises the unconsolidated alluvium deposited by the Gila River and its ephemeral tributaries, and the unconsolidated to weakly consolidated alluvium in the valleys separating the mountains. The quality of the groundwater makes it marginal to unusable for irrigation. Most of the water used for irrigation is imported from the Colorado River. Low well yields in the rest of the basin allow for domestic, livestock watering, and small mining uses (Leake and Clay 1979).

## B. GROUNDWATER QUALITY

Water quality varies with depth and location in the planning area. Total dissolved solid content in 1988 ranged from less than 1,000 to 4,000 milligrams per liter. Extensive groundwater contamination by agricultural pesticides and nitrates exists in the Yuma area (ADEQ 1998). Volatile organic compound contamination has been reported at the MCAS-Yuma (ADWR 2006).

The Town of Quartzsite, Arizona, is a small desert community of about 3,430 residents, mostly retired. Its economy is supported by a January-through-February gem show, which attracts as

many as a million annual visitors, many of whom are campers. This seasonal influx has caused a great burden on the upper groundwater aquifer compounding an existing problem of improperly maintained septic systems. The upper groundwater aquifer ranges in depth from 40 to 75 feet below the surface in shallow areas and from 400 to 500 feet below the surface in the deeper aquifer areas. ADEQ found high levels of nitrates in the groundwater of the shallow aquifer. An exhaustive study found that the contamination was caused by illegal dumping of waste and septage from RVs. A regional wastewater treatment system to address this problem is currently being planned. The system would include creating several RV dump stations around the community.

Known groundwater contamination also exists within Tyson Wash, northwest of the intersection of Highway 95 and Business Route I-10 in the Town of Quartzsite. Tetrachloroethene, a solvent commonly used in dry cleaning, is present in the groundwater approximately 40 to 70 feet below the ground (ADEQ 2001).

ADEQ's Ambient Ground Water Monitoring Program conducts sampling in groundwater basins throughout the State. Monitoring efforts were focused in 1998 to two areas (Maricopa and Yuma counties) based on the results of previous data collected. These areas have intense agricultural activities. Groundwater in these areas was tested for six constituents: pesticides; arsenic; fluoride; hardness; nitrates; radiochemicals (gross alpha and uranium); and total dissolved solids. The Yuma areas tested above average for nitrates and total dissolved solids. Generally, the highest nitrate concentrations tend to follow an arc starting in the Casa Grande area, continuing through Buckeye, and reaching Yuma through the lower Gila River area. The highest total dissolved solids levels were associated with agricultural areas along the Colorado, Gila, and Virgin rivers (ADEQ 2004).

The YFO recreation program manages water treatment facilities designed to treat sewage and protect water quality. At the Imperial LTVA there are currently two lined evaporative lagoons located at South Mesa. The YFO is permitted by the California Regional Water Quality Control Board to monitor the wastewater at these sewage lagoons per order number R7-2002-0007. The wastewater stream has been monitored on an annual basis and is in compliance for all designated criteria. The La Posa LTVA treats sewage through a leachfield system. The Quartzsite area does not produce enough water resources for a lagoon system. The leachfield is perched on a 210 foot layer of silt and gravel which overlays 1,000 feet of clay, safely separating it from any aquifer. YFO has been in compliance with water quality standards at this facility. Construction plans are being developed to augment or replace the existing system to meet current ADEQ standards.

Wells associated with the LTVAs provide drinking water for the winter visitors. Two wells have been developed in the La Posa LTVA. One drilled in 1985 supplies approximately 10,000 gallons a day. Another well, drilled in 2002 provides a smaller output of 1,500 gallons per day. Drinking water is also provided at the Imperial LTVA and at Squaw Lake. Two Reclamation piezometer wells were equipped and are being used for water source wells. The remaining piezometer wells in the area still allow for groundwater quality monitoring throughout the Imperial LTVA. There are several wells associated with mining claims and agricultural leases throughout the planning area. Should activity cease on the claim or at the lease, the wells would become Federal government property and the determination of whether or not the wells are capped would be made by BLM.

# C. SURFACE WATER

## 1. Surface Water Features

Surface waters in the planning area can be divided into sub-basins or portions of the landscape that collect runoff from the surface, concentrate it into channels, and conduct the resulting flow to a definable outlet (Map 3-3). The National Water Resources Council and the U.S. Geological Survey standardized watershed boundaries in the Southwest (U.S. Water Resources Council 1978). The planning area occurs within the Lower Colorado River Region, which is further divided into smaller basins and then sub-basins. Sub-basins that make up the majority of the planning area include the Imperial Reservoir, Lower Colorado River, Lower Gila River, Tyson Wash, Bouse Wash, Centennial Wash, Tenmile Wash, San Cristobal Wash, Tule Desert, Rio Sonoyta, and Yuma Desert Area sub-basins.

Surface waters in the planning area range from large rivers to dry washes (Map 3-3). The two primary surface waters are the Colorado and Gila rivers, which total 152 miles and 107 miles in length, respectively (Table 3-6). Over 10,000 additional miles of ditches and washes also occur in the planning area. Most of these (92 percent) are intermittent (dry washes that only flow when sufficient precipitation falls within the watershed; flows can last anywhere from momentary to 24 hours depending upon the intensity of the storm). The remaining eight percent are considered perennial; however, these primarily consist of irrigation ditches and canals. There are no perennial streams within the planning area.

**Table 3-6**
**Lengths of Rivers, Ditches, and Washes in Planning Area**

| Surface Water | Length within Yuma Planning Area (miles) |
|---|---|
| Colorado River | 152 |
| Gila River | 107 |
| Other Ditches and Washes | 10,595 |
| Total Length in Planning Unit | 10,854 |

Source: Arizona State Land Department, Arizona Land Resources Information System, and Reclamation 2001

Surface water information, including types, lengths, and locations, was provided by the hydrography layer obtained from the Arizona State Land Department, Arizona Land Resources Information System (converted in 1988 from U.S. Geological Survey 1:100,000 scale, digital line graph data). Additionally, surface water miles along the Colorado River within the planning area were obtained from Reclamation (2001).

Several dams occur within the planning area including the Palo Verde Diversion Dam, Imperial Dam, and Laguna Dam, all on the Colorado River, and the Morelos Dam at the Northerly International Boundary. Upstream of Morelos Dam, the main river channel carries water that is delivered to Mexico pursuant to the 1944 Water Treaty, along with occasional high flows. Normally, all of these water deliveries are diverted into Mexico's Reforma Canal at Morelos Dam. The diversity of surface water types reflects the varied topography, climate, and human modification of the landscapes.

Dripping Springs is the only perennial spring located on BLM-administered land within the planning area; it is an important source of water for several wildlife species. This microhabitat supports various riparian associated plant species and is an important oasis in the desert environment.

## 2. Surface Water Use

Despite a relatively dry climate, the Colorado River contains substantial surface water and serves as the primary water source in the planning area. The Gila River also flows occasionally, but most of the lower Gila River is ephemeral and flows only in response to precipitation or water releases from upstream dams (ADWR 2005). Aside from these major rivers and associated reservoirs, the only perennial surface water located on BLM-administered land in the planning area is Dripping Springs, located southeast of the Town of Quartzsite. This spring is used primarily by wildlife.

The Colorado River originates at about 10,000 feet elevation in the Rocky Mountains of Colorado and flows southwest for 1,470 miles to the Gulf of California (Sea of Cortez) in Mexico. It marks the International Boundary between Arizona and Mexico for 23.7 miles in the planning area. Before the construction of more than 20 dams along its route and tributaries, its flow regularly reached the Gulf of California. In total, the Colorado River drains 242,000 square miles in the U.S. and 3,000 square miles in Mexico.

The Secretary of the Interior is vested with the responsibility to manage the mainstream waters of the lower Colorado River pursuant to a body of law commonly referred to as the “Law of the River.” The Law of the River includes, but is not limited to, Federal and State laws, interstate compacts, an international treaty, court decisions, Federal contracts, Federal and State regulations, and multi-party agreements.

In 1963, a decision of the U.S. Supreme Court made explicit the amount of water appropriated among the lower Colorado River states, as well as the amounts that had been implicitly "reserved" for Native American tribes and Federal public lands. This decision prompted funding of the Central Arizona Project, completed in the 1980s. The project comprises a mountain aqueduct through which water from the southern end of Lake Havasu on the Colorado River is pumped up and into an aqueduct that flows southward to the two cities of Phoenix and Tucson. A relatively short segment of this tunnel crosses the planning area near the northeastern boundary.

The headwaters of the Gila River originate in the Mogollon Mountains of western New Mexico. The river flows west across southern Arizona, draining 57,900 square miles before joining the Colorado River near Yuma within the planning area. Before dams were built on the Gila River upstream of the planning area, flow would occur during spring snowmelt and summer monsoon rains.

Within the planning area, most diversions from the Colorado and Gila rivers provide water for the large agricultural production area, but other uses are also supported. Within the State of Arizona, water withdrawals are prioritized into first through sixth water priorities, depending on when rights were originally claimed (USDOI Reclamation et al. 2004). BLM’s water entitlements in the State of Arizona are fourth priority. As of July 2004, 348 surface water filings existed in the planning area, including rights and claims established under the Public Water Code

(1919), the Water Rights Registration Act (1974), and the Stockpond Registration Act (1977). Of these, 10 percent (35 filings) were filed by the BLM for wildlife and recreation uses (ADWR 2004a). The priority dates of BLM filings span from 1926 through 2001. The remaining filings include 20 filed by other Federal agencies, 37 by Arizona agencies or the University of Arizona, and 256 by private individuals, companies, or irrigation districts.

Surface water in the planning area is also used to support wildlife, livestock, agriculture, and mining. Wildlife catchments have been created in the planning area and are managed by AGFD. In total, 52 wildlife catchments exist in the planning area. In addition, wells, tanks, springs, and other water sources have been established for livestock and wildlife. BLM allotment permittees are also allowed to put in wells or catchments. Water in the planning area is limited. Refer to the Grazing Management section for additional details. Agricultural leases are obtained from the YFO; however, lessees must obtain their own irrigation water. Similarly, mining claimants must obtain their own water supply for mining activities on BLM-administered lands in the planning area.

### 3. Surface Water Quality

Several legal and policy requirements govern surface water quality, including the CWA, the Colorado Salinity Control Act, the Safe Drinking Water Act, the Clean Water Action Plan, EO 11988 on Floodplain Management, and BMPs. Under Section 303(d) of the 1972 CWA, states, territories and authorized tribes are required to develop a list of water quality limited segments. Waters on the list do not meet water quality standards or support beneficial uses, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for water on the lists and develop action plans, called TMDL, to improve water quality.

Surface water bodies are listed for water quality impairment in the lower Colorado River below Imperial Reservoir and the lower Gila River below Painted Rock Dam (local drainage) watersheds, two watersheds within the planning area. However, only one impaired water body, a segment of the Gila River, is proposed for listing under the 2004 303(d) listing within the planning area; the remaining impaired streams and lakes in these watersheds occur upstream of the planning area. The segment of the Gila River proposed for listing extends from Coyote Wash to Fortuna Wash. This segment was on Arizona’s 1998 303(d) list for turbidity and boron (ADEQ 2005). It became part of the active monitoring program and is again proposed for listing in Arizona’s 2004 303(d) list of impaired waters. The 2004 list identifies boron and selenium as the water quality issues in this segment. No TMDL assessments have been conducted to date (ADEQ 2005) in the planning area.

The proposed Gila River segment is currently under review as part of Arizona’s 2004 303(d) list. On November 16, 2004, EPA partially approved and partially disapproved Arizona's 303(d) listing submission. EPA identified additional waters and pollutants that need to be included on Arizona's final 303(d) list. After EPA transmits the final 303(d) list to the ADEQ and following the public comment period, BLM will incorporate EPA's changes and will publish the final 303(d) *Listing Report*. California is currently developing the 2004 Section 303(d) list. On July 25, 2003, EPA approved California's 2002 303(d) list.

Arizona has been affected by drought conditions during most of the last decade (Arizona Governor's Drought Task Force 2004a). Recent conditions on the Colorado River, and economic and environmental drought impacts, have resulted in the creation of a statewide drought strategy. On March 20, 2003 Arizona Governor Janet Napolitano issued EO 2003-12 and established the Governor's Drought Task Force to address drought issues under the leadership of the ADWR (Arizona Governor's Drought Task Force 2004a). This effort emphasizes providing assistance to rural communities with potable water supply needs and includes a water conservation strategy (Arizona Governor's Drought Task Force 2004b).

Goals of the annual Arizona Drought Preparedness Plan include identifying the impacts of drought on water users, defining sources of drought vulnerability, establishing monitoring programs to alert water users and resource managers to the onset and severity of droughts, and preparing drought response options and mitigation strategies to reduce the impact of drought on water users. The plan identifies a process for communication and coordination between Arizona State agencies, Federal agencies (including the BLM), Tribal governments, State lawmakers, water users, resource managers, and scientists.

Management concerns related to surface water include the proliferation of giant salvinia throughout the lower Colorado River, potentially elevated levels of nitrate related to agricultural uses, the ongoing regional drought, and detectable levels of perchlorate in the Gila River (Green 2005). The withdrawal of water from the Colorado and Gila rivers causes depletions that are not entirely replaced by natural runoff. Much of the remaining water is lost to evaporation and groundwater recharge. Sedimentation from soil erosion (described in the Soil Resources section) may contribute to water quality degradation. Washes used as travel ways for vehicles occur throughout this dry region.

# D. FLOODPLAINS

The YFO is subject to occasional high-intensity summer and fall rainstorms which can lead to flash flooding. The greatest hazard from these thunderstorms occurs in the usually dry washes, particularly those where human activities have modified the natural drainage system. The Colorado River is also subject to flooding throughout the winter and spring season from rapid snowmelt in the upper Colorado River Watershed.

The major flood control structures on the lower Colorado River are the Glen Canyon and Hoover Dams. The two major water storage levels in these reservoirs are regulated in association with the small reservoirs to provide flood protection, year-round water use, and hydroelectric power. In combination with these storage facilities, Reclamation and U.S. Army Corps of Engineers have developed extensive levee systems along many parts of the river to ensure safe passage of water during periods of high flow.

BLM-administered public lands along the lower Colorado River are used for recreation, wildlife habitat, and agriculture. Agricultural use of the floodplain is described in Section 3.15 Lands and Realty under the Land Disposal and Acquisition sections, wildlife use in the floodplain is described in Section 3.4, Fish and Wildlife, under the Riparian subsection, and the recreation use is described in Section 3.13, Recreation, of this chapter.

The base floodplain is an area expected to be inundated by floodwaters on the average of once in 100 years. Flood insurance rate maps prepared by the Federal Emergency Management Agency are generally accepted as the best delineations of base floodplains.

The Colorado River Floodway Protection Act, Public Law 99-450, was signed into law on October 8, 1986. The Act calls for the establishment of a federally declared floodway from Davis Dam to the Southerly International Boundary between the United States and Mexico. As required by the Act, Reclamation has developed maps that show the floodway boundaries. In accordance with Section 5 of the Act, these floodway maps shall have the same force and effect as if included in the Act. BLM adheres to the stipulations listed in the Act when it allows development in the floodway.

## 3.2.3 SOIL RESOURCES

Arizona is characterized by three physiographic provinces: the Colorado Plateau, the Basin and Range, and a Transition Zone of intermediate characteristics. The planning area lies within the Basin and Range physiographic province (Hendricks 1985).

The Basin and Range physiographic province occupies approximately the southwestern 40 percent of Arizona and is characterized by northwest-trending, block-faulted mountain ranges separated by deep, alluvium-filled basins. The province was created about 20 million years ago as the earth's crust stretched, thinned, and then broke into some 400 mountain blocks that partly rotated from their original horizontal positions. These mountains of late Precambrian and Paleozoic rock continue to erode and fill the intervening valleys with fresh sediment (USDOI USGS 2004).

Mountain ranges in the planning area generally are dominated by Tertiary volcanics with some Precambrian (Proterozoic) to Mesozoic igneous or metamorphic core complexes. The deep intermontane basins generally contain Paleozoic and Mesozoic sedimentary rocks overlain by Tertiary sedimentary and volcanic sequences.

The planning area occurs within the Sonoran Basin and Range ecoregion (EPA 2005). Ecoregions are large units of land and water that share similar climate, topography, and biological communities. Ecoregions can provide a spatial framework for ecosystem assessment, research, inventory, monitoring, and management (Weinstein et al. 2003). The Sonoran Basin and Range subecoregion contains scattered low mountains and has large tracts of federally owned land, including BLM-administered lands. Much of this area is used for military training.

The soils in the planning area are associated with a variety of climates, vegetative cover, topography, and geology. A detailed soil survey is available for the YPG (USDA SCS 1991), but it does not extend to other portions of the planning area. This soil survey and the STATSGO for Arizona (USDA NRCS 1994) were used to characterize soils in the planning area. The same approach was adopted in the Preliminary Assessment of Biodiversity Values and Management Framework Adaptation for the Expanded Kofa Complex and Yuma Resource Management Area in Southwestern Arizona (Weinstein et al.2003). Particular soil features were identified based on communications with BLM specialists and the Expanded Kofa Complex vegetation map (Weinstein et al. 2003).

In total, five soil suborders (specific soil types) are found in the planning area (Map 3-4). Almost 90 percent of the planning area consists of Aridisols (Table 3-7), a soil order (general soil type) of the USDA NRCS Soil Classification System. Aridisols are commonly found in dry environments that are low in organic matter and rich in deposited salts. Of the remaining 10 percent of the planning area, the largest area consists of Entisols, or soils of recent development with no or poorly developed soil horizons. Less than one percent of the planning area consists of badlands, rock outcrop, and water. Badlands occur in semi-arid landscapes that have been influenced by heavy river (fluvial) erosion. They are characterized by deep ravines and gullies, sharp ridges, and generally barren surfaces.

**Table 3-7**
**Soil Order, Suborder, and Areas in Planning Area**

| Soil Type | | Area within the Planning Area | |
|---|---|---|---|
| **Soil Order** | **Soil Suborder** | **Acres** | **Percent (%)** |
| Aridisols | Argids | 1,679,900 | 33.4 |
| | Orthids | 2,736,600 | 54.4 |
| Entisols | Fluvents | 418,700 | 8.3 |
| | Orthents | 157,100 | 3.1 |
| | Psamments | 4,600 | 0.1 |
| Badlands | | 6,500 | 0.1 |
| Rock Outcrop | | 22,300 | 0.4 |
| Water | | 8,300 | 0.2 |
| Total within Planning Area | | 5,034,000 | 100.0 |

Source: STATSGO (USDA NRCS 1994)

In general, soils in the planning area developed under hot, dry conditions and are characterized as having thermic or hyperthermic temperature regimes and aridic or semi-aridic moisture regimes. The soil suborders Orthids and Argids occur throughout the planning area (Map 3-4). These soils are light-colored, contain little organic matter, and have at least one diagnostic subhorizon. Orthids can be calcareous throughout, but can also have accumulations of carbonates (calcic horizon), cemented carbonates (petrocalcic horizon), or cemented silica (duripan), with limited areas having accumulations of gypsum (gypsic horizon).

Argids can have clay (argillic horizon) or sodium (natric horizon) accumulations in the subsurface. Sonoran and Mohave Desert Scrub are the primary vegetation communities associated with Orthids and Argids soils in the planning area. Fluvents occur along the Gila River floodplain in the planning area. In general, Fluvents form in recent loamy or clayey alluvial deposits near stream channels or on piedmont slopes. Several vegetation communities, including Chihuahuan Desert Scrub, Plains and Great Basin Grassland, Great Basin Desert Scrub, and Great Basin Pinyon–Juniper Woodland are associated with Fluvents in the planning area.

Orthents occur along rocky areas in the planning area. These shallow soils develop over rock and are commonly found on steep slopes or very dry environments. Orthent soils are characterized by a lack of horizon development, because they form in dry climates and the parent materials are resistant to weathering. Sonoran and Mohave Desert Scrub are the primary vegetation

communities associated with Orthents. Psamments, poorly developed sandy soils, are associated with sand dunes in the planning area.

## A. SENSITIVE SOILS

Sensitive soils occur throughout the planning area and include desert pavement, cryptobiotic (biological) soil crusts, stabilized sand dunes, and wetland soils. Sensitive soils are significant because of their susceptibility to erosion and their roles in supporting plants and wildlife. Soil disturbances (particularly to sensitive soils) last a long time in the arid southwest where estimated recovery times range from less than a century up to several millennia depending on the nature and intensity of the disturbance and soil properties (Belnap et al. 2001; Weinstein et al. 2003).

Desert pavements and cryptobiotic (biological) soil crusts are scattered throughout the planning area. Desert pavements form in the most arid parts of the Sonoran Desert, where annual rainfall is generally less than eight inches on average (Weinstein et al. 2003). Desert pavements occur on low flat ridges separated by narrow channels (rills). Examples of desert pavement within the planning area occur on the Palomas Plain (Weinstein et al. 2003). Desert pavement consists of a single layer of tightly packed pebbles and small stones, the surface of which is covered with a dark varnish. Extremely fine-grained soils of silt- and clay-sized particles are found beneath the pavement surface (McAuliffe 1999). Perennial plants are often absent from these surfaces; instead the pavements support a sparse seasonal cover of ephemeral species (Turner and Brown 1994). The tightly packed surface of desert pavement inhibits infiltration of precipitation and promotes runoff, which funnels water into the adjacent rills (Weinstein et al. 2003). Desert pavements may play a key role in hydrologic function by transferring rainfall and surface runoff from a large area and funneling it to nearby wooded wash channels that support trees and other vegetation (Turner and Brown 1994).

Cryptobiotic soil crusts are composed of highly specialized communities of cyanobacteria, mosses, and lichens. These biological crusts cover open spaces between vascular plants on relatively barren soils. Cryptobiotic crusts generally occur where vascular plant cover is sparse. Crust cover is generally greatest at lower elevation sites in semiarid areas (Belnap et al. 2001). The vertical and horizontal vascular plant structure of many semi-arid vegetation communities optimizes growth of biological soil crusts. Vascular plants create windbreaks and shade, influencing how much moisture and light reach the soil surface. They also trap leaf litter, keeping the interspaces free of substantial or persistent litter cover. Biological crusts in many regions are best developed in interspaces between shrubs. Invasive exotic plants generally decrease the biological crust cover in most ecosystems (Belnap et al. 2001). Stable or embedded rocks at or near the soil surface can increase soil crust cover by perching water and armoring the surface from physical disturbances. In general, more stable, fine-textured soils (such as silty loams) support greater crustal cover than less stable, coarse-textured soils (Belnap et al. 2001). North and east slopes generally favor crustal development.

Stabilized sand dunes form another sensitive soil in the planning area. Stabilized dunes have more dense vegetation cover than other dune types, which anchors sand in place. Sand dune complexes were identified as part of the vegetation mapping for the Expanded Kofa Complex (Weinstein et al. 2003). Dune systems within the Expanded Kofa Complex are principally

stabilized or semi-stabilized dunes with small areas of unvegetated, active dunes. Major dune complexes within the planning area include (1) the La Posa Dunes on the La Posa Plain in the northern portion of the planning area, (2) relatively small, isolated dune patches on the western arm of YPG near Cibola, referred to as the Cibola Dunes, (3) the northern portion of the Mohawk Dunes near Dateland; and, (4) the mesa dunefield in the southern portion of Yuma. Sand dunes serve as significant soil resources, because they support rare plant communities.

Wetland soils occur in areas along the Colorado and Gila rivers throughout the planning area. Overuse of natural surface water and groundwater resources and the loss of natural hydrological regimes have affected wetland soils (Weinstein et al. 2003). For detailed information about wetland and riparian areas, also refer to the Vegetative Resources section.

### B. PRIME AND UNIQUE FARMLAND

The USDA NRCS formerly known as the Soil Conservation Service has defined Important Farmlands in Yuma and La Paz County into three categories, Prime Farmland, Unique Farmland, and Additional Irrigated Farmland. Prime Farmland is one of the most important resources of the Nation. This exceptional land can be farmed continuously or nearly continuously without degrading the environment. It will produce food, fiber, forage, feed and oilseed crops with the least amount of energy used. It is the most responsive to management and requires the least investment for maintaining the productivity.

Unique Farmlands are land other than Prime Farmland that is used for production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season and moisture supply needed to produce sustained high-quality and/or high yields of a specific crop when treated and managed according to modern farming methods. Examples of such crops are citrus, seed crops, vegetables, and fruit.

Additional Irrigated Farmland has some properties that distinguish it from Prime Farmland including seasonal wetness, limited rooting depth or flooding.

All YFO agricultural leases within the planning area are Prime or Unique farmland. YFO currently authorizes approximately 1,528 acres of land in Arizona and California for agricultural lease (approximately 228 acres in California and 1,300 acres in Arizona). All cropland in YFO is irrigated cropland due to limited rainfall (three inches or less per year) (USDA NRCS 2005).

## 3.3 VEGETATION RESOURCES

The planning area is within the Lower Colorado Valley Subdivision of the Sonoran Desert. The extreme aridity characterizing this region is reflected in open plains covered sparsely with drought-tolerant shrubs, grasses, and cacti. Vegetation succession progresses very slowly in the desert, except where surface disturbance has taken place or moisture levels are high as a result of human influence. Despite the prolific seed-producing ability of many desert species, only a few plants survive to maturity due to low rainfall and harsh air and soil temperatures (USDOI BLM 1987b). Low precipitation also results in very slow perennial plant growth, and annual

production of woody materials in the planning area is especially low as a result of these slow growth rates. Average rainfall for the planning area is three inches annually.

## 3.3.1 TERRESTRIAL VEGETATION

Upland desert vegetation communities begin only a few hundred feet from the major river systems and associated riparian vegetation. Variation in slope, substrate, elevation, drainage, and disturbance regimes results in development of a variety of upland vegetation types. The upland vegetation, exclusive of riparian areas, can be generally split into two Major Land Resource Areas as classified by the USDA NRCS: Lower Sonoran Desert Scrub (sub-unit number 40-4AZ) and Sonoran-Mohave Desert Shrub Mix (sub-unit number 40-3AZ) (USDA NRCS 2005).

### A. LOWER SONORAN DESERT SCRUB LAND RESOURCE UNIT

Vegetation in the Lower Sonoran Desert Scrub Major Land Resource Areas comprises the majority of the planning area. This class of vegetation occurs within the elevation range of 200 feet at Imperial Reservoir to 3,788 feet at Castle Dome Peak. Creosotebush (*Larrea tridentata*), bursage (*Ambrosia* spp.), and brittlebush (*Encelia* spp.) are common to all desert washes. Trees such as paloverde (*Parkinsonia* spp.), ironwood, catclaw acacia (*Acacia greggii*), and mesquite, are confined primarily to the major washes. The nearly level alluvial fans and plains have uniform stands of sparsely spaced shrubs dominated by creosotebush. Sand dunes are also common in some areas.

Upland plant communities in this Major Land Resource Area are dominated by desert shrubs and cacti. Creosote and white bursage are the major shrubs. Big galleta (*Pleuraphis rigida*) and longleaf Mormon-tea (*Ephedra trifurca*) dominate sandy sites, and hill sites are dominated by white brittlebush and teddybear cholla (*Opuntia bigelovii*) with an overstory of littleleaf paloverde (*Parkinsonia microphylla*), ocotillo (*Fouquieria splendens*), and elephant tree (*Bursera microphylla*). Trees common in bottom sites include mesquite, blue paloverde, catclaw acacia, smoketree dalea, and bitter condalia (*Condalia globosa*). Winter annual grasses and forbs are present following favorable moisture. Ephemeral production by these annual species is an important source of forage for wildlife and livestock in the planning area. Average annual production of these shrub lands is 200 pounds per acre (USDA NRCS 2005).

### B. SONORAN-MOHAVE DESERT SHRUB MIX LAND RESOURCE UNIT

The Sonoran-Mohave Desert Scrub Mix Major Land Resource Area occurs on mountain slopes and relatively high elevations within the planning area (between 1,800 feet in the Mohave Mountains and 5,681 feet in the Harquahala Mountains). This type supports a rich mixture of flora in areas where coarse soils allow deep infiltration of rainwater. Some cacti, paloverde, desert ironwood, and crucifixion thorn (*Canotia holacantha*) grow in fairly dense stands in mountain washes. However, the rocky areas have sparse vegetation and appear barren. North-facing slopes in these areas often harbor very diverse vegetation communities relative to nearby habitats.

Plant communities in this Land Resource Unit are dominated by over-stories of large shrubs and low trees with understories of perennial grasses and forbs. Upland sites are dominated by large shrubs such as creosotebush, whitethorn acacia (*Acacia constricta*), littleleaf paloverde, crucifixion thorn, and Joshua tree (*Yucca brevifolia*) with understories of bush muhly (*Muhlenbergia porteri)*, big galleta, threeawn (*Aristida spp*.), desert globe mallow (*Sphaeralcea ambigua*), desert marigold (*Baileya multiradiata*), and spiny golden head. Average annual production of these shrubby plant communities is about 600 pounds per acre. Soils of this Land Resource Unit are thermic (USDA NRCS 2005).

## 3.3.2 VEGETATION COMMUNITIES AND RESOURCE AREAS

Past efforts to map and describe vegetation in the planning area have been conducted at a very large scale or have relied on physiographic descriptions rather than maps to describe communities. Recent efforts using a combination of remote sensing, aerial photography interpretation, and ground-truthing have been used to create a more refined and detailed map of upland vegetation communities (Weinstein et al. 2003). Gap Analysis Program data available from the U.S. Geological Survey was used for fire management planning and used to initially characterize the vegetation of the planning area. This data was further augmented with information from a variety of sources and methods, including community models to provide a complete coverage representing the plant communities within the planning area (Map 3-5). A description of vegetation communities is found below (Hall et al. 2001; Weinstein et al. 2003). Additional community descriptions may be found in original sources and other regional vegetation descriptions such as: *U.S. Geological Survey GAP Analysis* (2001 and 2004) and Brown et al. (1979).

### A. CREOSOTEBUSH—BURSAGE DESERT SCRUB

This community occupies flat to moderate slopes in valley bottoms and plains, low rolling hills, and lower bajadas extending from surrounding mountain ranges. This community is characterized by sparse cover of shrubs, co-dominated by creosotebush, white bursage (*Ambrosia dumosa*), triangle leaf bursage, ocotillo, white ratany (*Krameria grayi*), and jumping cholla (*Opuntia fulgida*) (Weinstein et al. 2003; Hall et al. 2001). The understory is typically sparse but may be seasonally abundant with ephemerals (Hall et al. 2001). This community is the most extensive of the upland communities and comprises the majority of the BLM-administered lands in the planning area.

### B. PALO VERDE–MIXED CACTI–MIXED SCRUB ON BAJADAS

This community is present on the upper bajadas (coalesced alluvial fans) of desert mountain ranges, generally transitioning into Creosotebush-Bursage Desert Scrub on the lower bajadas and valley bottoms. A sparse canopy of saguaro cacti (*Carnegiea gigantea*) and/or leguminous trees and a patchy understory of large and small cacti, shrubs, herbs, and grasses characterize these areas (Weinstein et al. 2003; Hall et al. 2001). Bursage dominates the subcanopy layer and at the community level is at least a co-dominant and often a dominant in regard to overall abundance.

The sparse herbaceous layer is dominated by perennial grasses and forbs with annuals seasonally present and occasionally abundant (Hall et al. 2001).

## C. PALO VERDE–MIXED CACTI–MIXED SCRUB ON ROCKY SLOPES

This community occurs on bedrock outcrops throughout low mountain ranges, often above the bajadas community. Vegetation cover may be sparse or absent, particularly on large rock outcrops and areas with more arid climates. Some species characteristic of the Mountain Upland community may be present on north facing slopes and canyons where environments are cooler and soils are likely to have more moisture (Weinstein et al. 2003). Species composition is generally comparable to the bajadas community, but additional associated species such as teddybear cholla, likely distinguish it (Hall et al. 2001).

## D. ELEPHANT TREE–LIMBERBUSH ON XERIC ROCKY SLOPES

Composition in this community is similar to the Palo Verde–Mixed Cacti–Mixed Scrub on Bajadas community, but is characterized by the presence of elephant tree. Vegetation of this community may differ with aspect and substrate and may be best expressed on granitic slopes (Hall et al. 2001). This community is located entirely in the southern portion of the planning area.

## E. WOODED WASH SCRUB

This community occurs in linear patterns in association with dry washes where intermittent, channel-constricted streamflow occurs. The composition of these communities is highly variable and dependent on site-specific drainage system characteristics and ecological processes sensitive to disturbance. Relative to surrounding communities, Wooded Wash Scrub communities are high in species richness and abundance. The relatively high vegetation production in these communities provides forage and thermal cover critical for the survival of many species of wildlife (Weinstein et al. 2003).

### 1. Valley Wooded Washes

This portion of the community is associated with dry washes within lower bajadas and valley bottoms where channels are dynamic. The overstory is typically dominated by deciduous trees including ironwood, blue paloverde, and mesquite (Weinstein et al. 2003). Understory species include Le Conte's barrel cactus (*Ferocactus cylindraceus*), big galleta, burrobush (*Hymonoclea salsola*), wolfberry (*Lycium* spp.), honey mesquite, smoke tree, and graythorn (Weinstein et al. 2003). Other shrubby cacti and sparse forbs and annual grasses may also be present (Hall et al. 2001).

### 2. Mountain Wooded Washes

This portion of the community occurs on higher gradients in the upper bajadas and mountains along generally static streambeds largely confined by bedrock. Vegetation is largely influenced by aspect and elevation (Weinstein et al. 2003). Vegetation typically consists of paloverde

species, ironwood, mesquite and succulents (Hall et al. 2001).

## F. BRAIDED CHANNEL FLOODPLAIN

Vegetation in this community occupies islands within low gradient to broad valley floodplains where interweaving braided channels flow during flood events and the surface is periodically inundated. The processes of channel development and resultant changes in disturbance intervals and moisture regimes result in communities differing in structure and composition from those of Wooded Wash Scrub. The moisture regime and surface flow pattern are critical to many species established in these communities. Disturbances in these conditions (e.g., caused by roads) can have significant impacts on species establishment and survival within this community. Species that differentiate this type from the Valley Wooded Wash Scrub type include fishhook barrel cactus (*Ferocactus wislizeni*) and bush muhly (Weinstein et al. 2003). Ironwood and plants characteristic of the Creosotebush-Bursage Desert Scrub Community are also present (Hall et al. 2001).

## G. MOUNTAIN UPLAND COMMUNITY

This community is characterized by an assemblage of relic chaparral and woodland plants that occur at the highest elevations, north facing slopes, and shaded canyons of the mountains located entirely within the Kofa complex. The most common plants within this type include shrub live oak (*Quercus turbinella*), one-seed juniper (*Juniperus monosperma*), and Arizona rosewood (*Vauquelinia californica*). Other species including barberry (*Berberis* spp.), crucifixion thorn, Bigelow's beargrass (*Nolina bigelovii*), desert willow, acacia, and perennial grasses are also present in this community. The precise composition is dependant on microclimates and substrates (Weinstein et al. 2003).

## H. DUNE COMPLEX

The Dune Complex is found throughout the desert southwest and provides conditions that support unique vegetation communities and habitats. These areas are characterized by sparsely or unvegetated active dune fields, stabilized dunes with more dense vegetation cover that serves to anchor sand in place, and wind-blown sand sheets that overlie other soil substrates. Dunes have low species similarity and high rates of occurrence of endemic plants relative to vegetation of other regional habitats. Vegetation is characterized by an abundance of ephemeral plants generally absent from adjacent areas (Weinstein et al. 2003).

Within the planning area, dune vegetation is dominated by big galleta and white bursage. Other characteristic species include creosotebush, evening primrose (*Oenothera deltoidea*), desert sand verbena (*Abronia villosa*), hairy desert sunflower (*Geraea canescens*), desert twinbugs (*Dicoria canescens*), ocotillo, perennial and ephemeral forbs and grasses, longleaf Mormon tea, white ratany, Emory dalea (*Psorothamnus emoryi*), and littleleaf ratany (*Krameria parvifolia*) (Weinstein et al. 2003; Hall et al. 2001). Sahara mustard, an invasive non-native species, is also common within this complex (Weinstein et al. 2003).

### I. CREOSOTEBUSH–BIG GALLETA SCRUB

This community is very limited in extent and is located on sandy soils and sand sheets extending from dunes. This type was not distinguishable at the scale of the map (see Map 3-5), but is expected to be located in some areas mapped as Creosotebush-Bursage Desert Scrub (Weinstein et al. 2003). Big galleta is the sole or dominant grass in the herbaceous layer, while creosotebush is the dominant shrub.

### J. MESQUITE WOODLAND

This community is associated with wooded wash and riparian systems and provides habitat for a variety of vertebrate species. Occurrences of this community are remnants of a community historically found throughout the Desert Southwest, but now more limited in extent due to agricultural use and other factors. This community may include honey mesquite (*Prosopis glandulosa*) and screwbean mesquite (*Prosopis pubescens*), mixed with salt cedar (Weinstein et al. 2003).

### K. RANEGRAS PLAIN

Vegetation within this unique community includes extensive stands of mesquite, big galleta, salt cedar, and bush muhly. Vegetation occurs primarily on the outer edges of the floodplain and is clumped in places. Much of the natural distribution of the Ranegras Plain, north of the planning area boundary, has been converted to agriculture (Weinstein et al. 2003).

### L. OTHER (RIPARIAN, AGRICULTURAL, INDUSTRIAL, UNKNOWN)

Other areas either classified as riparian zones or other types representing human disturbances are found throughout the planning area. Riparian zones are classified and discussed separately.

## 3.3.3 AQUATIC VEGETATION

The lower Colorado and Gila rivers support a variety of native and non-native aquatic vegetation and algae. Aquatic vegetation is classified into three different types; submerged (generally rooted at the bottom and completely underwater), emergent (those which grow above the water in shallow areas) and floating (leaves that float above the surface). Submerged plants include sago pondweed (*Potamogeton pectinatus* and *P. foliosus*) curly leaf pondweed (*P. crispus*), American pondweed (*P. americanus*), brittle naiad (*Najas minor*), southern naiad (*N. guadalupensis*), watermilfoil (*Myriophyllum* spp.), Eurasian watermilfoil (*M. spicatum*), and coontail (*Ceratophyllum demersum*). Emergent plants include many of the species discussed in the riparian section such as cattail (*Typha* spp.) and bulrush (*Scirpus* spp.), as well as parrot feather (*C. emersum*). Floating plants include duckweed (*Lemna minor*), water pennywort (*Hydrocotyle* spp.), and giant salvinia.

## 3.3.4 RIPARIAN HABITATS AND WETLANDS

Riparian habitats are areas of transition between upland and aquatic ecosystems that are influenced by lateral water flow from adjacent stream channels (Brown et al. 1979). These habitats are among the most productive ecosystems and provide many important ecological functions and benefits including improving water quality by filtering out nutrients from runoff, maintaining stream temperatures by providing shade, and helping to control sediment loading into aquatic systems. The BLM definition of riparian is a form of wetland transition between permanently saturated wetlands and upland areas. Riparian areas exhibit vegetation of physical characteristics that reflect the influence of permanent surface or subsurface water. Typical riparian areas include lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, and the shores of lakes and reservoirs with stable water levels. Excluded are ephemeral streams or washes that lack riparian vegetation and depend on free water in the soil.

Riparian areas in the arid southwestern U.S. are important to a variety of vertebrate species (Szaro 1991). Disturbance plays an integral role in establishing and maintaining undisturbed southwestern riparian ecosystems, and flooding is the most common natural disturbance in these systems (Szaro 1991). Fire acts as periodic disturbance and influences the composition and structure of riparian ecosystems. Riparian ecosystems in the southwestern U.S. have been altered extensively since European settlement. Introduction of non-native plants have greatly changed species composition and structure of riparian communities (Ohmart and Anderson 1982).

Riparian vegetation supports particularly high species richness and abundance of several vertebrate groups compared to drier uplands (Ohmart and Anderson 1982; Szaro 1991). The riparian ecosystem maintains an exceptional biological diversity of both vertebrate and invertebrate species in a variety of habitat types, including areas colonized by non-native trees and shrubs. Naturalization of non-native plants has greatly changed the composition and structure of the riparian ecosystems and also altered the fire regime in the riparian areas through the accumulation of deciduous litter (Ohmart and Anderson 1982).

Riparian habitats within the planning area are generally associated with large river corridors and are found along the lower Colorado and Gila rivers on BLM-administered lands, Tribal, military, USFWS, State, and private lands (Map 3-6). Pockets of lakes and reservoirs are also scattered throughout the planning area. Sandy desert washes are not included in this discussion; they are classified as xeroriparian, or dependent upon intermittent water sources. The planning area is extremely arid outside of the two major river systems, and all of the vegetation communities depend upon the bimodal pattern of rainfall for germination and growth. Sandy desert washes are xeroriparian. Riparian vegetation types in the planning area vary from woody riparian, which is typically dominated by a mix of native cottonwood-willow, native mesquite, and non-native salt cedar communities to arrowweed (*Pluchea sericea*), saltbush (*Atriplex* spp.), and marsh communities (Brown 1994; Ohmart et al. 1988) (Map 3-7 and 3-8) (Table 3-8).

**Table 3-8**
**Vegetation/Cover Types along the**
**Lower Colorado River and Lower Gila River Corridors within Planning Area**

| Vegetation/Cover Type | Characteristics | Total Mapped Acreage in Planning Area |
|---|---|---|
| Cottonwood–Willow | Willow and cottonwood at least 10% of total trees | 2,700 |
| Salt cedar | Salt cedar species constituting 80–100% of total trees | 36,200 |
| Honey Mesquite | Honey mesquite constituting 90–100% of total trees | 2,900 |
| Salt cedar–Honey Mesquite | Honey mesquite at least 10% of total trees | 9,900 |
| Salt cedar–Screwbean Mesquite | Screwbean mesquite at least 20% of total trees | 6,000 |
| Arrowweed | Arrowweed at least 90–100% of total vegetation | 3,200 |
| Atriplex | Saltbush species constituting 90-100% of total vegetation | 600 |
| Marsh | Open marsh (75% water) to nearly 100% cattail/bulrush | 6,300 |
| Creosotebush | Creosote 90–100% of total vegetation | 900 |
| Agricultural | Active or fallow, adjacent to riparian and aquatic habitats | 1,500 |
| Open Water | Open water | 1,700 |
| River | Mainstem plus tributaries and natural/artificial channels | 10,000 |
| Structured Open Water | "Lakes" formed by dams with variable water levels | 400 |
| Uplands | Vegetation dominated by upland species | 1,400 |
| **Total** | | 83,700 |

*Source:* Anderson and Ohmart 1984; Ogden 1998; Salas et al. 1996; Younker and Anderson 1997; USDOI Reclamation et al.2004 (LCR MSCP)

Riparian areas in the planning area provide several essential ecological functions including increasing water quality, providing water storage and groundwater recharge, maintaining stream water temperatures by providing shade, and controlling soil erosion. One of the most important functions of the riparian areas is providing food, water, and cover for wildlife. The riparian communities in the planning area are important to resident and migratory wildlife. The lower Colorado and Gila rivers associated with riparian habitats support several hundreds of species of wildlife including the federally endangered Yuma clapper rail, SWFL, and several other special status species. Riparian habitats of the river systems also provide essential stopover and nesting sites for a diversity of neotropical migrant birds, such as flycatchers, vireos, warblers, tanagers, and grosbeaks. Numerous species of raptors, waterfowl, other migratory and breeding birds, mammals, reptiles, fish, and amphibians all use the biologically diverse riparian habitats (USDOI Reclamation et al. 2004). Remnant native riparian habitats along the Colorado River corridor are valuable to native biodiversity and support hundreds of species of migratory and resident wildlife (USDOI Reclamation et al. 2004). The LCR MSCP provides detailed information concerning riparian land cover by reach in the lower Colorado River (USDOI Reclamation et al. 2004).

The extent of native riparian vegetation has decreased in the western U.S. since European settlement due to a variety of factors, including dam construction, river channelization, cattle

grazing, agricultural development, recreational development, naturalization of non-native plants, and alterations of historical fire regimes (Knopf et al. 1988; Szaro 1991).

Over the past several decades, the lower Colorado River has been channelized, dammed and diverted, resulting in significant hydrologic and ecological functional changes. The present regulation of natural hydrologic regime does not support extreme flow fluctuations mainly because of the presence of large, mainstem dams, resulting in reduced natural backwaters and reduced periods of inundation in adjacent floodplain lowlands. In addition, riparian woodlands and floodplains have been converted to agricultural and urban uses, and the species composition and structure of riparian ecosystems have been greatly altered by the invasion and naturalization of non-native trees and shrubs.

The Gila River is primarily an intermittent system that is dry for most of the year except during seasons with heavy rainfall and snow at the headwaters. However, for approximately 50 miles above its confluence with the Colorado River, the lower Gila River has stretches with perennial surface flows due to agricultural irrigation returns. Many species of riparian and marsh birds, one native fish species, and numerous species of native amphibians use this biologically diverse riparian area (Weinstein et al. 2003). Similar to the Colorado River, the Gila River floodplains have also been converted to agricultural and urban uses, and non-native trees and shrubs have displaced many of the native riparian vegetation (USDOI Reclamation et al. 2004).

The USFWS *National Wetlands Inventory* has not identified wetland types within the planning area. However, typical wetland types likely to be found in the planning area include riverine (e.g., lower Colorado and Gila rivers and their tributaries), palustrine (along the lower Colorado River and lower Gila River corridors), and lacustrine (e.g., Mittry Lake, Squaw Lake) systems. The riverine system includes all wetland and deepwater habitats contained within a channel that are not dominated by trees, shrubs, and persistent emergent plant species. The vegetation within the riverine system includes aquatic bed and non-persistent emergent plant species. Palustrine systems are generally adjacent to the riverine wetlands and include all wetlands dominated by trees, shrubs, and persistent emergents. Lacustrine systems include permanently flooded lakes, reservoirs, and intermittent lakes with extensive areas of deep water and considerable wave action (Cowardin et al. 1979).

## A. COTTONWOOD–WILLOW

The native Cottonwood-Willow Community is found on deep, well-watered, loamy alluvial soils on floodplains of the lower Colorado and Gila rivers and provides suitable habitat for many species of wildlife and migratory birds, including the federally endangered SWFL (Holland 1986). Although the dominant trees do not tolerate permanent inundation, this plant community requires periodic winter or spring flooding to create new silt beds for cottonwood and willow seedling establishment (Brown 1994; Ohmart et al.1988). As a result of flow stabilization by dams that eliminates annual spring floods, stands of the Cottonwood–Willow Community are primarily decadent and show little evidence of seedling recruitment (Brown 1994). During uncommon spring flood events, cottonwood recruitment along bank lines occurs where conditions allow.

## B. SALT CEDAR

Several species of salt cedar make up the Salt Cedar Community. These non-native plants have aggressively displaced the native riparian vegetation along the rivers, particularly in saline areas where native vegetation has been removed by fire (Brown 1994; Ohmart et al.1988; Turner and Karpiscak 1980). During the late fall, salt cedar will drop its leaves, increasing the salinity of topsoil. Through this action, the highly salt-tolerant salt cedar promotes the conditions that it tolerates better than native species such as cottonwood-willow. Salt cedar gradually replaces the native riparian communities and becomes well established as a monotypic community. It grows on sandy or gravelly soils and produces large numbers of very small seeds that are dispersed long distances by wind and water (DeLoach et al. 2000). Stabilized low flows, regular summer flooding of river bars, and the increase in fire frequency due to large amounts of litter produced by the vegetation create ideal conditions for establishment of salt cedar (DeLoach et al. 2000; Turner and Karpiscak 1980).

## C. HONEY MESQUITE

The native Honey Mesquite Community is found close to the rivers and often forms monotypic stands of trees, but will also grow interspersed with other shrub species. This species does not tolerate prolonged inundation and historically grew on higher terraces in the floodplain. However, conversion of vegetated lands to agriculture and water regulation allowed the species to colonize areas closer to the rivers. Because it does not colonize or reestablish in open areas as readily as salt cedar, flooding, vegetation clearing, and increased fire frequency (promoted by salt cedar) can eliminate honey mesquite communities (Minckley and Brown 1982; Ohmart et al. 1988).

## D. HONEY MESQUITE–SALT CEDAR

Honey Mesquite and Salt cedar communities form when salt cedar becomes well established in openings within the mesquite stand. Salt cedar gradually replaces honey mesquite creating a monotypic salt cedar stand (Ohmart et al. 1988). Another species of mesquite, screwbean mesquite, is found only in association with salt cedar in the planning area, reflecting the expansion of salt cedar and the displacement of screwbean mesquite (DeLoach et al. 2000; Ohmart et al. 1988).

## E. ARROWWEED

Arrowweed Communities occur along drier portions of the river floodplain, along canyon bottoms and irrigation ditches, around springs, and in sandy or gravelly washes. This species has replaced cottonwood–willow in some areas because it tolerates higher soil salinities and greater groundwater depths, although in other areas it is being replaced by salt cedar (Brown 1994; Holland 1986; Ohmart et al. 1988; Sawyer and Keeler-Wolf 1995).

## F. ATRIPLEX

The Atriplex Community is formed by several species of saltbush (e.g., *Atriplex canescens, A. hymenelytra, A. lentiformis, A. polycarpa*). This community occurs in saline areas, often between stands of cottonwood-willow or salt cedar and stands of mesquite (Brown 1994; Ohmart et al. 1988; Younker and Anderson 1997).

## G. MARSH

The Marsh Communities occur in areas with long-term flooding such as oxbow lakes, backwaters, and around reservoirs with minimal daily and annual fluctuations in water level. Common vegetation of Marsh Communities includes cattail and bulrush that grow in water three to five feet deep, and common reed (*Phragmites australis*) that forms dense stands along the banks (Brown 1994; Ohmart et al. 1988). Marsh Communities are important habitat for the federally endangered Yuma clapper rail.

## H. UNIQUE RIPARIAN RESOURCES

An important and unique stretch of the lower Colorado River is found in the southern most reach of the river, the Limitrophe area. This reach, located below Morelos Dam, is one of the few remaining segments of the lower Colorado River that has not been channelized and where fluctuating surface water from periodic dam releases and groundwater can sustain native vegetation such as cottonwood and willow trees when water is available. The resultant riparian habitat type sustains several wildlife species, including the SWFL and the Yuma clapper rail, and the habitat is also important for migratory birds and several other wildlife species that are not listed as special status species (USDOI Reclamation et al. 2004).

One special riparian habitat area along the lower Gila River is a large, contiguous stand of cottonwood-willow habitat located near the confluence with the lower Colorado River. This area supports a mixture of native riparian vegetation and provides important breeding habitat for the federally endangered SWFL (USDOI Reclamation et al. 2004). The Fred J. Weiler Green Belt area along the lower Gila River in Maricopa County, Arizona, is another important riparian area; a total of 6,900 acres of public land riparian habitat were withdrawn in 1954 under Public Land Order 1015 for use as waterfowl habitat.

# 3.3.5 PRIORITY SPECIES

Priority plant species are rare, unusual, or key species that are not listed as BLM sensitive or listed as threatened and endangered (Appendix 2-B). They are worthy of special treatment and indicate ecological health, biological diversity, and unique habitats. In the planning area, priority plants can be indicators, such as big galleta, which indicates rangelands historically in decline. Riparian floodplain habitats are indicated by cottonwood and willow. Desert wash woodlands have priority species that are Highly Safeguarded under the Arizona Native Plant Law. Other priority plants are unusual, at the edge of their distributional ranges or rare but not listed by any agency or rare plant protection program. For example, Thurber's stemsucker (*Pilostyles thurberi*)

occurs in desert scrub habitats. Alverson's foxtail cactus (*Coryphantha alversonii*) is present on rocky slopes.

## 3.3.6 SPECIAL STATUS SPECIES

Special status plants are those species listed by the USFWS, BLM, State of Arizona, and State of California. Species are offered varying levels of protection ranging from full protection, requiring "take" permits for activities which would negatively impact a species occurrence, to identification, but no official protection, for those species suspected of being at-risk or in decline.

The basic policy of BLM is to (1) conserve listed species and the ecosystems on which they depend and (2) ensure that actions authorized or carried out by BLM are consistent with the needs of special status species and do not contribute to the need to federally list any of these species. Protection is afforded to maintain the occurrence of these limited resources in accordance with existing laws and regulations to prevent their loss. Current Federal and State protection regulations and categories are summarized below. Uncommon plants not offered special status as described below are not currently protected.

BLM has certain responsibilities for all special status species and as such does not reiterate listings provided by other agencies. The BLM sensitive species list is meant to be dynamic. If information shows that a species needs to be included or removed, Field Managers may make nominations with information supporting such action. Criteria for BLM sensitive species include those that are:

- Under status review by the USFWS/National Marine Fisheries Service,
- Whose numbers are declining so rapidly that Federal listing may become necessary,
- With typically small and widely dispersed populations, or
- Those inhabiting ecological refugia or other specialized or unique habitats (USDOI BLM 2000).

### A. DISTRIBUTION OF SPECIAL STATUS SPECIES

Within the planning area, sand dunes and isolated mountain ranges are of special interest due to the presence of endemic plants found there (Warren and Laurenzi 1987). Many of the species present on the Arizona Native Plant Law list are widely distributed throughout the planning area, while federally listed and BLM sensitive species are less common. No plant species listed by the USFWS are known to occur in the planning area. However, due to their known limited populations, undiscovered isolated plants or communities may be found in the planning area.

BLM sensitive species known to be present in the planning area include blue sand lily, sand food, scaly sandplant, Schott wire lettuce (*Stephanomeria schottii*), all of which are endemic to sand dunes, and longleaf sandpaper plant (*Petalonyx linearis*) which is found on exposed rocky slopes. See Appendix 2-B for a list of sensitive species. Additional plant species are included on the list because they are located on adjacent land of other jurisdictions, or are expected to occur but are not verified. Kofa barberry (*Berberis harrisoniana*) is also known to occur on rocky

slopes at upper elevations in the Kofa Complex but is not know to occur on BLM-administered lands in the planning area.

## 3.3.7 INVASIVE NON-NATIVE SPECIES

Invasive non-native species are an increasing problem on BLM-administered lands. Noxious and invasive weeds are listed by State and Federal law and are generally considered those that are exotics and negatively impact agriculture, navigation, fish, wildlife, or public health. Currently, there are over 350 species of non-native plants in the Sonoran Desert Ecoregion alone, many of which are considered to be significant threats to native flora and fauna (Lardiere and Bate 2003). Invasive non-native species present and potentially present in the planning area are noted in Appendix 2-B. Existing plan decisions and EO 13112 require that BLM discourage the introduction of "exotic" species on public lands.

Invasive non-native species have a variety of origins including use as grain seed, livestock feed, ship ballasts, packing material, reclamation, and ornamental plants. As a result of accidental (e.g., contaminated crop seed) and intentional (e.g., planted for forage or soil stabilization) introduction, many species have spread throughout the planning area and now conflict with other resources and uses. The spread of invasive non-native species is furthered through such mechanisms as OHV and watercraft use, hiking, camping, wildlife movement, livestock grazing, and natural processes. Invasive species tend to establish in disturbed areas as well as areas that have perennial water sources or that receive frequent runoff from intermittent precipitation (e.g., roadside ditches).

Invasive non-native species displace native plants as they compete for space, sunlight, water, and nutrients. As they become established, invasive non-native species can alter the ecosystem functions of the area they invade. Dramatic changes in composition can reduce the production of palatable forage for livestock and wildlife, and some species may be poisonous to livestock. Species with fast growth rates tend to increase the risk of wildfire due to the relatively high amount of fuel available.

Invasive non-native species control can occur in a variety of ways including chemical, prescribed fire, biological, and mechanical, or a combination of techniques. The degree and type of rehabilitation necessary after control efforts depends upon the treatment selected. In the planning area, YFO has evaluated and implemented many site-specific control plans for a variety of species. Control methods vary, but are generally categorized as mechanical (e.g., physical removal, heavy equipment, use of livestock), chemical (e.g., herbicide), or biological (i.e., introduction of natural predators such as insects or diseases to target the invasive species). Integrated Pest Management is being used to manage non-native invasive species. See Section 2.22.3 Typical Management Actions for Vegetation Treatments for Integrated Pest Management guidelines.

### A. DISTRIBUTION OF INVASIVE NON-NATIVE SPECIES

The distribution of invasive non-native species is dynamic and varies in response to implemented control measures, management activities, and weather patterns (e.g., precipitation and

temperature). As such, the extent of infestations is difficult to accurately or precisely characterize. Regular surveys are conducted within the planning area to assess the general distribution of the most problematic species. Documented infestations of invasive non-native species are larger in size and more frequent in high-use areas than in low-use areas. Also, roads near Wildernesses and other remote locations have fewer and less severe infestations (Lardiere and Bate 2003). Invasive plant surveys are conducted annually by YFO personnel (Lardiere and Bate 2003), and Integrated Pest Management is being used to manage invasive species.

### 1. Salt cedar

Invasion of non-native plants in the Colorado River and Gila River systems has modified the riparian ecosystems resulting in lower diversity with monotypic stands of salt cedar and marginal quality habitats. Salt cedar, a non-native plant species known for its adaptation dealing with salinity and water stress, is well suited for the present hydrologic regime of the river systems and displacing native riparian vegetation, now dominating the lower Colorado River and much of the Gila River riparian communities. Only five percent of the riparian vegetation mapped by Reclamation along the lower Colorado River is native cottonwood-willow and honey mesquite communities. The remainder of the riparian vegetation is dominated by salt cedar. The majority of the riparian vegetation along the lower Gila River is also dominated by salt cedar, with young stands of cottonwood-willow and remnant mesquite wetlands scattered throughout the area (Weinstein et al. 2003). In addition to displacing native plant communities and altering the structure and species composition, salt cedar uses large amounts of water, increases soil salinity, decreases the quality of the habitat for wildlife, and increases fire frequency by producing large amounts of deciduous litter (DeLoach et al. 2000). Within the planning area, vegetation communities have been mapped for approximately 152 miles of the lower Colorado River and 10.2 miles of the lower Gila River riparian corridors (USDOI Reclamation et al. 2004). Salt cedar vegetation types comprise approximately 52,100 acres, while native riparian vegetation types consist of 15,700 acres (Table 3-8). Control measures must address both the treatment of salt cedar and soil remediation. Site specific treatment plans for salt cedar are commonly evaluated and implemented.

### 2. Giant Salvinia

Giant salvinia is an invasive floating aquatic fern classified by the Federal government and many states as a noxious weed. It has become a significant problem in the planning area. Giant salvinia flourishes in stagnant or slow moving water. Due to high water use and low recharge rates, portions of the lower Colorado River are both shallow and slow moving. Its backwater ponds and marshes are highly susceptible to giant salvinia infestations (Lardiere and Bate 2003). In areas of low flows, giant salvinia can cover the total water surface in a relatively short period, doubling in size every 2.5 to 10 days, depending on the time of year, water temperature, nutrients, and other water quality parameters. Mats can grow to over 2 feet thick and cover a 10-acre backwater in less than a month. In water systems that have visible flow, this plant is intermingled with riparian vegetation on the sides of the river and canal channels where riparian vegetation such as bulrushes and cattails grow, hampering treatment efforts (USDOI Reclamation et al. 2004). Giant salvinia restricts and impairs water flow, inhibits recreational use, creates operational and maintenance problems at pumping and diversion structures, damages fisheries and aquatic habitats by reducing open water areas and supplanting native vegetation, decreases water quality

by reducing nutrients and oxygen, and increases $CO_2$ and hydrogen sulfide concentrations (USDOI Reclamation et al. 2004).

Giant salvinia has been present in the lower Colorado River drainage since 1999. Surveys documented giant salvinia on the Colorado River and connected water bodies in varying degrees from Walters Camp into Mexico. A number of strategies have been implemented to control its spread (USDOI Reclamation et al. 2004). Eurasian watermilfoil (*Myriophyllum spicatum*) and parrrotfeather (*Myriophyllum aquaticum*) are other non-native aquatic plants documented within the planning area. Native aquatic plants such as spiny naiad, coontail, and sago pondweed also grow readily throughout the aquatic environment and could be considered weedy. Several other non-native species have been documented to occur in varying degrees in riparian areas.

## B. OTHER COMMON INVASIVE NON-NATIVE PLANTS

Upland invasive non-native species are now prolific throughout the planning area. The majority of Mediterranean grass (*Schismus arabicus* and *S. barbatus*), Sahara mustard, Bermuda grass (*Cynodon dactylon*), buffelgrass (*Pennisetum ciliare*), and iceplant (*Mesembryanthemum* spp.) infestations are located along roads, ROWs, washes, and material pits where disturbance has recently occurred. Bermuda grass is a popular turf grass that can be found in many residential areas as well as along roadsides where hay is frequently transported. Mediterranean grass has become common throughout most of the upland desert shrub communities and large desert washes (Lardiere and Bate 2003). Sahara mustard is well established on approximately 3,000 acres of the La Posa dunes and has been found in other undisturbed wildlands (Lardiere and Bate 2003). Infestations of leadplant (*Amorpha canescens*), Ravenna grass (*Erianthus ravennae*), and Bermuda grass were highly localized around perennial sources of water, namely dams and ditch banks.

## C. COOPERATIVE WEED MANAGEMENT EFFORTS

The YFO is currently a member of two interagency groups created to identify and control invasive non-native plant infestations across jurisdictional boundaries. The King of Arizona Cooperative Weed Management Area (overseen by the Sonoran Desert Invasive Species Council) and the Lower Colorado River Giant Salvinia Taskforce are both weed management areas that include BLM-administered lands. Cooperation with such groups and other land management agencies is crucial for the future identification and control of invasive species on a regional scale (Lardiere and Bate 2003).

# 3.4 FISH AND WILDLIFE

Public lands administered by the BLM provide significant portions of the habitat requirements (food, cover, water, and space) for a diverse array of wildlife species. The habitats within the planning area and the wildlife species that rely on them rarely exist solely on BLM-administered lands and often extend across administrative boundaries to Tribal, State, private, and other Federal lands. More than 500 species of birds, mammals, reptiles, amphibians, and fish occur within the planning area as year-round residents, seasonal residents, or migrants (USDOI BLM 1987a). This diversity has strong ecological value and attraction for the public.

The AGFD and CDFG are responsible for managing the wildlife populations in their respective states. YFO coordinates closely with AGFD (Region IV) and CDFG (Region 6) to manage the diverse habitats that sustain these wildlife populations[1]. The YFO has developed several habitat management plans or other interdisciplinary activity plans in cooperation with AGFD that outline the goals and actions for managing wildlife habitats and populations on public lands within the planning area. Wildlife habitats and priority wildlife species within the planning area are discussed in these habitat management plans and are incorporated by reference. Habitat management plans that are applicable to the planning area include the *Laguna-Martinez Habitat Management Plan* (1988c) and the *La Posa Interdisciplinary Activity Plan* (1997c).

## 3.4.1 GENERAL WILDLIFE HABITAT

The planning area is located within the Sonoran Desert physiographic province, with the primary habitat type being Upland or Lowland Sonoran Desert Scrub. Vegetation types such as riparian, desert shrub, desert tree, grassland shrub, and agricultural lands are represented in the planning area. For more information on vegetation types within the planning area, see Section 3.3 Vegetation Resources.

Special habitat features in the planning area include cliffs, sand dunes, snags, springs, reservoirs, rivers, marshes, lakes, and islands. These habitats provide a wide range of variation in vegetation species composition, structural components, and food quality and availability, thereby hosting abundant and diverse wildlife. Maintenance of these and other habitat types is critical to the continued existence of diverse and viable populations of wildlife.

The structure, composition, and condition of the various habitat types directly influence the fish and wildlife species assemblages that inhabit them. The habitats within the planning area reflect the influence of a variety of past and ongoing human activities and disturbances, resulting in significant increases in some species populations, declines in others, and the modification of large blocks of habitat. Increased human development as well as continued water diversion is a pressure on wildlife and fish populations. In many Sonoran Desert Scrub and riparian habitats, the proliferation of invasive non-native plants has altered the structure and composition of the

[1]For example, see the Master MOU between the State of Arizona, Arizona Game and Fish Commission, and the DOI, BLM (effective date March 18, 1987, 10 pp.)

habitat, leaving both the vegetation communities and their fish and wildlife inhabitants at risk of disturbance, fragmentation, and loss from natural or human-caused events (e.g., wildland fire).

## 3.4.2 KEY HABITAT FEATURES

Riparian habitats make up approximately three percent of the public lands in the planning area. Riparian areas are one of the most productive and important habitats, providing for a great diversity of wildlife species. Riparian areas range in total size from more than 13,000 acres in the Laguna–Martinez area to isolated pockets of less than five acres scattered along the length of the various river systems (USDOI BLM 1987a). Some riparian areas still support native plant species, such as cottonwood, willow, mesquite, and arrowweed communities; however, much of the native riparian habitats on public lands within the planning area have been severely fragmented, degraded, or otherwise substantially altered, thereby affecting the wildlife populations that inhabit them. Large areas of riparian habitats have been invaded by the invasive non-native (and less desirable) salt cedar. Salt cedar is extremely susceptible to fire and, therefore, has dramatically altered the riparian community.

In the desert southwest, wildlife use riparian areas disproportionately more than any other type of habitat, and many species are riparian-obligates (i.e., use only riparian habitats). For example, within the planning area, more than 400 species are either directly dependent on riparian habitats or use them more than other habitats (USDOI BLM 1987a). In addition, the zone of influence of riparian habitats on wildlife species extends well beyond riparian boundaries into the adjacent desert communities. Many riparian-obligate wildlife species, as well as many native fish species, are either federally listed or considered special status species by the Federal government (USFWS and BLM) or State wildlife agencies in Arizona and California.

Other key habitat features within the planning area include:

- **Sand dunes**, a sensitive and unusual habitat in the low deserts of the planning area, host a variety of plants and wildlife, many of which occur in no other habitat. Limited sand dunes occur on BLM-administered lands within the planning area.

- **Mountain ranges** provide important habitat for desert bighorn sheep and other wildlife species that could not survive on the arid plains of lower elevations. Mountain ranges in the planning area provide some of the best remaining bighorn sheep habitat in the southwest, with stable populations in several areas.

- **Wildlife watering sites** including tinajas (natural water tanks in rock pools) and man-made water catchments provide important water sources for big game (particularly bighorn sheep in high elevations and mule deer in low elevations), predatory mammals, bats, birds, and bees, particularly during the harsh summer season. At least 83 watering sites occur on BLM-administered lands within the planning area, which include 52 water catchments.

- **Braided channel floodplains and valley desert wash woodlands** occur in extensive networks throughout the planning area, maintaining hydrologic connections with the Colorado and Gila rivers. These natural communities are areas of great species richness and abundance in the Lower Colorado River Valley Subdivision of the Sonoran Desert providing

important cover, forage, and dispersal habitat for nearly every wildlife species during some portion of their life cycle. For example, bats and neotropical migratory birds use desert washes extensively for foraging, resting, shading, cover, and (for some bird species) nesting (U.S. Army YPG 1995).

- **Abandoned mines and natural caves** are particularly important to bats for roosts and maternity colonies. Many of the bat species occurring in the planning area use abandoned mines at least part of the year. Horizontal mine shafts and natural caves also provide shelter for other wildlife, such as ringtail (*Bassariscus astutus*) and fox (*Vulpes* spp.) (U.S. Army YPG 1995).

## 3.4.3 GAME SPECIES

### A. BIG GAME

Big game species are an important aesthetic and economic resource in Arizona. Four big game species (or subspecies) occupy BLM-administered lands within the planning area: mule deer, desert bighorn sheep, collared peccary (*Pecari tajacu*), and mountain lion. Habitat management is achieved cooperatively between YFO and AGFD or CDFG.

#### 1. Mule Deer

Mule deer are considered one of North America's premier big-game species. The public has a high level of interest in this species for both hunting and viewing. Mule deer are found on both sides of the Colorado River throughout the planning area. Their populations are generally thought to be stable. Mule deer are the most numerous, adaptable, and widely distributed big game species within the planning area. Mule deer use, at least seasonally, all but the most rugged mountains in the planning area. They make extensive use of riparian vegetation adjacent to permanent water sources during the hottest months. During cooler months, and after seasonal rainstorms, deer are able to spread out over the adjacent desert where they use the heavily vegetated washes for feeding, thermal cover, and travel corridors.

Adequate food, water, and cover are essential to the survival of deer. Mule deer rely on shrub and forb species for much of their diet. Some use of agricultural lands is made, although little damage to crops is known to occur. The "green-up" or flush of green growth provides important seasonal forage resources for a diversity of wildlife species, including mule deer. Competition can be significant during this period, particularly in riparian drainage and wash areas where wildlife and livestock both tend to concentrate. Some competition between mule deer and wild burros may also occur in vegetated desert washes.

#### 2. Desert Bighorn Sheep

Desert bighorn sheep are a high priority species that receive significant local, State, and national attention and interest. The planning area includes the largest unfragmented habitat for desert bighorn sheep in Arizona (Weinstein et al. 2003). Mountain ranges in the planning area provide some of the best remaining bighorn sheep habitat in the southwest, covering more than 30,000 acres, with stable populations in several areas. Bighorn sheep within the planning area are

occasionally used as a source population for translocation to other locations within Arizona. Water acts as a seasonal limitation to bighorn sheep distribution. During the hot dry summer months, sheep movements are confined to a limited radius around water. During cooler months and after seasonal rainstorms, sheep spread out over the rest of the habitat. Bighorn sheep in the mountain ranges surrounding the major rivers are able to use water along these rivers, when not excluded by development or recreationists. In addition, YFO and AGFD have cooperatively constructed several water catchments to provide adequate water during the hot, dry season for bighorn sheep inhabiting isolated mountain ranges or for populations that have been excluded from natural water sources by development or recreation. Sheep feed extensively year-round; perennial grasses are a major component of the diet in early spring and late fall when new growth is present, whereas annual forbs and grasses are seasonally important.

Special habitat features used by bighorn sheep include lambing grounds and migration corridors. Habitat fragmentation or human disturbance poses one of the major threats to bighorn sheep populations. Lambing grounds in the planning area are typically the highest, most rugged and most isolated portions of desert mountain ranges. Lambing is a critical period in the annual cycle of bighorn sheep, and disturbance of these areas during the lambing season can cause abandonment of the range and loss of lambs. Newborn lambs can be found every month of the year; however, the majority of lambing in the planning area occurs between January 1 and April 30.

Migration corridors are traditional movement paths bighorn sheep follow between adjacent mountain ranges. Roads, canals, and fences serve as barriers to bighorn sheep movements, and entire populations have been cut off from major portions of their range. Power lines and pipelines may impede bighorn sheep movements in the same manner. Thirteen migration corridors, not including those on the BMGR, have been identified by the AGFD. Two main migration corridors have been identified on lands administered by BLM. The first is between the Chocolate Mountains and the Castle Dome Mountains near Stone Cabin, Arizona. The route has been cut by a two-lane highway (Highway 95), a 161-kV transmission line, and two El Paso Natural Gas lines. Movement between the two mountain ranges still occurs; however it is unknown to what extent normal movements have been impacted. The second is in the Dome Rock Mountains where I-10 bisects the range. This migration corridor is cut by a four-lane highway, two five-strand barbed wire fences, and two high-power transmission lines.

### 3. Collared Peccary

Collared peccary, or javelina, are found within Sonoran Desert scrub (Arizona Upland subdivision) and semi-desert grasslands. Collared peccary are scattered in small numbers within the eastern portion of the planning area, although populations within this part of the species range are generally less abundant for hunting and big game management. The species has expanded northward as scrub and cactus have replaced native grasslands, although no population estimates exist. Collared peccary are opportunistic feeders that eat flowers and fruits of a great variety of plants.

### 4. Mountain Lion

Mountain lions are found in the rugged mountains of the planning area and in some riparian habitats where the major river systems flow through mountainous areas. No population estimates

exist; however, numbers are thought to be low. There is no problem with predation on domestic livestock within the planning area.

### B. SMALL GAME, WATERFOWL, AND FURBEARERS

Small game species include game birds and cottontail rabbits (*Sylvilagus auduboni*), as well as a wide variety of waterfowl species. One or more small game species occur in virtually all vegetation types within the planning area.

Game birds common to the planning area include white-winged dove (*Zenaida asiatica*), mourning dove (*Zenaida macroura*0, Gambel's quail (*Callipepla gambelii*), and pheasant (*Phasianus* spp.). White-winged doves are summer residents, and mourning doves are yearlong residents in the planning area. Both species rely on riparian areas and vegetated desert washes for nesting and cover. Citrus orchards are also important, and both species are present to a lesser extent in desert and urban areas. Doves feed extensively on weed and agricultural crop seeds. Gambel's quails are a common-to-abundant permanent resident throughout the planning area, with a population peak in late summer. Populations are concentrated in riparian areas along the major rivers and near water sources in the desert. Other important areas include vegetated desert washes. Annual seeds, green growth, and some insect matter comprise the bulk of their diet.

Waterfowl species within the planning area include ducks (*Anas* spp.), geese (*Branta* spp.), coots (*Fulica* spp.), and gallinules (*Gallinula* spp.). The Colorado River is part of the Pacific flyway and acts as a major migration corridor for many waterfowl species. Open water along the river, as well as backwaters, marshes, and agricultural lands provide important cover, feeding, and resting areas. Most species of ducks and geese migrate through or are winter visitors only. Some species, such as mallards (*Anas platyrhynchos*), gadwalls (*Anas strepera*), and ruddy ducks (*Oxyura jamaicensis*) may nest in the planning area, although this is rare (USDOI BLM 1987a).

Cottontail rabbits are common within the planning area as well. Populations are concentrated along the major rivers in riparian areas adjacent to alfalfa fields.

Coyote (*Canis latrans*), bobcat (*Lynx rufus*), and gray fox (*Urocyon cinereoargenteus*) are the most important furbearers in the planning area in terms of harvest, monetary value, and recreational days provided (USDOI BLM 1987a). Leg-hold traps are not allowed as a means of harvest on public lands within Arizona. Other common species include beaver, muskrat (*Ondatra zibethica*), striped skunk (*Mephitis mephitis*), badger *(Taxidea taxus*), kit fox, and raccoon (*Procyon lotor*).

## 3.4.4 NON-GAME SPECIES

Non-game wildlife species, which include small mammals, birds (migratory birds and raptors), amphibians, and reptiles, are common in habitats of the planning area. Many of these species are important food sources for larger birds and mammals and important as environmental quality indicators.

## A. SMALL MAMMALS

The planning area has a diverse, abundant mammalian fauna, including more than 60 species of mammals. While the distribution, ecology, and habitat needs of many of the non-game mammals are poorly understood (AGFD 2001), these species occupy a variety of habitats on public lands in the planning area. Many of these species have small, local populations that face a variety of threats, and some are tied to the severely altered riparian or native grassland communities (AGFD 2001). Twenty-two of Arizona's 28 bat species are found or expected to occur within the planning area (Weinstein et al. 2003), and 18 of these species are considered special status species (see Section 3.4.7 Special Status Species). The diversity of bats is perhaps due to the abundance of roost sites, including cliffs and abandoned mines, and the variety of foraging sites found on lands within the planning area (Weinstein et al. 2003). Foraging areas include springs, tinajas, extensive networks of wooded wash scrub and braided channel floodplains, and the riparian corridors along the lower Colorado and Gila rivers. BLM-administered lands within the planning area have not been systematically surveyed for bats.

## B. BIRDS

More than 350 bird species occupy the various habitats of the planning area, most of which are non-game species. Many of these species breed within the planning area, while others migrate through or are seasonal (summer or winter) residents. The greatest variety and abundance of birds occur in the riparian and wetland habitats, which often provide oasis within the upland desert scrub habitat. Migratory birds represent a wide diversity of species, including shorebirds, waterfowl, passerines (perching birds), and raptors, and may breed or winter in any or all of the vegetation types within the planning area.

The planning area provides habitat for many species of neotropical migratory birds, which breed in the U.S. and/or Canada and winter from Mexico to South America. The AGFD has prepared the *Arizona Partners in Flight Bird Conservation Plan* (Latta et al. 1999), which identified 43 bird species (of the more than 280 breeding bird species in Arizona) in 13 major habitats for priority management and protection within the State. In addition, numerous associated bird species were identified that would benefit from management actions for the priority species. At least three major habitats and 12 priority bird species occur within the planning area. These major habitats and their priority bird species include Sonoran Desert Scrub (Costa's hummingbird [*Calypte costae*], gilded flicker [*Colaptes auratus*], rufous-winged sparrow [*Aimophila carpalis*], Le Conte's thrasher [*Toxostoma lecontei*], and purple martin [*Progne subis*]); Low Elevation Riparian Habitat (common black-hawk [*Buteogallus anthracinus*], western yellow-billed cuckoo, SWFL, and Lucy's warbler [*Vermivora luciae*]); and Freshwater Marshes (Yuma clapper rail, California black rail [*Laterallus jamaicensis coturniculus*], and American bittern [*Botaurus lentiginosus*]).

Several raptor species (e.g., eagles, hawks, owls) have been documented in the planning area. Nesting species include prairie falcon (*falco peregrinus*), red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), northern harrier (*Circu cyaneus*), great horned owl (*Bubo virginianus*), barn owl *(Tyto alba*), burrowing owl, and American kestrel (*Falco spariverius*). Wintering migrant species include merlin (*Falco columbarius*), ferruginous hawk (*Buteo*

*regalis*), osprey (*Pandion haliaetus*), Cooper's hawk (*Accipiter cooperii*), and sharp-shinned hawk (*Accipiter striatus*). In addition, the Harris' hawk (*Parabuteo unicinctus*) has also been re-introduced into native habitat along the lower Colorado River through an interagency program. Precipitous rock formations and mature cottonwood, willow, and mesquite trees provide important nesting sites for raptors. Backwater lakes, riparian vegetation, and desert wash corridors provide suitable habitat for the prey base that supports the raptor population.

### C. AMPHIBIANS AND REPTILES

Because the majority of the planning area's wildlife habitats are arid or semi-arid, with a smaller percentage of habitats associated with water, reptiles (more than 40 species) are more prominent than amphibians (at least 10 species). Many amphibians and reptiles are abundant and seasonally conspicuous, especially the desert-dwelling species. Among them are such commonly encountered species as spadefoot toads (*Scaphiopus* spp.); whiptail lizards (*Cnemidophorus* spp.); side-blotched (*Uta stansburiana*), tree (*Urosaurus ornatus*), and desert spiny lizards (*Sceloporus magister*); gopher (*Pituophis melanoleucus*) and kingsnakes (*Lampropeltis* spp.); desert iguana (*Dipsosaurus doralis*); and western diamondback (*Crotalus atrox*) and mojave (*Crotalus* scutulatus) rattlesnakes. Two non-native species, bullfrog (*Rana* catesbeiana) and softshell turtle (*Apalone* spp.), have also become widespread and locally abundant. The distribution and status of many native amphibians and reptiles is not well known (AGFD 2001).

## 3.4.5 FISH

The rivers, lakes, and reservoirs occurring within the planning area support more than 35 native and non-native fish species. The Colorado River contains an extensive warm water fishery, providing a quality sportfishing experience. Common sportfish include striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), carp (*Cyprinus carpio*), flathead catfish (*Pylodictis olivaris*), and channel catfish (*Ictalurus punctatus*). Riparian communities, backwater areas, and marshlands on BLM-administered lands and Reclamation-withdrawn lands provide important nesting, foraging, and cover habitat for many fish species. Activities occurring on upland terrestrial habitats can affect the water quality and other attributes of these aquatic habitats.

Because of human-induced habitat changes, native fish in the planning area now occupy a small portion of their former ranges, if they are present at all. There are no surface waters within the planning area that support a completely native fish fauna (AGFD 2001). Historically, the lower Colorado River, lower Gila River, and their tributaries within were inhabited by 10 native fish species. Two of these native species, the machete (*Elops affinis*) and striped mullet (*Mugil cephalus*), are marine or brackish water species that probably never got much farther upstream than the Imperial Dam area (USDOI Reclamation et al. 2004). Occurrences of these two species vary with flows of the lower Colorado River as dams, water management, and floods permit (AGFD 2001).

Native freshwater fish species include Colorado pikeminnow, razorback sucker, bonytail chub, roundtail chub, flannelmouth sucker, desert pupfish, Gila topminnow, and woundfin. Of these eight native freshwater species, all but the flannelmouth sucker are federally protected by the

ESA, as amended, or are listed as Wildlife of Special Concern by AGFD. Only the razorback sucker and bonytail chub, both federally listed endangered species, are currently present within the planning area (see discussion in Section 3.4.7 Special Status Species).

## 3.4.6 OTHER AQUATIC SPECIES

Very little is known about Arizona's native crustaceans and mollusks (AGFD 2001), including those that may inhabit aquatic habitats within the planning area. Most of these species occur in isolated springs or other waters that have not been developed.

## 3.4.7 SPECIAL STATUS SPECIES

Special status species include federally listed (endangered or threatened), proposed, and candidate species, and designated or proposed critical habitat; species of concern managed under Conservation Agreements or Management Plans; BLM-sensitive species; and State-listed species (Arizona and California). For purposes of this discussion, "federally protected species" is a more narrowly defined term, referring to those species listed as endangered, threatened, or proposed under the ESA of 1973, as amended, including designated or proposed critical habitat, if applicable; as well as candidates for Federal listing. Several special status species occurring within the planning area were discussed in the previous 1985 Yuma District RMP (USDOI BLM 1987a) and other applicable LUPs for the YFO. However, additional species and designated or proposed critical habitats have been listed, or the species' status has changed since the time these plans were written. The most recent and complete list of special status species is considered in this section, also see Map 3-9 "Federally Listed Species North Field Office Area," Map 3-10 "Federally Listed Species South Field Office Area," and Map 3-11 "Sonoran Desert Tortoise Habitat Categories."

### A. FEDERALLY PROTECTED SPECIES

Regarding federally protected species, eight federally endangered species, one federally threatened species, and one candidate species occupy or have suitable habitat on BLM-administered lands within the planning area (Appendix 2-B). Two federally listed species, desert pupfish and Gila topminnow, have historical habitat within the planning area, but no longer occur there. The northern aplomado falcon is currently extirpated from Arizona. The USFWS is proposing to establish a non-essential experimental population area within Arizona and New Mexico, with the expectation that reintroduced aplomado falcons would only persist within the Chihuahuan Desert in southeastern Arizona (USDOI USFWS 2005a). Release sites would only be on lands within New Mexico (USDOI USFWS 2005a), and the expected area of persistence in the Chihuahuan Desert would be outside the planning area; however, released birds could potentially disperse as far west as Yuma County within the planning area.

The 10 federally protected species that potentially occur within the planning area can be grouped as follows: one mammal, four bird, one reptile, and four fish species. The razorback sucker has designated critical habitat within the planning area. The SWFL, bonytail chub, desert pupfish, and desert tortoise (Mohave population) have designated critical habitat; however, no proposed

or designated critical habitat for these species occurs within the planning area. Recovery Plans, which identify objectives, criteria, and actions needed for recovery, have been developed for the 10 federally listed species potentially occurring in the planning area.

## B. FEDERAL SPECIES OF CONCERN

Two species occurring within the planning area do not have Federal status under the ESA, as amended, but are Federal species of concern managed under a Conservation Agreement or Management Plan that BLM participates in. The FTHL is managed under a *Conservation Agreement*, signed in 1997, and the *FTHL Range-wide Management Strategy, 2003 revision* (FTHL Interagency Coordinating Committee 2003). YFO manages less than 1,000 acres of historic habitat for the FTHL in the planning area, much of this habitat is highly fragmented by urban and agricultural development. The Yuma Desert Management Area for the FTHL is located within the planning area, encompassing approximately 16,200 acres of non-military Federal lands and 114,800 acres of military lands. YFO does not administer any lands within the Management Area; all Management Area lands are administered by Reclamation or the military (the BMGR).

The Sonoran population of the desert tortoise is managed by BLM under the *Management Plan for the Sonoran Desert Population of the Desert Tortoise in Arizona* (Arizona Interagency Desert Tortoise Team 1996). YFO has classified desert tortoise habitat into three categories based on habitat quality, tortoise population densities, and management potential for tortoises. YFO manages both Category II (approximately 238,000 acres) and Category III habitat (approximately 269,000 acres) for the Sonoran population of the desert tortoise. While the planning area contains extensive areas of suitable habitat, Sonoran desert tortoise populations are at low densities and are patchily distributed, as their abundance and distribution are limited by shelter site availability due to the extreme heat and aridity of this region (Weinstein et al. 2003).

## C. BLM SENSITIVE SPECIES

BLM-administered lands within the planning area have the potential for 84 wildlife and fish species that are BLM-sensitive species, State wildlife species of concern in Arizona, or State-listed species in California (Appendix 2-B). Several of the bird species have been recorded in the planning area, but are rare, non-breeding transient species. Species that occur within the planning area but do not inhabit BLM-administered lands, such as the Mojave fringe-toed lizard (*Uma scoparia*), are included in the list to characterize the entire planning area, and to recognize that during the life of the plan (20 years), some of these species could potentially occupy suitable habitats on BLM-administered lands. These 84 special status species can be grouped as follows: 18 mammal, 54 bird, seven reptile, three amphibian, and two invertebrate species. BLM considers these additional plant and animal species as priority species in management of public lands. In addition, many of these special status species, or the guilds to which they belong, have been identified as priorities for conservation and management in the LCR MSCP (USDOI Reclamation et al. 2004), the “Expanded Kofa Complex” management framework adaptation (Weinstein et al. 2003) of the Sonoran Desert Ecoregion conservation priorities (Marshall et al. 2000), and the Arizona Partners in Flight Bird Conservation Plan (Latta et al. 1999).

Brief descriptions of the current conditions of each of the federally listed, proposed, and candidate species, Conservation Agreement species, and Management Plan species that occur or have suitable habitat within the planning area are provided in Appendix 2-B.

### 3.4.8 KEY HABITAT FEATURES

The key habitat features described at the beginning of this fish and wildlife section also apply to special status species. Again, a majority of special status species within the planning area are either directly dependent on riparian habitats, braided channel floodplains, and valley wooded wash scrub (desert washes), or wetland habitats, or use them more than other habitats. In addition, all of the special status fish species that either occur or historically occurred in the planning area have suitable habitat within the aquatic habitats of the lower Colorado and lower Gila rivers. Appendix 2-B lists the habitat association for each federally protected species. Under the ESA, as amended, BLM *Manual* 6840, and the four-agency MOU,[2] BLM has a particular responsibility to conserve or improve habitats that are suitable for or occupied by federally listed, proposed, or candidate species to promote the recovery of these species. In addition to the general association of each species with its particular habitat types, some special status species have a habitat that has been designated as a critical habitat or classified as a priority wildlife habitat within the planning area. BLM must ensure that its actions within the planning area maintain or improve the designated critical habitat for the razorback sucker, BLM-categorized habitat for both the Mohave and Sonoran populations of the desert tortoise, and suitable habitat for the FTHL within the historical habitat identified in the *Rangewide Management Strategy*.

## 3.5 WILD HORSE AND BURRO MANAGEMENT

Wild horses and burros are protected by the Wild Free-Roaming Horse and Burro Act of 1971 (P.L. 92-195), as amended by FLPMA and the Public Rangelands Improvement Act of 1978 (P.L. 95-514). After the passage of the 1971 Act, BLM became the managing agency responsible for protecting these animals and their habitat. The goal of management within HMAs is to maintain a viable burro population in balance with the habitat and other multiple uses. This includes ensuring burros have access to water and adequate forage, and that resources are available for wildlife habitat and other uses (USDOI BLM 1980).

There are four HAs and seven HMAs managed by BLM in Arizona, containing approximately 210 wild horses and 2,500 wild burros. To maintain the wild burro population at approximately 2,000 animals statewide, Arizona BLM uses a monitoring program for vegetation and animal populations. When monitoring data indicate that the population has exceeded the vegetative community's capacity to maintain it, horses or burros in excess of the capacity are removed and offered to the public through the *Wild Horse and Burro Adoption Program*.

[2]MOA on ESA Section 7 Programmatic Consultations and Coordination among BLM, Forest Service, National Marine Fisheries Service, and USFWS, dated August 30, 2000.

## 3.5.1 CIBOLA–TRIGO HERD MANAGEMENT AREA

The Cibola-Trigo HA was identified in 1973 as supporting wild horses and burros in accordance with the Act, and is comprised of slightly more than one million acres located entirely within the planning area (Map 2-6a) (USDOI BLM 2005f). In 1980, through completion of the Cibola-Trigo HMA Plan and in conjunction with the Yuma District Management Framework Plan, the HA became an HMA. This was further supported with the completion of the 1987 Yuma District RMP. Wild horse and burro populations within the HMA roam freely on lands with different administrative responsibilities. Including the BLM, other agencies and entities involved in the management of portions of the HMA include the YPG, USFWS, and the State of Arizona.

In Arizona, the Cibola-Trigo HMA supports both wild horses and burros. During the summer months, the burros are concentrated along the Colorado River or other permanent water sources. In late fall or early winter, depending on rainfall, they disperse throughout the HMA. They begin their movement back to the river in about May or June as the temperatures rise and mesquite beans mature. The wild horses remain near a permanent water source year round (USDOI BLM 2005f).

Within the HMA, there are four separate areas. The portion of the current HMA north of I-10 proposed for elimination has had no burro or horse use documented or observed since 1989. Further, a vast majority of the public lands in this portion of the HMA were transferred to the Colorado River Indian Tribes in August, 2005, through the Colorado River Indian Reservation Boundary Correction Act (119 Stat 451). Small tracts of public lands in the Gila and Mohawk Mountains are not currently used by burros or horses. The only time burro use was identified was in 1973. These areas are not connected to the main portion of the HMA, but are contiguous to the BMGR. Preliminary planning documents in the early 1980s stated that burros were on the BMGR, and that their use potentially moved up these two ranges. The area proposed for elimination within the main body of the HMA east of Highway 95 is primarily U.S. Army withdrawn lands on YPG. This portion of YPG has been used for much of its history as a live fire and high-explosive impact zone. This activity presents an unacceptable danger to wild horses and burros and all attempts to manage these animals in such an environment.

In southeastern California, only the wild burro roams between the river and the Chocolate/Mules and Picacho HMAs. Wild burros are managed under guidelines found in the *Proposed Northern & Eastern Colorado Desert Coordinated Management Plan* (USDOI BLM 2002a). The HMA in California is dominated by intricately dissected alluvial fans and bajadas adjacent to the Colorado River. The uplands support sparse stands of creosote, ocotillo, and paloverde while the many drainages emptying into the river support dense stands of desert trees including paloverde, ironwood, catclaw acacia, and mesquite that are important sources of forage for burros (USDOI USDOI BLM 2005d). Forage use in these drainages serves as an indicator of overall resource capabilities. Immediately adjacent to the river are thick stands of salt cedar, *Phragmites*, and arrowweed. Further from the river, the bajadas give way to rugged mountains which receive minimal use depending on current climatic conditions (USDOI BLM 2005f).

In 1980, the Cibola-Trigo HMA Plan established the $AML_2$ for the planning area at 165 wild burros and 150 wild horses (USDOI BLM 1980). The $AML_2$ represents the number of animal units that are determined to be within the resource capabilities and compatible with other uses.

Throughout the 1980s, regular gathers reduced the population from 1,200 to between 250 and 400 burros. Due to budget and other constraints, few wild burros were gathered from 1990 through 1996; removals conducted were only for nuisance animals. In the early 1990s, the population grew rapidly, aided by extremely wet years in 1993 and 1994. By 1996, the expanding population of burros, and the beginning of a drought cycle, created overuse of the habitat within the HMA (USDOI BLM 2005f). There are currently approximately 200 wild burros and 160 wild horses within the HMA according to the most recent survey and removal information.

There have been few removals of wild horses within the HMA. The wild horse population tends to merely maintain its population. The horses tend to foal during the late winter and early spring, but few foals survive to be yearlings. Since 1987, only 131 wild horses have been removed. In 2004, 36 wild horses were gathered; there were no yearlings in this removal.

In January 1996, BLM and Imperial NWR initiated a joint planning process for the Imperial and Trigo Mountains Wildernesses. Wild burros were a major issue in this plan, and became a very volatile issue. A "Burro Subgroup" was formed to develop monitoring protocols and other management activities. In 1998 and 1999, a monitoring protocol was developed in collaboration with the NWR, AGFD, YPG, and BLM (USDOI BLM 2005f). Although the Imperial/Trigo Plan has not been completed, several agreements and commitments have been made that have guided management of wild burros on the Cibola-Trigo HMA since 1999 (USDOI BLM 2005f). These include:

- The $AML_2$ for wild burros will remain at 165.
- Monitoring data would be collected annually in accordance with the monitoring protocol and would be used to periodically review the $AML_2$ and guide removal decisions.
- All portions of the HMA east of Highway 95 would revert to HA Status and all wild horses and burros would be removed due to safety concerns.
- The Imperial and Cibola NWRs are recognized as not being within the boundaries of the HMA, however, because the refuges are adjacent to the river, wild burro use would be allowed. Such use would be maintained at minimum levels, with the objective being 20 percent use on key species at established monitoring sites.

## 3.5.2 HERD MONITORING

Vegetation data for such attributes as species composition, age class, hedging/form class, utilization, and bark stripping have been analyzed annually and combined through the entire monitoring period. The combined averages for these attributes form baseline data to evaluate the success or failure of future management actions (USDOI BLM 2005f).

In 1999, the YFO and AGFD formed a committee to develop a burro census technique for the State of Arizona. The committee agreed to initially test the Simultaneous Double Count that continues to be used for big game surveys. In May 2000, the AGFD and the YFO conducted a pre- and post-gather census of the Cibola-Trigo HMA to test the use of the methodology. The post-gather census estimated the population of wild burros in the HMA to be 396. Based upon

estimates of recruitment and removal, the population as of September 30, 2004 was approximately 170 burros.

Data relating to color, age, and sex are also collected on wild burros removed and shipped to a preparation facility. The overwhelming majority of burros captured are gray. Other colors include brown, pink, blue, black, and maltese. No rare or unique colors have been observed within the HMA. The ages are nearly uniform up to age eight and the jack-to-jenny sex ratio is approximately 1:1. Yearlings have averaged 16 percent of the total of animals removed, which supports an anticipated recruitment rate of 16 percent annually. Blood samples have been drawn from a sample of captured burros at the Kingman Preparation Facility, in accordance with BLM policy, on two separate occasions. Overall, genetic variability in the Cibola-Trigo HMA appears to be strong (USDOI BLM 2005f).

The only age and sex data for horses come from the 2004 gather. The ages range from six weeks to 11 years, but none captured were yearlings. Of the total gathered, 22 percent were foals, the remainder consisted of adults, 13.9 percent were 2-year olds. The male-to-female ratio was 0.44:1, and the foals-to-female ratio was the same. Colors identified through the gather included brown, bay, appaloosa, and dun.

# 3.6 WILDLAND FIRE MANAGEMENT

## 3.6.1 WILDLAND FIRE MANAGEMENT AND WILDLAND-URBAN INTERFACE

All BLM-administered public lands in Arizona have been assigned to one of the following land use categories for fire management: 1—Wildland Fire Use (areas suitable for wildland fire use for resource management benefit) or 2—Non-Wildland Fire Use (areas not suitable for wildland fire use for resource benefit). Within the planning area, there are no lands in Category 1. Most of the planning area is categorized as Category 2, with large areas dominated by desert scrub communities. Fire is not a part of the natural regime for the planning area and fires are typically human caused.

The goal of the Arizona BLM WUI Strategy is to implement an efficient and effective WUI fuels reduction program. One of BLM's goals for the fire management program is to work collaboratively with communities at risk of property loss from wildfire within the WUI to develop plans for risk reduction (USDOI BLM 2004d). The desired resource condition is to maintain fuels at non-hazardous levels in WUI areas to provide for public and firefighter safety (USDOI BLM 2004c).

Communities at risk within the planning area are shown in Table 3-9. Fire Management Units with communities of concern include the lower Colorado River (South) and the Gila River (Map 3-12). The current list is incomplete, because the wildland fire risk in WUI areas has not been determined. It would be difficult for the BLM to implement the fuels reduction program in the WUI without a wildland fire risk assessment.

The YFO has developed two *Community Wildfire Protection Plans* with La Paz County, one covering communities along the lower Colorado River and the other covering communities in the upland desert. The YFO is currently working with Yuma County, Arizona, San Bernardino and Imperial Counties, California to develop community-based Community Wildfire Protection Plans.

**Table 3-9**
**Wildland–Urban Interface/Communities at Risk by Fire Management Units in the Yuma/Lake Havasu Zone**

| Fire Management Unit | Wildland Urban Interface/Communities at Risk |
|---|---|
| Lower Colorado River (South) | Yuma is on the 2001 Federal Register list as a community at risk from wildfire. There are many other communities of concern that are not on the 2001 list. |
| Gila River | Three communities of concern within the FMU. None of these communities are listed on the 2001 Federal Register as communities at risk. Wellton is located 15 miles from the western boundary of the FMU. Tacna is located in the middle of the FMU. Hyder is located near the eastern boundary of the FMU. |
| Sonoran Desert Wilderness (South) | No communities at risk within this FMU. |
| Sonoran Desert Scrub | No communities at risk from wildfire within this FMU on the 2001 Federal Register list. |

*Source:* BLM GIS Data; Yuma/Lake Havasu Fire Management Plan (USDOI BLM 2004d)
FMU = Fire Management Unit

## 3.6.2 FIRE ECOLOGY

The historical fire regime patterns of Arizona lands vary in frequency (mean or median fire return interval) and magnitude (both intensity and severity), depending on major vegetation types, climate, elevation, fuel conditions, and other characteristics of the landscape. Fire history studies have been often used to characterize the historical range of variability. Natural resource managers use information on historical/natural variability to set management goals for ecological restoration based on natural processes of ecological systems. Prior to European settlement in the southwestern U.S., wildland fire was a common and widespread influence in shaping the landscape pattern (Paysen et al. 2000). Many of the historical wildland fires prior to European settlement were lightning induced fires, with some human induced fires by Native American tribes (Brown 2000).

Within the planning area, desert scrub communities are a major vegetation type, and wildfire was not historically part of the disturbance ecology for these communities. The natural fire regime of the desert scrub communities has long return intervals, with frequencies extending hundreds of years (McAuliffe 1999; Rogers and Steele 1981). In these communities, the distance between shrubs is too great for fire to carry, unless annual plant growth in the inter-shrub spaces is sufficient to carry fire. In some Arizona lands, cheatgrass (*Bromus tectorum*) has increased the frequency of fire in the desert ecosystems. Cheatgrass and other introduced non-native annual grasses are prolific seed producers and grow rapidly, especially during wet years. When these annual plants dry, they increase the risk of wildfires. With an increased frequency of fire, native grasses and shrubs cannot compete, resulting in a loss of native plant communities.

There is little evidence for extensive fires in southwestern floodplain ecosystems prior to European settlement. Lightning and human induced fires now occur across a variety of low-elevation riparian ecosystems where salt cedar has invaded (Ellis et al. 1998). Colonization and naturalization of non-native plant species, such as salt cedar, affect native ecosystems by altering historical fire regimes. The deciduous nature of salt cedar, combined with the suppression of periodic flooding needed in river floodplain ecosystems to decrease the forest floor liter, has resulted in increased accumulation of fuels, rendering the riparian communities highly susceptibility to wildfires (Ellis et al. 1998). The frequency of fire in riparian ecosystems has been reduced to fire return intervals as short as five to 15 years in some cases. The short-interval fires can create monotypic stands of salt cedar in the riparian ecosystems. Salt cedar sprouts prolifically after a fire, but native riparian vegetation including cottonwood is not well adapted to severe fire (Ohmart and Anderson 1982; Ellis et al. 1998). The increasing frequency of fires in the riparian ecosystems can further change the vegetation composition and structure and may also have detrimental effects on riparian-obligate species.

Wildland fires of special concern are those with the potential to burn uncharacteristically (in intensity, severity, and/or extent), because these fires could have long-term adverse impacts on ecosystem components and processes (e.g., biodiversity, soil productivity, and hydrologic processes).

## 3.6.3 FIRE REGIMES AND RISK CONDITIONS

Fire regime refers to the nature of fires occurring over long periods of time and the prominent immediate effects of fire that generally characterize an ecosystem (Brown 2000). Fire regimes can be defined through the attributes of frequency, seasonality, size/spatial extent, rotation (or fire cycle), predictability (or variation in fire frequency), and magnitude (both intensity and severity) (Agee 1993; Morgan el al. 2001). Fire regimes can be subdivided into components that vary in time, space, and magnitude. However, fire regime descriptions are often limited to the frequency and severity of wildfires.

Fire regimes vary considerably by both vegetation types and landscape characteristics. Map 3-13 and Table 3-10 display the historical/natural fire regimes, based on fire frequency and severity, for the vegetated lands in the planning area. The vegetated lands in the planning area are classified as Fire Regimes III (fire frequency of 35 to over 100 years with mixed severity) and IV (fire frequency of 35 to over 100 years and high severity). These fire regime groups are generalized and address only the primary type of fire that occurs in each regime.

Current condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion or suppression, vegetation management, grazing, introduction and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities (Hann and Bunnell 2001).

**Table 3-10**
**Historical Fire Regimes Based on Fire Frequency and Severity**

| Fire Regime Group | Fire Frequency and Severity[1] | All Lands within the Planning Area (acres) | BLM Lands within the Planning Area (acres) |
|---|---|---|---|
| I | 0-35 years;<br>Low (surface fire most common) severity | -- | -- |
| II | 0-35 years;<br>High (stand replacement) severity | -- | -- |
| III | 35-100+ years;<br>Mixed severity | 1,844,600 | 575,800[2] |
| IV | 35-100+ years;<br>High (stand replacement) severity | 228,100 | 31,400[2] |
| V | > 200 years;<br>High (stand replacement) severity | -- | -- |

*Source:* Schmidt et al. 2002; http://www.fs.fed.us/fire/fuelman
[1]Fire frequency refers to fire return interval. Fire severity refers to fire effects to dominant above ground vegetation (less than or greater than 75% dominant overstory replacement).
[2]Acres represent vegetated lands only.

Map 3-14 and Table 3-11 display the current fire regime condition classes, based on degree of departures from historical/natural fire regimes, for the vegetated lands in the planning area. The vegetated lands in the planning area are mostly classified as Condition Class 1 (fire regimes within the historical range), with a minor portion classified as Condition Class 3 (significantly altered fire regimes).

Landscape-level fire and fuels management strategies, including wildland fire suppression, vegetation and fuel treatments, wildland fire use, and prescribed fires are used in the planning area to reduce the fire hazard and risk in the wildland and WUI areas. In general, actions related to wildland fire and fuels management should reduce the amount of vegetated lands characterized as Fire Regime Condition Classes 2 and 3. Class 3 occurs within the planning area. Fuel hazard reduction may include prescribed fire, mechanical, biological, and chemical treatments or a combination thereof. The fuel treatment strategies reduce both existing fuel levels and risks of large damaging wildfires.

Landscape-level fire and fuels management strategies are designed to limit wildland fire extent, modify fire behavior, protect values at risk, and improve terrestrial ecosystem conditions. Fire management and fuel treatment strategies allow land/resource managers to control fires and set priorities that protect fire fighters, public life and property, and natural resources.

**Table 3-11**
**Current Condition Classes Based on Departures from Historical Fire Regimes**

| Condition Class (CC) | Description | All Lands within Planning Area (acres) | BLM Lands within Planning Area (acres) |
|---|---|---|---|
| CC1 | Fire regimes are within a historical range and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range. | 1,716,600 | 565,400[1] |
| CC2 | Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. | -- | -- |
| CC3 | Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. | 3,000 | 200[1] |

*Source:* Hann and Bunnell 2001; http://www.fs.fed.us/fire/fuelman
[1]Acres represent vegetated lands only.

## 3.6.4 FIRE MANAGEMENT UNITS AND WILDFIRE HISTORY

The Yuma/Lake Havasu Zone is subdivided into eight Fire Management Units—Bill Williams River, Gila River, High Elevation Sonoran Desert, Lower Colorado River (North), Lower Colorado River (South), Sonoran Desert Wilderness (North), Sonoran Desert Wilderness (South), and Sonoran Desert Scrub. Of these eight Fire Management Units, six overlap the planning area. Map 3-12 displays the spatial extent of the Fire Management Units, and Table 3-12 provides descriptions of the geographical locations and areas.

Wildfire history is closely related to vegetation and climatic patterns in terrestrial ecosystems. Patterns of fire frequency, season, size, severity, and uniformity are functions of existing vegetation conditions, weather, elevation, physiographic features, ignition sources, and fire suppression activities.

**Table 3-12**
**Fire Management Units in Yuma/Lake Havasu Zone Overlapping Planning Area**

| Fire Management Area | Location | All Lands within Planning Area (acres) | BLM Lands within Planning Area (acres) |
|---|---|---|---|
| High Elevation Sonoran Desert | High Elevation Sonoran Desert FMU consists of two mountain ranges within the Lake Havasu Field Office boundaries. It represents all of the uplands in the Fire Zone with an elevation of 3,500 feet or more and includes the Harcuvar Mountains Wilderness and the Mohave Mountains. | 23,400 | -- |
| Lower Colorado River (North) | Lower Colorado River (North) FMU is located along the Colorado River from Davis Dam south to I-10. | 103,500 | 4,000 |
| Lower Colorado River (South) | Lower Colorado River (South) FMU is located along the Colorado River from I-10 south to the Southerly International Boundary at San Luis, Arizona. | 266,600 | 45,000 |
| Gila River | Gila River FMU is located east of Yuma and starts at the north end of the Gila Mountains and follows the Gila River riparian area east approximately 80 miles to the YFO boundary. | 159,300 | 33,600 |
| Sonoran Desert Wilderness | Sonoran Desert Wilderness (North) FMU consists of BLM-administered wildernesses north of I-10 in Arizona, excluding the Harcuvar Mountains Wilderness. Sonoran Desert Wilderness (South) FMU consists of BLM-administered wildernesses south of I-10 in Arizona. | 1,120,800 | 167,800 |
| Sonoran Desert Scrub | Sonoran Desert Scrub FMU includes the entire upland Sonoran Desert that is not included elsewhere. This FMU can be accessed from Interstates 8, 10, and 40. | 3,353,400 | 1,067,600 |

*Source:* BLM *GIS Data; Yuma/Lake Havasu Fire Management Plan* (USDOI BLM 2004d)
FMU = Fire Management Unit

Between 1984 and 2003, approximately 98 percent of fires in the Yuma/Lake Havasu Zone were caused by humans and generally occurred between the months of February and October (Map 3-15). Fires caused by humans were usually associated with main travel corridors and the rivers.

The number of fires varies from year to year in the planning area. The twenty-year annual average is approximately 36 fires, burning an average of 3,022 acres per year. Multiple fire days consisting of two or more fires per day have occurred 34 times in the past 20 years. Of the 34 events, six consisted of days with three fires.

Fires were largely confined to the Lower Colorado River (North), Lower Colorado River (South), and Gila River Fire Management Units, where the fires were almost entirely caused by humans. Fire occurrence is most common in the Lower Colorado River (South) Fire Management Unit. Based on historic data, the probability of large wildfires is also highest in this Fire Management Unit because of public use, fuel continuity, and reduced access. A Federal national team (Type I Incident Management Team) has been mobilized once between 1984 and 2003 for fires in the Lower Colorado River (South) Fire Management Unit.

While the majority of the area experiences fires ranging from less than an acre to 99 acres (Class A, B, and C fires), the Lower Colorado River (South) Fire Management Unit has a history of large fire activity, with a total of eight fires ranging from 240 to 4,100 acres (Class E and F fires).

# 3.7 CULTURAL RESOURCES

Lands managed by the YFO have a rich and diverse cultural heritage. The ancestors of today's Native Americans lived in the region for thousands of years. The Spanish first explored the planning area in 1540. American trappers began filtering into the area in the early 1800s and the U.S. took over the territory in 1848 as a result of the Mexican-American War and the Treaty of Guadalupe Hidalgo. Today's southern Arizona and New Mexico south of the Gila River were acquired in the Gadsden Purchase of 1853. Soon Arizona had a growing pioneer population and an economy based on ranching and mining. All of these various visitors and residents left an archaeological record of their lives and their time spent in the planning area. These traces of past activities require a wide variety of approaches and methods for their effective management. These include cultural site protection, surveys for identification and evaluation, scientific research, ethnographic and oral history research, interpretive development, and public education.

## 3.7.1 CULTURAL SEQUENCE

### A. MALPAIS (PRIOR TO 12,000 BP)

Defined primarily by Julian Hayden (1987), the contemporary use of the term refers to assemblages of heavily weathered and varnished choppers, scrapers, and other core-based tools. Projectile points are lacking. These materials are typically found on Pleistocene-age desert pavements, sometimes associated with cleared circles or trails. Dating has been attempted on the basis of weathering and desert varnish formation, but obtaining radiocarbon or other absolute dates remains elusive. The existence and dating of the Malpais Complex remains controversial.

### B. PALEOAMERICAN PERIOD (13,000 TO 7,000 BP)

Also known as the Paleoindian Period, this is when people first entered North America according to most archaeologists. This period is generally accepted to have occurred from about 13,000 BP to 7,000 BP, although there is some evidence of earlier occupations (e.g., Moratto 1984:71). This was a time of greater effective moisture than present.

#### 1. The Fluted Point Tradition

The Fluted Point Tradition, first documented in Clovis, New Mexico, is primarily a southern Great Plains, big game hunting tradition. However, fluted projectile points have been found all over North America. In places other than the Great Plains, the economy seems more generalized. The typical Clovis type projectile point is a finely flaked, concave base spear point with a flute (a long thinning flake) running from base toward the tip. The assemblage also includes flaked-stone crescents, gravers, perforators, scrapers, and choppers (Justice 2002).

### 2. The San Dieguito Complex and Lake Mojave Complex

The San Dieguito Complex and the very closely related Lake Mojave Complex are primarily found in the deserts of Arizona, Nevada, Sonora, and the Californias (Rogers et al. 1966:24-25). Defined by Malcolm Rogers in the 1920s, the San Dieguito Complex represents primarily a big game hunting-based economy with some small game hunting and gathering of plant foods. The San Dieguito Complex, as currently known, contains only leaf-shaped projectile points, while the Lake Mojave Complex contains the long, tapered stem Lake Mojave type point and the short stem Silver Lake type point and an occasional Clovis fluted point. The assemblage also contains heavy percussion-shaped domed and keeled choppers, planes, and scrapers and finely flaked spokeshaves and crescents. The San Dieguito and Lake Mojave sites have limited numbers of slab metates for seed processing (Warren 1987).

## C. THE ARCHAIC PERIOD

### 1. Early Archaic (approximately 7,000 to 4,000 BP)

The early Holocene was a time of global warming when Pleistocene lakes dried up, woodlands retreated upslope, and big game became relatively scarce. In response, native people gradually shifted their economic focus from hunting big game to gathering plant products, especially hard seeds. In the early Archaic, one finds the Pinto Complex in the nearby Mojave Desert and north in the Great Basin; few Early Archaic sites have been noted in western Arizona and none are known from the Salton Sink. This complex is characterized by thin slab millingstones or metates, large, crude Pinto series projectile points, crude choppers, scrapers, scraper-planes, and knives (Warren 1987; Warren and Crabtree 1986).

### 2. Late Archaic (approximately 4,000 to 1,500 BP)

During the Late Archaic Period, the Amargosa or Gypsum Complex developed. While the Gypsum Complex was defined for the Mojave Desert and the Great Basin, Rogers recorded numerous Late Archaic sites in western Arizona, but did not note any from the California side of the Colorado Desert (Rogers et al. 1966; Warren 1984:403-404). The Gypsum Complex is characterized by fine, pressure-flaked Elko (or San Pedro in eastern and central Arizona), Humboldt, and Gypsum-type projectile points, leaf-shaped points, rectangular-based knives, flaked scrapers, T-shaped drills, and occasional large scraper-planes, choppers, and hammerstones. Manos and basin metates became relatively common and the mortar and pestle were introduced late in this period (Warren and Crabtree 1986).

## D. LATE PREHISTORIC PERIOD

Around the start of this period, ceramics begin to appear in the archaeological record along the lower Colorado River, as does the bow and arrow.

### 1. The Patayan

Patayan is a lower Colorado Basin culture that is also known as the Ancestral Yuman or Hakataya. The Patayan Complex is divided into three phases. These phases are primarily defined by changes in ceramic types and forms.

- **Patayan I (AD 500 to 1000):** The Patayan I phase is characterized by small mobile groups living in dispersed seasonal settlements, primarily along the Colorado River, but also at some desert springs. The subsistence economy was dominated by gathering plant foods, primarily mesquite pods, fishing, and hunting small game. Paddle and anvil pottery and small projectile points, such as the Desert Side-notched and Cottonwood Triangular types, were introduced. Disposal of the dead changed from inhumation to cremation.

- **Patayan II (AD 1000 to 1500):** The Patayan II phase is marked by the existence of Lake Cahuilla. This was a huge freshwater lake that formed from time to time when the Colorado River flowed into the Salton Sink instead of the Gulf of California. Lake Cahuilla was approximately 100 miles long and 35 miles wide. It is thought to have had numerous filling and drying cycles over the last million years or so since the mid-Pleistocene. Late Prehistoric sites are very abundant along the Lake Cahuilla high stand shoreline and recessional shorelines. During Patayan II, a major subsistence shift took place from fishing and gathering along the Lake Cahuilla shoreline to floodplain horticulture in the Colorado and lower Gila River floodplains. Maize, tepary beans, pumpkins, gourds, and grasses were cultivated, but the pods of the native mesquite tree were evidently the most important food (Castetter and Bell 1951). People of this period typically lived in substantial houses on hills and terraces away from the floodplain during late winter, spring and early summer when the Colorado and Gila rivers would flood. After the floodplain dried out sufficiently, the people would move back to the floodplain and plant their crops in the moist mud. A few months after the harvest, they would move to an upland location again to avoid the spring flood (Castetter and Bell 1951).

- **Patayan III (approximately AD 1500 to the 1900s):** The Patayan III phase begins after the final desiccation of Lake Cahuilla between approximately AD 1500 and 1600. This phase is, therefore, in the Historic Period for the most part. It is marked by cultural continuity with Patayan II on the one hand, and with the ethnographically attested tribes living in the region in modern times on the other hand (Castetter and Bell 1951). With the drying up of Lake Cahuilla, people living along the east bank probably moved back to the Colorado River, while those on the west bank are believed to have moved to the west (e.g., Rogers 1945).

## 2. The Hohokam

The Hohokam lived primarily in the Gila-Salt basin near Phoenix, Arizona, but there were Hohokam settlements north to the Flagstaff area, south to the Tucson area and west as far as Gila Bend. Cultural resources associated with the Hohokam can be found at the very eastern portion of the planning area, around the Maricopa County line. The Hohokam were agriculturalists who built an extensive system of canals to aid in the cultivation of cotton, tobacco, agave, maize, beans, squash, gourds and grasses. The Hohokam cultural sequence has been divided into four periods (Doyel 1981; Gumerman and Haury 1979).

- **The Pioneer Period (AD 200-775):** Villages were small and located primarily along the middle of the Gila River. Here they built semi-rectangular, semi-subterranean houses. They dug wells and built extensive canals to support agriculture based on maize, cotton, beans, squash, and pig weed. Stone manos and metates were used for seed grinding. Pottery was undecorated brown ware. Clay human and animal figures and incense burners were also

made. The dead were cremated and placed in ceramic urns (Doyel 1981; Gumerman and Haury 1979).

- **The Colonial Period (AD 775-975):** During this period, village size and Mexican influence increased. In larger homes, there was evidence of social stratification and grave goods were more ornate. Ball courts reminiscent of those in Mexico were established in larger villages. Iron-stained slip was introduced, resulting in a red-on-buff ware pottery.

- **The Sedentary Period (AD 975-1150):** The Sedentary Period saw an increase in population that resulted in larger irrigation canals and structures, an expansion of cultivated land, communal ovens for cooking bread and meat, and greater communal activity. Houses became post-reinforced pit houses and villages were built around common courtyards. More cotton textiles and jewelry made from shell, stone, and bone were produced. Carved stone figures and acid etching were introduced and craftsmanship improved. An elite class emerged, suggesting increased social stratification. Platform mounds similar to those in central Mexico appeared (Doyel 1981; Gumerman and Haury 1979).

- **The Classic Period (AD 1150-1400/1450):** This period is separated into two cultural phases. The Soho Phase (AD 1150-1300) saw a decline in population, the number of canals and rancherias, and trade with Mexico. An outside threat resulted in more centralized villages with dense structures and perimeter walls. Great House structures, made of stone or adobe, had up to four stories. These were probably associated with the managerial or religious class. Trade with Pueblo peoples to the north and east increased (Doyel 1981; Gumerman and Haury 1979). During the Civano Phase (AD 1300-1400/1450), many villages were abandoned. Several years of major river flooding followed by long periods of low water resulted in lack of dependable irrigation water and the ability to produce food for large numbers of people. By AD 1355, the central authority had collapsed and large villages and the centralized irrigation systems were abandoned. Small groups moved to the desert or areas with more dependable water sources. Some Hohokam may have reorganized into smaller villages and stayed along the Gila River. Some scholars suggest the remnant Hohokam may have been the Piman-speaking people that the Spanish encountered there at the end of the seventeenth century (e.g., Ezell 1963). Others suggest that the Pima-speakers moved into the area after the Hohokam collapse (Di Peso 1956). Pima oral tradition suggests they moved into the area from the east and drove out the remnant Hohokam, who fled to the west (Doyel 1981).

## E. HISTORIC

In 1540, Hernando de Alarcón and his crew rowed up the Colorado River to the Yuma area. Melchior Diaz, as part of the Coronado Expedition, visited the area on horseback. Oñate, the governor of New Mexico, explored Yuma and environs in 1605 and the famous Italian Jesuit, Eusebio Francisco Kino, visited in 1701. Franciscan missionaries, Francisco Garces Juan Diaz and others established two small missions and settlements in the Yuma vicinity in 1779. In 1781, there was a small mining boom in the Spanish settlement of Potholes, north of the Yuma area; however, the Spanish were ultimately driven from the Yuma area by the successful Quechan Revolt of 1782. Few Spanish, Mexican and Americans used the Yuma Crossing until the Mexican-American War of 1846-1848 (Forbes 1965).

The California Gold Rush of 1849 brought thousands of emigrants to the Yuma Crossing, and Fort Yuma was established in 1852 despite stiff armed resistance by the Quechan (Forbes 1965; Woznicki 1968). From the 1850s until 1877, steamboats plied the Colorado River transporting passengers and goods to mines, ranches and military outposts all along the river from Port Isabel on the Gulf of California up to Hardyville, now known as Bullhead City. In 1877, the Southern Pacific Railroad bridged the river, ending riverboat transportation. Yuma remained a transportation hub, however, as extensive railway yards and maintenance operations were developed (Woznicki 1968). Agriculture, based on small scale irrigation systems, was an important part of the economy in the late 19$^{th}$ century. After the construction of the Laguna Dam in 1909 and the associated siphon and delivery canals in 1912, agriculture expanded dramatically (Woznicki 1968).

MCAS-Yuma began with a primitive airfield in 1928. In World War II, it became one of the busiest flying schools in the country. In 1943 through May 1944, the Desert Training Center, later renamed the California – Arizona Maneuver Area, was established. Here General George S. Patton trained soldiers in World War II for desert campaigns in North Africa. This training facility then became the Yuma Proving Ground (YPG), which continues to test various Army gear and equipment.

## 3.7.2 CULTURAL AFFILIATION

Yuman (Cocopah, CRIT, Fort Mojave, Hualapai, Quechan, Yavapai), Maricopa (Ak-Chin, Gila River, and Salt River Pima-Maricopa), Southern Paiute (Chemehuevi) and Hopi have ties to the planning area. The lower Colorado River tribes typically practiced floodplain horticulture and grew the classic southwestern crops of corn, beans, squash, melons, pumpkins, and gourds. A major staple of their diet was the pods of the mesquite tree. Their primary source of protein was fish and small game. Most of the tribes followed a bi-polar settlement system. In late summer and fall they lived in the floodplain near where they planted their crops; in late winter, spring, and early summer they lived in more substantial houses in upland settings to avoid the seasonal floods (Castetter and Bell 1951). The Tohono O'odham and Hia C'ed O'odham also have important ties to the planning area, with the Tohono O'odham traditionally occupying the arid desert south of the Gila River and the Hia C'ed O'odham occupying the lands from the Gulf of California to the Tinajas Altas Mountains.

## 3.7.3 ARCHAEOLOGICAL INVENTORY AND IDENTIFIED SITES

YFO follows the guidance provided by the BLM – SHPO Cultural Resources Data Sharing Partnership for management of its cultural resources data. This partnership developed a central cultural resources database for each state with BLM-administered lands. YFO enters information on cultural sites and surveys for the entire planning area into AZSITE, Arizona's statewide database for cultural resource information that is administered by the Arizona SHPO and the Arizona State Museum. In addition, YFO contributes data to the California Historical Resources Information System by sharing information on its cultural sites and surveys that are located in California with the California Office of Historic Preservation Information Centers for Imperial

and Riverside Counties, which are hosted at the Imperial Valley College Desert Museum and the University of California at Riverside, respectively.

As of June 2006, the statewide AZSITE database lists about 700 previous cultural resource surveys in the planning area covering approximately 215,000 acres. These areas have been inventoried for cultural resources at either a Class II (sample survey) or a Class III (100 percent-coverage survey) level. This represents about 16 percent of the planning area's surface acreage. Locations that have undergone inventory have been dictated primarily by proposed construction projects, with the inventory conducted for compliance with Section 106 of the NHPA. However, some inventory has been conducted in response to Section 110 of that same law, which requires Federal agencies to identify, evaluate, and nominate to the NRHP historic properties under their jurisdiction.

In total, over 4,300 archaeological sites have been documented in AZSITE for the planning area. Given the relatively low level of survey coverage in the planning area, one could reasonably expect that several thousand prehistoric and historic sites remain undiscovered on BLM-administered lands managed by the YFO.

Prehistoric site types recorded include habitation sites, temporary camps, petroglyphs and pictographs, intaglios and geoglyphs, trails, hearths, and artifact scatters with chipped stone and ceramics. Prehistoric sites are distributed over all ecological zones within the region. Miles of trails and numerous cleared areas, rock rings, and hearths scattered across the desert lowlands attest to a constant presence and movement across the desert landscape. Upland zones provided more variety in biotic resources and were a great resource for raw lithic materials. These upland and lowland sites are components of a larger interconnected system established prehistorically for the exploitation of the area's resources.

Historic sites include railroads, roads, trails, irrigation facilities, mining sites, telegraph lines, homesteads, and cemeteries. Some historic trails in the area include the Anza Trail, Butterfield Overland Mail Route, Mormon Battalion Trail, and Gila Trail. Economic enterprises such as mining and agriculture populated the region, and southern Arizona became the focus of a transportation route to California and the coast. Mail routes and the railroad continued the populating of the region. Thus, the historic sites tend to occupy transportation corridors along river valleys, between mountain ranges, and over mountain passes. Historic sites are often located at or near the same locations as prehistoric sites, indicating similar needs for access to water and other resources.

Determining the age of prehistoric sites is particularly difficult in this region of the southwest. Most sites located along the terraces above the river floodplains are surface manifestations with little or no stratigraphic depth and few diagnostic artifacts, so that the sites cannot be dated to a specific prehistoric period. Depending on the site, a combination of the geomorphology at these locations and the length of occupation result in a lack of subsurface archaeological materials. Long-term habitation sites would provide the best opportunity for site dating, because they would contain substantial subsurface cultural deposits. However, these sites are likely to be located on the river floodplains and have been either severely disturbed by water flows, destroyed by agricultural activities, or deeply buried beneath floodplain deposits. Thus, these site types are extremely rare and immensely valuable.

## 3.7.4 PLACES OF TRADITIONAL CULTURAL IMPORTANCE

Places of traditional cultural importance provide a sense of spiritual and social continuity to Native Americans and other cultural groups. Some places may have religious significance. Others may be used for the observance of traditional ceremonial activities, or for hunting or gathering plants for food or medicinal use. Because they are not usually recognizable to an outsider through archeological or historical investigations, the existence and locations of traditional cultural importance may often only be identified through consultation with members of the groups who ascribe value to those places.

YFO is consulting specifically with Native American tribes to provide an opportunity for tribes to identify any places of traditional religious or cultural importance relevant to the proposed RMP alternatives. Many Native American belief systems require that the identity and location of traditional religious and cultural properties not be divulged. BLM has a commitment to keep specific information regarding such resources confidential to the fullest extent allowed by law.

## 3.7.5 NATIONAL REGISTER OF HISTORIC PLACES

In general, sites are considered significant if they are associated with an important prehistoric or historic event, person, architectural style or engineering style, or have the potential to yield important information about prehistory or history. Currently, approximately 25 percent of known sites in the planning area are considered or determined eligible for listing on the NRHP, 12 percent are considered or determined not eligible for the NRHP, and the remaining sites have not been formally evaluated. Sites, districts, and thematic resources listed on the NRHP for the planning area include:

- Blythe Intaglios Complex, listed on August 22, 1975;
- Ripley Intaglios Complex, listed on November 20, 1975;
- Eagletails Petroglyph Site, listed on September 28, 1988;
- Sears Point Archaeological District, listed on October 16, 1985;
- Martinez Lake Site, listed on September 10, 1987; and
- Earth Figures of California–Arizona Colorado River Basin Thematic Resource.

The Sears Point Archaeological District is part of the existing Gila River Cultural Area ACEC, and the Blythe Intaglios Complex is within the Big Marias ACEC.

## 3.7.6 EVALUATION OF CULTURAL RESOURCES

BLM evaluates cultural resources according to their current and potential uses. Cultural resources can be managed under one or more of the following six use categories: Scientific Use, Public Use, Traditional Use, Conservation for Future Use, Experimental Use, and Discharged from Management. Definitions for these categories are found in Section 2.15.3 Allocation to Use Categories.

All cultural sites that are known and projected to occur in the planning area are managed under one or more of the six use categories, following the guidelines described in BLM *Manual* 8110.4. The BLM determines suitable uses for cultural resources based on a site's characteristics, condition, setting, location, accessibility, perceived values and potential uses. Management categories are used to determine appropriate mitigation and treatment options for cultural sites that are presently known and for those discovered in the future. The BLM reevaluates and revises management categories, as appropriate, when circumstances change or new data become available. See Section 2.15 in Chapter 2 for a more detailed description of how cultural sites within the planning area would be managed under the six use categories.

Cultural properties currently managed for Public Use in the planning area are the Blythe Intaglios Complex in the Big Marias ACEC, the Fisherman Intaglio, the Sears Point ACEC interpretive area, and historic trails such as the Anza Trail, the Butterfield Overland Mail Route, the Gila Trail, and the Mormon Battalion Trail.

## 3.7.7 AREAS OF HIGH CULTURAL RESOURCE SENSITIVITY

### A. COLORADO RIVER CORRIDOR

The lower Colorado River corridor stands in stark contrast to the surrounding dry desert. Prehistorically along the river, one would find tall cottonwood and willow gallery woodlands (Minckley and Brown 1994). In upper floodplain areas were extensive mesquite bosques. The pods of the mesquite were a major dietary staple during the Late Prehistoric Period and the Historic Period (Castetter and Bell 1951). Indigenous peoples planted their crops in the river's floodplain. The river also provided fish, the major source of protein, as well as habitat to rabbits and other small game, which also contributed to the diet (Forde 1931). The adjacent desert provided small game and plant foods, as well as lithic resources and ceremonial sites.

The tribes who lived along the river were inveterate visitor travelers. They were in more or less constant contact with other river tribes for visiting and trading by means of an extensive trail network along both banks. In addition to their role as transportation routes, the trails have a great deal of spiritual significance. Travel along the lower Colorado River corridor figures prominently in their origin stories, oral traditions, and song cycles (Kroeber 1925). Also in the adjacent desert pavement terraces are many intaglio features and other important geoglyphs. These designs in the desert pavement are highly significant and irreplaceable resources that have a great deal of spiritual significance for the river tribes. Very few archaeological deposits have been discovered within the river floodplain, presumably because the river either scoured away or deeply buried archaeological deposits during flooding episodes. However, the adjacent desert is archaeologically very rich (e.g., Altschul and Ezzo 1994; Cleland et al. 2003). The Blythe Intaglios NRHP site, Martinez Lake NRHP site, and Ripley Intaglios NRHP site are located along this corridor, and the Big Marias ACEC was designated to help preserve and manage sensitive cultural resources along the river.

## B. GILA RIVER CORRIDOR

Like the lower Colorado River corridor (see above), the Gila River also functioned as a source of sustenance for inhabitants and travelers in prehistoric and historic times. Indigenous peoples along the lower Gila River had very similar languages, cultures, and subsistence strategies to the lower Colorado River tribes. In the planning area along the lower Gila River corridor, one also finds geoglyphs and intaglios on delicate desert pavement formations, and an extensive system of prehistoric trails, extensive rock art sites, and other important cultural features. These sites along the Gila River have substantial spiritual significance to contemporary Native Americans of the region. This river corridor also has importance as a travel route in historic times, with the Anza Trail, Butterfield Overland Mail Route, Mormon Battalion Trail, and Gila Trail all following the course of the Gila River floodplain. In order to effectively manage the important cultural resources that are situated along the Gila River, the BLM designated the Sears Point ACEC, which contains the Sears Point NRHP archaeological district and a portion of the Anza Trail route.

## C. SPRINGS, TINAJAS, AND WASHES

Ethnographic and archaeological studies suggest that in desert areas, access to water was a prime consideration in prehistoric and historic settlement location decisions and travel routes (e.g., Taylor 1961). Most undisturbed water sources in the planning area, including springs, tinajas, and washes, have some type of prehistoric and/or historic sites in association. These include trails and associated features, petroglyph and pictograph sites, and habitation sites. The Eagletails Petroglyph NRHP site (inside the Eagletails Wilderness Area), the Dripping Springs archaeological site, and the Tyson Wash petroglyphs are all examples of important archaeological sites that are situated around isolated water features on the desert landscape.

# 3.8 PALEONTOLOGICAL RESOURCES

Paleontologic resources are the fossilized evidence of past life found in the geologic record. Despite the tremendous volume of sedimentary rock deposits preserved worldwide and the enormous number of organisms that have lived through time, preservation of plant or animal remains as fossils is an extremely rare occurrence.

Because of their rarity and because of the scientific information they can provide, fossils are highly significant records of ancient life. They can provide information about the interrelationships of living organisms, their ancestry, development, and change through time, and their former distribution. Progressive morphologic changes observed in fossil lineages may provide critical information on the evolutionary process itself—that is, the ways in which new species arise and adapt to changing environmental circumstances. Fossils can also serve as important guides to the ages of the rocks and sediments in which they are contained and may prove useful in determining the temporal relationships of rock deposits from one area to another and the timing of geologic events. Time scales established by fossils provide chronologic frameworks for geologic studies of all kinds (Table 3-13).

Within the planning area, several rock units have potential to contain significant paleontologic resources. These rock units are present at the surface as well as in the subsurface and were originally deposited as fluvial (river or stream) and/or lacustrine (lake) sediments, in most cases over broad geographic areas. Sediments deposited under these conditions are generally favorable for the preservation of fossil resources.

**Table 3-13**
**Geologic Time Scale**

| Eon | Era | Period | | Epoch | Age[1] |
|---|---|---|---|---|---|
| Phanerozoic | Cenozoic | Quaternary | | Holocene | 0.01 – present |
| | | | | Pleistocene | 0.01 – 1.6 |
| | | Tertiary | Neogene | Pliocene | 1.6 – 5.3 |
| | | | | Miocene | 5.3 – 23.7 |
| | | | Paleogene | Oligocene | 23.7 – 36.6 |
| | | | | Eocene | 36.6 – 57.8 |
| | | | | Paleocene | 57.8 – 66.4 |
| | Mesozoic | Cretaceous | | | 66.4 – 144 |
| | | Jurassic | | | 144 – 208 |
| | | Triassic | | | 208 – 245 |
| | Paleozoic | Permian | | | 245 – 286 |
| | | Carboniferous | Pennsylvanian | | 286 – 320 |
| | | | Mississippian | | 320 – 360 |
| | | Devonian | | | 360 – 408 |
| | | Silurian | | | 408 – 438 |
| | | Ordovician | | | 438 – 505 |
| | | Cambrian | | | 505 – 570 |
| Precambrian | Proterozoic | | | | 570 – 2500 |
| | Archean | | | | 2500 – 3800 |
| | Hadean | | | | 3800 – 4550 |

*Source:* Palmer 1983;
[1]Age in millions of years before the present

## 3.8.1 GEOLOGY IN THE PLANNING AREA

The following composite list of geologic formations having potential to contain paleontologic resources is presented in order by geologic age, from oldest to youngest. Similar rock units located in other areas of the southwestern U.S. have been demonstrated to have high paleontologic sensitivity (Tedford et al. 2004; Bell et al. 2004). Geographic locations where these rock units are present at the surface are mentioned, but it is possible that these rock units also have limited, smaller-scale exposures elsewhere. Formational abbreviations for each unit are presented in parentheses below to facilitate comparison of these data with Map 3-16.

### A. PALEOZOIC SEDIMENTARY ROCKS (Pz)

Sedimentary rocks deposited during the Paleozoic Era crop out primarily in the New Water Mountains, the Dome Rock Mountains, the Plomosa Mountains, and the northern Gila Mountains. If present, scientifically significant fossils from these rocks would include marine invertebrates and vertebrates, depending upon the age of the strata.

## B. TRIASSIC AND JURASSIC SEDIMENTARY AND VOLCANIC ROCKS (JTR)

Sedimentary rocks deposited during the Triassic and Jurassic Periods of the Mesozoic Era, approximately 240 million years ago to 144 million years ago, crop out primarily in the Dome Rock Mountains. Mapping by Richards et al. (2000) does not distinguish sedimentary rocks from volcanic rocks in these units; however, volcanic rocks do not typically contain fossils. Some Triassic and Jurassic rocks in the southwestern U.S. have yielded fossil remains of animals (including bones, teeth, and fossilized trackways) and plants from the beginning of the Mesozoic Era—the "Age of Dinosaurs."

## C. JURASSIC SEDIMENTARY AND VOLCANIC ROCKS (Jsv)

Sedimentary rocks deposited during the Jurassic Period of the Mesozoic Era crop out primarily in the Castle Dome Mountains, the Kofa Mountains, the Little Horn Mountains, and the Tank Mountains. Mapping by Richards et al. (2000) does not distinguish Jurassic sedimentary rocks from Jurassic volcanic rocks; however, the volcanics do not have potential to contain fossil resources. Bones, teeth, and trackways of extinct animals have been found in some Jurassic rocks in the southwestern U.S.

## D. UPPER JURASSIC TO CRETACEOUS SEDIMENTARY ROCKS (KJs)

Sedimentary rocks deposited during the Late Jurassic Period through the Cretaceous Period, from approximately 160 million years ago to around 65 million years ago, crop out primarily in the Dome Rock Mountains and the Plomosa Mountains. Fossil remains of plants and animals from the end of the Mesozoic Era have been reported in similar rock units in the southwestern U.S.

## E. OLIGOCENE TO MIDDLE MIOCENE SEDIMENTARY ROCKS (Tsm)

Sediments and sedimentary rocks deposited during the Oligocene Epoch through to the middle Miocene Epoch, between approximately 34 million years ago and 11 million years ago, occur primarily in the Dome Rock Mountains, the Gila Bend Mountains, the Laguna Mountains, the Muggins Mountains, the Plomosa Mountains, and the northern Mohawk Mountains. Vertebrate fossils from these rocks can include early, primitive ancestors of horses and camels, as well as extinct forms such as oreodonts, titanotheres, and amphicyonids ("bear dogs"), as well as abundant small mammals.

## F. MIDDLE MIOCENE TO PLIOCENE SEDIMENTARY ROCKS (Tsy)

Sediments and sedimentary rocks deposited during the middle Miocene Epoch through to the later Pliocene Epoch, between approximately 16 million years ago and two million years ago,

occur primarily in the Palomas Plain and King Valley, as well as in the Dome Rock Mountains, the Eagletail Mountains, the Gila Mountains, the Clanton Hills, and portions of the Kofa Mountains. Vertebrate fossils from these rock units can include three-toed and later one-toed horses, numerous diverse species of camels, and gomphotheres (primitive elephant ancestors), as well as early saber-toothed cats and bone-crushing dogs, as well as abundant small mammals.

## G. LATE MIOCENE TO EARLY PLEISTOCENE SEDIMENTARY ROCKS (QTs)

Sediments deposited during the Late Miocene Epoch through Early Pliocene Epoch, from approximately 11 million years ago to 750,000 years ago, occur in the Cibola Plain.

## H. LATE PLIOCENE TO EARLY PLEISTOCENE SEDIMENTARY ROCKS (Qo)

Sediments and sedimentary rocks deposited during the late Pliocene Epoch through the early part of the Pleistocene Epoch, between approximately three million years ago and 750,000 years ago, are found along the flanks of the junction of the Kofa Mountains and the Little Horn Mountains, along the flanks of the southwestern Eagletail Mountains, in the Cibola Valley, in King Valley, in the Castle Dome Plain, and in the New Water Mountains. Vertebrate fossils from sediments deposited during this time can include zebras, giant camels and llamas, mastodons, early mammoths, sabre-toothed cats, dire wolves, and abundant small mammals.

## I. EARLY TO LATE PLEISTOCENE SEDIMENTARY ROCKS (Qm)

Sediments and sedimentary rocks deposited during the middle to late Pleistocene Epoch, from approximately 750,000 years ago to about 10,000 years ago, occur in the Clanton Hills, on the flanks of the Castle Dome Mountains, in the Ranegras Plain, along the flanks of the Bear Hills, in the New Water Mountains, and in the Little Horn Mountains. Vertebrate fossils from sediments deposited during this time can include large and small horses, giant camels and llamas, mastodons, mammoths, sabre-toothed cats, short-faced bears, and giant bison, as well as abundant small mammals.

### J. UNDIVIDED QUATERNARY SEDIMENTS (Q)

Undivided sediments and sedimentary rocks deposited during the Quaternary Period, between approximately 1.8 million years ago and the present, are located primarily in the flat-lying Palomas Plain, the Ranegras Plain, the southern La Posa Plain, the Castle Dome Plain, and the floor of the Yuma Desert. If these sediments are determined to be of Pleistocene age and exhibit a lithology conducive to the preservation of fossil resources, they would have high paleontologic sensitivity. In contrast, sediments of Holocene Age (less than 10,000 years old) are likely too young to have potential to contain significant fossil resources, and would therefore be assigned low paleontologic sensitivity. However, Holocene sediments may overlie older fossil-bearing rock units. If this is so, these subsurface rock units would have undetermined paleontologic sensitivity.

## 3.8.2 PREVIOUSLY RECORDED PALEONTOLOGIC RESOURCES

There have been very few known previous paleontology surveys in the planning area, which is why the majority of the field office has unknown paleontological sensitivity. Between Fiscal Year 2005 and the publication date of this PRMP/FEIS, BLM has partnered with Arizona Western College to survey and document paleontological resources in the YFO planning area. Surface specimens collected during this project are currently curated at Arizona Western College, and reports of survey results are on file at the YFO. The central goal of this partnership project is to identify significant fossil localities in the field office, and to assist the BLM with developing a paleontological sensitivity map in accordance with BLM *Manual* 8270 and BLM *Handbook* H-8270-1. This partnership between the BLM and Arizona Western College is expected to continue into future fiscal years.

Other sources of information on known paleontology localities in the planning area include the Regional Paleontologic Locality Inventory at the San Bernardino County Museum; the Mesa Southwest Museum; Northern Arizona University; the University of Arizona; the University of California, Berkeley Museum of Paleontology; and the Florida Museum of Natural History. The review of the Regional Paleontologic Locality Inventory indicated that as of 2005 the San Bernardino County Museum has no records of paleontologic resource localities from within the planning area.

There is documented paleontological research in the vicinity of Wellton and Ligurta, Arizona (see Bryan 1925, Croxen 2004, Lance and Wood 1958; Lindsay and Tessman 1974, Meade 1983, Moodie 1930, and Wood 1956). See Table 3-14 for a list of fossils identified in late Pleistocene deposits and also Late Pleistocene to Early Holocene packrat middens in this portion of the planning area.

**Table 3-14**
**Identified Fossils in the Vicinity of Wellton and Ligurta**

| Taxa | Common Name |
|---|---|
| Class Amphibia, Order Anura, Family Pelobatidae, *Scaphiopus* | spadefoot toad |
| Class Aves | unidentified aquatic birds |
| Class Mammalia, Order Artiodactyla, Family Bovidae, *Bison antiquus* | short-horned bison |
| Class Mammalia, Order Artiodactyla, Family Bovidae, *Bison* cf. *B. alleni* | long-horned bison |
| Class Mammalia, Order Artiodactyla, Family Camelidae, *Camelops hesternus* | western camel |
| Class Mammalia, Order Artiodactyla, Family Camelidae, *Hemiauchenia* sp. | long-legged camel |
| Class Mammalia, Order Artiodactyla, Family Camelidae, *Palaeolama* sp. | stout-legged camel |
| Class Mammalia, Order Artiodactyla, Family Cervidae, *Odocoileus* sp. | deer |
| Class Mammalia, Order Lagomorpha, Family Leporidae, *Silvilagus* sp. | cottontail rabbit |
| Class Mammalia, Order Perissodactyla, Family Equidae, *Equus* sp. | large horse |
| Class Mammalia, Order Perissodactyla, Family Equidae, *Equus* sp. | burro-sized horse |
| Class Mammalia, Order Proboscidea, Family Elephantidae, *Mammuthus columbi* | columbian mammoth |
| Class Mammalia, Order Rodentia, Family Castoridae, *Castor canadensis* | beaver |
| Class Mammalia, Order Rodentia, Family Cricetidae, *Neotoma* | pack rat |
| Class Mammalia, Order Rodentia, Family Geomyidae, *Thomomys* sp. | pocket gopher |
| Class Mammalia, Order Rodentia, Family Heteromyidae, *Dipodomys* | kangaroo rat |
| Class Mammalia, Order Rodentia, Family Heteromyidae, *Perognathus* | pocket mouse |
| Class Mammalia, Order Rodentia, Family Sciuridae, *Spermophilus* | squirrel |
| Class Mammalia, Order Xenarthra, Family Megatheriidae, *Nothrotheriops shastensis* | shasta ground sloth |
| Class Mammalia, Order Xenarthra, Family Mylodontidae, *Paramylodon*? sp. | ground sloth |
| Class Reptilia, Order Chelonia, Family Testudinidae, *Gopherus* sp. | land tortoise |
| Class Reptilia, Order Squamata, Family Colubridae, *Arizona* | glossy snake |
| Class Reptilia, Order Squamata, Family Colubridae, *Masticophis* | whipsnake |
| Class Reptilia, Order Squamata, Family Gekkonidae *Coleonyx* | gecko |

*Source:* Croxen 2004

# 3.9 VISUAL RESOURCES

One component of the BLM's multiple-use mission includes ensuring that the scenic values of the public lands are considered before authorizing uses that may have adverse impacts to the landscape. The VRM system involves inventorying scenic values and establishing management objectives for those values through the RMP process, and then evaluating proposed activities to determine whether they conform to the established management objectives. The VRM system is the BLM's tool to document a proposed activity's potential impacts to the landscape, develop mitigation measures to minimize those impacts, and maintain the scenic values of the public lands for the future. The BLM's VRM system is implemented according to guidelines in BLM *Manual* 8400, *Information Bulletin* No. 98-135, and IM No. 98-164.

The various RMPs, RMP amendments, and *Management Framework Plans* that are currently being implemented within the planning area allocated all public lands as VRM Classes I through IV. However, none of these various planning documents published maps of the different classes; instead, geographical locations and landscape types were designated to certain VRM classes. The absence of VRM class maps has left many areas of VRM designations up to differing interpretations and has been problematic in the management of the planning area's landscapes.

Currently, the planning area maintains 167,800 acres of VRM Class I lands, 15,200 acres of VRM Class II, 1,135,000 acres of VRM Class III, and zero acres of VRM Class IV lands.

In 2005, the YFO completed a new Visual Resource Inventory specifically for this RMP effort. The inventory was accomplished through a multi-agency, interdisciplinary team process according to the systematic inventory procedures described in BLM Handbook H-8410-1—*Visual Resource Inventory*. The four classes within the VRM Inventory were based on professional determinations of scenic quality, visual appeal, distance zones from which the landscape is viewed, and public sensitivity to changes in the landscape character. The results of the 2005 VRM Inventory are represented on Map 3-17.

# 3.10 WILDERNESS CHARACTERISTICS

Wilderness characteristics do not currently exist under the 1987 *Yuma District RMP*, as amended, but these characteristics may be considered for any new land use plans or amendments. BLM IM No. 2003-275-Change 1 provides guidance regarding the consideration of wilderness characteristics in the land use planning process. The IM states that BLM may consider information on wilderness characteristics along with information on other uses and values when preparing LUPs.

Through the planning process, the best mix of resource use and protection will be determined consistent with the multiple-use and other criteria established in FLPMA and other applicable laws, regulations, and policies. Lands with wilderness characteristics may be managed to protect and/or preserve some or all of those characteristics. A variety of LUP decisions can be made to protect wilderness characteristics, such as establishing VRM class objectives to guide the placement of roads, trails, and other facilities; establishing conditions of use to be attached to permits, leases and other authorizations to achieve the desired level of resource protection; and designating lands as open, closed, or limited to OHVs to achieve a desired visitor experience.

Public land use proposals, including the protection of lands with wilderness characteristics may be considered during the preparation of a LUP amendment or revision. The BLM completed an assessment of wilderness characteristics on approximately 301,200 acres of public lands through a multi-agency, interdisciplinary team process. The BLM Arizona State Office provided the protocol for the assessment process, which was completed in 2005. The assessment teams identified lands that exhibit a high degree of naturalness, provide outstanding opportunities for solitude, and provide outstanding opportunities for primitive and unconfined types of recreation. The results of the assessments are represented on Table 3-15 and on Map 3-18.

**Table 3-15**
**Wilderness Characteristics Assessment Results**

| Components of Wilderness Characteristics Identified | BLM Acres |
|---|---|
| Naturalness | 40,800 |
| Naturalness and Solitude | 41,000 |
| Naturalness, Solitude, and Primitive and Unconfined Recreation | 111,400 |
| Primitive and Unconfined Recreation | 66,100 |
| Naturalness and Primitive and Unconfined Recreation | 23,900 |
| Solitude and Primitive and Unconfined Recreation | 6,100 |
| No Wilderness Characteristics Identified | 11,900 |
| Total Acreage of Lands Assessed for Wilderness Characteristics | 301,200 |

The YFO then considered BLM policy, other resource allocation proposals, and the practicality of management to develop the Chapter 2 alternatives to manage for wilderness characteristics.

# 3.11 LIVESTOCK GRAZING

## 3.11.1 GRAZING RESOURCES

Grazing in the planning area is administered through permits held on specific parcels of land known as allotments. Some of these allotments cross the planning area boundary, and one allotment (Calhoun, 3,012 acres) falls entirely outside the northern boundary (Map 3-19). However, since these allotments are managed by BLM, the allotment management will be addressed.

Approximately 1,184,464 acres of BLM-administered lands are managed as part of grazing allotments ranging in size from 523 to 234,645 acres (USDOI BLM 2003b; 2003c; 2003d). All authorized use in the planning area is specific to cattle. Resource management within an allotment is based on AUMs where one AUM is equal to the forage required to sustain one cow-calf pair for a month (approximately 800 pounds dry forage). Annual and seasonably available species are considered when determining the AUMs available and the season of use authorized.

## 3.11.2 GRAZING ADMINISTRATION

### A. GRAZING PERMITS AND LEASES

Grazing use on an allotment is authorized through the issuance of a grazing permit or lease. The permit or lease describes the class of livestock, number of livestock, and season of use. BLM analyzes effects of proposed grazing according to the NEPA process and conducts an Environmental Assessment prior to permit issuance or renewal. Historically, permits and leases were authorized for a period of 10 years. However, the most recent assessments (2003) authorized use for only five years to allow for review through this planning process. Leases of duration less than 10 years were found to be in the best interest of sound land management (USDOI BLM 2003b; 2003c; 2003d).

Grazing use may be authorized through either Section 3 or Section 15 of the Taylor Grazing Act (P.L 73-482). Grazing use under Section 15 of the Act is authorized through leases, for lands outside of an established Grazing District. Leases are perennial with forage production generally adequate to support grazing on a regular (annual) basis. The class of livestock, AUMs, season of use, and other prescriptions or limitations are specified in the approved lease (USDOI BLM 2003b; 2003c; 2003d). Grazing permits apply to lands within Grazing Districts, under Section 3 of the Taylor Grazing Act, and include allotments classified as either perennial, perennial-ephemeral, or ephemeral. There are six perennial leases within the planning area. For perennial-ephemeral allotments, the stocking rate is determined from the year-long grazing capacity of the available perennial forage. Additional livestock grazing use can be authorized for ephemeral forage, when sufficient annual forage is present and such use does not conflict with other resource uses and needs or damage the perennial vegetation resource (USDOI BLM 1987a). Allotments with unreliable forage production or infrequent or sporadic use capabilities are classified as ephemeral and use is authorized only when annual forage is available and applied for by the permittee (USDOI BLM 2003b; 2003c; 2003d).

## B. ALLOTMENTS

Allotments are located within three general regions in the planning area: Dateland area, Quartzsite area, and Vicksburg area. General description of allotments in the vicinity of these communities is provided below and in Table 3-16 (see next page) and Map 3-19.

### 1. Dateland Area

Grazing use in the Dateland area has been extremely limited due to lack of facilities, small, widely scattered tracts of public land, and intermingled private and State lands not controlled by the lessees. Non-use is common and range improvements are generally in poor condition. Recommendations made during standard and guide assessments include retiring grazing on several allotments and reviewing the perennial classification on others (USDOI BLM 2003b; 2003c; 2003d).

### 2. Quartzsite Area

The Ehrenberg, Martinez, Scott, and Weisser Allotments are classified as ephemeral allotments. There has been no use on the Ehrenberg, Martinez, and Scott Allotments for the last 20 years. For the most part, livestock handling facilities no longer function. Some limited grazing use has been authorized on the Weisser Allotment over the last 10 years, but use is being heavily restricted by increasing recreational use and the growth of the Town of Quartzsite. The Bishop Allotment is a Section 15 allotment and has been consistently utilized by livestock for 20 years. Recommendations made during standard and guide assessments include retiring grazing on several allotments and reviewing the perennial classification on others (USDOI BLM 2003b; 2003c; 2003d).

### 3. Vicksburg Area

Grazing use has been year-long on the Crowder-Weisser and K Lazy B Allotments for many years. The Calhoun Allotment is used as pasture of the Crowder-Weisser Allotment, as the grazing privileges are controlled by the same permittee, and has been utilized annually. Grazing

use on the Eagletail Allotment has been primarily seasonal. However, year-long use has occurred. Livestock management facilities are in place and well maintained. These developments are used to attain proper livestock distribution throughout the allotment. With the exception of the Vicksburg Area, grazing use in the planning area is a very minor use of the public lands. Recommendations made during standard and guide assessments include retiring grazing on several allotments and reviewing the perennial classification on others (USDOI BLM 2003b; 2003c; 2003d).

**Table 3-16**
**Allotments' Administered and Authorized Use by BLM in the Planning Area**

| Allotment Name, Number, and Location | Management Category | Section 3/15 | Perennial/ Ephemeral | Authorized Use (AUMs) | BLM Acres |
|---|---|---|---|---|---|
| 05001 – Bishop (Q) | C | 15 | P | 516 | 26,100 |
| 03012 – Calhoun (V) | C | 3 | P/E | 1,728 | 40,800* |
| 05044 – Calient Farms (D) | C | 15 | P | 180 | 2,400 |
| 03022 – Crowder-Weisser (V) | M | 3 | P/E | 15,758 | 237,900† |
| 05053 – Dateland Ranch (D) | C | 15 | P | 900 | 16,600 |
| 03028 – Eagletail Ranch (V) | M | 3 | P/E | 1,400 | 202,200 |
| 03028 – Eagletail Ranch (V) | C | 3 | E | 0 | 107,800 |
| 03088 – Ehrenberg (Q) | C | 3 | E | 0 | 54,500 |
| 05000 – Hyder Ranch (D) | C | 15 | P | 960 | 4,100 |
| 03047 – K Lazy B (V) | M | 3 | P/E | 1,861 | 130,300‡ |
| 03097 – Martinez (Q) | C | 3 | E | 0 | 60,200 |
| 03056 – Morton (Q) | C | 3 | E | 0 | 24,900 |
| 03064 – Palomas (D) | C | 3 | E | 0 | 109,900 |
| 05036 – Palomas Ranch (D) | C | 15 | P | 424 | 4,500 |
| 03075 – Scott (Q) | C | 3 | E | 0 | 123,800 |
| 05003 – Trust #1347 (D) | C | 15 | P | 144 | 6,700 |
| 03096 – Weisser (Q) | C | 3 | E | 0 | 67,200 |
| 05006 – Whitewing (D) | C | 15 | E | 36 | 500 |
| | | | Total | 23,907 | 1,363,700 |

AUM = Animal Unit Month, D = Dateland area, Q = Quartzsite area, V = Vicksberg area
Maintain (M) allotments are allotments where current conditions are at or near the goals and objectives for the allotment and management is not an issue. Custodial (C) allotments are those allotments where it would not be cost beneficial to attempt to improve current conditions on an allotment.
*This allotment is completely in the LHFO but is managed by the YFO. Grazing Decisions would be made in this revision of the RMP.
** Approximately 5,800 acres of public land are within the LHFO but is managed by the YFO.
†Approximately 116,600 acres of public land are within the LHFO but is managed by the YFO.
‡Approximately 52,000 acres of public land are within the LHFO but is managed by the YFO.

## C. RANGE HEALTH ASSESSMENTS

The condition of the resources on allotments and the potential impacts of grazing are evaluated during the permit and lease renewal processes. A BLM interdisciplinary team evaluates allotments in accordance with the *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration* (*Standards and Guidelines*) (USDOI BLM 1997a). Standards are descriptions of the desired condition of the biological and physical components and characteristics of rangeland. Guidelines are management approaches, methods, and practices related to grazing management that will lead to achieving those standards.

Rangeland Health is analyzed through allotment specific goals and objectives. All allotments in the planning area fall within the Lower Sonoran Desert Scrub Land Resource Unit. Within this Land Resource Unit are 26 different ecological sites characterized by unique soil conditions, precipitation regimes, and plant communities. Each Land Resource Unit has unique potential plant composition and production, precipitation, and soil conditions.

Ecological status is determined by comparing current vegetative composition to the potential described in the ecological site description. Other resource needs and outside influences on the site are also considered in determining the role of grazing in meeting desired conditions. Allotment evaluations include identification of factors influencing the condition of the resources. Where grazing is a significant factor in failure to achieve rangeland health standards, BLM has until the next grazing season to implement corrective actions. Such actions may include adjustment to grazing duration, timing, intensity, forage utilization, or installation or implementation of range improvement projects. Climax or potential natural communities are not always the most desirable communities depending on the other goals and objectives for a specific area. The community targeted is dependant on the site specific uses proposed and other use and resource goals and objectives.

In 2002 and 2003, all allotments managed by the YFO were assessed in accordance with the *Standards and Guidelines* (USDOI BLM 1997a). Vegetation communities are noted to be producing at or near potential, and no specific trend was noted for any allotment. All permits and leases were reauthorized with terms and conditions of use (i.e., implemented guidelines) (USDOI BLM 2003b; 2003c; 2003d).

### D. RANGE IMPROVEMENT PROJECTS

Range improvements are installed and projects are implemented to improve condition or facilitate management of resources. In the planning area, most range improvements consist of such structures as fences, wells, and livestock handling facilities, many of which are in disrepair or non-functioning. Fences make it possible to control the season of use, and exclude grazing from selected areas. Water developments improve distribution of livestock as well as provide accessibility for some species of wildlife.

New range improvements can be authorized on public land under a Cooperative Range Improvement Agreement or Range Improvement Permit. All improvements are constructed according to BLM standards and specifications. Range improvements are infrequently constructed in the planning area due to the low intensity of livestock use.

## 3.11.3 FACTORS INFLUENCING GRAZING

A variety of environmental, economic, and social factors weigh heavily in planning decisions related to livestock grazing in the planning area. Grazing management is adjusted during renewal of permits and leases and at other times as appropriate in response to these factors. Site-specific factors, such as those listed below, have an influence on grazing management.

Due to the ephemeral nature of annual grass and forb production and the otherwise low productivity of upland sites in the Sonoran Desert Ecoregion, it is difficult to make long-term use plans that adapt to the resource available in any given year.

Noxious/invasive non-native plant species effectively compete with native vegetation for resources and continue to expand in the planning area. These species are unpalatable to most classes of domestic livestock, and their expansion reduces the amount of available forage. Livestock use must be adjusted in response to reduced forage availability to ensure other portions of the allotment are not overutilized and that other resource conflicts do not occur.

Recreational use in the planning area (e.g., camping, long-term visitors, OHV use, etc.) continues to grow. Where conflicts with grazing use occur, decisions must be made regarding which use is most compatible with resources available. Grazing is managed to eliminate or minimize such conflicts as appropriate.

# 3.12 MINERAL RESOURCES

This section assesses the mineral resource occurrence and development potential for all mineral resources owned by the Federal government and managed by BLM, including those on lands with split estate. Areas within the planning area that are withdrawn from mineral location entry are presented below.

**Military**

- BMGR, West managed by U.S. Marine Corps; East managed by the U.S. Air Force
- YPG, managed by the U.S. Army

**BLM**

- Gila River Cultural Area ACEC
- Big Maria Mountains Wilderness
- Eagletail Mountains Wilderness
- Little Picacho Wilderness
- Muggins Mountains Wilderness
- New Water Mountains Wilderness
- Palo Verde Mountains Wilderness
- Riverside Mountains Wilderness
- Trigo Mountains Wilderness

**USFWS**

- Cabeza Prieta NWR
- Cibola NWR
- Imperial NWR
- Kofa NWR

**Reclamation**

- First Form Withdrawal

## 3.12.1 DESCRIPTION OF MINERAL RESOURCES

There are three basic types of Federal energy and mineral resources: leasable, locatable, and salable as defined by Federal laws, regulations, and legal decisions. The following sections discuss the known occurrences, activity, and potential of mineral resources in the planning area. Appendix 3-A provides a summary of the exploration history, current lease status, and 20-year projections for reasonable foreseeable development of leasable, locatable, and salable minerals in the planning area.

### A. LEASABLE MINERALS

Federal leasable minerals are fluid or solid minerals that can be developed after obtaining a lease from BLM. Leasable fluid minerals include oil, gas, geothermal energy, and $CO_2$. Leasable solid minerals include coal, potash, sulfur, and sodium. Leasing for mineral development may be accomplished by competitive bid, as typically is the case for oil and gas. A lease sale may be initiated by an Expression of Interest nomination, wherein an interested party nominates a parcel for exploration and development. If there is no competitive interest in the lease of a parcel, the interested party may obtain a non-competitive lease.

A successful applicant for an oil and gas lease is required to pay rent on the leased parcel. Rental costs range from $1.50 per acre per year for the first five years to $2.00 per acre per year for the last five years of a standard 10-year lease. Competitive bonus bids are determined by oral auction on a per-acre basis and range from approximately $1.00 per acre for a parcel having little or no competitive interest up to $10.00 per acre for a parcel having high competitive interest. The lessee also is required to pay royalties on the sale of mineral resources produced from the leased parcel. For example, oil and gas royalties are 12.5 percent of sales. Royalty payments are paid to the U.S. General Revenue Fund.

The leasable fluid minerals addressed in this report are oil, natural gas, and $CO_2$. There are no known coal, potash, sulfur, or sodium resources in the planning area.

## 1. Oil and Gas

Oil and gas are non-renewable energy fluid mineral resources that typically are discovered and exploited by drilling exploratory and development wells into oil- and/or gas-bearing sedimentary rocks. Such sedimentary rocks have reservoir-quality porosity, are proximal to petroleum source rocks such as organic-rich shale or coal, and contain an accumulation of oil and/or gas that has been confined by a structural or stratigraphic trap.

BLM-administered land in the planning area identified as having moderate oil and gas potential is 50,200 acres (Tetra Tech 2005a). There are no documented proven reserves in the planning area and currently only minor leasing interest. No drilling activity has occurred since 1987. Exploration for oil and gas in the planning area has taken place primarily in the Yuma Basin (Map 3-20). The Yuma Basin is located in the southwestern corner of Arizona and includes the entire area south of Yuma to Mexico. The Yuma Basin is part of the Salton Trough, a tectonic structure related to the opening of the Gulf of California and the San Andreas fault system. The Yuma Basin contains an exceptionally thick sequence of marine, estuarine, and non-marine sediments of Tertiary Age that thickens toward the south in the northern part of the Gulf of California (Rauzi 2001). Butler (1995) describes the area as part of Province 025 (Yuma Desert), the Altar Basin (proto-Gulf of California), and states that the area contains a hypothetical oil and non-associated gas play that includes source rocks, reservoir rocks, and traps. He also notes that possibly commercial Miocene gas was reported as discovered in 1981, 14 miles offshore in the Gulf of California in deltaic sediments of the Colorado River. Further, Butler (1995) records the Exxon #1 Yuma-Federal well, drilled in 1973, which had a vitrinite reflectance measurement at total depth (11,444 feet) of $R_o$ 1.1 percent.

Guzman (1981) suggested that the hydrocarbon-rich Los Angeles and Ventura marine basins in southern California may have been in proximity to the Yuma Basin before the California basins moved northward along the San Andreas Fault system. Under this scenario, oil and gas generated in the deep waters of the Los Angeles Basin migrated up-dip into folds that were generated by movement within the San Andreas Fault system. These hydrocarbon traps could still be present in the southern part of the Yuma Basin. Brennan (1989) concluded that these strata have high hydrocarbon potential in the eastern half of the Yuma Basin within the BMGR.

In addition to the Yuma Basin, the Mohawk Basin and the Harquahala Basin are Tertiary Basins identified by Rauzi (2001) that may be similar to productive Tertiary basins in Nevada. These contain strata that could include petroliferous limestone buried deeply beneath thick evaporate deposits (Rauzi 2001).

### a. Known Oil and Gas Occurrences and Prospects

From 1925 to 1987 there were 26 exploratory wells drilled in or near the planning area (Brennan 1989; Rauzi 2001) (Map 3-16). In 1973, Exxon drilled the #1 Yuma-Federal well to a depth of 11,444 feet. There were no reported oil or gas shows in this well. A surface occurrence of an oil seep and early Miocene to late Oligocene petroliferous thinly bedded limestone is reported in the northwest portion of the Gila Bend Mountains (Rauzi 2001). Seven oil shows and two gas shows are recorded in the Yuma Valley Gas and Oil #1 Musgrove test well, drilled to 4,870 feet in June of 1940 (Brennan 1989). Dowling Petroleum #1 State was drilled in 1983 to a total depth of 2,925 feet and recorded an oil and gas show, while the An-Son #1-23 State well, drilled to 2,883 feet in 1980, recorded an oil show.

Central Oil Company's #1 Aman well was drilled to 2,850 feet and recorded one oil show (date is unknown).

**b. Oil and Gas Leasing Activity**

Regulations applicable to Federal oil and gas leasing in the planning area include the Mineral Leasing Act of 1920, the Mineral Leasing Act of 1947, Mining and Minerals Policy Act of 1970; Federal Onshore Oil and Gas Leasing Reform Act of 1987; and 43 CFR 3100—Oil and Gas Leasing. Policy/guidance specific to BLM include Manual 1601—*Land Use Planning*; BLM Manual Section 1624-2—*Supplemental Program Guidance for Fluid Minerals*; and BLM Manual Series 3100—*Onshore Oil and Gas Leasing*.

Leasing of Federal minerals for exploration and development of oil and gas begins by the submittal of an Expression of Interest to the Arizona State Office of the BLM. The Expression of Interest is an informal nomination by an interested entity, such as an energy company, to request that certain lands be included in a competitive lease sale. BLM administers competitive lease sales, which are held on a quarterly schedule following public notification of the sale. Permitting for oil and gas exploration and drilling within the State is administered by the Arizona Oil and Gas Conservation Commission.

Currently there are no active petroleum leases in the planning area. Numerous closed leases are present south of Yuma in seven townships west of the BMGR. A sampling of lease information from those areas indicates that much of the activity took place during the 1980s through the BLM. Most of the leases were on land that is now administered by Reclamation or on State land. However, these former leases are adjacent to BLM-administered land. A database containing this information is available on the following website: http://www.geocommunicator.gov

## 2. $CO_2$ and Helium

$CO_2$ and helium are non-renewable non-energy fluid mineral resources typically discovered by exploratory oil and gas wells that encounter natural gas or non-flammable gas. Helium is typically associated with $CO_2$ gas and, for the purposes of this PRMP/FEIS, the two gases are considered one resource. If $CO_2$/helium can be economically separated, collected, and delivered to a market, then a $CO_2$/helium gas field can be potentially developed.

**a. $CO_2$/Helium Known Occurrences and Prospects**

There are no known occurrences or prospects for $CO_2$/helium in the planning area. However, there are known occurrences of $CO_2$/helium in volcanic terrain comparable to the planning area where volcanic outgassing is the proposed source for $CO_2$/helium (Studacher 1987). Although $CO_2$/helium may not be primary targets for future exploration, gas analyses may confirm the presence of $CO_2$/helium in test wells.

## 3. Geothermal Resources

BLM has established that geothermal resources are renewable, leasable minerals. The evaluation of geothermal resources follows the guidelines for mineral resources. Geothermal energy is natural heat from the interior of the earth. Sources of geothermal energy include artesian hot

springs and wells that tap into groundwater or dry rock at elevated temperatures resulting from high heat flow gradients in the subsurface.

No high or moderate temperature geothermal resources exist in the planning area. There is no reported leasing or development activity for geothermal energy resources in the planning area. Known geothermal resources are present in the Imperial Valley–Salton Sea area, which may expedite the maturation of the shallower source rocks nearest the California border. There are four low-temperature geothermal resource regions identified in the planning area: two in Yuma County, one in La Paz County, and one in Maricopa County (Witcher et al. 1982; AGR MAP 2005). There has been development of these energy resources only for aquaculture. Information on the known occurrences of geothermal energy resources in the planning area is reported by the Arizona Geological Survey (formerly the State of Arizona Bureau of Geology and Mineral Technology) (Witcher et al. 1982). Most of the wells in the planning area are used for agricultural purposes with any thermal properties of the waters not being utilized. Well temperatures ranging from 30 to 40º Celsius have been recorded (USDOE 1979). Deeper wells could tap higher temperatures. Three of the known geothermal regions reported are thermal wells or loose clusters of thermal wells that have low-temperature geothermal resources. The Hyder region is associated with a cluster of wells and the hot spring at Agua Caliente (102º F [39º C]) in Hyder Valley. Geothermal water (105º F [41º C]) at Hyder has been developed for direct use for aquaculture, raising fish (Oregon Institute of Technology 2004). Another hot springs is at an isolated location at Radium Springs (140º F [60º C]) just north of the Gila River northeast of Wellton (Hot Springs Enthusiast 2005).

Geothermal resources are classified according to temperature. High temperature resources are above 302° Fahrenheit (150° C). Moderate temperature resources are between 194° F and 302° F (90° C and 150° C). Low temperature resources are below 194° F (90° C). Only those resources with high enough temperatures to produce steam have been developed commercially for power generation. Low temperature and moderate temperature geothermal water can be used for ground-source heat pumps and without the use of a heat pump for applications such as heating of buildings and use in industrial processes, greenhouses, aquaculture, and resorts. Potential uses of the known resources include residential and commercial space heating, greenhousing, aquaculture, crop and food processing, and heated swimming pools and spas.

Regulations applicable to geothermal leasing of Federal minerals include the Mineral Leasing Act of 1920, Mineral Leasing Act of 1947, Mining and Minerals Policy Act of 1970, Geothermal Steam Act of 1970, and 43 CFR 3200.

## B. LOCATABLE MINERALS

Locatable minerals are defined as those minerals that make the land more valuable because of their existence, are recognized as a mineral by the standard experts, and are not subject to disposal under some other law. Many solid minerals are locatable, but due to complexities in the law there are exceptions (such as leasable coal, potash, sulfur, and sodium). Locatable minerals include both metallic minerals (e.g., gold, silver, copper, lead, uranium) and non-metallic minerals (e.g., gemstones, kaolin, fluorspar, perlite). Rights to locatable minerals are obtained by filing a mining claim.

## 1. Metallic Locatable Minerals

The planning area has many designated mineral districts (Keith et al. 1983; Welty et al. 1985). A list of mines and prospects located on BLM-administered land that are open to mineral entry is presented in Table 3-17 according to the commodity type (gold, silver, copper, etc.). This list is based on the Arizona Lands Resource Information System Minerals Available System (Arizona State Land Department 2005). A number of the districts are excluded from consideration in this report, because they are within areas that have been withdrawn from mineral location.

There are seven gold districts within the planning area in Arizona and one in California along the Colorado River. Four of these (Moon Mountains, Middle Camp, La Paz, and Southern Plomosa) are located to the north, west, and east of the Town of Quartzsite in the northern portion of the planning area. Two gold districts are located to the east of the Kofa NWR. These are the Sheep Tanks and the Gila Bend Mountains Districts. A gold district is also located in California in the far southeastern extent of the Chocolate Mountains adjacent to the Colorado River. Silver has been produced from some of the historic gold mines, as well as lead and zinc, although they are not likely targets in their own right.

Base metals within the districts include copper, lead, and zinc. Most of the base metal districts are located within areas excluded from mineral entry such as the Kofa NWR, YPG, Wilderness areas, and other withdrawals. For example, the Castle Dome District lead-zinc-silver district is entirely enclosed by the Kofa NWR.

There are several uranium prospects in the Muggins Mountains mining district. No uranium has been produced from this area, and the resource potential is not well defined. However, the prospects are significant enough to have generated interest among major mining companies, especially during the period of elevated uranium prices during the late 1970s and early 1980s.

**Known Occurrences and Prospects of Metallic Locatable Minerals**

Below is a summary of information on specific mines, historical mines, prospects, and areas of mining interest. Map 3-21 shows the locations of metallic mineral occurrences and prospects. There are 22 mineral districts in the planning area, most of which have production data (Keith et al. 1983; Welty et al. 1985).

**Gold.** There are two gold mines in the planning area: the Verdstone Mine, located in the Sheep Tanks District, which is a former gold mine that includes an open pit as well as underground workings, and the Copperstone Gold Mine, located northeast of the Moon Mountains District, which was operational between 1987 and 1992.

Placer mining for gold has taken place since pre-Spanish times. Recreational placer mining is popular in the districts surrounding the Town of Quartzsite, such as the La Paz and Middle Camp districts. The Southern Plomosa district has also produced placer gold. Terrace gravels on the north slope of the Gila Mountains have intermittently produced placer gold. Placer gold also has been mined historically in the Potholes area of the southeastern Chocolate Mountains in California, along the Colorado River.

**Table 3-17**
**Mining District, Commodities, and Production Locations in Areas for Mineral Entry**

| Mining Areas in District | Name | Deposit Type[1] | Town-ship | Range | Sections | Production Base or Precious (tons) | Gold (ounces) | Silver (ounces) | Copper (lbs) | Lead (lbs) | Zinc (lbs) | Manganese (lbs) | Uranium (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Plomosa Pass | 1a | 5N | 18W | 1 | | | | | | | | |
| | | | 6N | 18W | 36 | | | | | | | | |
| 1 | La Cholla | 2 | 3N | 20W | 2, 3, 10, 11, 15, 16, 17, 20, 21 | 300 | 300 | 2,600 | 36,000 | | | | |
| 2 | Southern Plomosa (part) | 2 | 3N | 18W | 1, 2, 3, 4, 5, 8, 9, 10, 12, 15, 16, 17, 33, 34, 35, 36 | 3,500 | 1,000 | 26,000 | 457,000 | 5,000 | | | |
| | | | 4N | 18W | 22, 23, 24, 25, 26, 27, 32, 33, 34, 35 | | | | | | | | |
| 1 | Moon Mtns. | 3 | 5N | 20W | 5, 7, 18 | 300 | 800 | 100 | | | | | |
| | | | 5N | 21W | 2, 3, 12, 13 | | | | | | | | |
| | | | 6N | 20W | 31, 32, 12 (includes Copperstone Mine) | | | | | | | | |
| 2 | Middle Camp | 3 | 3N | 20W | 4, 5 | 800 | 200 | 200 | 200 | 116,000 | | | |
| | | | 4N | 20W | 20, 21, 22, 26, 27, 28, 29, 32, 33 | | | | | | | | |
| 3 | La Paz | 3 | 4N | 21W | 22, 23, 25, 26, 27, 34, 35, 36 | 11,000 | 1,600 | 700 | 16,000 | 3,000 | | | |
| 4 | Grand Central | 3 | 1S | 23W | 25, 35, 36 | 50 | 60 | | | | | | |
| 5 | Sheep Tanks (part) | 3 | 1N | 14W | 31 | 17,000 | 6,000 | 34,000 | 2,000 | | | | |
| | | | 1S | 14W | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 16, 17, 18 (includes Verdstone Mine) | | | | | | | | |
| 6 | Gila Bend Mtns/Webb | 3 | 1S | 11W | 19, 20, 21, 27, 28, 29, 30 | 400 | 50 | 200 | 27,000 | | | | |
| | | | 2S | 11W | 11, 12, 15, 16, 21, 22, 23, 24 | | | | | | | | |
| 7 | Yuma | 3 | 8S | 23W | 25, 26, 27, 34, 35, 36 | 500 | 100 | | | | | | |

**Table 3-17**
**Mining District, Commodities, and Production Locations in Areas for Mineral Entry (cont.)**

| Mining Areas in District | Name | Deposit Type[1] | Town-ship | Range | Sections | Production Base or Precious (tons) | Gold (ounces) | Silver (ounces) | Copper (lbs) | Lead (lbs) | Zinc (lbs) | Manganese (lbs) | Uranium (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | So. Chocolate Mtns, CA | 3 | 15S | 24E | | | | | | | | | |
| | Potholes | | | | | | | | | | | | |
| | Senator | | | | | | | | | | | | |
| | Three Cs | | | | | | | | | | | | |
| | Golden Dream | | | | | | | | | | | | |
| 1 | Mohawk (part) | 4 | 8S | 15W | 10, 11, 12, 14, 15 | | | 4,700 | 800 | 4,000 | | | |
| 2 | New Water (part) | 4 | 3N | 17W | 1, 10, 12, 13, 15, 20, 24 | 10,000 | 200 | 314,000 | 58,000 | 499,000 | 47,000 | 512,900 | |
| 3 | Silver (part) | 4 | 3S | 23W | 25, 34, 35, 36 | 103,000 | 100 or less | 1,311,000 | 2,000 | 2,456,000 | | | |
| | | | 4S | 23W | 1, 2, 12, 25, 36 | | | | | | | | |
| 1 | Trigo Mtns. | 6a | 2S | 23W | 1, 11, 12, 13, 14, 23, 24, 25, 26, 27, 33, 34, 35 | | | | | | | 2,096,500 | |
| | | | 3S | 23W | 2, 3, 4, 9, 10 | | | | | | | | |
| 2 | Eagle Tail | 6a | 1N | 12W | 27, 28, 29, 32, 33, 34, 35, 36 | | | | | | | 19,000 | |
| | | | 1S | 12W | 1, 2 | | | | | | | | |
| 3 | Metate | 6a | 3N | 21W | 1, 2, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26 | | | | | | | 126,300,000 | |
| 1 | Cinnabar (part) | 7 | 3N | 20W | 30, 31 | 100 | 10 or less | 200 | 6,000 | | | | |
| 1 | Tungsten Hill | 8 | 5N | 20W | 20, 21, 22, 23, 25, 26, 27, 34, 35, 36 | No recorded production | | | | | | | |
| 2 | Dome | 8 | 8S | 20W | 8, 18 | | | | | | | | 8 |
| | | | 8S | 21W | 10, 11, 12, 13, 14, 15 | | | | | | | | |

**Table 3-17**
**Mining District, Commodities, and Production Locations in Areas for Mineral Entry (cont.)**

| Mining Areas in District | Name | Deposit Type[1] | Town-ship | Range | Sections | Production Base or Precious (tons) | Gold (ounces) | Silver (ounces) | Copper (lbs) | Lead (lbs) | Zinc (lbs) | Manganese (lbs) | Uranium (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Muggins | 10b | 7S | 18W | 31 | Uranium prospects | | | | | | | |
| | | | 7S | 19W | 34, 35, 36 | | | | | | | | |
| | | | 8S | 18W | 5, 6, 7, 8, 17, 18 | | | | | | | | |
| | | | 8S | 19W | 1, 2, 3, 10, 11, 12, 13, 14, 15, 22, 23, 24 | | | | | | | | |
| 2 | Big Chimney | 10c | 9S | 20W | 8, 9, 10, 15, 16, 17 | | | | | | | | 3 |

[1]Deposit Type: 1 Copper: (a) porphyry and (b) stratabound; 2 Copper with or without gold or lead; veins; 3 Gold with or without copper or lead; 4 Lead-zinc-silver veins and replacements; 6 Manganese; 7 Mercury deposits; 8 Tungsten; 10 Uranium with or without vanadium

**Uranium.** The Red Knob prospect is located in the Muggins Mountains, approximately 30 miles east of Yuma. Uranium minerals occur in the lower member of the Kinter Formation, associated with a northwest-trending normal fault near an intrusive rhyolite dome. A 1.5-foot-thick silicified mudstone bed is exposed along a 15-foot-long trench at the portal of a collapsed and partly filled adit at least 35 feet long. Weeksite, a rare uranium silicate, calcite, chalcedony, mimetite, and vanadinite occur in a silicified mudstone bed. Mineralized rock with a geochemical signature similar to that in the Red Knob prospect may also occur elsewhere in the Muggins Mountains District (Smith et al. 1989).

## 2. Non-metallic Locatable Minerals

### Known Occurrences and Prospects of Non-metallic Locatable Minerals

Occurrences and prospects of non-metallic locatable minerals within areas of BLM-administered land open for mineral entry are presented on Map 3-22, based on the *Arizona State Mineral Resources Data System* (Mason and Arndt 1996). The information provided below is based on Phillips (1987); Keith et al. (1983); U.S. Geological Survey (USDOI USGS 1999); and BLM (USDOI BLM 2004d).

**Alunite.** Alunite, a hydrous sulfate of aluminum and potassium, is used as an alternative to bauxite for alumina in aluminum production. As of 1987, alunite had not been mined in Arizona. There is one deposit in La Paz County, near the Town of Quartzsite, although this deposit is not identified in the Mineral Resources Data System minerals database.

**Asbestos.** Asbestos is the generic name for a group of fibrous mineral silicates found in nature. There are two deposits of asbestos identified in the planning area, one in La Paz County, and one in Yuma County, although these are not identified on the Mineral Resources Data System. According to Phillips, there has been no asbestos production in Arizona since 1982, and there is no known asbestos production in the planning area as of the date of this report.

**Barite.** Barite is produced for many applications but use in oil well drilling mud is the most common, due to the high specific gravity of 4.5 grams/cubic centimeter. Barite occurs in numerous locations within the planning area in veins associated with faults, breccias, and fracture zones. It is often a gangue mineral or byproduct in precious and base metal mines and prospects. There are approximately 20 barite deposits identified by Phillips (1987) within the planning area, but these do not fall within areas of BLM-administered land open for mineral entry.

**Gypsum.** Gypsum is a hydrous calcium sulfate that occurs in evaporite basin deposits in most Arizona counties. It is used in making plaster and as an agricultural amendment. There are approximately eight deposits identified by Phillips (1987) within the planning area, with only one of these in Yuma County, known as the Castle Dome occurrence. These are not located within areas open for mineral entry.

**Mica.** Mica is the general name for a group of complex hydrous potassium aluminum silicate minerals which share the common physical property of a perfect basal cleavage. Sheet mica is used in the electronics industry, where the material's excellent electrical insulation properties and resistance to heat are put to use. Six mica deposits occur within the planning area, although they are in areas that are closed to mineral entry.

## C. SALABLE MINERALS

BLM defines common varieties of sand, gravel, stone, pumice, pumicite, cinders, and clay as salable, not locatable (USDOI BLM 1997d). Salable minerals include materials used for building and construction, both commercially and privately. Sand, gravel, aggregate, cinders, decorative rock, and building stone are the more common salable minerals. Extraction of salable minerals from public land requires either a sales contract or a free-use permit. Sales are at the appraised fair-market value. Under a free-use permit, salable minerals may be provided at no cost to government agencies for use in public projects. Sand and gravel resources are the focus of the information presented below due to their current and future economic importance to Yuma and the planning area. The locations of known salable mineral deposits are shown in Map 3-23.

### Salable Mineral Known Occurrences and Prospects

The locations of known occurrences and prospects for salable minerals are too numerous to discuss on an individual basis. In general, aggregate resources are associated with major river channels of the Colorado and Gila rivers (including the reaches of the Colorado River on tribal land) major wash systems, and foothill terraces flanking the Gila Mountains.

# 3.12.2 POTENTIAL FOR OCCURRENCE OF MINERAL RESOURCES

The potential for occurrence of mineral resources is determined using guidance provided in BLM Manual 3031—*Energy and Mineral Resource Assessment*. The manual sets standards for assessing, classifying, and reporting the potential for occurrence of mineral resources on lands managed by BLM.

## A. DEFINITION OF MINERAL RESOURCE POTENTIAL

The potential occurrence of a mineral resource is a prediction of the likelihood that the mineral resource will occur in a given area. The potential occurrence of a mineral resource includes both exploitable and potentially exploitable occurrences, and does not evaluate whether the mineral resource can be developed economically. The four categories of mineral potential, as defined in BLM *Manual* 3031, are as follows:

- **No potential**. The geologic environment, inferred geologic processes, and lack of mineral occurrences do not indicate potential for accumulation of mineral resources;
- **Low potential (L)**. The geologic environment and inferred geologic processes indicate low potential for accumulation of mineral resources;
- **Moderate potential (M).** The geologic environment, inferred geologic processes, and reported mineral occurrences or valid geochemical/geophysical anomalies indicate moderate potential for accumulation of mineral resources; and

- **High potential (H).** The geologic environment, inferred geologic processes, and reported mineral occurrences or valid geochemical/geophysical anomaly, and known mines or deposits (within the same type of geologic environment) indicate high potential for accumulation of mineral resources.

In addition to these four categories, within each mineral potential category the potential must be supported according to a level of certainty regarding the available data. The level of certainty is a measure of the confidence in the data that was assessed. The four mineral potential categories are displayed on the mineral resource potential maps (Maps 3-21 through 3-23). The levels of certainty are annotated in the narrative of mineral resource potential using the letter designations described below.

A The available data are insufficient and/or cannot be considered as direct or indirect evidence to support or refute the possible existence of mineral resources within the respective area.

B The available data provide indirect evidence to support or refute the possible existence of mineral resources.

C The available data provide direct evidence, but are quantitatively minimal to support or refute the possible existence of mineral resources.

D The available data provide abundant direct and indirect evidence to support or refute the possible existence of mineral resources.

The following text sections describe the level of potential for occurrence of the various commodities. Clusters of known mines and prospects (or hydrocarbon exploration holes) are rated as having high potential. Areas adjacent to these clusters are rated as moderate, because of geologic similarities to the areas of high potential. For non-metallic locatable and salable minerals, all areas not interpreted as having high potential are interpreted as having moderate potential because these types of minerals may be present in many areas, even though they have not been identified to date. For the metallic locatable minerals, areas lacking known occurrences and lacking similar geologic characteristics are rated as having low or no potential and encompass all the areas outside the moderate potential boundaries. The boundaries are interpretive based on the available data and best professional judgment.

## B. LEASABLE MINERALS—OIL AND GAS POTENTIAL

Oil and gas potential is allocated to areas that have the following characteristics:

- Source for hydrocarbons: for example, an organic-rich shale or coalbed that has attained a level of thermal maturity through burial or other heating mechanism such that oil and/or gas could be generated. These data generally are obtained by testing core or drill cuttings samples in a laboratory.
- Reservoir-quality rock: sandstone, limestone, or fractured rock having interconnected porosity and permeability into which oil and/or gas may migrate from the source rock and be trapped.

- Trapping mechanism that prevents oil and/or gas from migrating out of the reservoir-quality rock. Structural traps, stratigraphic traps, and faults are some common trapping mechanisms.
- Known deposits of oil and/or gas.

The Yuma Basin and the Tertiary Basins below were evaluated based on the above criteria.

### 1. Yuma Basin

According to Rauzi (2001), the hydrocarbon potential in the Yuma Basin is considered fair to good, especially in the deeper, sparsely tested southern parts of the basin and the completely untested eastern part of the basin beneath the BMGR. The latter, however, is currently withheld from leasing and exploration.

Butler (1995) defines the Altar-San Luis Basin Play as a hypothetical oil and non-associated gas play in the Basin and Range Physiographic Province of southwestern most Arizona (Yuma Desert). The play is defined by very significant onshore and offshore petroleum shows and possible discoveries in Cenozoic sand-shale sequences just to the south (of the planning area) in northwestern Sonora, Mexico.

The oil and gas level of potential is moderate (M) and the level of certainty is C. The locations with moderate potential hydrocarbon occurrence are in the Yuma Basin/Salton Trough. All other areas are interpreted as having low or no hydrocarbon potential.

### 2. Tertiary Basins (Mohawk and Harquahala)

The Mohawk Basin and the Harquahala Basin are Tertiary Basins identified by Rauzi (2001) that may be similar to productive Tertiary basins in Nevada. These contain strata that could include petroliferous limestone buried deeply beneath thick evaporate deposits. No exploratory holes have been drilled in either of these basins and the only indication of hydrocarbon potential is by analogy with productive similar geologic settings in Nevada. Therefore, the level of potential is low (L) and the level of certainty is A (uncertain), due to insufficient data.

## C. $CO_2$ AND HELIUM POTENTIAL

$CO_2$/helium potential is allocated to areas that have the following characteristics:

- A source for $CO_2$/helium such as thick volcanic sequences that may have locally charged reservoir-quality sediments with $CO_2$. Volcanic rocks are prominent throughout the planning area but may not have the thickness and areal extent necessary to provide abundant $CO_2$ to reservoir-quality rocks.
- Reservoir-quality rock: sandstone, limestone, or fractured rock having interconnected porosity and permeability into which $CO_2$/helium may migrate from the source area and be trapped.
- Trapping mechanism that prevents $CO_2$/helium from migrating out of the reservoir-quality rock.

- Structural traps, stratigraphic traps, and faults are some common trapping mechanisms.
- Known production of $CO_2$/helium.

Areas having $CO_2$/helium potential are generally correlative with areas having oil and gas potential because those areas are known to have the necessary reservoir-quality rock and geologic structures. However, since there is no known production and no known shows of $CO_2$/helium in the planning area, and the extent of a volcanic source for $CO_2$/helium is uncertain, those areas have low potential (L). The level of certainty is B for those areas because no $CO_2$/helium has been reported.

## D. LOCATABLE METALLIC MINERALS

There is moderate potential for metallic minerals immediately outside the mineral districts. Mineral occurrences are inferred in those areas because the geological environment for mineral occurrence in the mountains surrounding the mineral district is comparable to the known mineralized areas in the district. Moderate potential also is attributed to mountainous areas having rock types and geologic histories comparable to the established mineral districts. The level of certainty is B because available data provide indirect evidence that the metallic minerals occur in those districts.

## E. LOCATABLE NON-METALLIC MINERALS

Areas with high potential for non-metallic mineral resources are in mineral districts with known occurrences of the non-metallic minerals. The Mineral Resources Data System identified only two non-metallic mineral locations on BLM-administered land within the planning area, although many other prospects are known to occur in the areas withdrawn from mineral entry (such as the YPG, etc.). The level of certainty is D (most certain) because available data provide direct evidence that the non-metallic minerals occur in these locations.

There is moderate potential for non-metallic minerals outside the mineral districts. Mineral occurrences are inferred in those areas because the geological environment for mineral occurrence in the mountains surrounding the mineral district is comparable to the known mineralized areas in the district. Moderate potential also is attributed to areas having rock types and geologic histories comparable to the recognized mineral districts. The level of certainty is B, because available data provide indirect evidence that the non-metallic minerals occur in those districts.

## F. SALABLE MINERALS

### 1. Sand, Gravel, and Stone

Sand and gravel (aggregate) deposits, as well as decorative stone and stone for riprap, are being actively mined on or adjacent to BLM-administered land, particularly near Yuma. Two notable examples of aggregate mines are the Rinker Plant 801 and the BLT operations. These mines, as well as additional areas, have strong potential for near-term development, as the market for aggregate keeps pace with economic growth in the vicinity of Yuma. In addition to the Yuma

area mines, aggregate and riprap are mined near the Town of Quartzsite and Ehrenberg along the I-10 corridor in La Paz County.

The level of potential for the aggregate market is H (high potential), because the deposits are being actively mined and there are additional known resources of similar type and size in the surrounding area. The level of certainty is C, because available data (current mineral sales and direct observation of active mining) provides evidence to support the existence of the mineral resource.

# 3.13 RECREATION

The resources of the BLM-administered lands in the planning area provide a wide range of recreational opportunities that significantly contribute to the quality of life and eco-tourism industry in the region. Camping, hiking, OHV riding, boating, swimming, fishing, hunting, shooting, wildlife viewing, photography, mountain biking, horse back riding, cultural resource viewing, rock hounding, and geocaching are currently the most common recreational activities that take place within the planning area. Existing recreation sites are shown on Map 3-24 and Table 3-18.

**Table 3-18**
**YFO Recreation Site Descriptions**

| Recreation Site Descriptions | Fee | Restrooms | Trash Collection | Volunteer Host | Dump Station | Water | Telephone | Boat Launch |
|---|---|---|---|---|---|---|---|---|
| **Long Term Visitor Area** | | | | | | | | |
| Imperial Dam | X | X | X | X | X | X | X | |
| La Posa | X | X | X | X | X | X | X | |
| **14-day Camping Area** | | | | | | | | |
| A-10 Backwaters | | | | | | | | X |
| Dome Rock | | | | X | | | | |
| Ehrenberg Sandbowl Open OHV Management Area | X | X | X | | | | | |
| Fortuna Pond | | | | | | | | |
| Hi Jolly | | | | X | | | | |
| Oxbow Recreation and Wildlife Area | X | X | X | X | | | | X |
| Plomosa Road | | | | X | | | | |
| Road Runner | | | | X | | | | |
| Scaddan Wash | | | | X | | | | |
| Senator Wash North Shore Campground | X | X | | | | | | |
| Senator Wash South Shore Campground | X | | | X | | | | |
| Squaw Lake Campground and Boat Launch | X | X | X | X | | X | X | X |
| VFW Highway 95 | | | | X | | | | |
| **10-day Camping Area** | | | | | | | | |
| Mittry Lake Wildlife Area | | | | | | | | |

**Table 3-18**
**YFO Recreation Site Descriptions (cont.)**

| Recreation Site Descriptions | Fee | Restrooms | Trash Collection | Volunteer Host | Dump Station | Water | Telephone | Boat Launch |
|---|---|---|---|---|---|---|---|---|
| **Day Use Only** | | | | | | | | |
| A-7 Backwater Day Use Area | | | | | | | | X |
| Betty's Kitchen National Recreation Trail and Watchable Wildlife Viewing Area | X | X | X | | | | | |
| Bill Kerekes Boat Launch and Day Use Area | | X | X | | | | | X |
| Laguna Dam Primitive Boat Launch | | | | | | | | X |
| Senator Wash Boat Launch and Day Use Area | X | X | X | X | | | X | X |
| **Concession** | | | | | | | | |
| Hidden Shores RV Village | X | X | X | | | X | X | X |
| Walters Camp | X | X | X | | | X | X | X |

Three distinct groups of visitors recreate on BLM-administered lands within the planning area: (1) winter visitors who migrate to Arizona from the northern states from October to March; these visitors are generally retirees who camp in self-contained RV units, (2) families and groups from metropolitan centers in southern California and Phoenix; these visitors primarily come for water-based recreation activities on the lower Colorado River from May to September, and (3) local residents who regularly visit the public lands on weekday evenings and weekends; these visitors primarily come for hunting, fishing, camping, and trail-based recreation activities (USDOI BLM 1987b).

Visitor use patterns within the planning area are mainly seasonal. During the summer months, water-based weekend recreation on the Colorado River is the most common activity, and very few visitors recreate in the upland desert ecosystems for a significant period of time due to extreme summer heat. However, a considerable amount of OHV use occurs on lands adjacent to the river during the summer months. During the winter months, the river is relatively quiet and most recreation occurs within the upland desert ecosystems as visitors participate in camping, cultural resource viewing, hunting, rock hounding, and a wide variety of trail-based activities due to the favorable weather in this region.

Recreation management in the planning area comprises the following components: the Recreation Fee Programs, Recreation Concession Leases, Free Recreation Opportunities, and ROS. For additional information regarding routes (trails, roads, and driveable washes), see Section 3.14 Travel Management.

## 3.13.1 RECREATION FEE PROGRAMS

The BLM is authorized to collect two types of recreation-related revenues from the public, SRP fees and amenity recreation fees. Changes in the costs of fees and the locations where fees are collected are based on publicly reviewed YFO Recreation and Visitor Services Business Plans.

These plans are also reviewed by the Arizona Resource Advisory Council. The BLM is permitted to retain 100 percent of the collected recreation fees, and use them for the operation, maintenance, and improvement of recreation fee collection sites.

## A. SPECIAL RECREATION PERMIT PROGRAM

The YFO SRP program manages use of the public lands for commercial activities, organized group events, and individual use of special areas by the discretionary issuance of permits. The BLM SRP program also includes permitting competitive uses on the public lands; however, the public has not approached the YFO to permit such a use in several years. SRPs are issued with stipulations YFO specialists have determined appropriate to mitigate the potential impacts these uses may have on the other resources included in the BLM's multiple-use mission. Revenues generated from SRPs for commercial activities and organized group events are used to cover the costs to the Recreation and Visitor Services program for administrative and regulatory compliance documentation procedures necessary prior to authorization. Revenues generated from SRPs for individual use of special areas are used to cover standard operational costs and address identified capital improvement needs.

### 1. Commercial Activities

The BLM considers any activity on the public lands where a person, group, or organization attempts to make a profit, receive money, or where there is paid public advertising to seek participation a commercial activity. Commercial operators are required to pay a $90.00 annual fee and provide proof of insurance prior to conducting business on the public lands. Commonly permitted commercial activities within the YFO include RV supplies, services, and repairs and food concessionaires at popular river recreation areas.

### 2. Organized Group Events

The BLM issues SRPs for any activities on the public lands that are part of a structured, ordered, consolidated, or scheduled event for recreational purposes. If the purpose of an event is to generate revenue, then the YFO would issue a SRP for commercial activities on the public lands. In most cases, organized group events enable community groups to recreate together on their public lands and are not commercial in nature. Commonly permitted organized group events within the YFO include horseback rides for local equestrian clubs and Boy Scout campouts.

### 3. Individual Use of Special Areas

The BLM LTVA program was established in the YFO in 1983 to fulfill the needs of winter visitors and to protect local desert ecosystems from degradation due to intensive use. The YFO's two LTVAs are special areas established for management by the SRP program. Although many services and facilities are located in these areas, they primarily provide for resource protection, visitor safety, and regulatory compliance measures. The areas are not BLM campgrounds nor designed as developed recreation facilities.

SRPs purchased for the use of the LTVAs are honored throughout the BLM's LTVA program for the length of the permit's validity. The BLM El Centro and Palm Springs/South Coast Field Offices also maintain LTVAs. Between April 16 and September 14, the LTVAs become 14-day

camping areas. One contact station at each of the YFO's two LTVAs remains open year round to provide the public with information and assistance.

**a. Imperial Dam LTVA**

The 3,300-acre Imperial Dam LTVA is situated approximately 21 miles north of Yuma in Imperial County, California. The LTVA is located adjacent to the Senator Wash Reservoir. The Imperial Dam LTVA provides two universally accessible rest rooms, a water distribution site, a three-lane dump station with water, a dry dump station, a grey water dump site, trash disposal services, shade ramadas, three full hook-up sites for volunteer hosts and contractors, post and cable fencing, extensive signage, numerous unpaved roads, and pay phones. The increasing use of the LTVA creates a heavy demand on the existing facilities. The waste treatment facilities that serve this general area need to be upgraded to address environmental concerns and for legally mandated regulatory compliance.

**b. La Posa LTVA**

The 10,700-acre La Posa LTVA is located approximately two miles south of the Town of Quartzsite in La Paz County, Arizona. Facilities at the La Posa LTVA include a well water system, a water distribution site, a two-lane dump station with leach fields, a dry dump station, trash receptacles, 10 vault toilets, approximately three miles of post and cable fencing, shade ramadas, a concrete dance floor, and extensive signage. Other improvements include four block contact stations with power, four electrical hook-up sites for hosts, several pay phones, business phones located within each contact station, one major paved road, and numerous improved and unimproved roads which require routine maintenance.

## B. AMENITY RECREATION FEE PROGRAM

The FLREA, P.L. 108-447, authorizes the BLM to collect amenity recreation fees for the use of recreation areas that meet specified levels of development and facilities. If permitted, overnight camping at amenity recreation fee sites within the YFO are limited to 14 days within any 28-day period. The YFO collects amenity recreation fees at the seven following recreation areas:

### 1. Senator Wash Boat Ramp Day Use Area

The Senator Wash Boat Ramp Day Use Area provides the public with recreational access to Senator Wash Reservoir, located approximately 25 miles north of Yuma. The area offers the public with day use parking, a paved boat launch, a restroom with flush toilets and showers, garbage collection, pay phones, and a buoyed swimming area. Picnicking, swimming, fishing, boating, jet and water skiing, and wildlife viewing are the most common activities within the reservoir. The boat ramp also provides boat-in camping access to the Senator Wash North Shore and South Shore Campgrounds (USDOI BLM 2007a). Water levels within Senator Wash are controlled by Reclamation as part of the water control and delivery system of the lower Colorado River.

### 2. Senator Wash North Shore Campground

The winding northern shoreline along Senator Wash Reservoir provides access to several private campsites. The campground can be accessed by land from Ferguson Lake Road or by water from the Senator Wash Boat Ramp. Five universally accessible vault restrooms are maintained in the

campground. OHV use is also a common recreational activity on the public lands adjacent to the campground. The amenity recreation fee at North Shore also includes the use of the trash disposal facilities at the nearby Imperial Dam LTVA (USDOI BLM 2007a).

### 3. Senator Wash South Shore Campground

The wide, flat beach along Senator Wash Reservoir's southern shore provides ideal family camping opportunities. The campground can be accessed by land from the adjacent Imperial Dam LTVA or by water from the Senator Wash Boat Ramp. The amenity recreation fee at South Shore also includes the use of the trash disposal and restroom facilities within the LTVA (USDOI BLM 2007a).

### 4. Squaw Lake Campground and Day Use Area

The Squaw Lake Campground and Day Use Area is located on the southern side of Senator Wash Dam, and provides camping opportunities and boating access to the lower Colorado River. The area includes over 100 RV campsites and numerous areas for tent camping, four universally accessible restrooms with flush toilets, garbage collection, picnic areas with grills, two boat launches, boat trailer parking, two buoyed swimming areas, and pay phones. Hot water showers are also available within the restrooms for an additional fee. The most common recreational activities at Squaw Lake include camping, hiking, swimming, fishing, boating, and picnicking. A no wake zone encompasses Squaw Lake until it reaches the Colorado River (USDOI BLM 2007a).

### 5. Betty's Kitchen Watchable Wildlife Viewing Area and National Recreation Trail

This 10-acre day use area is located along the lower Colorado River approximately 15 miles north of Yuma. The area is situated just upstream of the Reclamation-operated Laguna Dam, which was the first dam on the Colorado River. Betty's Kitchen maintains dense assemblages of riparian vegetation, and past restoration projects have increased the vegetative diversity. The universally accessible trail was designated a NRT in 1993, and interpretive panels along the walk familiarize the visitor with the natural and cultural features of the area. Facilities at Betty's Kitchen include a day use parking area, shade ramada, picnic tables, grills, and a small outdoor classroom. Fishing, hiking, and wildlife viewing are the most common recreational activities (USDOI BLM 2007a).

### 6. Oxbow Recreation and Wildlife Area

The 420 acre Oxbow Recreation and Wildlife Area is located approximately 25 miles south of Blythe, California along the lower Colorado River and Oxbow Lake, an abandoned meander of the original river channel. The area was formally designated in 2005 with the finalization of the BLM's Oxbow Recreation and Wildlife Area Management Plan. The plan has earmarked approximately 150 acres for campground and day use development to meet the growing recreational demands along this stretch of the Colorado River. The other 270 acres of the area have been identified for a variety of riparian habitat restoration projects. The facilities at Oxbow include RV and tent campsites, two universally accessible vault restrooms, garbage collection, grills, picnic tables, one paved and one unpaved boat launch, and boat trailer parking. Camping, boating, fishing, and wildlife viewing are the most common recreational activities. Jet skiing, water skiing, and other fast paced boating activities occur within the Colorado River. Slower

paced boating activities, such as fishing, kayaking, and canoeing are more common within Oxbow Lake.

### 7. Ehrenberg Sandbowl Open OHV Management Area

Located approximately three miles south of Ehrenberg, Arizona, this 400 acre designated Open OHV Management Area provides exceptional OHV riding opportunities throughout its hilly and sandy terrain. The entrance to the Sandbowl area provides day use parking, a universally accessible vault restroom, OHV loading/unloading ramps, two shade ramadas, and picnic tables (USDOI BLM 2007a).

## 3.13.2 RECREATION CONCESSION LEASES

The BLM currently administers two recreation concession leases along the lower Colorado River. Concessions are generally authorized so that private enterprises can provide the public with a wider range of recreational opportunities that the BLM is not capable of managing. The maximum length of stay within concessions is limited to 150 days per year. Recreation concession leases within the planning area are authorized by FLPMA.

### A. HIDDEN SHORES RV VILLAGE

Hidden Shores RV Village is located on the eastern side of Imperial Dam in Yuma County, Arizona. Managed by the private sector, Hidden Shores RV Village primarily caters to visitors interested in water-based recreation activities on the lower Colorado River. Amenities provided by Hidden Shores RV Village include water and electric RV hookups, boat ramps, universally accessible showers and restrooms, carry-out and fuel sales, recreation center, golf course, and laundry facilities. Hidden Shores RV Village visitors also commonly ride OHVs on the BLM-administered lands adjacent to the concession.

### B. WALTERS CAMP

Walters Camp is located on the original Colorado River channel between the Cibola and Imperial NWRs in Imperial County, California. The 18-acre concession provides a boat ramp, carry-out, RV hookups, flush restrooms and showers, fuel sales, and tent camping sites.

## 3.13.3 OTHER RECREATION OPPORTUNITIES

A vast majority of the recreational opportunities within the planning area are available to the public for no cost. Several areas throughout the planning area have historically received high amounts of recreational use. Most of these free areas provide no type of recreational facilities, and visitors are expected to pack out what they pack in.

The YFO continuously monitors visitor use patterns and resource degradation in free 14-day campgrounds and other sites of high public use identified on Map 3-24. Monitoring data is used to determine if the installation of recreation facilities, such as restrooms, trash receptacles, and designated parking areas, are needed to address any existing public health and safety and

resource protection concerns. If recreation facilities are needed to address these types of concerns, the YFO would then consider if the area should be included in the BLM recreation fee program to cover the cost of facility maintenance. Potential changes in the recreation fee program are contingent upon the outcome of publicly reviewed NEPA documents and the YFO Recreation and Visitor Services Business Plan.

## A. 14-DAY CAMPING AREAS

Outside of recreation fee areas, designated day use only areas, and other areas closed to overnight camping, visitors may camp on the public lands free of charge for 14 days within any 28-day period, after which they must move to another location at least 25 miles away. There are several areas throughout the planning area that have historically received high amounts of winter visitor camping use and have been designated as free 14-day camping areas. No recreational facilities are provided within designated 14-day camping areas. BLM Volunteer Hosts are normally stationed within these areas during the winter visitor season to ensure that visitors comply with BLM camping regulations.

### 1. A-10 Backwaters

The A-10 Backwaters are located between Colorado River Miles 113.7 and 115.1 in La Paz County, Arizona just south of Ehrenberg. The backwaters provide camping, kayaking, and on-shore fishing opportunities. The site does not provide a maintained boat launch, however, limited backwater boating access is available through the site's gradual slopes into the water.

### 2. Fortuna Pond

Fortuna Pond is located in Yuma County, Arizona, approximately one mile north of Highway 95 and three miles east of Avenue 7E. Fortuna Pond is cooperatively managed with the AGFD and Reclamation, who stock the pond with fish and control the pond's water level, respectively. Further information on Fortuna Pond can be found in the Coordinated Management Area sections of this document.

### 3. Quartzsite 14-day Camping Areas

The 1997 La Posa Interdisciplinary Management Plan designated five 14-day camping areas on the public lands surrounding the Town of Quartzsite, Arizona. The Dome Rock, Road Runner, Hi Jolly, Plomosa Road, and Scaddan Wash camping areas collectively provide over 5,500 acres of free overnight camping opportunities in the area. Due to the large numbers of winter visitors who annually visit the Town of Quartzsite, approximately 106,000 acres of public land outside of the La Posa LTVA and the 14-day camping areas have been closed to overnight camping for resource protection purposes.

### 4. VFW Highway 95 Camping Area

This 14-day camping area is located approximately 13 miles northeast of Yuma, directly adjacent to both Highway 95 and the Veterans of Foreign War (VFW) post. The flat topography of the area is conducive to RV camping, and the camping area's proximity to both Highway 95 and the VFW make it particularly popular with winter visitors.

## B. 10-DAY CAMPING AREA

The Mittry Lake Wildlife Area includes over 600 acres of surface water and over 2,400 acres of marsh and upland habitat. Camping regulations within this area are unique to the planning area, in that overnight camping is limited to 10 days per calendar year for wildlife protection purposes. While much of the land is available for camping, overnight use is normally concentrated along the fishing jetties located on the lake's southwestern shore, and along the Gila Gravity Main Canal to the south. The Mittry Lake Wildlife Area is cooperatively managed with the AGFD and Reclamation, and further information on these lands can be found in Section 3.17 Coordinated Management Areas.

## C. DAY USE ONLY AREAS

There are several heavily used free areas where the YFO has prohibited overnight camping. These free day use only areas are presented below.

### 1. A-7 Backwater

The A-7 Backwaters are located between Colorado River Miles 118.7 and 120.6 in La Paz County, Arizona just south of Ehrenberg. The BLM designated approximately 200 acres of land surrounding the waters as day use only in 1989 to reduce potential impacts to riparian vegetation and wildlife. The site is accessed from the Ehrenberg-Cibola Levee Road, and provides backwater and river boating access through an unpaved boat launch.

### 2. Bill Kerekes Day Use Area and Boat Launch

The Bill Kerekes Day Use Area and Boat Launch are located within the Mittry Lake Wildlife Area in Yuma County, Arizona. This area provides the public with a paved boat launch, designated boat trailer parking, restrooms, barbeque grills, and a universally accessible fishing dock and shade ramada. These facilities, which are available for public use free of charge, have been installed through substantial donations from local community residents and are cooperatively managed with the AGFD.

### 3. Laguna Dam Primitive Boat Launch

Located approximately 15 miles north of Yuma, this unpaved launch provides boating access to the original Colorado River channel just upstream from Laguna Dam. The site is popular with local fishermen and provides limited boat trailer parking with no developed facilities.

## D. OTHER FREE RECREATION OPPORTUNITIES

There is no cost associated with a wide variety of recreational trail use opportunities, such as hiking, mountain biking, horseback riding, and OHV riding on BLM-administered lands in the planning area. The YFO also does not collect fees for other dispersed recreation activities, such as rock hounding, geocaching, and cultural resource viewing.

Hunting and fishing permits within the planning area are regulated by the AGFD and the CDFG, accordingly. The BLM does not generally charge fees associated with hunting and fishing on the

public lands, unless the visitors are using commercial guides for these activities.

## 3.13.4 RECREATION OPPORTUNITY SPECTRUM INVENTORY

The purpose of the ROS Inventory is to catalog the different types of recreation opportunities currently available within the planning area, and categorize them into six types of ROS Classes ranging from Urban to Primitive. A YFO-specific ROS Inventory was completed in 2005 through a multi-agency, interdisciplinary team process. ROS Inventory Classes were based on professional determinations of nine different physical, social, and administrative attributes of the public lands. The results of the ROS Inventory are shown on Map 3-25. The ROS Inventory also provides the basis for the prescribed recreation settings proposed in Chapter 2. The six types of ROS Classes are defined as follows:

### A. URBAN RECREATION SETTING

The urban recreation setting provides very limited opportunities to see, hear, and smell the natural resources because of the extensive level of development, human activity, and natural resource modification. Watching and meeting other visitors is expected and desired; large group activities are popular; opportunity to briefly relieve stress and to alter everyday routines is important; socializing with family and friends is important; large groups and families are common; a high sense of safety, security, comfort, and convenience is central and dominant; the mix of recreation activities may be diverse, ranging from those of relaxation and contemplation to those of physical exertion, thrills, excitement and challenge. The setting is often attractive to short-term visitors, tours, and school groups; it may serve as a staging area for visitors traveling on to areas with non-urban recreation settings.

### B. SUBURBAN RECREATION SETTING

The suburban recreation setting provides limited or little opportunity to see, hear, or smell the natural resources because of the widespread and very prevalent level of development, human activity, or natural resource modification; watching and meeting other visitors is expected and desired; opportunity to briefly relieve stress and to alter everyday routine is important; families are common; a high sense of safety, security, comfort, and convenience is central and dominant; the mix of recreation activities may be diverse, ranging from relaxation and contemplation to physical exertion, thrills, excitement, and challenge; learning about the natural and cultural history of the area is important to some; area is popular with local residents or long-term winter visitors.

### C. RURAL DEVELOPED RECREATION SETTING

The rural developed recreation setting provides occasional or periodic opportunities to see, hear, or smell the natural resources because of the common and frequent level of development, human activity, or natural resource modification; opportunity to experience brief periods of solitude and change from everyday sights and sounds is important; socialization within and outside one’s

group is typical and the presence of other visitors is expected; opportunity to relieve stress and to alter everyday routines is important; a moderate level of comfort and convenience is important; a sense of safety and security is important; the array of recreation activities may be diverse, ranging from relaxation and contemplation to physical exertion and challenge; area is typically attractive for day-use and weekend visits from regional metropolitan areas and smaller nearby communities.

## D. RURAL NATURAL RECREATION SETTING

The rural natural recreation setting provides prevalent opportunities to see, hear, or smell the natural resources because development, human activity, and natural resource modifications are occasional and infrequent; socialization with others is expected and tolerated; opportunity to relieve stress and to get away from built environment is important; a high sense of safety, security, comfort and convenience is not important nor expected; a sense of independence and freedom with a moderate level of management presence is important; moments of solitude, tranquility, and nature appreciation are important; experiences tend to be more resource-dependent, although may be diverse, ranging from relaxation and contemplation to socialization, to physical exertion and challenge; area is typically attractive to extended weekend visitors using recreation vehicles, tents, or rustic cabins.

## E. SEMI-PRIMITIVE RECREATION SETTING

The semi-primitive recreation setting provides widespread and very prevalent opportunities to see, hear, or smell the natural resources because development, human activity, and natural resource modifications are seldom encountered; opportunity to experience a natural ecosystem with little human imprint is important; a sense of challenge, adventure, risk, and self-reliance is important; solitude and lack of contact with other visitors, managers, and facilities is important; the recreation experiences tend to be more resource-based; a sense of independence, freedom, tranquility, relaxation, nature appreciation and wonderment, testing skills, and stewardship is typical; area provides opportunities for the more adventure-based enthusiasts. Overnight visits are typically car and tent camping far from modern conveniences and facilities. Knowledge of desert survival skills is critical to visitor safety. Topography, an absence of existing roads, or resource protection measures may limit motorized access.

## F. PRIMITIVE RECREATION SETTING

The primitive recreation setting provides extensive opportunities to see, hear, or smell the natural resources because development, human activity, and natural resource modifications are rare; opportunity to experience natural ecosystems with very little and no apparent human imprint is paramount; natural views, sounds, and smells dominate; a sense of solitude, tranquility, challenge, adventure, risk, orienteering, and self-reliance is important; a sense of freedom, tranquility, humility, relaxation, nature appreciation, wonderment, and stewardship is central and dominant; overnight visitors tent camp with no modern facilities; adventure travelers are often attracted to the undisturbed wild settings.

# 3.14 TRAVEL MANAGEMENT

BLM-administered lands are adjacent to several rapidly growing communities within the planning area. As the demand for multiple-resource uses continues to grow, the YFO is challenged to provide a comprehensive transportation system that meets user needs and remains sustainable with the resource base.

## 3.14.1 ROADS

Roads within the planning area provide essential access to private property, mining activities, agricultural fields, and recreational opportunities. These roads can be broadly categorized into two types, primary transportation routes and recreational routes.

### A. PRIMARY TRANSPORTATION ROUTES

Components of the National Highway System pass through the planning area. Interstate 10 and Interstate 8 both cross in an east–west direction, and Highway 95 runs north–south. Various other Arizona and California State highways and county roads provide a comprehensive transportation system linking the communities within the planning area. The YFO also authorizes the construction and maintenance of roads across BLM lands by issuing ROWs. ROWs are typically issued when roads are needed to provide access to private property, mining and mineral materials activities, and utilities.

### B. RECREATIONAL ROUTES

The recreational routes on BLM-administered lands are primarily low-standard, unpaved roads. The conditions of recreational routes are dependent upon the levels of use, weathering, susceptibility of erosion, and age. The YFO does not actively maintain a vast majority of these routes, and public use normally requires the use of high clearance and/or four-wheel drive vehicles. The YFO maintains many of the routes which provide access into the recreation fee areas. These routes are maintained with improved surfaces that can withstand the heavier amounts of vehicle traffic. The BLM inventories route maintenance needs in a database called the Facility Assessment Management System.

The YFO has used a variety of data sources to compile the inventory of recreational routes on BLM-administered lands within the planning area. The Proposed Route Inventory includes approximately 4,600 miles of recreational routes (including drivable washes) and linear features miles, and is represented on Map 3-26. A closer examination of these routes and linear features miles can be found in large format on Maps TMA-1, TMA-2, TMA-3, TMA-4, and TMA-5.

## 3.14.2 OHV MANAGEMENT AREA DESIGNATIONS

The CFR and the BLM *Land Use Planning Handbook* require that all BLM-administered lands within the planning area are designated as Open, Closed, or Limited to OHV use. The existing designations for OHV use are described below (see Map 2-9c).

## A. OPEN OHV MANAGEMENT AREAS

Visitors may operate any type of motorized vehicles at all times, anywhere within Open OHV Management Areas. The YFO currently maintains one Open OHV Management Area at the Ehrenberg Sandbowl, which is approximately 400 acres.

## B. CLOSED OHV MANAGEMENT AREAS

Motorized vehicle travel is prohibited within Closed OHV Management Areas. Only the YFO Field Manager can authorize motorized travel within these designated areas for administrative and emergency purposes. The YFO currently maintains approximately 169,000 acres of Closed OHV Management Areas, 167,800 acres of which are statutorily closed through their designation as Wilderness. Approximately 1,000 acres in the La Paz Valley near the Town of Quartzsite and 100 acres east of Yuma (Fortuna Wash) have been closed to motorized travel for several years to reduce impacts from OHV use to adjacent community residents. In addition, 100 acres have been temporarily closed to OHV use in the North Bank Milipitas Wash area (see additional information below in Section 3.14.3 A.3).

## C. LIMITED OHV MANAGEMENT AREAS

Motorized travel is currently limited to existing roads, trails, and drivable washes within approximately 1,148,600 acres of BLM-administered lands within the planning area.

# 3.14.3 PUBLIC ACCESS

Public access within the planning area is managed by the BLM, Federal, other State, Tribal agencies, and private property owners.

## A. BLM ADMINISTRATIVE RESTRICTIONS

The BLM has placed administrative restrictions for public health and safety and resource protection purposes, which limit the type of public access and uses allowed on specific public lands.

### 1. Fortuna Pond Restriction

The YFO has prohibited overnight camping and parking within a 50-foot wide zone along the southern shore of Fortuna Pond in Yuma County, Arizona. These restrictions were implemented to reduce shoreline erosion and impacts to riparian vegetation.

### 2. Quartzsite Area Restrictions

The 1997 La Posa Interdisciplinary Management Plan prohibited overnight camping and firewood collection within 115,200 acres of BLM-administered lands surrounding the Town of Quartzsite, Arizona. The overnight camping restriction was implemented in order to consolidate impacts from winter visitor camping use into the La Posa LTVA and five free 14-day

campgrounds. The firewood collection restriction was implemented because such use of the public lands was not sustainable when such large numbers of visitors were coming to the area each winter.

### 3. North Bank Milpitas Wash Restriction

The YFO has temporarily restricted OHV use within 100 acres of public land in Imperial County, California. This restriction was implemented so that the YFO can assess the resource values of these lands that were recently transferred to the BLM's jurisdiction from the Cibola NWR under P.L. 109-127. The OHV Management Area designation proposed in this RMP would supersede the restriction for this area.

## B. PUBLIC ACCESS ON NON-BLM LANDS WITHIN THE PLANNING AREA

### 1. Military Lands

Two large military installations limit public access to a significant amount of land within the planning area. YPG restricts public access to main traveled roads, and the BMGR Air Force Range provides public access by permit only.

### 2. USFWS Lands

The USFWS manages public access within the planning area's three NWRs independent of BLM transportation management decisions. Motorized travel within the Imperial, Cibola, and Kofa NWRs are limited to designated roads and trails. BLM-administered lands in the planning area also provide access into the Cabeza Prieta NWR, which allows public access by permit only.

### 3. Reclamation Lands

The BLM co-manages Reclamation acquired and withdrawn lands along the lower Colorado River. Reclamation is responsible for managing public access on the river levee roads. Use of these levee roads is prohibited unless specifically designated as open to the public by Reclamation. Reclamation also manages public access within identified Security Zones surrounding the various dams on the lower Colorado River.

### 4. Arizona State Trust Lands

State Trust Lands are dispersed throughout the planning area. The Arizona State Land Department provides a State Land Recreational Permit for individuals or families or groups for visitors wishing to recreate on these lands. The permit is designed to allow use of State Trust Lands for non-consumptive and environmentally compatible recreational activities.

### 5. Tribal Lands

Public access into the Native American Tribal reservations within the planning area is managed by the individual tribes, which generally require a permit prior to entry for recreational purposes.

### 6. Private Property

The BLM does not authorize public access to private property for recreational purposes. Individuals seeking access to their private property may apply for a ROW grant to obtain legal access.

# 3.15 LANDS AND REALTY

## 3.15.1 LANDS AND REALTY MANAGEMENT

YFO maintains an active lands program that oversees ROW authorizations for major ROW Corridors connecting energy-rich states (Texas and New Mexico) through Arizona to California. The planning area has no lands and realty management responsibility over Tribal lands.

Land use designations are ROW Corridors and communication sites. Land use designations may overlap the same area. In such situations, potential conflicts between uses and desired resource conditions are resolved through management decisions or prescriptions.

Examples of land use authorizations include leases, permits, easements, and ROWs. Land use authorizations are evaluated by analyzing current and desired future resource conditions and designations on a case-by-case basis. Land for lease or patent according to the R&PP Act would be considered to meet the needs of local communities and government entities. All land use authorizations are discretionary actions and may be subject to rent and bonding as determined by BLM using sound business management principles in accordance with existing regulations.

Land tenure adjustments are discretionary and may involve surface and/or subsurface estates to obtain an optimum land ownership pattern. BLM would consider resolving split-estate issues where practicable. Public lands would be retained in Federal ownership, unless specifically identified for disposal in the RMP or by a subsequent amendment. Additional lands may be identified for disposal to accommodate such actions as land exchanges with the State, or special legislation that calls for the disposal of Federal lands, but would not be limited to these specific actions. Land to be considered for disposal and/or acquisition would be evaluated on a case-by-case basis according to appropriate laws and regulations. Public lands that are within priority wildlife habitat and special management areas, designated as Wilderness, or otherwise classified or withdrawn from disposal would be retained in Federal ownership (USDOI BLM 1987a). Lands would be considered for acquisition to meet BLM's mission. Lands may be acquired through purchase, donation, exchange, or eminent domain. The land exchange program both disposes and acquires lands and/or interests in lands.

# 3.15.2 LAND USE AUTHORIZATIONS

## A. WITHDRAWAL

Federal agency withdrawals within the planning area include but are not limited to Reclamation, USFWS, Department of the Navy, Department of the Air Force, and Department of the Army (see Appendix 2-G for complete list).

In the 1992 *Yuma District RMP Amendment*, the La Posa LTVA was proposed to be withdrawn from entry under the mining laws for recreational purposes (long-term camping). Approximately 11,400 acres would be withdrawn. This proposed withdrawal has not been completed and would require congressional approval because it exceeds 5,000 acres.

The Gila River Cultural Area ACEC, known as Sears Point (3,600 acres), and all the Wilderness Areas (167,800 acres) have been withdrawn from the general land laws and entry under the mining laws (Map 2-12a).

## B. LEASES/PERMITS/EASEMENTS

Under the 43 CFR 2900 regulations, the three primary types of authorizations are leases, permits, and easements. Leases are generally for longer term and substantial development, and can convey possessory interest. Permits are normally for a maximum of three years and involve minimal development. Easements are non-possessory, non-exclusive interest in lands and are rarely authorized.

Leases, permits, or easements may be offered on a competitive basis if a competitive basis exists. These types of authorizations may be offered on a negotiated non-competitive basis where determined by the authorized officer. In the planning area, the primary types of leases authorized are agricultural, residential, and concession.

### 1. Agricultural Leases

BLM authorizes agricultural uses under the authority of FLPMA on certain public lands within the planning area. Currently, all agricultural leases are along or near the Colorado River. On Reclamation withdrawn lands, the lease allows for termination, cancellation, or revocation of the lease if the lands are needed for the use by Reclamation for reclamation purposes.

### 2. Residential Leases

The existing residential leases were issued to resolve unauthorized occupancy on public land.

### 3. Concession Leases

Concession leases entail the investment of large amounts of capital which would be amortized over time. Proposals for concession leases are driven by recreational needs. For additional information on concession leases, see Section 3.13.3 Recreation Concession Leases.

### 4. R&PP Leases

BLM considers R&PP lease applications for community expansion proposals from government agencies or nonprofit corporations and associations for such uses as airports, parks, hospitals, government facilities, etc. Authorization of an R&PP lease requires development in accordance with the approved lease and plan of development. Upon completion of substantial development of existing R&PP leases, the lessee may apply for patent to the public lands. In cases where an R&PP application is for the purpose of solid waste disposal or for any other purpose that may include the disposal, placement, or release of any hazardous substance, such as shooting ranges and wastewater treatment facilities, the lands go directly to patent if approved. The primary types of permits authorized in the planning area are as follows:

### 5. Film/Still Photography Permit

Commercial filming activity on Federal lands requires authorization and collection of appropriate fees based on days of filming, size of film crew, and type of equipment. Film permits are not issued if there is a likelihood of resource damage.

### 6. Apiary Permit

An apiary permit is a bee colony use site primarily for assisting in the pollination of agricultural crops. An additional benefit is the production of honey. All apiary permits must be located at a safe distance from residential areas and within close proximity to water. All permittees must monitor for Africanized bees.

### 7. Mineral Material Processing Plant Permit

These permits are associated with mineral material contracts which only allow for the extraction of mineral materials. Contractors often need land adjacent to their contracts for the processing and storage of mineral material.

### 8. Easements

In accordance with 43 CFR 2900, easements may be issued if determined to be the appropriate authorization. No easements have been issued for access across public lands within the planning area.

## C. RIGHTS-OF-WAY

User-initiated proposals or applications generate most of the present ROW activity. Inquiries and proposals are received from Federal, State and local governments, and from private individuals and companies interested in acquiring access across or locating facilities on public land. BLM considers proposals on a case-by-case basis and in accordance with decisions established in the existing RMP (USDOI BLM 1987a).

ROWs are evaluated on a case-by-case basis. Public lands would generally be available for ROWs subject to NEPA evaluation, except where specifically prohibited by law or regulation or in areas specifically identified for avoidance and/or exclusion to protect significant resource values.

## 1. Right-of-Way Corridors

There are four existing major ROW Corridors with one-mile widths in the current planning area boundaries (Map 2-13a), which are designed and located to facilitate linear ROWs (primarily natural gas pipelines and transmission lines). These ROW Corridors are:

- Interstate 10,
- El Paso Natural Gas,
- Palo Verde-Devers, and
- San Diego Gas & Electric Interconnection.

New major ROWs are located in designated corridors, unless an evaluation for the proposed project shows the location outside of the corridor is the most practicable alternative and/or causes the least impacts to the environment (USDOI BLM 1987a). All existing or proposed new corridors are required to be designated in the RMP or through an RMP amendment. ROW Corridor designations in the YFO need to meet the needs identified in the *Draft West-wide Energy Corridor Programmatic EIS* and be consistent with the 1992 *Western Utility Group's Western Regional Corridor Study*. Established corridors in the planning area are required to align with adjacent BLM field office corridors.

## 2. Communications Sites

Communications sites are generally limited by BLM to designated areas, usually mountain peaks, with existing facilities. Emphasis is placed on consolidating single facility sites into more efficient communications facilities through site management plans. There are 11 existing communications sites in the planning area, six designated (Airway Beacon, Big Maria, Cunningham, Mohawk, Stone Cabin, and Telegraph) and five undesignated (Block Rock Hill, Guadalupe, Palo Verde Gap, Qwest, and Salome) (Map 3-27). YFO does not currently have a designated high-power communications site.

## 3. Renewable Energy (Solar and Wind)

Federal energy resources in the planning area are currently managed by YFO according to existing RMPs and *Management Framework Plans*. Since the existing *Management Framework Plans* and RMPs were developed, numerous changes in the environment, regulations, and policies have occurred that require reconsideration of certain management decisions. The potential for renewable energy in the planning area is based on environmental, physical, and economic criteria, in conjunction with policy directives.

Renewable energy sources, such as solar and wind power, are evaluated and discussed in terms of the ROW authorization that may be obtained to construct collection facilities on public land. There is the associated recognition of ROW authorizations needed for transmission lines as part of renewable energy development.

### a. Solar Energy

Currently, there are no existing solar energy authorizations in the planning area. A solar energy prospective area refers to a solar energy resource area characterized by the amount of

solar radiation collectable by the types of collectors used. The entire planning area is considered a solar energy resource area (USDOE 2001, 2003).

A recent report prepared by the USDOE (USDOE 2003), in cooperation with the BLM, identified the planning area as having a large total land area with a high-potential for concentrating solar power and/or photovoltaic sites. Solar energy is a renewable energy resource that has excellent potential for generating electricity in Yuma and La Paz counties. Installation of solar energy facilities on public lands requires a ROW grant. Commercial electric generating facilities must comply with BLM's planning, environmental, and current ROW application requirements. If sufficient interest is recognized for a specific area, then competitive bidding is required for a ROW. BLM's general policy is to facilitate environmentally responsible commercial development of solar energy projects on public lands and use solar energy systems on BLM facilities where feasible. Laws and regulations applicable to solar arrays on public lands in the planning area include, but are not limited to, FLPMA and 43 CFR 2800.

Some types of solar energy facilities would require relatively flat land with slopes not exceeding three percent to accommodate the solar collectors, access to available water, and proximity to electric transmission facilities. The area of land required would depend on the type of plant, but is about five acres per produced megawatt. It is anticipated that a commercial scale concentrating solar power facility may be in the range of 100 megawatt or larger and may require in excess of 500 acres.

The annual average solar insolation throughout the planning area is relatively uniform at 6,100 to 7,000 Wh/m2/day (Energy Atlas 2005). Commercial solar generating stations have been constructed and operated in Arizona and other states, particularly in desert locations. Existing solar array technology can place approximately 125 to 150 kilowatts of photovoltaic cells per acre. Such an array would generate 250 to 300 megawatt-hours of electricity per year (Arizona Public Service 2002).

**b. Wind**

Wind energy is a renewable energy resource that has excellent potential for generating electricity. The BLM Wind Energy Programmatic EIS (USDOI BLM 2005b) determined which areas have high, medium, or low potential for wind energy development based on the typical wind speed measured at a location or area. The wind power classification used in the EIS had seven wind classes based on the wind power density at a height of 50 meters, measured in watts per square meter ($W/m^2$) (Table 3-19). Wind power is considered economic for large turbines (commercial utilities-scale) at Class 3 and higher, although a small non-commercial turbine can be used at Class 1.

Currently, there are no commercial wind generating facilities operating in Arizona. Identified prospects are north of the planning area and in northeastern Arizona (AZCENTRAL 2005). No potential commercial developments have been identified for the planning area. Small non-commercial wind projects where the power is used locally may be located anywhere. Wind power is often used to pump water for farming or grazing.

**Table 3-19**
**Wind Power Classification/Energy Development Potential**

| Wind Power Class | Energy Development Potential | Wind Power Density (W/m²) at 164 ft (50 m) above Ground Level | Wind Speed* (mph) at 164 ft (50 m) above Ground Level |
|---|---|---|---|
| 1 | Poor | 0–200 | 0.0–12.5 |
| 2 | Marginal | 200–300 | 12.5–14.3 |
| 3 | Moderate | 300–400 | 14.3–15.7 |
| 4 | Good | 400–500 | 15.7–16.8 |
| 5 | Excellent | 500–600 | 16.8–17.9 |
| 6 | Excellent | 600–800 | 17.9–19.7 |
| 7 | Excellent | >800 | >19.7 |

*Mean wind speed is estimated by assuming a sea level elevation and a Weibull distribution of wind speeds with a shape factor (k) of 2.0. The actual mean wind speed may differ from the estimated values shown here by as much as 20%, depending on the actual wind speed distribution (or Weibull k value) and elevation above sea level.

There are four small areas of high potential for wind energy development in the planning area:

- Dome Rock Mountains southwest of the Town of Quartzsite just north of YPG,
- Red Cloud Mine area between the Trigo Mountains Wilderness Area and YPG,
- Telegraph Pass in the Gila Mountains east of Yuma, and
- Little Horn Mountains in northeastern Yuma County.

These areas are surrounded by slightly larger areas of medium potential for wind energy development. In addition, there are numerous isolated spots of medium potential for development along Highway 95 from Yuma to the northern border of the planning area and near the paths of the east-west high voltage transmission lines.

A wind energy prospective area refers to a wind energy resource area as characterized by the wind power energy resource levels described above. Areas of medium or high potential are considered usable for generating wind power with large turbines (USDOI BLM 2005b). Based on the non-industrial use of small turbines to generate electricity, the entire planning area is considered a wind resource area. Based on the industrial use of large turbines to generate electricity, there are two wind energy resource areas in the planning area close to existing transmission lines:

- Dome Rock Mountains southwest of the Town of Quartzsite just north of YPG, and
- Telegraph Pass in the Gila Mountains east of Yuma.

Laws and regulations applicable to wind farms on public lands in the planning area include FLPMA and 43 CFR 2800. Wind energy site testing, monitoring, and development on BLM-administered public land is authorized by application for a ROW authorization at the appropriate BLM Field Office. If sufficient interest is recognized for a specific area, then competitive bidding may be required for a ROW authorization. At this time, there are no monitoring sites, commercial operations, or permitting activity authorized in the planning area.

## D. TRESPASS

The primary type of trespass within the planning area is illegal dumping. Other types of trespass present are activities which could potentially be approved by land use authorizations (e.g., roads, utility lines, agricultural). Trespass resolution includes, but is not limited to, termination, issuance of the appropriate authorization for the unauthorized activity, or litigation. There are several pending trespass cases and resolution would be subject to availability of resources, including personnel and funding. Trespass cases are resolved in accordance with BLM's laws, regulations, and policies.

# 3.15.3 LAND TENURE

## A. CLASSIFICATION

All public lands within the planning area were classified under the Taylor Grazing Act and continue to be classified unless reclassified for specific purposes including but not limited to R&PP lease/patent and FLPMA Sec. 203 sales.B. DisposalAll land disposal actions are discretionary with emphasis on serving the public interest. Disposal of Reclamation-withdrawn/acquired lands requires Reclamation approval. Sales are currently considered more efficient. Sales are primarily competitive or modified-competitive. Disposal of lands are made on a case-by-case basis and are accomplished by the most appropriate disposal authority (Map 2-13a). Approximately 3,300 acres have been disposed of through actions implemented under the existing RMP.

BLM policy is to not dispose of lands occupied by listed or proposed threatened or endangered species. When public uses outweigh the value of a parcel as federally owned threatened or endangered species habitat, disposal is considered on a case-by-case basis. In this instance, consultation or conferencing with USFWS under Section 7 of the ESA is required. Exchange for other parcels of habitat is encouraged. Compensation for loss of habitat value is required where a compensation policy exists. Their mitigation measures may also be required (USDOI BLM 1987a).

BLM determines the presence or absence of lands available for Desert Land Entries in the planning area, including Native American allotments. There are none present at this time, although requests have been received from individuals to establish them. They are generally not viable because of lack of adequate water sources.

## C. ACQUISITION

Land acquisitions are considered on a case-by-case basis through exchange, purchase, donation, or eminent domain (USDOI BLM 1996a). Acquisition of easements, for purposes such as access or conservation, is also considered on a case-by-case basis. Since implementation of the current RMP, the YFO has acquired approximately 15,600 acres consisting of approximately 4,100 acres of subsurface estate only and 11,500 acres of both surface and subsurface estate. Decisions to acquire lands would be based on public benefits, management considerations, and public access

needs. Specific actions to implement RMP land acquisition decisions consider public participation as deemed necessary. Acquisition of in-holdings from willing sellers within ACECs and Wilderness has been a priority. Currently, there are pending acquisition projects using Land and Water Conservation Funds within the Gila River Cultural Area ACEC.

### D. EXCHANGE

Land exchanges include both the disposal of public lands and acquisition of non-Federal lands. Exchange is the preferred method of land tenure adjustment. The Federal and non-Federal lands involved in an exchange must be of equal value or an equalization payment of not more than 25 percent may be required.

## 3.16 SPECIAL DESIGNATIONS

Existing special designations within the planning area include one NRT and eight congressionally designated Wilderness Areas, two ACECs, and one NHT. Other BLM-supported special designations which currently do not exist within the planning area include Wilderness Study Areas, National Scenic Byways, National Back Country Byways, National Scenic Trails, and Wild and Scenic Rivers (Map 2-1a).

### 3.16.1 NATIONAL LANDSCAPE CONSERVATION SYSTEM

In June 2000, the BLM responded to growing concern over the loss of open space by creating the NLCS. The NLCS brings into a single system some of the BLM's premier designations. By putting these lands into an organized system, the BLM hopes to increase public awareness of these areas' scientific, cultural, educational, ecological, and other values. Inclusion in the NLCS does not create any new legal protections for these lands, but it does provide field offices with overall guidance and direction for management of the system. Components of the NLCS include National Conservation Areas, National Monuments, Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, and National Historic and Scenic Trails. Wilderness Areas and a National Historic Trail are the only components of the NLCS present within the YFO planning area.

#### A. WILDERNESS

The BLM manages four Wilderness Areas in Arizona, and portions of four Wilderness Areas in California (Table 3-20). Wilderness is designated by Congress and is managed according to the Wilderness Act of 1964, the Arizona Desert Wilderness Act of 1990, the California Desert Protection Act of 1994, regulations for wilderness management at 43 CFR 6300, BLM *Manuals* 8560 and 8561, BLM *Handbook* H-8560-1, and Wilderness management plans.

Management plans have been written for Wilderness within Arizona; these are the Eagletail Mountains, Muggins Mountains, and New Water Mountains (jointly developed with Kofa

NWR). Decisions are currently being implemented in the three Wilderness Areas with finalized management plans. Management plans have not yet been completed for the Trigo Mountains Wilderness or the four California Wilderness Areas, which are currently managed according to 43 CFR 6300, BLM *Manual* 8560, BLM *Handbook* H-8560-1, and other applicable guidance. For the four California Wildernesses, management plans will be developed in coordination with the BLM California Desert District.

**Table 3-20**
**Wilderness Areas Managed by YFO in the Planning Area**

| Wilderness Area | YFO Managed Acres | Total Wilderness Acres |
|---|---|---|
| **Arizona** | | |
| Eagletail Mountains | 98,600 | 98,600 |
| Muggins Mountains | 7,700 | 7,700 |
| New Water Mountains | 24,700 | 24,700 |
| Trigo Mountains | 30,400 | 30,400 |
| **California** | | |
| Big Maria Mountains | 1,600 | 47,600 |
| Little Picacho | 2,900 | 33,600 |
| Palo Verde Mountains | 800 | 32,300 |
| Riverside Mountains | 1,100 | 22,400 |
| Total Wilderness | 167,800 | 295,300 |

## 1. Eagletail Mountains Wilderness

The Eagletail Mountains Wilderness is about 65 miles west of Phoenix in Maricopa, Yuma, and La Paz counties and is 98,600 acres. The Wilderness includes 15 miles of the Eagletail Mountains ridgeline and Courthouse Rock to the north, Cemetery Ridge to the south, and a large desert plain area between the two ridgelines. Several different rock strata are visible in most places, with natural arches, high spires, monoliths, jagged sawtooth ridges, and numerous washes six to eight miles long. Recreation such as extended horseback riding and backpacking trips, sightseeing, photography, rock climbing, and day hiking are enhanced by the topographic diversity, scenic character, size, as well as the botanical, wildlife, and cultural values of the area. This Wilderness is managed according to the 1995 Eagletail Mountains Wilderness Management Plan.

## 2. Muggins Mountains Wilderness

The Muggins Mountains Wilderness is located approximately 25 miles east of Yuma and is 7,700 acres. The Wilderness includes a cluster of rugged peaks at the western end of the Muggins Mountains, the most prominent being Muggins Peak, Klothos Temple, and Long Mountain. Twin Tanks Wash, Long Mountain Wash, Morgan Wash, and other deeply cut drainages dissect the peaks. The rugged landform and colorful geologic strata of the Muggins Mountains are considered exceptionally scenic for the region. Recreation such as backpacking, day hiking, sightseeing, photography, and rock climbing are enhanced by the topography and scenic character, as well as botanical, wildlife, and cultural values. This Wilderness is managed according to the 1994 Muggins Mountains Wilderness Management Plan.

### 3. New Water Mountains Wilderness

The rugged New Water Mountains Wilderness, 24,700 acres, is 10 miles east of the Town of Quartzsite, Arizona and approximately four miles south of I-10. This area is characterized by strings of craggy spires, sheer rock outcrops, natural arches, slickrock canyons, and deep sandy washes. Vegetation is sparse with saguaro, creosote, ocotillo, and cholla dotting the hills and paloverde and ironwood lining the washes. The Wilderness is important desert bighorn sheep habitat. The Wilderness offers many types of primitive and unconfined recreation opportunities, such as extended backpacking and hiking trips, day hikes, wildlife viewing, hunting, rock hounding, and landscape photography. This Wilderness is located adjacent to the Kofa NWR, and both are managed according to the 1997 Kofa NWR and *Wilderness and New Water Mountains Wilderness Interagency Management Plan*.

### 4. Trigo Mountains Wilderness

The Trigo Mountains Wilderness is located about 25 miles north of Yuma, in La Paz County and is 30,400-acres. The Wilderness is characterized by sawtooth ridges and steep-sided canyons and is heavily dissected by washes. Recreation such as extended horseback riding and backpacking trips, sightseeing, hiking, and rock climbing are enhanced by the topographic diversity, scenic character, as well as botanical, wildlife, and cultural values. The *Trigo Mountains Wilderness Management Plan* is still being developed, and the Wilderness is currently managed under 43 CFR 6300, BLM *Manual* 8560, BLM *Handbook* H-8560-1, and other applicable guidance. Interim operations plans are currently in effect for range, wildlife, and fire management in this Wilderness (USDOI BLM 1992c and 1993b).

### 5. California Wilderness

The YFO jointly manages four Wilderness Areas in California with the BLM California Desert District. The total acreage managed by YFO is approximately 6,400 acres. The Little Picacho and Palo Verde Mountains Wildernesses are located in Imperial County and co-managed with the BLM El Centro Field Office. The Riverside Mountains and Big Maria Mountains Wildernesses are located in Riverside County and co-managed with the BLM Palm Springs/South Coast Field Office. None of the California Wilderness Areas have management plans, and all are currently managed through interim operation plans for range, wildlife, and fire management in wilderness according 43 CFR 6300, BLM *Manual* 8560, BLM *Handbook* H-8560-1, and other applicable guidance.

## B. JUAN BAUTISTA DE ANZA NATIONAL HISTORIC TRAIL (ANZA TRAIL)

In 1774 and 1776, the Spanish crown commissioned the captain of the small Presidio of Tubac (promoted to Lieutenant-Colonel after the first expedition) Juan Bautista de Anza to lead two expeditions to establish a settlement on San Francisco Bay. Congress designated the route followed by Juan Bautista de Anza (Anza) as a NHT in 1990. Within the U.S., the Anza Trail is approximately 1,200 miles long, extending from Tubac, Arizona to San Francisco, California. In 1996, the NPS finalized a Comprehensive Management and Use Plan and EIS for the Anza Trail, which provides the BLM with trail management guidance. Local agencies have been tasked to develop a recreational Anza Trail inside of a one-mile wide corridor

established by the NPS management plan and EIS. Within the planning area, approximately 21 miles of BLM-administered lands along the Gila River are located within this trail corridor. There is currently no operational Anza Trail in the YFO planning area. The de Anza Auto Route has already been established along I-8.

In 1999, the Anza Trail was selected by the White House Millennium Council and the U.S. Department of Transportation as a National Millennium Trail. Millennium Trails "are the roads, rivers and routes that best illustrate the American story," according to the White House proclamation. There is a plan for the Mexican government to develop 600 miles of the trail through Mexico from Culiacan to Nogales, which would create the first international historic trail in the world.

### C. WILD AND SCENIC RIVERS

A *Final Arizona Statewide Wild and Scenic Rivers Legislative EIS* was prepared in December 1994. At that time, a determination was made that the BLM would support the development of an interagency EIS addressing the potential eligibility and suitability of the Colorado River's inclusion into the *National Wild and Scenic River System* (USDOI BLM 1994b). To date, an interagency effort for this task has not been coordinated. BLM, USFWS, and NPS manage Federal lands along the lower Colorado River and are responsible for implementing the Wild and Scenic Rivers Act.

For the Gila River, a field assessment was conducted by staff specialists from both the Lower Sonoran and Yuma field offices on June 28, 2005. The entire length of the Gila River within the planning area was determined to be non-eligible for inclusion into the National Wild and Scenic River System. The primary reason for the Gila's non-eligibility was that it did not meet the National Wild and Scenic River System "free-flowing" criteria. Naturally appearing flows only occur within the Gila River during years of heavy precipitation which necessitate water releases from the upstream Painted Rock Dam. Water is otherwise absent or rare within the Gila River floodplain, with most of the water present originating from agricultural runoff.

## 3.16.2 AREAS OF CRITICAL ENVIRONMENTAL CONCERN

The guidance for ACECs is included in FLPMA where Federal agencies are directed to protect and conserve ecosystems in need of "special management attention" by designating them as "areas of critical environmental concern" in their land use planning process (FLPMA § 1702 [a]). Existing ACECs in the planning area are summarized in the Table 3-21.

**Table 3-21**
**Areas of Critical Environmental Concern in Planning Area**

| ACEC | Total Acres |
|---|---|
| Big Marias | 4,500 |
| Gila River Cultural Area (Sears Point) | 3,600 |

*Source:* GIS

## A. BIG MARIAS ACEC

The approximately 4,500-acre Big Marias ACEC was designated in the 1987 *Yuma District RMP*. The ACEC is located entirely within Riverside County, California, and contains nationally significant cultural resources such as the Blythe Intaglios and at least 30 other geoglyph sites. The Blythe Intaglios Complex, which was listed on the NRHP in 1975, consists primarily of six giant human and animal images formed on the desert pavement. These unique cultural resources in the Big Marias are recognized by the BLM as the single greatest concentration of geoglyphs in North America. The Big Marias ACEC also contains other features such as rock alignments, cleared areas, trails, and lithic and ceramic scatters.

Two unusual plant species are known to grow in the Big Marias ACEC – Alverson's foxtail cactus (*Coryphantha vivipara* var. *alversonii*) and barrel cactus (*Ferocactus acanthodes* var. *acanthodes*). They are both candidate species for Federal listing as either endangered or threatened, Category 2 (*Federal Register*, December 15, 1980 and as amended *Federal Register*, November 28, 1983). Desert bighorn sheep also inhabit the Big Maria Mountains range.

## B. GILA RIVER CULTURAL AREA ACEC

The Gila River Cultural Area ACEC encompasses the Sears Point Archaeological District, which was listed on the NRHP in 1985, an important mesquite bosque composed of mature mesquite trees, and a portion of the Fred J. Weiler Green Belt. The ACEC has been designated since June 1988 when the Lower Gila South RMP Amendment was approved. Currently, the BLM manages approximately 75 percent of the lands contained within the approximately 3,600 acre ACEC boundary.

The prehistoric cultures which are believed to have utilized this archaeological district between around 10,000 B.C. and A.D. 1450 include the Desert Archaic, Patayan, and Hohokam cultures. These cultures left behind a rich assortment of cultural resources, including several thousand petroglyph images etched into the area's basalt mesas, plus other archaeological features like intaglios, trails, rock alignments, rock shelters, shrines/cairns, and lithic and ceramic scatters. The area contains evidence which suggests an unusual association between Patayan and Hohokam features, and is hypothesized to have been a boundary between these two cultures.

The ACEC is situated along an important historic travel corridor that follows the course of the Gila River. Trails that travel across the ACEC include the Anza Trail, Butterfield Overland Mail Route, Mormon Battalion Trail, and the Gila Trail. Historic petroglyphs recording the names and dates of people traveling through the area at various times are also preserved in the basalt rock faces.

### 3.16.3 NATIONAL RECREATION TRAIL

The YFO currently manages one NRT, which is located within the Betty's Kitchen Watchable Wildlife Viewing Area. Betty's Kitchen is near the Laguna Diversion Dam, which was the first dam on the Colorado River. The dam was completed by Reclamation in 1924 and diverted river water into irrigation canals, enabling the Yuman agricultural industry to thrive. The Betty's Kitchen NRT winds through dense riparian vegetation past a fishing pier and over a rugged metal bridge, and interpretive panels along the walk familiarize the visitor with the natural and cultural features of the area. The NRT also provides public access to fishing and bird watching opportunities. The trail was designated as a NRT in 1993.

## 3.17 COORDINATED MANAGEMENT AREAS

There are two CMAs within the planning area: Fortuna Pond and Mittry Lake Wildlife Management Area (Maps 2-2a and 2-2c). Both of these areas are managed cooperatively by BLM, AGFD, and Reclamation under agreements between these agencies. AGFD focuses on the management of fish and wildlife resources, including migratory birds; while the BLM focus is on recreation and visitor use, and the protection of natural and cultural resources. Reclamation's role is tied to their authorities associated with the Colorado River water resources development.

### 3.17.1 FORTUNA POND

Fortuna Pond is located near the confluence of Fortuna Wash and the Gila River, approximately three miles east of County Road 7 E, Yuma County. The site was excavated as a borrow pit during construction of the main outlet drain (i.e., the Wellton Mohawk salinity canal). The pond is inside the south Gila River levee on public land withdrawn by Reclamation.

In July, 1981, Arizona Game and Fish Commission, USFWS, and Reclamation signed a contract stipulating mitigation requirements for impacts from Reclamation's Colorado River Salinity Control Project. Fortuna Pond, identified as Borrow Pit No. 2, was designated by these agencies as mitigation for lost recreational fishing opportunities on the Colorado River (AGFD 2001). The Fortuna Pond area is popular for recreation, especially fishing and camping. Since 1997, BLM, Reclamation, and AGFD have worked cooperatively to improve the site for visitors.

### 3.17.2 MITTRY LAKE WILDLIFE MANAGEMENT AREA

Mittry Lake is located in Yuma County, about 18 miles northeast of Yuma, Arizona, on the east side of the Colorado River between Laguna and Imperial dams. The Mittry Lake Wildlife Area offers a wide variety of habitat types from open lakes to cattail marshes and streamside woodlands, providing an equally wide opportunity for wildlife-based recreation. This combination of habitat types provides abundant opportunities for fishing, wildlife watching, hiking, boating, and hunting.

In accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as

amended; 16 USC. 661 et seq.), the Arizona Game and Fish Commission, and the Secretary of the Interior (acting through the USFWS and Reclamation) entered into a lease and cooperative agreement in 1951 to develop and manage a portion of the Mittry Lake area. In 1971, USDOI gave AGFD administrative authority over 3,800 acres of land and water at the lake for the management of fish and wildlife, including migratory birds. In 1972 (amended 1982), USDOI (acting through Reclamation and BLM) authorized AGFD (through contract agreement) to manage the Mittry Lake Wildlife Area for the purpose of developing, maintaining, and managing fish and wildlife through July 14, 2031. Current management of the area is pursuant to the mandates of the Fish and Wildlife Coordination Act, the above-referenced documents, and AGFD's *Mittry Lake Wildlife Area Management Plan* (AGFD 1997).

# 3.18 PUBLIC HEALTH AND SAFETY

## 3.18.1 EMPLOYEE AND PUBLIC SAFETY

Increased pressure from urban interface, growth in visitor use at recreation sites, and the escalation of anti-government sentiment has heightened the awareness of possible conflict in the field.

Confrontations between public land users are becoming more frequent. Gang activities in the recreation sites and back country areas have increased as evidenced by incidents of vandalism and graffiti at facilities and back country areas, law enforcement contacts, and third party reports. Public lands near urban areas provide relative isolation and have experienced an increase in criminal activities, including homicides, stolen vehicles, and the illegal disposal of household and commercial wastes.

The lower Colorado River corridor has received a steady increase in boating and camping recreation. This increase has been reflected in a growing number of boating accidents and problems related to alcohol and drug use. Increased use of the boat-in campsites has significantly increased the number of incidents involving alcohol, drug use, and natural resource destruction requiring response from law enforcement.

With its warm weather and southern travel route, the lower Colorado River has a large transient population. Over the past several years, the number of transient individuals has increased, particularly in the Lake Havasu City, Needles, and Bullhead City areas. Some of these individuals have criminal histories and may present a threat to any public land users who might encounter them.

## 3.18.2 ABANDONED MINES

Arizona has a long and distinguished mining history and a legacy of abandoned mines. The State of Arizona Mine Inspector conducts inventories of abandoned and inactive mines throughout Arizona via a program known as the Abandoned and Inactive Mine Survey. This program was funded by a contract through the BLM, although that contract ended in 1999.

Currently, the Abandoned and Inactive Mine program estimates that there are at least 125,000 abandoned or inactive mine openings in Arizona. According to the State of Arizona Mine Inspector, there are 378 abandoned mine sites in the planning area. Fifty-eight of these have been field tested by the Mine Inspector's office. The majority of these sites are located in the vicinity of the Town of Quartzsite, Yuma, and northeast of the Kofa NWR. Inventory and field checking of these sites would resume as funding becomes available.

A GIS database of abandoned mine sites is available through the Mine Inspector's office and through the Arizona Bureau of Mines AZMILS database.

The Mine Inspector's office has published several informational brochures regarding abandoned mines. These publications emphasize the safety hazards associated with abandoned and inactive mines and the precautions that should be utilized around these sites. Abandoned mine hazards include, but are not limited to, open shafts and adits, open pits and quarries, high and steep walls of pits and trenches, potential for the presence of explosives, the presence of contaminated air or gas in underground workings and the presence of unstable buildings or structures. Recommended precautions include, but are not limited to, never working alone around abandoned mines, never entering underground workings or unstable structures, and being aware of snakes and other animals that may live in mine workings.

## 3.18.3 HAZARDOUS MATERIALS MANAGEMENT

Hazardous materials within the planning area consist of military ordnance, downed aircraft and related materials, materials within municipal and informal dumping sites, and mining-related hazardous materials. Each is described in more detail below.

### A. MILITARY ORDNANCE

UXO and munitions constituents on military bases on land in proximity to military bases in the U.S. are causing increasing concern. While civilian fatalities from UXO explosions in the U.S. have been rare, the risk of such accidents could increase substantially as more closed military bases are transferred from military to other government agencies or to civilian control. UXO may include but is not limited to bombs, mortars, artillery shells, rockets, submunitions, and mines.

UXO or munitions and explosives of concern consist of military materials used in test and training ranges. Two sources of risk at UXO sites must be considered: (1) risks from UXO explosions and (2) risks from munitions constituents (materials originating from UXO or other munitions, including the chemical constituents that result from their breakdown) that have leached into soil and water. These two hazards differ substantially in the nature of the threats they pose. For example, the consequence of a human accidentally detonating UXO is immediate and typically results in serious injury or death. In contrast, the consequence of human exposure to munitions constituents is most likely chronic and increases the risk of illness after prolonged exposure.

Within the planning area the YPG and the BMGR are potential sources of UXO. The YPG is largely surrounded by BLM-administered land, while the BMGR is bordered intermittently by

State, private, and BLM-administered lands. It is notable that the lands along the margins of the YPG are labeled "No Public Access Danger Live Fire Training Area" on the BLM map (USDOI BLM 1998). All BLM-administered lands bordering the YPG could potentially contain UXO according to BLM sources, although BLM has not documented any specific UXO locations (USDOI BLM 2005d). The realty officer for the U.S. Army Garrison at Yuma was contacted regarding the location of UXO, but did not provide any information.

In addition to UXO, formerly used defense sites located on BLM-administered land may contain hazardous materials. These materials may include, but are not limited to, asbestos-containing materials, lead paint, and petroleum products. The following military radar sites were identified by BLM (USDOI BLM 2005d) as potentially containing hazardous materials:

- Texas Hill,
- Radar Hill, and
- Palo Verde Gap Site (Milpitas Wash).

The U.S. Army Corps of Engineers is responsible for investigating and mitigating environmental impacts related to past military use at these types of facilities. Given the amount of aircraft that is used on the various military facilities in the planning area, it is possible that a downed military aircraft could crash and cause environmental impacts. Impacts would likely be from aircraft fuel, burned materials, and possibly ordnance or munitions on the aircraft.

## B. LANDFILLS AND ILLEGAL DUMPING

Authorized landfills (operating, closed, and informal) and illegal dumping have a potential to cause environmental impacts to BLM-administered land. Chemical leachate from these sites has the potential to contaminate soil and reach surface and/or ground water.

Closed or covered landfills that are on or near BLM-administered lands are located near Dateland, the Town of Quartzsite, and Ehrenberg. The type of dumping that took place in these landfills is not known. However, chemical leachate from these landfills has the potential to contaminate soil and reach surface water or groundwater. Informal dumping grounds are known as the Dateland Dump, the Cibola Dump, and informal dumping grounds at Harvey's Fishing Hole near Cibola (USDOI BLM 2005e).

Illegal dumping continues to be a problem throughout the planning area. Concentrations of illegal dumping are greatest at the urban interface. Local law enforcement is responsible for enforcing laws and regulations that prohibit illegal dumping.

## C. MINING AND MILLING WASTE

Hazardous mining waste consists of mineralized waste rock, ore stockpiles, and mill tailings. Metallic minerals that occur in the rock have the potential to contaminate soil and water down gradient of the mining waste. Mill tailings may contain traces of metals as well as other chemical constituents, such as acids. Further, mine workings and mine dumps containing sulfide

mineralization can create acid mine drainage when exposed to oxygen and water. The potential for this type of hazardous material occurs at abandoned mines on and adjacent to BLM-administered land. The extent to which these problems exist within the planning area is unknown as a survey has not been conducted.

### 3.18.4 BORDER ISSUES

The planning area has extensive International Border issues. Undocumented immigrant traffic, smuggling, transient populations, illegal dumping, rampant litter, abandoned vehicles, and diversionary fires are just a few of the issues that are currently impacting the resources of the public lands along the border. Undocumented immigrant and smuggling traffic is known to occur throughout the entire planning area. These International Border issues create challenging management issues for the BLM and cooperating agencies. Law enforcement and YFO resource personnel coordinate with the U.S. Department of Homeland Security and other agencies on a regular basis to address issues associated with these actions.

A 20 mile stretch of the planning area, named the Limitrophe Division by Reclamation, is situated along the International Border with Mexico along the lower Colorado River. “Limitrophe” means a river that forms a boundary between two nations. This densely vegetated riparian area is a public health and safety hazard due to the presence of smugglers and illegal dumping.

### 3.18.5 MILITARY TRAINING ROUTES

Military training routes are low level military routes that allow Department of Defense aircraft to conduct flights that may be as low as 100 feet above the ground at speeds in excess of 250 knots indicated air speed. Several military training routes cross portions of the planning area (Map 3-28). YFO considers the affects of military training routes when making decisions related to windmills, transportation routes, and recreation areas within the planning area.

## 3.19 SOCIAL AND ECONOMIC CONDITIONS

There are important relationships between BLM-administered lands and the communities in and near the planning area. Social science and economic information important for the planning process in the planning area were identified as:

- Demography and Social Indicators;
- Social Organization and Institutions;
- Attitudes and Values;
- Human Geography;
- Economic Value;
- Employment, Income, and Subsistence; and

- Public Finance and Government Services.

Information from these categories was used to provide an understanding of the relationship between BLM-administered lands and the social and economic situation in the planning area.

Economic activities closely connected to BLM management decisions in the planning area include livestock grazing management, recreation management, lands and realty management, and mineral resource management. BLM management decisions with regard to economic programs may also affect social conditions, lifestyle, and quality of life. The communities in the planning area may also affect the management of BLM-administered lands because the residents demand various uses of public lands. The demand for recreational use comprises a particularly large number of residents. The mix of demands is related to the demographic and economic profile of area residents, and the perceived value of opportunities provided by the BLM-administered lands.

BLM-administered lands in the planning area are distributed across five contiguous counties in two states (Table 3-1). Potential social and economic effects associated with the proposed RMP revision include changes in employment and income, as well as potential quality of life effects. These effects are likely to occur primarily in La Paz and Yuma counties where the majority of the planning area lands are located. Although the effects are likely to be relatively small in Maricopa, Imperial, and Riverside counties, these counties are also included in the following discussion, as appropriate.

## 3.19.1 SOCIAL CONDITIONS

Social conditions concern the human communities in the planning area, including towns, cities, and rural areas, and the custom, culture, and history of the area as it relates to human settlement, as well as current social values. BLM management actions can affect social conditions in the planning area and in nearby communities. This section provides a summary of demographic information, and custom and culture, including trends and current conditions. Social conditions often are based on a wide range of community and demographic characteristics and involve broad topics of community interests. Other discussions related to social conditions are provided in Economic Conditions presented later in this section.

## A. DEMOGRAPHY AND SOCIAL INDICATORS

Demography and social indicators include population trends; migration; distribution by age and gender; income distribution; percent of households in poverty and percent poverty by race; unemployment; and education.

### 1. Population Trends

The five-county planning area had a total population of 5.46 million in 2003, with the majority of this population residing in Maricopa (62 percent) and Riverside (31 percent) counties. More than half of the population of Arizona resides in Maricopa County, which includes the cities of Phoenix, Mesa, Glendale, Scottsdale, and Tempe (Arizona Department of Commerce 2004). The

Phoenix Metropolitan area is less than 60 miles east of the planning area. Riverside County also includes a number of large population centers, including Riverside, Moreno Valley, and Corona, none of which are located in close proximity to the planning area (California Demographic Research Unit 2003a). In addition, the lands managed by the BLM in Maricopa and Riverside counties comprise a small share of total land in these counties, as well as a small share of total BLM-administered lands.

County population densities ranged from 4.4 persons per square mile in La Paz County to 333.8 persons per square mile in Maricopa County in 2000 compared to a statewide average of 45.2 persons per square mile. Yuma County had a population density of 29 persons per square mile in 2000. The statewide population density in California was 217.2 persons per square mile in 2000. Imperial and Riverside counties had population densities in 2000 of 34.1 and 214.4 persons per square mile, respectively (U.S. Census Bureau 2005).

Arizona is presently the second fastest growing state in the country. Total population increased by 40 percent in the 1990s and has continued to increase in this decade, increasing by an estimated 9.7 percent between 2000 and 2003 (Table 3-22). Population in the State of California increased slightly faster than the national average in the 1990s, 13.8 percent compared to 13.1 percent (U.S. Census Bureau 2005). Population has continued to grow in California, increasing by an estimated 5.1 percent between 2000 and 2003 (Table 3-22).

**Table 3-22**
**Population by County and Incorporated Place in 1990, 2000, and 2003**

| | | | | 1990 to 2000 | | 2000 to 2003 | |
|---|---|---|---|---|---|---|---|
| **State, County** | **1990** | **2000** | **2003** | **Absolute Change** | **Percent Change** | **Absolute Change** | **Percent Change** |
| Arizona | 3,665,339 | 5,130,632 | 5,629,870 | 1,465,293 | 40.0 | 499,238 | 9.7 |
| La Paz* | 13,844 | 19,715 | 20,715 | 5,871 | 42.4 | 1,000 | 5.1 |
| Quartzsite | 1,876 | 3,354 | 3,425 | 1,478 | 78.8 | 71 | 2.1 |
| Maricopa | 2,122,101 | 3,072,149 | 3,396,875 | 950,048 | 44.8 | 324,726 | 10.6 |
| Yuma* | 106,895 | 160,026 | 175,045 | 53,131 | 49.7 | 15,019 | 9.4 |
| San Luis | 4,212 | 15,322 | 19,745 | 11,110 | 263.8 | 4,423 | 28.9 |
| Somerton | 5,282 | 7,266 | 8,180 | 1,984 | 37.6 | 914 | 12.6 |
| Wellton | 1,066 | 1,829 | 1,880 | 763 | 71.6 | 51 | 2.8 |
| Yuma | 56,966 | 77,515 | 83,330 | 20,549 | 36.1 | 5,815 | 7.5 |
| California | 29,758,213 | 33,873,086 | 35,612,000 | 4,114,873 | 13.8 | 1,738,914 | 5.1 |
| Imperial | 109,303 | 142,361 | 152,600 | 33,058 | 30.2 | 10,239 | 7.2 |
| Riverside | 1,170,413 | 1,545,387 | 1,719,000 | 374,974 | 32.0 | 173,613 | 11.2 |
| Blythe | 8,448 | 20,465 | 21,300 | 12,017 | 142.2 | 835 | 4.1 |

*Source:* Arizona Workforce 2003, 2004; California Demographic Research Unit 2003b, 2003c
**Note:* RMP related effects are more likely to occur in these counties where the majority of the planning area lands are located.

Population increased in all five planning area counties during the 1990s with increases ranging from 30.2 percent in Imperial County to 49.7 percent in Yuma County (Table 3-21). Net in-migration was the main source of growth in the five planning area counties, ranging from approximately 53 percent of population growth in Imperial County to about 93 percent in La Paz

County (U.S. Census Bureau 1999a and 1999b). Net in-migration accounted for approximately 57 percent of population growth in Yuma County over this period.

Population projections generated by the states of Arizona and California, respectively, anticipate continued population growth in all five planning area counties through 2020 (Arizona Workforce 2005a; California Demographic Research Unit 2003b).

## 2. Retirement Migration

The percent of total population 65 years or older was 13 percent in Arizona in 2000 and 10.6 percent in California. Persons 65 years or older comprise a relatively large share of the population in La Paz and Yuma counties, accounting for 25.8 percent and 16.5 percent of total population in 2000, respectively. These percentages of persons 65 years or older were much closer to their respective State averages in Maricopa, Imperial, and Riverside counties (U.S. Census Bureau 2005).

Arizona is one of a limited number of states that might be considered a national retirement destination based on inflows of retirees from non-contiguous states. Other retirement destination states include California, Florida, Texas, and North Carolina (Rex 2002). The winter climate is the main factor that attracts retirees to Arizona, with the majority of the net in-migration of retirees occurring in the warmer desert areas including La Paz, Maricopa, and Yuma counties. Many retirees moving to Arizona are attracted to areas with scenic beauty and recreational opportunities, and nearly all of the popular retirement destinations in the State have average to below average living costs (Rex 2002).

Arizona experienced a net gain in older population, defined as those aged 65 and over, of approximately 53,000 between 1995 and 2000. This represented a net migration rate of 87.4, the second highest in the country. This net migration rate means that Arizona gained 87.4 older people for every 1,000 in 1995. Migrants from California and Washington accounted for one-quarter of older movers to Arizona over this period. Other major sources of older migrants included Colorado and Illinois (U.S. Census Bureau 2003).

The percent of housing for seasonal, recreational, or occasional use was 15.7 in Yuma County and 34.6 in La Paz County in 2000.

The large number of people in the baby-boom generation, those born between 1946 and 1964, indicate that much higher levels of retirement migration are likely over the next 20 years. This could increase retirement migration flows to Arizona, but it is also possible this generation may not behave as their parents did when they reached retirement age (Rex 2002).

## 3. General Demographics of Yuma and La Paz Counties

Yuma County has a somewhat younger population than La Paz County and is larger overall (Table 3-23). Race other than “White” makes up a significant portion of the Yuma County population, which is consistent with the portion of foreign born population. In addition, almost half of the households indicate a language other then English is spoken at home. The proportion of unoccupied housing units is fairly high in both counties.

**Table 3-23**
**General Demographic Characteristics**
**of Yuma and La Paz Counties, Arizona (2000)**

| Demographic Characteristic | La Paz County | Yuma County |
|---|---|---|
| Population | 19,715 | 160,026 |
| Sex | | |
| Male | 51.3% | 50.5% |
| Female | 48.7% | 49.5% |
| Median Age (years) | 46.8 | 33.9 |
| Male | 46.5 | 32.7 |
| Female | 47.2 | 35.1 |
| Race | | |
| White | 74.2% | 68.3% |
| Black or African American | .8% | 2.2% |
| American Indian/Alaska Native | 12.5% | 1.6% |
| Asian | 0.4% | 0.9% |
| Native Hawaiian and Pacific Islander | 0.1% | 0.1% |
| Some Other Race | 9.4% | 23.6% |
| Two or More Races | 2.7% | 3.3% |
| Housing Units | 15,133 | 74,140 |
| Percent Unoccupied | 44.7% | 27.3% |
| Owner Occupied | 43.1% | 52.5% |
| Renter Occupied | 12.2% | 20.2% |
| Percent Housing Units for Seasonal, Recreational, or Occasional Use | 34.6% | 15.7% |
| Place of Birth | | |
| Native | 90.3% | 76.0% |
| Foreign Born | 9.7% | 24.0% |
| Language Spoken at Home | | |
| English Only | 78.4% | 54.5% |
| Language Other than English | 21.6% | 45.5% |
| Employment Status 16 Years and Over | | |
| In Labor Force | 44.3% | 50.3% |
| Not in Labor Force | 55.7% | 49.7% |
| Class of Worker | | |
| Private Wage and Salary | 61.8% | 70.8% |
| Government Worker | 29.3% | 22.4% |
| Self-employed | 8.8% | 6.2% |
| Unpaid Family Workers | 0.2% | 0.6% |
| Median Household Income | $25,839 | $32,182 |
| Per Capita Income | $14,916 | $14,802 |
| Average Number in Household | 2.35 | 2.97 |

*Source:* U.S. Census Bureau 2003

La Paz County exhibits a housing stock where roughly one-third of the units are used for seasonal, recreational, or occasional use. Roughly one-half of individuals 16 years of age or older participate in the labor force with a significant percentage working for government agencies. While median household income is higher in Yuma County, the per capita income is quite similar due to Yuma's larger average household size.

## 4. Distribution by Age and Gender for Yuma and La Paz Counties

The populations of both Yuma and La Paz counties became older from 1990 to 2000 (Table 3-24) (U.S. Census Bureau 2005).

The largest age category for Yuma County in 2000 was five to nine years old (13,338 people or 8.3 percent of the total in 2000). For La Paz County, the largest age category was 65 to 69 years old (1,690 people or 8.6 percent of the total in 2000) (U.S. Census Bureau 2005). The population in Yuma County increased by 50 percent and in La Paz County increased by 42 percent from 1990 to 2000 (Table 3-24) (U.S. Census Bureau 2005). The age group that experienced the fastest growth was 45 to 49 in Yuma County and 70 to 74 in La Paz County (U.S. Census Bureau 2005).

**Table 3-24**
**Population by Age and Gender in 1990 to 2000**

| | Total Number | Under 20 years | | 40 - 54 (Baby Boom in 2000) | | 65 years and over | | Median Age | Density (Pop. per sq. mi.) |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Share | Number | Share | Number | Share | | |
| **Yuma County Population by Age and Gender** | | | | | | | | | |
| **Total Population** | | | | | | | | | |
| 2000 | 160,026 | 51,023 | 32% | 25,904 | 16% | 26,456 | 17% | 33.9 | 29 |
| 1990 | 106,895 | 34,976 | 33% | 14,827 | 14% | 14,849 | 14% | 30.4 | 19 |
| 10 Yr. Change | 53,131 | 16,047 | -1% | 11,077 | 2% | 11,607 | 3% | 3.5 | 10 |
| 10 Yr. % Change | 50% | 46% | | 75% | | 78% | | 12% | 50% |
| **Distribution by Gender** | | | | | | | | | |
| Male | 80,799 | 26,092 | 32% | 12,763 | 16% | 13,016 | 16% | 32.7 | |
| Female | 79,227 | 24,931 | 31% | 13,141 | 17% | 13,440 | 17% | 35.1 | |
| Male/Female Split | 50% / 50% | 51% / 49% | | 49% / 51% | | 49% / 51% | | | |
| **La Paz County Population by Age and Gender** | | | | | | | | | |
| **Total Population** | | | | | | | | | |
| 2000 | 19,715 | 4,539 | 23% | 3,645 | 18% | 5,088 | 26% | 46.8 | 4 |
| 1990 | 13,844 | 3,987 | 29% | 2,229 | 16% | 2,646 | 19% | 37.2 | 3 |
| 10 Yr. Change | 5,871 | 552 | -6% | 1,416 | 2% | 2,442 | 7% | 9.6 | 1 |
| 10 Yr. % Change | 42% | 14% | | 64% | | 92% | | 26% | 42% |
| **Distribution by Gender** | | | | | | | | | |
| Male | 10,123 | 2,351 | 23% | 1,833 | 18% | 2,668 | 26% | 46.5 | |
| Female | 9,592 | 2,188 | 23% | 1,812 | 19% | 2,420 | 25% | 47.2 | |
| Male/Female Split | 51% / 49% | 52% / 48% | | 50% / 50% | | 52% / 48% | | | |

## 5. Income Distribution for Yuma and La Paz Counties

In 1999 in Yuma County, for every household that made over $100,000, there were 7.7 households that made under $30,000. In 1989, for every household that made over $100,000, there were 33.9 households that made under $30,000 (Table 3-25) (U.S. Census Bureau 2005).

In 1999 in La Paz County, for every household that made over $100,000, there were 15.7 households that made under $30,000. In 1989, for every household that made over $100,000, there were 51.3 households that made under $30,000 (Table 3-25) (U.S. Census Bureau 2005).

**Table 3-25**
**Household Income Distribution for 1989 and 1999**

| Income | Yuma County | | La Paz County | |
|---|---|---|---|---|
| | 1989 | 1999 | 1989 | 1999 |
| Less than $10,000 | 6,369 | 5,273 | 1,646 | 1,329 |
| $10,000 to $14,999 | 4,282 | 4,847 | 871 | 876 |
| $15,000 to $19,999 | 4,339 | 4,985 | 632 | 922 |
| $20,000 to $24,999 | 3,888 | 4,917 | 513 | 917 |
| $25,000 to $29,999 | 3,448 | 4,633 | 390 | 759 |
| $30,000 to $34,999 | 2,673 | 4,630 | 322 | 567 |
| $35,000 to $39,999 | 2,046 | 3,649 | 233 | 634 |
| $40,000 to $44,999 | 1,722 | 2,989 | 208 | 459 |
| $45,000 to $49,999 | 1,439 | 2,729 | 137 | 282 |
| $50,000 to $59,999 | 2,438 | 4,301 | 173 | 533 |
| $60,000 to $74,999 | 1,579 | 4,234 | 142 | 464 |
| $75,000 to $99,999 | 945 | 3,507 | 81 | 345 |
| $100,000 to $124,000 | 359 | 1,483 | 29 | 140 |
| $125,000 to $149,999 | 109 | 581 | 22 | 65 |
| $150,000 or more | 191 | 1,146 | 28 | 100 |

## 6. Percent of Households in Poverty and Percent Poverty by Race for Yuma and La Paz Counties

The family type with the highest poverty rate is “Female-no husband-under five years and five to 17 years” (61 percent were under the poverty line in 1999) (Table 3-26) (U.S. Census Bureau 2005). The race with the highest poverty rate is “Black” (38 percent were under the poverty line in 1999) (Table 3-27) (U.S. Census Bureau 2005).

## 7. Unemployment for Yuma and La Paz Counties

In 2004, the unemployment rate in Yuma County was 15.4 percent, compared to five percent in the State and 5.5 percent in the nation (U.S. Census Bureau 2005). Unemployment in Yuma County shows a significant seasonal variation. For Yuma County, the unemployment rate varied from a low of 9.7 percent in February 2005 to a high of 21.2 percent in July 2005 (U.S. Census Bureau 2005).

In 2004, the unemployment rate in La Paz County was 6.7 percent, compared to five percent in the State and 5.5 percent in the nation (U.S. Census Bureau 2005). For La Paz County, the unemployment rate varied from a low of 6.1 percent in May 2005 to a high of 7.6 percent in September 2005 (U.S. Census Bureau 2005).

**Table 3-26**
**Families under the Poverty Line by Household Type (1999)**

| Household Type | Married | | Male – No Wife | | Female – No Husband | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| **Yuma County** | | | | | | |
| With related children under 18 years | 2,982 | 19 | 393 | 29 | 1,903 | 45 |
| Under 5 years only | 545 | 18 | 82 | 25 | 325 | 50 |
| Under 5 years and 5 to 17 years | 1,081 | 24 | 98 | 49 | 503 | 54 |
| 5 to 17 years | 1,356 | 16 | 213 | 26 | 1,075 | 41 |
| No related children under 18 years | 924 | 5 | 70 | 13 | 218 | 14 |
| Total | 3,906 | 11 | 463 | 25 | 2,121 | 37 |
| **La Paz County** | | | | | | |
| With related children under 18 years | 193 | 15 | 40 | 19 | 230 | 44 |
| Under 5 years only | 37 | 19 | 2 | 8 | 25 | 41 |
| Under 5 years and 5 to 17 years | 52 | 18 | 8 | 29 | 54 | 61 |
| 5 to 17 years | 104 | 12 | 30 | 19 | 151 | 49 |
| No related children under 18 years | 259 | 8 | 21 | 17 | 21 | 12 |
| Total | 452 | 10 | 61 | 18 | 251 | 36 |

*Note:* The percentages above represent the number of families under the poverty line divided by the total number of families in that category.

**Table 3-27**
**Poverty by Race (Individual) Percent of Total (1999)**

| Race | Number | Percent |
|---|---|---|
| **Yuma County** | | |
| White | 15,762 | 15 |
| Black | 556 | 20 |
| American Indian and Alaska Native | 760 | 30 |
| Asia | 119 | 9 |
| Native Hawaiian and other Pacific Islander | 9 | 6 |
| Other Race | 11,385 | 30 |
| 2 or more Races | 1,079 | 24 |
| Hispanic or Latino | 22,818 | 29 |
| White not Hispanic | 5,524 | 8 |
| **La Paz County** | | |
| White | 2,374 | 16 |
| Black | 49 | 38 |
| American Indian and Alaska Native | 790 | 32 |
| Asia | 2 | 3 |
| Native Hawaiian and other Pacific Islander | 0 | 0 |
| Other Race | 481 | 29 |
| 2 or more Races | 102 | 22 |
| Hispanic or Latino | 1,261 | 30 |
| White not Hispanic | 1,731 | 14 |

*Note:* Population for whom poverty status is determined. Race and ethnicity are broken out separately. The ethnicity breakout is separate because Hispanics can be of any race.

### 8. Education Attainment for Yuma and La Paz Counties

In Yuma County, 34 percent of residents 25 and over have less than a high school degree (Table 3-28) (U.S. Census Bureau 2005). In La Paz County, 31 percent of residents 25 and over have less than a high school degree (Table 3-28) (U.S. Census Bureau 2005).

**Table 3-28**
**Education Attainment for Yuma and La Paz Counties (2000)**

| Education Level | Number | Percent |
|---|---|---|
| **Yuma County** | | |
| Less than high school | 33,397 | 34 |
| High school | 25,134 | 26 |
| Some college | 22,800 | 23 |
| Associate degree | 4,780 | 5 |
| Bachelor's degree | 7,017 | 7 |
| Master's degree | 3,063 | 3 |
| Professional school degree | 1,117 | 1 |
| Doctoral degree | 372 | 0 |
| Total | 97,680 | |
| **La Paz County** | | |
| Less than high school | 4,421 | 31 |
| High school | 4,880 | 34 |
| Some college | 3,211 | 22 |
| Associate degree | 627 | 4 |
| Bachelor's degree | 785 | 5 |
| Master's degree | 307 | 2 |
| Professional school degree | 100 | 1 |
| Doctoral degree | 58 | 0 |
| Total | 14,389 | |

*Note:* Table is based on the population 25 years and over.

## B. SOCIAL ORGANIZATION AND INSTITUTIONS

Social organization and institutions include government (local, county, and Tribal governments in and near the planning area that may be cooperating agencies); communities of place (gateway communities and natural resources dependent communities); and occupational and interest groups.

### 1. Governments

**a. County:** Imperial and Riverside counties in California, and La Paz, Maricopa, Yuma counties in Arizona.

**b. Local:** City of Blythe and City of Needles, California. City of Kingman, City of San Luis, City of Somerton, City of Tucson, City of Yuma, and the Town of Quartzsite, Arizona.

**c. Tribal**: Ak-Chin Indian Community, Chemehuevi Indian Tribe, Cocopah Tribe, CRITs, Fort McDowell Yavapai Nation, Fort Mojave Indian Tribe, Fort Sill Apache Tribe, Fort Yuma–Quechan Tribe, Gila River Indian Community, Havasupai Tribe, Hia C'ed O'odham, Hopi Tribe, Hualapai Tribe, Kaibab-Paiute Tribe, Las Vegas Paiute Tribe, Mescalero Apache

Tribe, Moapa Band of Paiute Indians, The Navajo Nation, Pascua Yaqui Tribe, Salt River Pima-Maricopa Indian Community, San Carlos Apache Tribe, San Juan Southern Paiute Tribe, Tohono O'odham Tribal Nation, Tonto Apache Tribe, Viejas Band of Mission Indians, White Mountain Apache Tribe, Yavapai-Apache Nation, Yavapai-Prescott Indian Tribe, and Pueblo of Zuni.

## 2. Communities of Place

Communities of place are local and regional population centers relative to the planning area that would be considered gateway or natural resource dependent communities. Gateway communities are defined as such because they are near publicly owned natural areas that attract visitors who pass through to reach their destination. Increasingly, people who visit an area as tourists return as part-time or year-round residents.

The City of Yuma and Town of Quartzsite are considered gateway communities in the planning area. These communities experience an increase in population during the winter months, due primarily to the weather and recreational opportunities. These communities are near a large variety of scenic and recreational attractions visited by residents and tourists throughout the year.

### a. City of Yuma

As of July 1, 2005, the City of Yuma population estimate was 88,775, which reflects a 14.5 percent growth rate since 2000. The population within one hour driving time to Yuma was approximately two million in 2005 (City of Yuma 2005).

Yuma is the third fastest growing area in the U.S. for the period of 1990 to 2000, behind Las Vegas, Nevada and Naples, Florida. Yuma’s growth rate during this period was 49.7 percent. Yuma was also Arizona’s third largest metropolitan area, behind Phoenix and Tucson (City of Yuma 2006).

The largest employment industries in the City of Yuma are educational, health, and social services at 22 percent; retail trade at 15 percent, and public administration at 12 percent (U.S. Census 2005). Agriculture is a major economic factor, and at the current growth rate, Yuma-area agribusiness is a billion-dollar industry. Tourism and the military also contribute substantially to the economy (Arizona Department of Commerce 2004).

The City of Yuma estimated that 95,000 winter visitors stayed in the area in 2004 (City of Yuma 2006). Recreational and scenic attractions include BLM-administered lands, three USFWS NWRs, Colorado and Gila rivers, historic and cultural sites within the city and surrounding areas, sand dunes, dams, military installations, and port-of-entry communities (Mexico).

### b. Town of Quartzsite

As of 2004, the population estimate for the Town of Quartzsite was 3,550, which reflects a 9.4 percent growth rate since 2000 (Arizona Department of Commerce 2004). The Town of Quartzsite experienced an almost 53 percent growth rate from 1990 (population 1,876) to 2004.

The largest employment industries for the Town of Quartzsite were retail trade at 28 percent, arts, entertainment, recreation, accommodation and food services at 16 percent, and construction at 10 percent (U.S. Census Bureau 2005). Tourism is the major contributor to the Town of Quartzsite's economy. The retail trade and services sectors benefit from the visitors who reside at the numerous (more than 70) mobile home and trailer parks in the vicinity between October and March. Nine major gem, mineral, and 15 general swap-meeting shows are popular tourist attractions, attracting 1.5 million people annually (Arizona Department of Commerce 2004). The winter population may reach a temporary peak of 250,000 (Arizona Department of Commerce 2004).

Recreational and scenic attractions are similar to those mentioned for the City of Yuma and also include a wide variety of rock hunting opportunities (agates, limonite, cubes, gold, and quartz are some of the minerals found in the area) (Arizona Department of Commerce 2004).

### 3. Occupational and Interest Groups

During the scoping process, BLM YFO received comments from the following interest groups:

- Arizona Cotton Growers Association,
- Arizona Native Plant Society Conservation Committee,
- Arizona Wilderness Coalition,
- Blythe Riding Club,
- Center for Biological Diversity,
- Colorado River Board of California,
- Forest Guardians,
- La Cuna Aztlan Sacred Sites Protection Circle Advisory Committee,
- Pacific Legal Foundation,
- Phoenix Zoo,
- Quartzsite Historical Society,
- Quartzsite Roadrunner Gem and Mineral Club,
- Sierra Club,
- Wilderness Society,
- Wildlife Management Institute, and
- Yuma Valley Rod and Gun Club.

During the Economic Profile System Workshop for the YFO and YPG held in May 2005, representatives from the following groups and agencies attended:

- AGFD,
- Arizona Tourism Alliance,
- Arizona Western College,

- City of Yuma Chamber of Commerce,
- Mexican Consulate,
- Minerals (sand and gravel) companies,
- Natural Resources Conservation District,
- USDA NRCS,
- Reclamation, and
- Yuma County.

## C. ATTITUDES AND VALUES

Attitudes and values indicators include attitudes and beliefs regarding the local environment and its uses; significance of proposed land management actions for various publics; and quality of life perceptions. Information presented below was derived primarily from two James Kent Associates reports conducted for BLM YFO: *Social Considerations for the YFO in Developing a Preparation Plan for a New Resource Management Plan*, 2001; and *Identifying the Interests and Issues of Winter Visitors in the Yuma Area: A Social Ecology Approach to Community-Based Management*, 2004. These reports identified social/cultural boundaries that distinguished populations in the planning area. The lowest level of population geography identified was the Community Resource Unit. Between the two reports, data were collected for 10 Community Resource Units in the planning area. Field visits for each Community Resource Unit included interviews with publics of interest and formal communications with organizations and potential partners. A summary of the major resource issues and themes identified in the reports for all Community Resource Units is outlined below.

### 1. Major Resource Issues Identified

- OHV use and access - issues included concerns about loss of OHV areas (closures), need for information brochures on OHV etiquette and safety, damage caused to natural resources, excessive speed, and straying off trails.
- Information - requests for more BLM brochures describing recreational opportunities available, services available, rules of public land use, more interpretive and informational signs, and maps of recreational areas.
- Desert stewardship - concerns about vandalism of facilities, trash accumulation and the need for additional trash disposal sites (closer to camping areas and LTVAs), dumping of hazardous materials, dust control concerns, request for better equestrian trails, concerns that there is too much OHV use, particularly near Yuma, and illegal dumping in many areas including roadways. Individuals expressed interest in desert cleanup opportunities.
- Easements and leases - need for improved ROW process (takes too long), need more business opportunities (concession leases), cooperate more with the Town of Quartzsite to solve ROW issues and land availability needs, and better communication with local governments regarding waste disposal and water services.

- Access - request for additional recreational opportunities along the Colorado River, request for additional camping locations, concerns that areas are being closed to access by the public (but hunters seem to be trespassing), too many restrictions on access particularly in Wilderness and related to endangered species, make more lands available for disposal for community development, and a statement that the public should not be charged for the use of public lands.
- Impacts on the Town of Quartzsite's capacity to deal with winter visitors - the community has experienced budget impacts due to the need for increased law enforcement and fire department services, waste service needs, and library resources.
- Mining - concern that BLM did not recognize recreational mining activities and concerns that miners consider their mining claims as private property, closing off access to the public.
- Law enforcement - requests for additional law enforcement, particularly in LTVAs, concerns that there are insufficient rangers to cover areas where vandalism is occurring, and concerns that rangers do not enforce the rules enough.
- LTVAs - safety and environmental concerns were common, and more information was requested related to facilities, rules, and recreational opportunities near LTVAs.
- Agriculture - request that agricultural leases be renewed on a timely basis, concerns about illegal dumping on agricultural fields, and concern about the loss of agricultural lands to development.
- Water - water issues must be part of BLM planning, concerns that the Colorado River is polluted and has too much trash, and water should be more available to visitors.

### 2. Major Themes about Public Lands Identified

- People believe that BLM is doing a good job.
- People bring their public land issues with them from their State of origin.
- Most issues were related to services and information, but very few to basic policy direction or philosophy.
- Desert dumping will be an issue that has to be addressed, and can be, outside of planning.
- Ongoing urban environmental education will always be the business of the YFO.
- Awareness is low about public lands, where people can go, and the regulations operating on the lands.

## 3.19.2 ECONOMIC CONDITIONS

This section provides a summary of regional economic sectors and employment information. This section is divided into main parts that address employment, economic sectors, and potentially affected industries.

# A. EMPLOYMENT

Total full- and part-time employment is presented for 2003 for the five planning area counties and the two affected states in Table 3-29. The number of jobs in the five-county planning area increased by almost one half between 1990 and 2000, with the largest increases occurring in the construction, services, finance, insurance, and real estate sectors. Employment increased in all sectors with the exception of mining and military sectors (U.S. Census Bureau 2005).

**Table 3-29**
**Employment by County in 2003**

| | La Paz | Maricopa | Yuma | Arizona | Imperial | Riverside | California |
|---|---|---|---|---|---|---|---|
| Total full-time and part-time employment | 7,390 | 1,918,748 | 76,606 | 2,874,989 | 64,206 | 719,804 | 19,681,012 |
| **Percentage of Total Employment** | | | | | | | |
| **By Type** | | | | | | | |
| Wage and salary employment | 79.9 | 83.7 | 88.8 | 82.7 | 85.4 | 77.2 | 80.4 |
| Proprietors employment | 20.1 | 16.3 | 11.2 | 17.3 | 14.6 | 22.8 | 19.6 |
| **By Industry** | | | | | | | |
| Farm employment | 4.5 | 0.4 | 4.9 | 0.8 | 10.2 | 1.9 | 1.7 |
| Nonfarm employment | 95.5 | 99.6 | 95.1 | 99.2 | 89.8 | 98.1 | 98.3 |
| Forestry, fishing, related activities, and other | (D) | 0.2 | (D) | 0.8 | 9.9 | 1.5 | 1.2 |
| Mining | (D) | 0.2 | (D) | 0.4 | 0.1 | 0.1 | 0.2 |
| Construction | 2.8 | 7.8 | 5.3 | 7.4 | 3.7 | 10.1 | 5.4 |
| Manufacturing | 3.2 | 7.4 | 2.9 | 6.7 | 4.0 | 7.5 | 8.8 |
| Transportation and warehousing | 1.9 | 3.2 | 1.8 | 2.8 | (D) | 2.2 | 2.8 |
| Wholesale trade | 1.6 | 4.4 | 2.5 | 3.6 | 3.0 | 2.8 | 3.7 |
| Retail trade | 18.0 | 11.4 | 9.8 | 11.6 | 12.3 | 12.1 | 10.2 |
| Finance and insurance | 0.9 | 6.7 | 1.6 | 5.3 | 1.9 | 3.0 | 4.5 |
| Other services except public administration | (D) | 4.7 | 3.7 | 5.1 | 5.3 | 6.3 | 6.0 |
| Government and government enterprises | 30.6 | 10.5 | 21.4 | 14.3 | 25.3 | 14.9 | 13.7 |
| Federal, civilian | 1.9 | 1.0 | 3.5 | 1.7 | 2.9 | 0.9 | 1.2 |
| Military | 0.5 | 0.6 | 5.6 | 1.2 | 0.7 | 0.3 | 1.2 |
| State and local | 28.2 | 8.9 | 12.3 | 11.4 | 21.7 | 13.7 | 11.2 |

*Source:* U.S. Bureau of Economic Analysis (2005)
*Note:* Full- and part-time employment includes self-employed individuals. Employment is measured as the average annual number of jobs, both full- and part-time, with each job that a person holds counted at full weight.
(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

The data presented in Table 3-29 are by place of employment, not place of residence, and, therefore include people who work in the area but do not live there. In the case of the border counties, this likely includes Mexican nationals who reside south of the border but work in the

U.S. Data compiled for 2001 indicated that there were 6.7 million border crossings at San Luis in Yuma County with approximately 20 percent of visitors entering Arizona to work (Charney and Pavlakovich-Kochi 2002).

In addition to workers who regularly commute to the U.S. to work, there are also undocumented migrant workers who may not be included in these official totals. There are no official estimates of the size of this population, but unofficial estimates developed by the Pew Hispanic Center have estimated there are as many as 500,000 undocumented migrants in Arizona. Nationwide, approximately 70 percent of undocumented migrants participate in the U.S. labor force, which suggests that there may be as many as 350,000 undocumented migrants working in Arizona (Passel 2005).

## B. ECONOMIC SECTORS

### 1. Yuma County

The retail and services industries (including retail trade; real estate, rental, and leasing services; arts, entertainment, and recreation; accommodation and food services; and other services) have become the highest employment industries in Yuma County, employing 18,891 full- and part-time workers in 2004. Personal income for these industries was $436,168,000 in 2004. Employment for these industries increased by 7.8 percent between 2003 and 2004 (U.S. Bureau of Economic Analysis 2005).

Government and government enterprises (including Federal and civilian, military, and State and local) were the second highest employers in Yuma County, employing 17,075 full- and part-time workers in 2004. Personal income for these industries was $849,810,000 in 2004. Employment for these industries increased by about one percent between 2003 and 2004 (U.S. Bureau of Economic Analysis 2005).

Agriculture and related activities were the third highest employers in Yuma County, employing 14,434 full- and part-time workers in 2004. Personal income for these industries was $275,006,000 in 2004. No data were available to determine the increase in these industries between 2003 and 2004 (U.S. Bureau of Economic Analysis 2005).

### 2. La Paz County

Government and government enterprises (including Federal and civilian, military, and State and local) were the highest employers in La Paz County, employing 2,362 full- and part-time workers in 2004. Personal income for these industries was $87,393,000 in 2004. Employment of these industries increased by about 0.27 percent from 2003 to 2004 (U.S. Bureau of Economic Analysis 2005).

The retail and services industries (including retail trade; real estate, rental, and leasing services; arts, entertainment, and recreation; accommodation and food services; and other services) were the second highest employment industries in La Paz County, employing about 1,700 full- and part-time workers in 2004. Personal income for these industries was $40,920,000 in 2004. Employment for these industries increased by about 0.27 percent between 2003 and 2004 (U.S. Bureau of Economic Analysis 2005).

Agriculture and related activities were the third highest employers in La Paz County, employing 619 full- and part-time workers in 2004. Personal income for these industries was $10,622,000 in 2004. No data were available to determine the increase in these industries between 2003 and 2004 (U.S. Bureau of Economic Analysis 2005).

## 3. Economic Activity Level in Yuma and La Paz Counties

Yuma County has a significantly larger level of economic activity than La Paz County (Table 3-30). In the 2000 to 2005 time period, gross product grew much faster in Yuma County than in La Paz County. Together the counties represent almost four billion dollars in economic activity.

**Table 3-30**
**Gross Product: Yuma and La Paz Counties, Arizona, 2000—2005**
**(Billions of Dollars)**

| County | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| La Paz | $0.28 | $0.28 | $0.29 | $0.30 | $0.30 | $0.31 |
| Yuma | $2.67 | $2.88 | $3.00 | $3.14 | $3.29 | $3.42 |

*Source:* Economy.com Inc., 2002
*Note:* Sum of all income produced in County including corporate profits.

## 4. Economic Profile for Yuma and La Paz Counties

Both La Paz and Yuma counties have shown growth in personal income, per capita income and average earnings per job in the 2000 to 2004 time period (Table 3-31). La Paz County showed very little population growth and only modest employment growth in the 2000 to 2004 time period. Yuma County exhibited much larger population and employment growth in the 2000 to 2004 time period. In terms of full-time employment equivalents, Yuma County showed steady growth while La Paz County appeared stagnant in the 2000 to 2005 time period.

**Table 3-31**
**Economic Profile: Yuma and La Paz Counties, Arizona 2000–2004**

| Category | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|
| **Personal Income (in thousands)** | | | | | |
| La Paz | $308,061 | $327,294 | $359,390 | $359,636 | $393,184 |
| Yuma | $2,653,830 | $2,976,395 | $3,312,998 | $3,284,477 | $3,563,282 |
| **Population (persons)** | | | | | |
| La Paz | 19,657 | 19,607 | 19,509 | 19,686 | 19,915 |
| Yuma | 160,753 | 163,452 | 166,693 | 170,518 | 175,629 |
| **Per Capita Income** | | | | | |
| La Paz | $15,672 | $16,693 | $18,422 | $18,269 | $19,743 |
| Yuma | $16,509 | $18,210 | $19,875 | $19,262 | $20,289 |
| **Total Full-time & Part-time Employment** | | | | | |
| La Paz | 7,461 | 7,182 | 7,331 | 7,389 | 7,778 |
| Yuma | 68,313 | 74,896 | 76,653 | 77,870 | 80,783 |
| **Average Earnings Per Job** | | | | | |
| La Paz | $25,833 | $25,221 | $28,803 | $27,608 | $29,351 |
| Yuma | $28,421 | $29,365 | $32,759 | $31,416 | $33,497 |

*Source:* Regional Economic Information System, Bureau of Economic Analysis, 2006

Although recently revised by the U.S. Department of Labor, the Yuma unemployment rate was quite high, more than doubling the rate found in La Paz County (Table 3-32).

**Table 3-32**
**Labor Data: Yuma and La Paz Counties, Arizona, 2000–2005**

| Category | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| **Employment** | | | | | | |
| La Paz | 7,124 | 6,533 | 6,703 | 6,850 | 7,024 | 7,003 |
| Yuma | 53,695 | 54,162 | 56,863 | 59,915 | 61,396 | 63,388 |
| **Unemployment Rate** | | | | | | |
| La Paz | 6.2% | 6.4% | 6.7% | 7.0% | 6.7% | 6.9% |
| Yuma | 16.5% | 16.4% | 16.7% | 16.8% | 15.6% | 16.0% |

*Source:* U.S. Department of Labor, Bureau of Labor Statistics (www.bls.gov), accessed on May 22, 2006.

Table 3-33 provides tax collection information from 2000 to 2005. Both net taxable income and total tax collections increased faster in Yuma than in La Paz County. Retail tax collection growth was fairly similar in the two counties. However, hotel/motel tax collection rate increases were much larger in Yuma County.

**Table 3-33**
**Gross Transaction Privilege, Use, and Severance Tax Collections:**
**Yuma and La Paz Counties, Arizona, Fiscal Year 2000–2001 through Fiscal Year 2004–2005**

| Category | FY2000-01 | FY2001-02 | FY2002-03 | FY2003-04 | FY2004-05 |
|---|---|---|---|---|---|
| **La Paz** | | | | | |
| Net taxable income | $165,512,813 | $190,062,464 | $160,384,941 | $196,553,151 | $209,764,823 |
| Total tax collections | $8,294,936 | $9,527,328 | $8,041,296 | $9,851,275 | $10,496,926 |
| Retail tax | $4,384,524 | $4,753,848 | $4,709,286 | $5,198,759 | $6,071,787 |
| Hotel/motel tax | $276,118 | $242,066 | $286,014 | $297,479 | $312,281 |
| **Yuma** | | | | | |
| Net taxable income | $1,536,749,125 | $1,560,215,050 | $1,651,429,348 | $1,846,049,133 | $2,180,324,626 |
| Total tax collections | $76,961,620 | $78,114,184 | $82,698,950 | $92,450,952 | $109,156,240 |
| Retail tax | $42,777,847 | $43,348,612 | $46,516,639 | $50,132,210 | $57,894,374 |
| Hotel/motel tax | $1,533,120 | $1,477,937 | $1,588,933 | $1,853,807 | $2,068,959 |

*Source:* Arizona Department of Revenue, 2004 Annual Report

## 5. Summary of Yuma and La Paz Counties IMPLAN Model

The IMPLAN Input-Output System was applied to economic conditions of Yuma and La Paz counties. IMPLAN enables the user to develop input-output models for regions comprising one or more counties, states, or zip code areas. An IMPLAN model is derived using software developed by the Minnesota Implan Group (MIG, Inc.), that uses the Bureau of Economic Analysis 1997 Benchmark Input-Output Study and incorporates the Bureau of Labor Statistics implicit output deflators from their Employment Growth model projections to get current model parameters. IMPLAN data is currently available by State, county, and zip code through calendar year 2003. These data are updated annually using Bureau of Economic Analysis Regional

Economic Information System and Bureau of Labor Statistics' *Covered Employment and Wages* (ES202) program data.

### 6. Agricultural Statistical Service and Other Local Area Data Sources

The IMPLAN data for La Paz and Yuma counties for 2003 detail 198 industries with 85,917 total employees, in an economy of 190,300 people in 94,197 households with an average household income of $38,398 and total personal income of $3.6 billion. For purposes of this study, the number of sectors of the model was reduced to 41, leaving the key sectors covering activities on BLM-administered lands disaggregated, and aggregating the remaining activities to broader North American Industry Classification System categories. The basic model structure and key statistics for the area are shown in Table 3-34. The model structure shows the distribution among 41 sectors: $6.4 billion in output, employment of 85,917, employee compensation of $2.47 billion, $448.3 million in proprietor earnings, $863.4 million in other property income, $224.8 million in indirect business taxes, and just over $4 billion in value added.

## C. POTENTIALLY AFFECTED INDUSTRIES

The following paragraphs provide an overview of the industries that could be affected by the proposed YFO RMP revision: livestock grazing, mineral resources, recreation, and agriculture. The land managed by BLM in the planning area, approximately 1.3 million acres, is distributed across five large counties, and comprises 6.7 percent of the total land area in these counties. As a result, the contribution of activities on BLM-administered land to the economies of these counties may be relatively small, especially in Maricopa, Riverside, and Imperial counties. This contribution may, however, be very important at the community level and especially for individuals who make all or part of their living from activities on or related to this land.

### 1. Livestock Grazing

Grazing fees and BLM grazing allotments are measured in terms of AUMs. For a cattle operation, an animal unit is defined as one cow with a nursing calf or its equivalent. An AUM is the amount of forage needed to sustain that cow and calf for one month. AUMs are authorized by BLM on an annual basis. Data compiled for the range analysis presented in this document indicate that BLM manages 16 allotments consisting of approximately 1.2 million acres and 23,907 AUMs, with BLM-administered land accounting for approximately 91 percent of the total acreage.

### 2. Mineral Resources

In terms of future development potential, the most important mineral resources in the planning area are aggregate (rock, sand, and gravel) and gold (hard rock). These commodities are currently in production (aggregate) or nearing production (gold) in several locations within the planning area. Uranium deposits and oil and gas potential are also present in the planning area. Existing mining activities and resource capabilities in the planning area are discussed in the Mineral Resources Section. Major existing aggregate operations are located approximately 13 miles northeast of Yuma along Highway 95 and near the Gila River channel. Potential future sources of aggregate include a former ADOT gravel pit located approximately 17 miles east of

**Table 3-34**
**Output, Value Added, and Employment in Yuma and La Paz Counties, Arizona, 2003 (in million dollars)**

| | Industry | Industry Output* | Employment | Employee Compensation* | Proprietor Income* | Other Property Income* | Indirect Business Tax* | Total Value Added* |
|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture, forestry, fish & hunting | 59.61 | 795 | 8.23 | 11.83 | 12.01 | 1.43 | 33.51 |
| 3 | Vegetable and melon farming | 616.36 | 3,440 | 96.57 | 202.43 | 166.63 | 7.87 | 473.50 |
| 8 | Cotton farming | 33.41 | 192 | 5.13 | 2.94 | 7.42 | 0.42 | 15.91 |
| 10 | All other crop farming | 85.93 | 412 | 6.64 | 17.39 | 25.23 | 2.27 | 51.53 |
| 11 | Cattle ranching and farming | 30.48 | 234 | 1.62 | 0.17 | 0.71 | 0.87 | 3.37 |
| 18 | Agriculture and forestry support activities | 303.16 | 16,320 | 282.61 | 21.68 | -69.41 | 2.96 | 237.83 |
| 19 | Other mining | 0.62 | 2 | 0.08 | 0.12 | 0.19 | 0.05 | 0.44 |
| 24 | Sand, gravel and stone | 21.20 | 202 | 7.02 | 1.28 | 6.39 | 0.63 | 15.33 |
| 30 | Utilities | 34.17 | 173 | 9.73 | 0.20 | 11.49 | 2.34 | 23.76 |
| 33 | Construction | 496.73 | 4,524 | 118.01 | 32.55 | 38.02 | 2.36 | 190.95 |
| 41 | Other new construction | 41.27 | 419 | 11.23 | 3.05 | 1.46 | 0.16 | 15.91 |
| 45 | Other maintenance and repair construction | 4.13 | 68 | 1.85 | 0.50 | 0.23 | 0.03 | 2.60 |
| 46 | Manufacturing | 679.26 | 3,059 | 99.93 | 10.47 | 32.33 | 3.66 | 146.39 |
| 390 | Wholesale trade | 198.87 | 1,954 | 78.94 | 5.76 | 33.83 | 32.72 | 151.26 |
| 391 | Transportation and warehousing | 172.12 | 1,569 | 66.49 | 12.12 | 21.59 | 4.51 | 104.72 |
| 401 | Retail trade | 288.74 | 5,256 | 132.52 | 10.48 | 41.45 | 41.56 | 26.00 |
| 405 | Food and beverage stores | 92.66 | 1,605 | 35.31 | 4.94 | 11.14 | 11.58 | 62.96 |
| 407 | Gasoline stations | 88.88 | 1,173 | 22.96 | 19.52 | 8.80 | 15.89 | 67.16 |
| 413 | Information | 200.78 | 930 | 44.54 | 1.47 | 25.85 | 3.46 | 75.32 |
| 425 | Finance and insurance | 109.03 | 978 | 26.99 | 2.82 | 40.01 | 1.73 | 71.55 |
| 431 | Real estate and rental | 180.23 | 1,256 | 20.58 | 27.26 | 56.99 | 14.88 | 119.71 |
| 437 | Professional- scientific and tech services | 110.42 | 1,396 | 38.47 | 14.05 | 6.84 | 0.95 | 60.31 |
| 451 | Management of companies | 16.58 | 126 | 6.78 | 0.10 | 1.93 | 0.15 | 8.96 |
| 452 | Administrative and waste services | 146.37 | 3,151 | 57.66 | 5.86 | 14.23 | 2.37 | 80.11 |
| 461 | Educational services | 12.52 | 245 | 6.36 | 0.03 | 0.14 | 0.30 | 6.85 |
| 464 | Health and social services | 463.75 | 6,584 | 212.90 | 21.38 | 26.28 | 2.99 | 263.56 |

**Table 3-34**
**Output, Value Added and Employment Yuma County, La Paz County, Arizona, 2003 (in million dollars) (cont.)**

| | Industry | Industry Output* | Employment | Employee Compensation* | Proprietor Income* | Other Property Income* | Indirect Business Tax* | Total Value Added* |
|---|---|---|---|---|---|---|---|---|
| 475 | Arts- entertainment and amusement | 9.00 | 201 | 0.50 | 0.84 | 0.48 | 0.08 | 1.89 |
| 478 | Recreation and gambling | 13.18 | 286 | 3.96 | 1.44 | 1.96 | 0.92 | 8.28 |
| 479 | Hotels and motels, including casino hotels | 24.86 | 506 | 8.93 | 1.09 | 5.14 | 2.47 | 17.63 |
| 480 | Other accommodations | 50.43 | 604 | 11.53 | 1.07 | 7.81 | 1.84 | 22.25 |
| 481 | Food services and drinking places | 188.73 | 4,421 | 58.80 | 1.13 | 15.55 | 8.66 | 84.14 |
| 482 | Other services | 197.75 | 4,752 | 81.89 | 12.30 | 11.63 | 7.37 | 113.19 |
| 496 | Other Federal government enterprises | 7.83 | 145 | 2.71 | 0.00 | 2.15 | 0.00 | 4.86 |
| 497 | State and local government passenger transit | 0.55 | 13 | 0.65 | 0.00 | -0.58 | 0.00 | 0.07 |
| 498 | State and local government electric utilities | 78.10 | 170 | 13.59 | 0.00 | 16.71 | 0.30 | 30.61 |
| 499 | Other State and local government enterprises | 64.27 | 340 | 17.86 | 0.00 | 2.79 | 0.01 | 20.66 |
| 500 | Government and non NAICs | 324.60 | 0 | 0.00 | 0.00 | 214.43 | 44.99 | 259.42 |
| 503 | State and local education | 288.67 | 8,006 | 252.40 | 0.00 | 36.27 | 0.00 | 288.67 |
| 504 | State and local non-education | 157.06 | 2,975 | 133.99 | 0.00 | 23.06 | 0.00 | 157.06 |
| 505 | Federal military | 263.55 | 4,913 | 261.89 | 0.00 | 1.67 | 0.00 | 263.55 |
| 506 | Federal non-military | 224.92 | 2,524 | 222.36 | 0.00 | 2.55 | 0.00 | 224.92 |
| | Totals | 6,380.72 | 85,917 | 2,470.21 | 448.30 | 863.39 | 224.80 | 4,006.69 |

Yuma, areas along the Gila River, and locations in the foothill terrace gravels on the west and east side of the Gila Mountains. Gold mining in the planning area has occurred since pre-Spanish times and continues today on both a small, recreational scale and on a (potentially) commercial scale. Recreational placer mining is a popular activity in the foothills and washes surrounding the Town of Quartzsite and in the foothill gravels on the flanks of the Gila Mountains. Potential commercial gold operations include the Verdstone and Copperstone properties, which have been mined in the past, and other nearby deposits. Silver, copper, lead, zinc, and uranium deposits or prospects are also present in the planning area.

Oil and gas exploration occurred in the southwestern corner of the planning area primarily during the 1980s. Twenty-six exploratory wells have been drilled in or near this area, with oil and/or gas shows in four of these wells.

The mining sector accounted for approximately 0.4 percent and 0.2 percent of total employment in Arizona and California in 2002, respectively (U.S. Bureau of Economic Analysis 2005). Mining employment data for La Paz and Yuma counties were last available for 1997, with mining accounting for 25 jobs and 61 jobs, respectively. Data for 1998 through 2002 are not available to avoid disclosure of confidential information. Mining accounted for 0.2 percent, 0.1 percent, and 0.1 percent of total employment in Maricopa, Imperial, and Riverside counties in 2002, respectively (U.S. Bureau of Economic Analysis 2005).

The mining sector is typically well paid. The average annual salary for the mining sector in Arizona was $39,959 in 2003, compared to an average annual state salary of $33,837 (Arizona Workforce 2005b).

### 3. Recreation

Arizona received an estimated 27.8 million domestic overnight visitors in 2003 (Arizona Office of Tourism 2004a). Approximately 2.62 million of these visits were to Arizona's west coast area, which extends along the Colorado River from Lake Havasu to Yuma and includes Yuma and La Paz counties, as well as parts of Maricopa, Yavapai, and Mohave counties (Arizona Office of Tourism 2004b). The average round trip distance traveled by domestic overnight visitors to the west coast area in 2003 was 1,096 miles, with Los Angeles, Phoenix, and San Diego accounting for 33 percent, 14 percent, and 10 percent of total visitors, respectively. Average expenditures per person per day were $78.79, with 81 percent of visitors staying one to three nights (Arizona Office of Tourism 2004b).

Visitors using the planning area include winter visitors who migrate to Arizona from October to March and live in self-contained mobile camping units, weekend visitors from southern California and the greater Phoenix metropolitan area, and local residents who visit for day-use activities on weekends and weekday evenings (USDOI BLM 1987a).

Popular recreation activities in the planning area include hunting, OHV and other motorized use, camping, rock hunting/collecting, fishing, photography, hiking, and wildlife viewing, among other uses (Tetra Tech 2004). Existing recreation opportunities and resource capabilities in the planning area are discussed in Section 3.13 Recreation. Developed recreation opportunities include two concession areas (Hidden Shores RV Village and Walters Camp) and nine recreation fee sites, including the La Posa LTVA, Imperial Dam LTVA, Betty's Kitchen Watchable

Wildlife Area and Interpretive Trail, and Ehrenberg Sandbowl Open OHV Management Area. The La Posa and Imperial Dam LTVAs are the most heavily used dispersed camping areas in the planning area. There are also 13 designated 14-day camping areas near the Town of Quartzsite on BLM-administered land. The 400-acre Ehrenberg Sandbowl OHV Area is designated as an Open OHV Management Area. Within the remainder of BLM-administered lands in the planning area, motorized travel is limited to existing roads, trails, and drivable washes within approximately 1,148,700 acres and closed to motorized travel on approximately 169,000 acres.

Recreation and tourism is not classified or measured as a standard industrial category and therefore, employment and income data are not specifically collected for this sector. Components of recreation and tourism activities are instead captured in other industrial sectors, primarily the retail sales and services sectors. The contribution of travel and tourism to a local economy and employment may, however, be generally assessed by assigning all or a portion of the economic impacts in other sectors to visitors. Employment in the arts, entertainment, and recreation and the accommodation and food services sectors accounted for 18 percent and 10 percent of total covered employment in La Paz and Yuma counties in 2003, respectively, compared to 11 percent statewide (Arizona Workforce 2005c). This provides a general indication of the relative importance of travel and tourism, but tends to overstate the total contribution because these totals also include employment supported by local spending in these sectors.

Employment in the recreation and tourism sector tends to be seasonal and relatively low wage, with a high proportion of the labor force self-employed. In Arizona in 2003, the average annual salary in the arts, entertainment, and recreation sector was $26,213, and in the accommodation and food services sector was $17,319. These salaries are low compared to the average annual state salary of $33,837 (Arizona Workforce 2005b).

A recent study of the economic importance of OHV recreation in Arizona estimated that OHV recreation supported approximately 459 and 1,094 full- and part-time jobs in La Paz and Yuma counties in 2002, respectively (Silberman 2003). These estimates are based on surveys of local residents and do not include non-residents or commercial operators. A similar study conducted for fishing and hunting found that fishing and hunting activities supported approximately 232 and 689 full- and part-time jobs in La Paz and Yuma counties in 2001, respectively (Silberman 2002). There is likely some overlap in these estimates, because some OHV users are driving an OHV to gain access to areas for hunting and fishing. These estimates do, however, provide an indication of the relative importance of these activities to La Paz and Yuma counties.

## 4. Lands and Realty—Agriculture

There were a total of 6,465 farms and ranches in the five-county planning area in 2002, with a total of 101 and 531 farms identified in La Paz and Yuma counties, respectively (USDA 2005). The overall value of agricultural products sold in the planning area's five counties was about four billion dollars. Market share data are not available for Yuma County. In the other four planning area counties, crops and livestock accounted for approximately 62 percent and 38 percent of total value, respectively. Crops accounted for approximately 99.3 percent of agricultural production by market value in La Paz County. Although market share data are not available for Yuma County, data on the number of farms suggest that crop production accounts for a large share of overall agricultural activity in the county with 84 percent of farms engaged in crop production in 2002 (USDA 2005).

Farms in the five-county planning area provided nearly 55,000 jobs in 2002, approximately three percent of total employment, compared to statewide averages of 1.3 percent in Arizona and 2.7 percent in California. Agricultural employment was relatively important in La Paz, Yuma, and Imperial counties, accounting for approximately 12 percent, 11 percent, and 13 percent of total full and part-time employment in 2002, respectively (Table 3-35). Employment in the agricultural sector is often seasonal or part-time and workers are often self-employed.

**Table 3-35**
**Agricultural Employment by County in 2002**

| State, County | Farm Employment | Percent of Total Employment |
|---|---|---|
| Arizona | 36,459 | 1.3 |
| La Paz* | 877 | 12.3 |
| Maricopa | 13,990 | 0.7 |
| Yuma* | 8,265 | 10.8 |
| California | 535,256 | 2.7 |
| Imperial | 8,438 | 13.1 |
| Riverside | 22,788 | 3.2 |
| Total Planning Area | 54,358 | 2.6 |

*Source:* U.S. Bureau of Economic Analysis (2005)
*RMP-related effects are most likely to occur in these counties, where the majority of the planning area lands are located. The data include covered and self-employed farm workers.

Farm income accounted for approximately one percent of total income in the five planning area counties in 2002, ranging from 0.1 percent in Riverside County to 7.3 percent in Imperial County in 2000 (Table 3-36). Farm income comprised approximately 6.8 percent and 5.7 percent of total income in La Paz and Yuma counties, respectively (Table 3-36). Farm income fluctuated as a percentage of total income in the five planning area counties in the 1990s. Adjusted for inflation, farm income in the five-county planning area decreased by 28.5 percent between 1990 and 2000, with the largest decreases, 52.7 percent and 41.6 percent, occurring in Imperial and La Paz counties (Table 3-36). Farm income increased slightly (4.7 percent) in Yuma County over the same period.

**Table 3-36**
**Agricultural Income by County in 1990 and 2000 (in thousands)**

| | 1990 | | 2000 | | | |
|---|---|---|---|---|---|---|
| County | Agriculture | Farming as Percent of Total Income | Agriculture | Farming as Percent of Total Income | Absolute Change | Percent Change 1990 to 2000 |
| La Paz* | 35,632 | 19.6 | 20,815 | 6.8 | -14,817 | -41.6 |
| Maricopa | 256,893 | 0.6 | 278,269 | 0.3 | 21,376 | 8.3 |
| Yuma* | 143,551 | 9.7 | 150,338 | 5.7 | 6,787 | 4.7 |
| Imperial | 391,129 | 22.0 | 185,101 | 7.3 | -206,028 | -52.7 |
| Riverside | 29,458 | 0.1 | 35,339 | 0.1 | 5,881 | 20.0 |
| Total | 354,290 | 1.6 | 253,397 | 0.7 | -100,893 | -28.5 |

*Source:* U.S. Bureau of Economic Analysis (2005)
*RMP-related effects are most likely to occur in these counties, where the majority of the planning area lands are located.

# 3.20 ENVIRONMENTAL JUSTICE

U.S. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 CFR 7629, 16 February 1994) directs Federal agencies to "make … achieving environmental justice part of its mission" and to identify and address "…disproportionately high and adverse human health or environmental effect of its programs, policies, and activities on minority and low-income populations." BLM IM No. 2002-164 confirms that "BLM will incorporate environmental justice considerations in land use planning alternatives to adequately respond to environmental justice issues and problems facing minority populations, low-income communities, and Tribes living near public lands, working with, and/or using public land resources."

## 3.20.1 METHODOLOGY

Pursuant to IM No. 2002-164, this section identifies possible minority, low-income, or Tribal populations that might be subject to disproportionately high and adverse environmental impacts or health effects from activities proposed in the planning area. The areas of potential effect for environmental justice are Yuma, La Paz, and Maricopa counties in Arizona; and Imperial and Riverside counties in California.

The first step in analyzing this issue is to identify minority, low-income, and Tribal populations that might be affected by implementation of any of the proposed alternatives. Demographic information on ethnicity, race, and economic status is provided in this section as the baseline against which potential effects of future land use decisions can be identified and analyzed. Information utilized in this section is directly from the U.S. Census Bureau which provides necessary data for environmental justice analysis.

## 3.20.2 BASELINE ANALYSIS

### A. MINORITIES

Minorities are persons of Hispanic or Latino origin of any race, Blacks or African Americans, American Indians or Alaska Natives, Asians, and Native Hawaiian and other Pacific Islanders. Compilation information on minority populations is presented in Table 3-37.

The CEQ identifies these groups as minority populations when either:

- The minority population of the affected area exceeds 50 percent; or
- The minority population percentage in the affected area is meaningfully greater than the minority population percentage in the general population or appropriate unit of geographical analysis.

In order to be classified as "meaningfully greater," a local population must exceed the State minority population by 10 percent; in the State of Arizona, this threshold is 36.2 percent.

Because the minority population in California exceeds 50 percent (53.3 percent), the latter condition is not applicable for California counties.

**Table 3-37**
**Minority Populations in 2000**

| | County | | | | |
|---|---|---|---|---|---|
| **Minority Populations** | **Yuma AZ** | **La Paz AZ** | **Maricopa AZ** | **Imperial CA** | **Riverside CA** |
| Total Population | 160,026 | 19,715 | 3,072,149 | 142,232 | 1,545,387 |
| White not of Hispanic/ Latino origin (%) | 44.3 | 63.8 | 66.2 | 20.2 | 51.0 |
| Minority, composed of* (%) | 55.7 | 36.2 | 33.8 | 79.8 | 49.0 |
| Hispanic or Latino origin (%) | 50.5 | 22.4 | 24.8 | 72.2 | 36.2 |
| American Indian or Alaska Native (%) | 1.6 | 12.5 | 1.8 | 1.9 | 1.2 |
| Black or African American (%) | 2.2 | 0.8 | 3.7 | 4.0 | 6.2 |
| Asian (%) | 0.9 | 0.4 | 2.2 | 2.0 | 3.7 |
| Native Hawaiian and other Pacific Islander (%) | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 |

*Source:* U.S. Census Bureau, 2002, State and County *Quick Facts.* Available online at http:quickfacts.census.gov/qfd/states.html
*Totals may not add up due to reporting classifications.

Minority populations in Yuma County, Arizona, and Imperial County, California, both exceed 50 percent of the total population, meeting the CEQ standard for having a minority environmental justice population. Throughout the planning area, persons of Hispanic or Latino origin constitute the largest portion of the minority population, which is consistent with the planning area location near the Mexican border. La Paz County, Arizona, has a large percentage of American Indian or Alaska Native persons (see Tribal populations below).

## B. LOW INCOME POPULATIONS

Low-income populations are defined by environmental justice guidance by using the statistical poverty thresholds of the U.S. Census Bureau. In 1999, the poverty-weighted average threshold for a family of four was $17,029 and $8,501 for an unrelated individual (U.S. Census Bureau 2001). The national poverty level was 12.4 percent. In order to be classified as “meaningfully greater,” local poverty rates must exceed the national rate by 10 percent; this threshold is 22.4 percent. Imperial County, California, meets this standard with 22.6 percent of its population living below the poverty limits. Compilation information on low-income populations is presented in Table 3-38.

**Table 3-38**
**Low-Income Populations in 1999**

| Jurisdiction | Percent Below Poverty Level |
|---|---|
| United States | 12.4 |
| State of Arizona | 13.9 |
| Yuma, AZ | 19.2 |

**Table 3-38**
**Low-Income Populations in 1999 (cont.)**

| Jurisdiction | Percent Below Poverty Level |
|---|---|
| La Paz, AZ | 19.6 |
| Maricopa, AZ | 11.7 |
| State of California | 14.2 |
| Imperial, CA | 22.6 |
| Riverside, CA | 14.2 |

*Sources:* U.S. Census Bureau 2001, U.S. Census Bureau 2002

## C. TRIBAL POPULATIONS

Tribal populations are defined as groups of individuals who live within the boundaries of designated reservations. The planning area contains three Native American tribal reservations.

The CRIT Reservation is located in the northwestern corner of the planning area. The reservation spans the Colorado River and contains land in La Paz County, Arizona, and San Bernardino County, California. The CRIT economy is centered around agriculture, recreation, as well as government and light industry. According to the InterTribal Council of Arizona, the CRIT have senior water rights to 717,000 acre feet of the Colorado River, which is almost one-third of the allotment for the entire State of Arizona (InterTribal Council of Arizona 2003). The river is also the tribes' greatest recreational resource offering scenic attractions as well as fishing and boating opportunities. The CRIT operate the Ahakhav Preserve, a 250-acre aquatic and riparian habitat preserve which offers hiking and wildlife viewing. The BlueWater Resort and Casino opened in 1999. In 2000, 1,998 people lived within the reservation boundaries, of whom 1,707 identified themselves as full members of the CRIT. Twenty-seven percent of the CRIT residents were classified as living below the poverty level (U.S. Census Bureau 2004).

The Cocopah Reservation is located south of the City of Yuma (Yuma County) in the southwest corner of the planning area boundary just east of the Colorado River. Agriculture is the tribe's major economic resource, farming on its irrigated lands and leasing farmland to non-Indian farmers. The tribe opened a tribal museum and cultural center in 1999 and operates a casino with slot machines and bingo. In 2000, approximately 1,013 people lived within the reservation boundaries, of whom 891 identified themselves as full members of the Cocopah Tribe. Almost 35 percent of the reservation residents were classified as living below the poverty limits (U.S. Census Bureau 2004).

The Fort Yuma–Quechan Reservation is located along both sides of the Colorado River just west of the City of Yuma, in Yuma County, Arizona and Imperial County, California, as well as abutting the Mexican states of Baja California and Sonora. The reservation encompasses 45,000 acres and is bisected by Interstate 8 mid-way between Phoenix, Arizona, and San Diego, California. Largely an agricultural community, the Quechans lease a 700-acre farm and a sand-and-gravel operation to non-Indian businesses. The tribe also counts on tourism and related businesses to augment its economy. In addition to trailer and RV parks and a small museum, the tribe recently developed a casino. In 2000, 2,761 people lived within the reservation boundaries, of whom 2,146 identified themselves as full tribal members. Approximately 25 percent of the

residents on the reservation were classified as living below the poverty level (U.S. Census Bureau 2004).

## 3.20.3 PUBLIC INVOLVEMENT AND ENVIRONMENTAL JUSTICE

Public involvement meets two requirements of EO 12898:

- It aids in identifying minority and low-income groups; and,
- It provides the means for these groups to participate in Federal decision making that might affect them.

A full description of the public involvement process is located in the Scoping Report. Persons and organizations known or thought to have a potential interest, including minority, low-income, disadvantaged, and Native American groups, were identified, informed, and given the opportunity to participate in the decision-making process.

## 3.20.4 SUMMARY

Environmental justice populations exist throughout the planning area, specifically in Yuma County, Arizona, and Imperial County, California, as well as on the three reservations. Impacts of the of the PRMP alternatives analyzed in this FEIS will be evaluated for disproportionately high and adverse environmental impacts or health effects from activities and land use decisions proposed in the planning area.

No environmental justice-specific issues were raised during the scoping process, although there were several issues raised about the International Border and undocumented immigrants.

## 3.20.5 PROTECTION OF CHILDREN

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997) recognizes a growing body of scientific knowledge that demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because (1) children's bodily systems are not fully developed, (2) children eat, drink, and breathe more in proportion to their body weight, (3) their size and weight may diminish protection from standard safety features, and (4) their behavior patterns may make them more susceptible to accidents. Based on these factors, the President directed each Federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

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