

AGUA FRIA

WATERCOURSE MASTER PLAN

Ecological Evaluation of the Lower Agua Fria River Corridor New Waddell Dam to Confluence with Gila River

Prepared for



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Ecological Evaluation of the Lower Agua Fria River Corridor New Waddell Dam to Confluence with Gila River

Prepared for:

Flood Control District of Maricopa County

2801 W. Durango Street

Phoenix, Arizona 85009

As part of the Agua Fria Watercourse Master Plan

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1.0 Introduction

This Technical Report has been prepared in support of the environmental evaluation of the approximately 32-mile reach of the lower Agua Fria River included in the Agua Fria Watercourse Master Plan (**Figure 1**). The Technical Report evaluates the existing floral and faunal resources within and immediately adjacent to the Agua Fria River channel. This report is one of numerous reports prepared in support of the evaluation and development of the watercourse master plan. A summary of the Technical Reports and an evaluation of the potential impacts of the proposed project are included in the Environmental Assessment Document for the Agua Fria Watercourse Master Plan.

This report includes a general description of the Study Area in Section 2.0, the methodology utilized to evaluate the area in Section 3.0, the results of the evaluation in Section 4.0, and a summary in Section 5.0. Included, as appendices are various references and documentation of coordination with resource agencies.

2.0 General Description

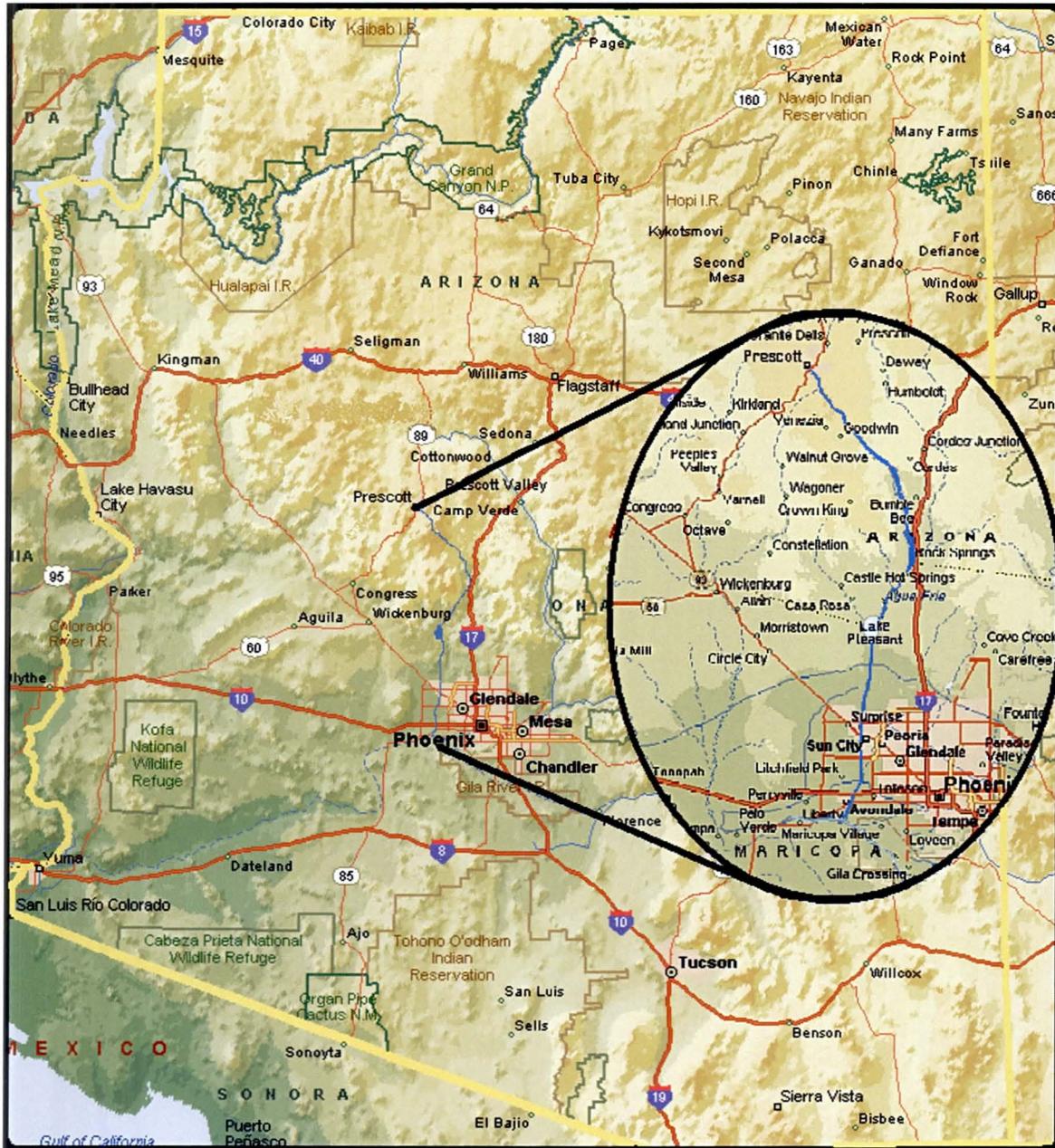
The Agua Fria River watershed extends from near Prescott, Arizona to the confluence of the Gila River south of the Metro-Phoenix area. The approximately 2250-square mile watershed has varied topography, soils and vegetation characteristics and has been altered by land management activities. The upper 65-mile portion of the watershed includes a portion of the Bradshaw Mountains and Granite Dells area, where elevations are approximately 5000 feet above mean sea level (MSL). Vegetation and land use varies but is typically high to mid elevation arid vegetation with agricultural and residential/commercial uses. Portions of this reach of the channel are perennial and others are intermittent. This portion of the watershed discharges into Lake Pleasant, the reservoir formed behind New Waddell Dam

Below New Waddell Dam the Agua Fria River channel is primarily ephemeral (the reach immediately below the dam is intermittent based on discharge from Morgan City Wash.). Under all but the extreme flood condition, there is no discharge from Lake Pleasant to the lower reach of the channel. This reach of the Agua Fria traverses an area that has undergone more extensive development than the upper reach. This report details the results of the evaluation of the lower portion of the Agua Fria River channel from New Waddell Dam to the confluence with the Gila River (**Figure 2**).

For purpose of this report, the Agua Fria Watercourse Master Plan study area was divided into three reaches. The three reaches are:

- 1) **Upper Reach:** New Waddell Dam south to approximately Bell Road
- 2) **Middle Reach:** Bell Road to New River confluence
- 3) **Lower Reach:** New River confluence to Gila River confluence

See **Figure 3** for an illustration of the reach areas.



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FIGURE 1
Agua Fria River Watershed

WEST VALLEY RECREATION CORRIDOR
 AGUA FRIA WATERCOURSE MASTER PLAN
 ECOLOGICAL EVALUATION



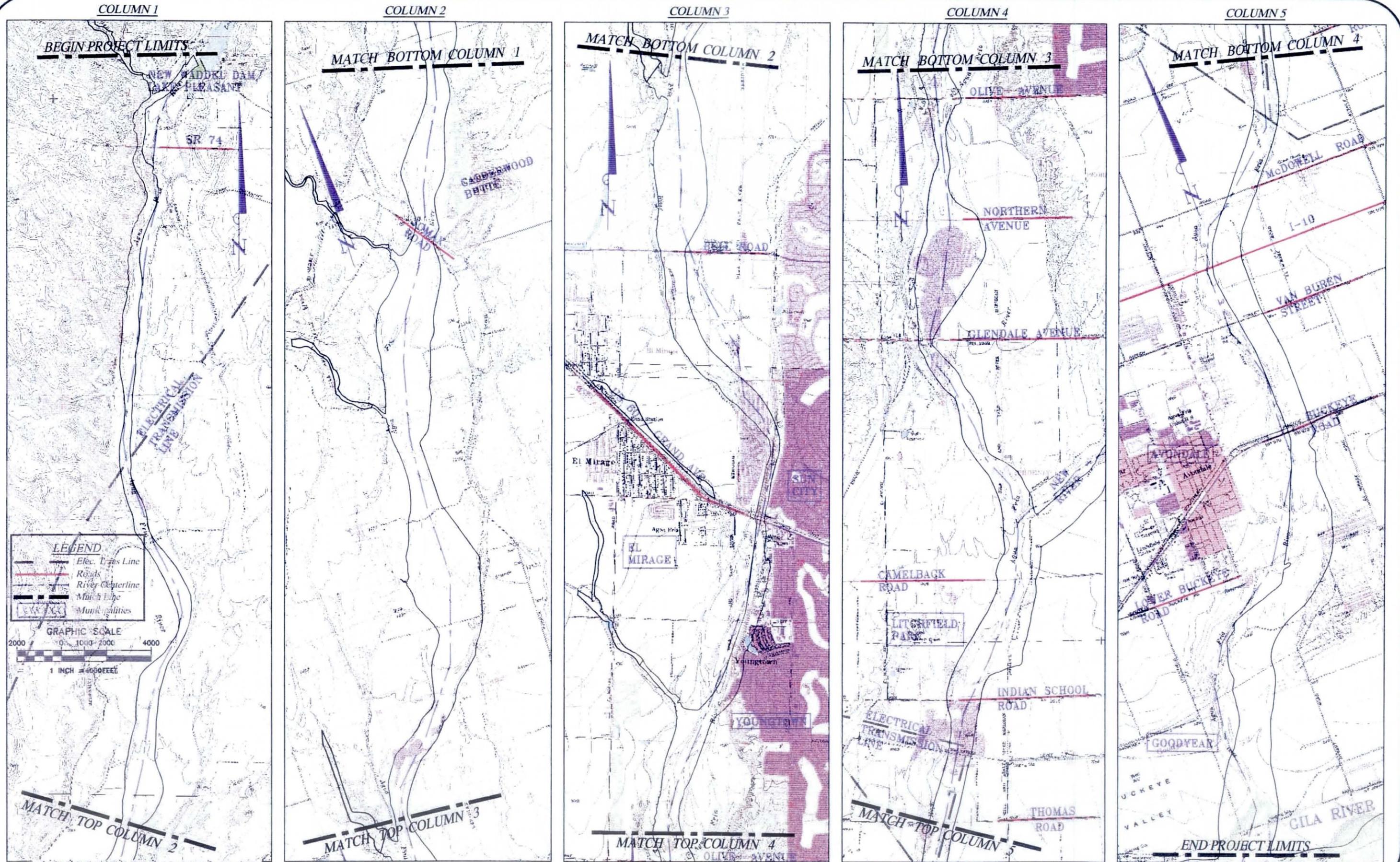


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FIGURE 2
Agua Fria River Study Corridor

WEST VALLEY RECREATION CORRIDOR
 AGUA FRIA WATERCOURSE MASTER PLAN
 ECOLOGICAL EVALUATION







3.0 General Methodology

The following describes the general methodology used for the evaluation of the flora and fauna resources of the Agua Fria Watercourse Master Plan study corridor. Specific methodologies for floristic evaluations or for protected species surveys are noted in their representative section.

Prior to conducting on-site field evaluations, available data pertaining to the site was collected and reviewed. The data included environmental and engineering documents and studies previously prepared for the site, soil surveys, United States Geologic Survey (USGS) topographic quadrangles, water resource reports, vegetation guides, and available habitat data. A listing of protected species for Maricopa County was obtained from the United States Fish and Wildlife Service (USFWS) and a description of habitat requirements for these species was developed from published sources.

The boundaries of the study area were loosely established based on land use, vegetation patterns, geographic features and topography. Generally, the study area was considered to encompass the surrounding area that contained similar landscape and/or land use. Boundaries were then loosely based on physical features in the surrounding landscape that were thought to present a physical barrier to either vegetation communities or area wildlife. As an example, subdivisions or aggregate mining sites would be considered a significant feature and could be used as a study area boundary. (Note: Aggregate mining sites within the channel were not used to establish the study corridor boundaries.) Barbed wire fences and dirt access roads were not normally considered significant physical impediments to wildlife and vegetation.

In some cases, the field reconnaissance team established transects across the river channel or across some other significant area feature. The location of transects was based on standard ecological evaluation techniques coupled with the specific survey requirement of the species or community under investigation (see the protected species section of this document). Aerial photography and the results of the initial field reconnaissance were used to identify potential vegetation communities, land uses, and topographical changes that might indicate varying biotic conditions.

Transect locations were only developed for specific areas within the study area that exhibited some significant attribute. As an example, several transects were established in the northern-most portion of the Upper Reach of the corridor in the cottonwood willow vegetation areas to determine extent and integrity of the remnant community. Additional transects were established in areas around I-10 and along the Gila confluence. The remaining property considered within the study area was not assigned transects but was evaluated based on pedestrian or vehicular reconnaissance. Where access was restricted (i.e., private property or rough terrain), areas were evaluated with binoculars, aerial photography, or other non-intrusive methods.

Pedestrian meander surveys were chosen as an adequate methodology to determine the approximate location of various vegetation communities, to provide a representative sampling of cover densities, and to determine general non-inclusive species composition. In the areas with established survey transects the meander surveys were conducted utilizing the transect as a guide. The observer meandered back and forth across the established transect centerline to provide the desired meander coverage.



In the field, each transect or meander survey was established by designating visibly predominate landmarks (large trees or cacti, boulders, wash bottoms, hilltops, or other visibly dominate objects) at each end of the transect line. Field personnel then conducted a pedestrian survey that meandered back and forth across the approximate transect line. Additionally, if the scientist noted a specific location that was significantly different than the surrounding area, it was then evaluated. This methodology provides an efficient overall evaluation of the large-scale sites without ignoring potentially significant areas.

Field personnel recorded species identified during the reconnaissance, the approximate density of cover, and the general health condition of the vegetation. Growth patterns (i.e. clumped, spaced, linear, concentric rings etc.) were noted where applicable. Visible signs of physical disturbance were also noted. This information, along with landscape positioning and adjacent activity, was utilized to develop a qualitative projection of habitat type and functional value. This type of transect also provides a generally representative sampling of the study area wildlife species by identification of animal sign or visible sighting. Wildlife species sighted during the transect surveys were identified and noted in field books or aerial photography and the noted activity of the individual was recorded (i.e. foraging, resting, nesting, traveling etc.). Additionally, a limited blind survey was conducted to aid in developing an estimate of wildlife populations in the study area. The methodology for the blind survey is described later in this section. In the absence of an accepted survey methodology for a specific wildlife species or habitat type, this methodology yields a representative sample of habitat and occupation within the river corridor and the immediately surrounding area.

Identification of wildlife sign included noting size, shape, and positioning of animal burrows, identification of scat, identification of carrion or skeletal remains, tracks, rubs, nests, or other visibly evident indications of inhabitation or transient occupation. The density and location of the wildlife sign was recorded in field books or on aerial photography. The type of sign, its location, and its abundance were considered indicators of the type or degree of usage that the site received.

As an example, if animal tracks for a coyote were identified in a single area and were limited to a trail that traversed the area, then it was assumed that the species was transient to the study area. If the coyote tracks were sighted in several areas, appeared to meander around the site, and were obviously formed at different times, the coyote was assumed to be at least a part-time forager of the study area. If further evidence, such as signs of opportunistic feeding on carrion, skeletal remnants of apparent coyote kills, or suspected dens were noted, then the coyote was assumed to be at least a part-time site resident. This type of evaluation is always subjective since there is seldom a preponderance of evidence to completely affirm the assessment. In cases in which the evidence was inconclusive, this assessment conservatively assumes the species is present as more than just a transient on the site.

In an attempt to further identify potential wildlife habitation, a series of limited blind surveys were also conducted at various times during the season. The blind surveys were not always conducted from areas of complete concealment, but were always done from behind stands of native vegetation or boulders or from areas where topographic relief and distance provided some level of cover.



Locations for the blind surveys were chosen randomly from areas that provided an exceptional viewshed (such as the higher areas in the northern portion of the Study Area). Additional areas where specific field conditions were present that were conducive to wildlife activity (such as the confluence of the Gila and Agua Fria channels) were also evaluated with blind surveys.

Time limits for the blind surveys varied from less than 15 minutes to approximately 60 minutes. The diurnal timing of the surveys varied. At least one early morning (within one hour of dawn) and one dusk (within one hour of sunset) survey was conducted at the Gila confluence, the George's Pond area and at the I-10 Bridge site (**Figure 4**). Dusk and dawn blind surveys were also conducted in some of the high bluff areas of the northern portion of the corridor. The observer utilized binoculars to view the corridor. Species observed during this time period were identified and their behavior and apparent purpose (i.e. foraging, nesting, traveling) were noted. The various wildlife surveys were adjusted to avoid, to the extent practical, hikers/ recreational users and industrial activity.

Study results were recorded on aerial photography, topographic maps, field data books, or species survey forms, if appropriate. Approximate locations of specifically identified vegetation communities, wildlife habitat, landforms, or other noteworthy features were noted and are presented in Figure 4. Vegetation communities were identified, non-inclusive species lists were developed, and the communities' approximate boundaries were delineated. A listing of wildlife species was compiled. The wildlife species list includes species that were sighted or for which a sign was identified.

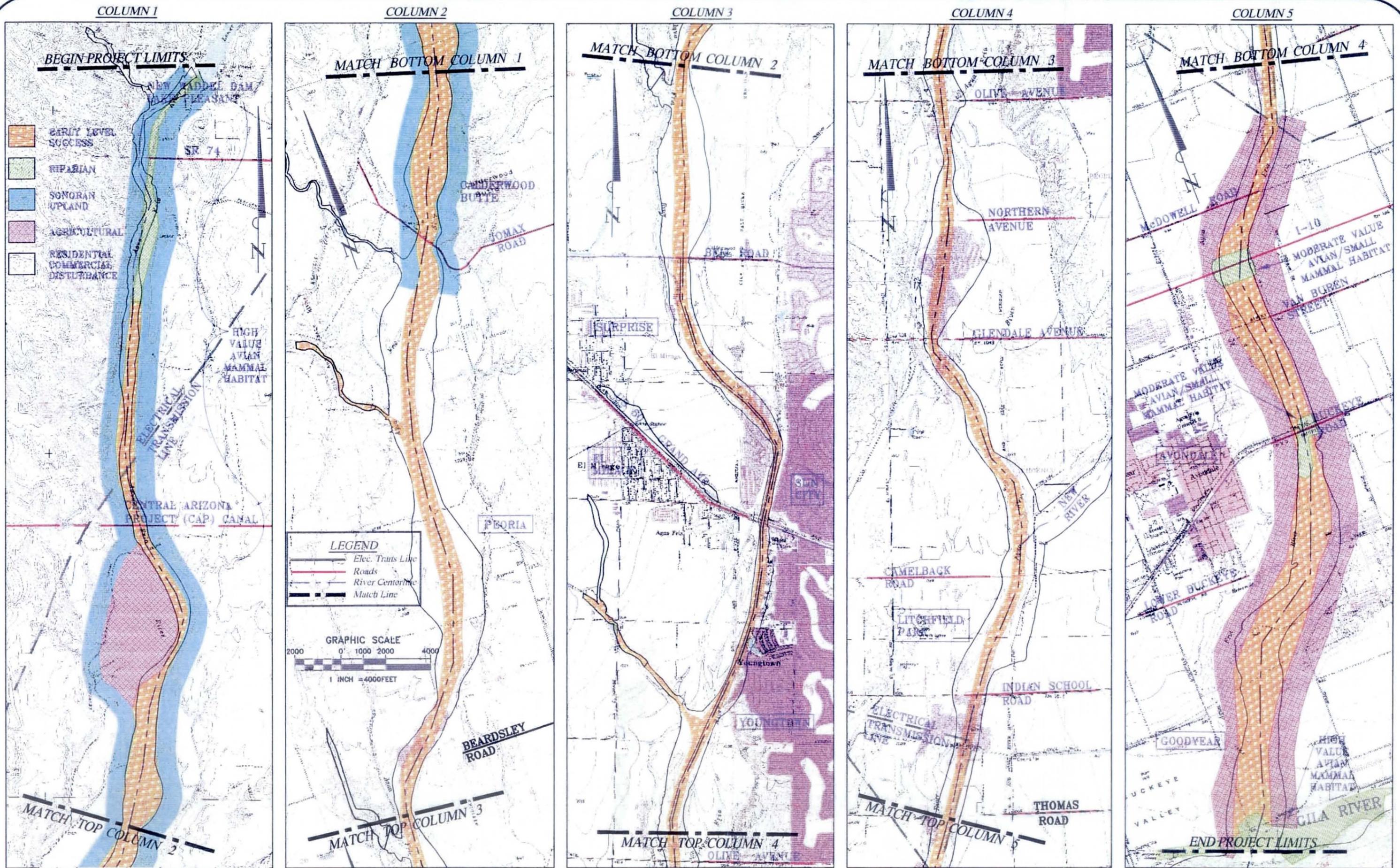
4.0 Project Corridor Existing Conditions

The following is a description of the existing biological resources noted during the field evaluation of the Agua Fria Study Corridor (New Waddell Dam to the confluence with the Gila River). The evaluation includes a description of the various vegetation communities, wildlife habitat, potential for protected species, and an evaluation of the jurisdictional status and functional value of identified waters of the United States.

4.1 Vegetation

Topography, soils, hydrology and land management practices in combination have affected the vegetation patterns within the Agua Fria River Corridor. The vegetation communities range from riparian to agricultural, and all have been affected by past activity. The vegetation analysis included an evaluation of black and white aerial photography to determine vegetation and land use patterns. The aerial photographic interpretation was verified with a series of field reconnaissances conducted in late autumn, mid-spring, and late summer. The field reconnaissances were timed to compensate for seasonal variation in the vegetation conditions and moisture regimes.

The evaluation identified both physiognomy of the vegetation and floristic values. The physiognomic evaluation concentrated on identifying vegetation patterns or patches that repeated over the landscape to form landscape sized vegetation communities. The floristic evaluation identified the taxonomic value of the specific vegetation community by identifying specific taxonomic species within the community.



This approach to vegetation evaluation is readily correlated to wildlife habitat potential and provides for a relatively detailed description of vegetation communities.

The evaluation of the Agua Fria River corridor identified five general categories of vegetation communities:

- Early Level Successional
- Sonoran Upland
- Agricultural
- Commercial/Residential
- Mesic/Hydric Riparian

Several of the vegetation communities are a function of land use and are named accordingly. Each community is composed of several physiognomic and floristic groups and several communities share numerous common species. The communities identified along the corridor are noted below in addition to a brief description of the community and a non-inclusive species list.

A brief discussion of some of the major forces affecting the community is also included. Figure 4 illustrates the general locations of the various communities. Small inclusions of each of the different communities are interspersed along the corridor and within areas mapped as a different community.

Early Level Successional Community

The Early Level Successional Community is located within the low terrace banks of the Agua Fria River channel from south of the State Route 74 Bridge crossing to near the confluence with the Gila River. This area generally encompasses the majority of the braided sub-channel system of the “active Gila River channel”. The channel system varies in width from several hundred feet to over a thousand feet. Historical aerial photography and narratives suggest that this community, or variations of it, has been in place for at least 75 to 100 years. Some accounts suggest the early community contained more large growth woody species. While the existing community is relatively heterogeneous throughout the corridor, it is broken in several places by sand and gravel mining activity and infrastructure intrusions. Species composition changes slightly from area to area, but remains generally early successional vegetation. It is also interspersed with small inclusions of the mesic/hydric riparian community in several areas. Very small inclusions of the Early Level Successional Community are located in areas of recent or continued disturbance outside of the channel.

The community is generally composed of ruderal, invasive or early level successional species with isolated inclusions of mid-level successional species. The Early Level Successional Community has a low-floristic value because most of the species represented are not habitat specific. The Early Level Successional Community is dominated by annual/perennial herbaceous and low-growth shrub species. Many portions of the low-flow channels are barren and others exhibit dense stands of snakeweed or rabbitbrush. Ground cover density varies greatly, primarily as a function of substrate and moisture. Areas of increased moisture have greater densities and some moist areas are nearly 100 percent covered. Canopy cover is very limited, except for occasional areas of tamarisk.



The vegetation community development appears to be, in large, a function of the unique landforms of the occasionally active Agua Fria channel. The low terrace channel is a series of very braided, low-flow sub-channels separated by narrow islands of slightly higher elevation. These interfluvial islands can withstand isolated low-flow events but are susceptible to scour during prolonged or moderate volume flows. Thus, the interfluvial areas may exhibit more advanced vegetation structure than the surrounding low-flow channel. In areas of recent or repeated disturbance the vegetation community is dominated by annuals or is barren. Typical events that cause disturbance of the vegetation are recent flow events, off road vehicle (ORV) tracks, and mining operations. Thus, the community is interspersed with inclusions of annual vegetation and areas of more established (but still early level successional) vegetation.

The Early Level Successional community forms ecotones with several of the upland communities located along the middle and upper terrace banks of the channel. The transition zone between this community and the adjacent communities is normally relatively abrupt (less than 10 feet wide in most cases). It is driven by the moisture regime (for the mesic/hydric riparian community), by the development of hard-pack desert soils along the terrace banks or by disturbance history. Some areas, particularly areas within the channel itself, exhibit more gradual zones.

Table 1 is a non-inclusive vegetative species list for the early-level successional community. Some of the species listed are transitional to the various other vegetation communities. The community includes many other annual and short-lived perennials that are not included in Table 1.

Table 1. Early Level Successional Community

Common Name	Scientific Name	Comment
Trees		
Mesquite	<i>Prosopis</i> spp.	Scattered along margins of ephemeral wash tributaries
Saltcedar	<i>Tamarix</i> spp.	Invasive species, dominate in some areas
Cottonwood	<i>Populus fremontii</i>	Native, at margins of mesic/hydric areas
Shrubs		
Saltbush	<i>Atriplex</i> spp.	Throughout corridor (T/O)
Burrobush	<i>Hymenoclea monogyra</i>	Scattered T/O, primarily on interfluves
Desert broom	<i>Baccharis sarothroides</i>	Scattered T/O
Brittlebush	<i>Encelia farinose</i>	Scattered T/O, primarily on interfluves
Rabbitbrush	<i>Chrysothamnus nauseosus</i> or <i>C. viscidiflorus</i>	Native perennial, T/O
Bursage	<i>Ambrosia dumosa</i>	Primarily as transition species to Sonoran Upland community in southern upper and middle reaches. Associated with creosotebush
Creosotebush	<i>Larrea tridentata</i>	Mainly as transitional species to middle reach Sonoran Upland community. Scattered occurrence in other areas
Apache plume	<i>Fallugia paradoxa</i>	Native, Scattered T/O
Winter fat	<i>Eurotia lanata</i>	Native, Scattered T/O



Table 1. Early Level Successional Community (con't.)

Common Name	Scientific Name	Comment
Herbaceous		
Broom Snakeweed	<i>Gutierrezia sarothrae</i>	Native perennial, primarily in central corridor forming dominant community.
Tumble pigweed	<i>Amaranthus albus L.</i>	Native annual, T/O
Annual bursage	<i>Ambrosia acanthicarpa</i>	Native annual, T/O
Knapweed	<i>Centaurea spp.</i>	Introduced invasive biennial, isolated T/O corridor
Quackgrass	<i>Elytrigia repens</i>	Scattered in moist areas and along disturbed areas
Cudweed	<i>Gnaphalium palustre</i>	Annual, in moist areas
Pineapple-weed	<i>Matricaria matricariodes</i>	Scattered in isolated areas
Cocklebur	<i>Xanthium stumarium L.</i>	Native annual, isolated T/O corridor
Creeping bellflower	<i>Campanula rapunculoides L.</i>	Perennial, middle and lower
Nettleleaf goosefoot	<i>Chenopodium murale L.</i>	Introduced annual, T/O corridor
Halogeton	<i>Halogeton glomeratus</i>	Introduced annual
Yellow nutsedge	<i>Cyperus esculentus L.</i>	Introduced perennial, in moist areas
Horsetail	<i>Equisetum arvense L.</i>	Native perennial, in moist areas
Rush	<i>Juncus spp.</i>	Native perennial in moist areas
White horehound	<i>Marrubium vulgare L.</i>	Introduced perennial, T/O
Brome grass	<i>Bromus spp.</i>	Perennial, Scattered T/O (generally non-native)
Bermudagrass	<i>Cynodon dactylon</i>	Introduced perennial, T/O in moist areas
Saltgrass	<i>Distichlis spicata</i>	Perennial, at drainage outlets and grade control structures
Mexican sprangletop	<i>Leptochloa uninervia</i>	Annual, in wet areas.
Bush muhly	<i>Muhlenbergia porteri</i>	Along margins w/Sonoran upland vegetation in upper reach
Dallisgrass	<i>Paspalum dilatatum</i>	Introduced perennial, in moist areas

Sonoran Upland Community

The adjacent overbanks of the Agua Fria River channel form an important vegetation and habitat component of the corridor. These areas are vegetated with species typical of open-range desert communities found in the valley and foothills of the Phoenix- metro area. The corridor traverses an area that contains two of the major subdivisions of the Tropical-Subtropical Desert land vegetation communities as described in *Biotic Communities Southwestern United States and Northwestern Mexico* (Brown 1994). In general, the northern portion of the corridor is considered part of the Arizona Upland Subdivision, Paloverde – Cacti – Mixed Scrub Series (also considered thornscrub) and is located on alluvial fans and bajadas along the channel. The lower portion of the river corridor, along the valley floor is considered part of the Lower Colorado River Valley Subdivision, Creosotebush – White Bursage Series and Saltbush Series. These are noted as KO41 - Creosotebush, KO42 - Creosotebush/Bursage and



KO43 — Paloverde/cactus shrub in the Kuchler Plant Association nomenclature (Kuchler 1964). This vegetation community has a high floristic value and provides excellent wildlife habitat.

Tree species (paloverde) and succulent species dominate the Arizona Upland Subdivision, while the Lower Colorado River Valley community is dominated by creosotebush and bursage. The difference in vegetation is a function of moisture, elevation, and aspect. Both communities have sub divisions that are very similar. The margins of these two communities are not well defined, and boundaries are indistinct. The resulting ecocline between the two communities is normally quite wide and easily encompasses the entire study corridor. Additionally, from a habitat aspect, the two communities, especially in this transition zone, offer relatively similar functions (although the Arizona Upland community is generally more diverse habitat). Therefore, for purposes of this study, the two communities were considered as one and are identified as the Sonoran Upland community. Also included in this community is the xeric-riparian community normally associated with established ephemeral washes.

Vegetation density within the Sonoran Upland Community varies as a function of the surrounding landform. Other factors being equal, cover densities tend to decrease from north to south across the corridor. The decline in cover density correlates with the vegetation change from typical Arizona Upland vegetation to the less diverse and more open, Lower Colorado Creosotebush dominated community. Species diversity is high in the Arizona Upland areas and is much lower in the Lower Colorado community.

The northern portion of the Agua Fria corridor has numerous incised, ephemeral washes that exhibit some of the highest vegetation cover densities along the corridor. These so-called xeric-riparian communities are composed of woody desert scrub vegetation that is concentrated mainly along the margins of the washes. The slight increase in moisture provided by the wash enhances vegetation growth, and in many areas, the woody vegetation forms a closed canopy cover. Species composition in the wash areas is similar to the surrounding upland areas, although succulents are less evident and woody species are more prevalent. The surrounding upland areas also contain some of the same woody species but are primarily dominated by succulents or small shrubs. Groundcover density outside of the ephemeral channels is low to moderate with many non-vegetated open areas.

This community (particularly the northern portion) is a highly diverse mixture of small inclusions of various vegetation groupings (xeric-riparian, alluvial fan, desert pavement, and ephemeral wash) that form a mosaic of sub-habitat types. This provides excellent habitat that is heavily traveled by area wildlife. The relatively intact nature of the northern portion of this community and its proximity to open water and mesic riparian habitat further contribute to the community's significance.

An evaluation of historical photography, narratives, and floristic inventories suggests that this community has been established for a significant period. Based on this evidence, the community originally extended down the Agua Fria River corridor to near the confluence with the Gila River. Current field evidence suggests that lower undisturbed portions of this community remain similar to the historic community, with only minimal shifts in densities or species composition.



Large tracts of this community remain relatively intact in the northern portion of the corridor. These areas have a species composition similar to the previously noted Arizona Upland subdivision. Access roads and isolated development have impacted some areas. In the southern portion of the corridor, the community has been significantly altered or displaced by other vegetation communities. The few remaining relevant areas in the southern portion of the corridor suggest the species composition is more similar to the lower Colorado subdivision. The species listed in **Table 2** were noted within the Sonoran Upland Community. This community also contains some of the early seral species noted in the Early Level Successional Community. These species are most evident at the community margins and in disturbed areas.

Table 2. Sonoran Upland Community

Common Name	Scientific Name	Comment
Trees		
Paloverde	<i>Cercidium</i> spp.	Dominant woody species. Scattered throughout corridor (T/O), concentrated in wash areas.
Saltcedar	<i>Tamarix</i> spp.	Invasive species concentrated in channel/wash bottoms
Ironwood	<i>Olneya testoa</i>	Very scattered, in northern Upper Reach
Desert willow	<i>Chilopsis alineras</i>	Very limited, in margins of xeric and mesic riparian interface with Sonoran upland
Mesquite	<i>Prosopis</i> spp.	Several dense stands in Upper and Middle Reach
Catclaw	<i>Acacia greggii</i>	Scattered along wash and channel banks
Crucifixion thorn	<i>Canotia holacantha</i>	Limited to Upper Reach
Shrubs		
Creosotebush	<i>Larrea tridentate</i>	Dominant in Lower and Middle Reach
Saltbush	<i>Atriplex</i> spp.	Scattered T/O
Burrobush	<i>Hymenoclea monogyra</i>	Scattered T/O
Brittlebush	<i>Encelia farinose</i>	Scattered T/O
White and Triangle bursage	<i>Ambrosia dumosa</i> and <i>A. deltoide</i>	Scattered T/O, but co-dominate in portions of Middle and Lower Reaches
Broom Snakeweed	<i>Gutierrezia sarothrae</i>	Scattered T/O, prevalent along community margins
Jojoba	<i>Sisymbrium irio</i>	Scattered
Ocotillo	<i>Fouquieria splendens</i>	Scattered along ridgelines and bajadas
Desert broom	<i>Bacchris sarrothroides</i>	Common T/O
Succulents		
Saguaro	<i>Carnegiea gigantean</i>	Scattered T/O northern portion of corridor
Cholla	<i>Optunia fulgida</i>	Isolated stands in Upper and Middle Reaches
Barrel cactus	<i>Ferocactus</i> spp.	Scattered T/O Upper Reach
Cereus	<i>Peniocereus gregii</i>	Very scattered Upper Reach
Pincushion	<i>Mammillaria</i> spp.	Scattered Upper Reach, concentrated in rock areas
Hedgehog	<i>Echinocereus</i> spp	Scattered in Upper Reach
Herbaceous		
Bladderpod	<i>Isacoma acradenia</i>	Scattered T/O
Wooly plantain	<i>Plantago insularis</i>	Lower Reach

Agricultural Community

This vegetation community inhabits areas that are currently (or were in the past) under agricultural production for row crops, orchards or structured pasture areas. Also included in this classification are the scattered residences or other buildings that are associated with the agricultural activity. This community is not assigned a floristic value. It does provide some wildlife habitat value, particularly in the form of forage and cover.

Most of these areas have been cleared of native vegetation and have been graded to promote irrigation. Tilling has disturbed soil profiles and many areas have been compacted by agricultural traffic. The active agricultural fields are irrigated and may produce multiple crops per year. Many of the fields are chemically treated for control of pests and receive fertilizer. The agricultural species include cotton, alfalfa, and citrus. Active irrigation ditches are normally maintained but exhibit some herbaceous growth, and are sometimes lined by woody species. Fallow agricultural areas are vegetated with remnant agricultural species and ruderal or invasive species. The invasive species include several herbaceous annuals/perennials such as tumbleweed, pigweed, and others. Mesquite and creosotebush are normally among the first woody species to colonize the fallow areas.

The majority of the active agricultural areas are in the southern portion of the corridor, south of the I-10 Bridge. Orchards are noted in the upper reach of the corridor, north of Calderwood Butte and south of the CAP crossing. Isolated active and fallow agricultural areas are noted in scattered areas along the corridor.

Mesic/Hydric Riparian Community

The Mesic/Hydric Riparian Community includes the vegetation along the intermittent or perennially wet portions of the Agua Fria River corridor. It includes woody vegetation as well as the herbaceous vegetation associated with the ponded areas. This community is a combination of the vegetation communities classified by the U.S. Fish and Wildlife Service (FWS) as palustrine emergent, scrub-shrub, and riparian wetland (Cowardin et al 1979). The vegetation communities associated with the mesic/hydric portions of the river channel are also included. This community differs from the xeric-riparian community included in the Sonoran Upland community by the inclusion of more moisture dependent species such as sycamore, cottonwood, and willow. Many of the vegetation species included in this community are considered facultative wet or obligate species, indicating a high dependence on a near perennial source of moisture. The community normally has a moderate-to-high floristic value, depending on the degree of disturbance.

Historically, the cottonwood/willow riparian community represented the dominant vegetation community along the perennial and intermittent river channels of the southwest. It was located along most of the perennial and intermittent drainages and along some ephemeral channels. The Cottonwood -Willow Association was often the transition zone to the palustrine areas. It provides the highest habitat value of the communities identified along the corridor.

Palustrine emergent communities are perennially wet areas that exhibit vegetation along the shoreline and within the shallow shelves of the open water areas. This emergent vegetation normally exhibits a distinct boundary from the adjacent vegetation community, unless the Cottonwood-Willow Association borders it. The woody vegetation associated with the riparian and scrub-shrub communities have a less

distinct boundary-line and are more blended with the edge of the surrounding vegetation community. In most cases, the early level successional vegetation borders the riparian vegetation. In the northern portion of the corridor, the Sonoran Upland Community borders some of the riparian areas. This particular interface (Sonoran to riparian) provides a unique and very limited habitat type.

The Mesic/Hydric Riparian Community is represented in the northernmost portion of the corridor from the New Waddell Dam to below the SR 74 crossing. It is also noted in several areas where near permanent surface discharge outfalls to the Agua Fria channel i.e. at I-10, at wastewater treatment facilities, and at sand and gravel mining operations.

Species characteristic of the Mesic/Hydric Riparian Community are listed in **Table 3**. The outer edges of this community contain many of the species listed in the Early Level Successional and Sonoran Upland Communities.

Table 3. Mesic/Hydric Riparian Community

Common Name	Scientific Name	Comment
Woody Species		
Cottonwood	<i>Populus fremontii</i>	Native, co-dominate species of historical community
Willow	<i>Salix gooddingii</i> (may be hybridize)	Native, other co-dominate species of historical riparian community
Ironwood	<i>Olneya tesota</i>	Native, scattered primarily in northern reach
Seep willow	<i>Baccharis glutinosa</i>	Native, Scattered at interface w/other community
Mesquite	<i>Prosopis</i> spp.	Native, scattered throughout corridor (T/O)
Salt Cedar	<i>Tamarix chinensis</i>	Invasive, dominant in some areas, particularly at confluence with Gila
Desert broom	<i>Baccharis sarothroides</i>	Scattered in disturbed areas and along drier margins of community
Herbaceous		
Cattail	<i>Typha</i> spp.	Limited to northern upper reach and at scattered point discharge sites, obligate water species
Bulrush	<i>Scirpus</i> spp.	Limited to northern upper reach and at scattered point discharge sites, obligate water species
Rush	<i>Juncus</i> spp.	Limited to northern upper reach and at scattered point discharge sites, obligate water species
Spike rush	<i>Eleocharis</i> spp.	Limited to northern upper reach and at scattered point discharge sites, obligate water species
Reed	<i>Phragmites</i> spp.	Noted a Glendale Road Bridge site.
Brome	<i>Bromus</i> spp.	Scattered

Commercial/Residential/Disturbed Areas

This vegetation community includes the landscaped species associated with residential and commercial development. For this report, this community includes golf courses, landscape medians, buildings, paved areas and other areas associated with commercial/residential development. In most cases, the native vegetation community and site topography have been altered. Most of the landscaped areas are irrigated and are maintained.

Many times the landscaped portions of the residential and commercial areas provide satisfactory wildlife habitat. Wildlife usage is normally limited to small mammals, reptiles and avian species, which are attracted to the increased vegetation and moisture. Open water areas are the most attractive landscape amenity to most wildlife species. Waterfowl commonly use open water areas in fairly urbanized environments. Many golf course communities provide better than average habitat for nocturnal species, which utilize the vegetation, open water and increased moisture from irrigation during the time the courses are normally not in use.

4.2 Wildlife and Special Habitat

The evaluation of wildlife populations and wildlife habitat was conducted to establish the estimated wildlife population (both species mix and density) and to identify special wildlife habitat issues. The vegetation evaluation provided a general discussion of the wildlife habitat value of each of the vegetation communities. The following section reports the results of the wildlife population evaluation and the second section notes special habitat conditions or needs that might be important to the Master Plan development.

Wildlife Population

Several field reconnaissances were conducted along the Agua Fria River corridor to identify wildlife usage patterns and evaluate habitat potential. The field visits were conducted in late December, early January, early March, early June, and late September in early morning or late afternoon (some of the December surveys were all day). The timing of the field reconnaissance was a function of seasonal variation in wildlife usage patterns and habitat development. As noted in the General Methodology section, the field reconnaissances included pedestrian meander transects, blind surveys, and identification of animal sign.

If areas were identified that provide a specific value or appeared to be high usage areas, surveys were repeated to identify usage patterns. Areas such as the Gila River confluence and the George's Pond area received multiple visits over the course of the study.

The following table summarizes the results of the field reconnaissance conducted to identify resident wildlife populations. The comment section of the table notes where the sighting was made, evaluation of residency potential, and an identification of habitat preference as relevant.



Table 4. Agua Fria River Corridor Wildlife Population

Common Name	Scientific Name	Comment
Reptiles		
Western diamondback rattlesnake	<i>Crotalus atrox</i>	Single sightings in northern most and southern most areas. Possible resident throughout corridor (T/O)
Garter Snake	<i>Thamnophis matecianus</i>	Sighted in Lower Reach. Likely a resident T/O
Western banded gecko	<i>Coleonyx variegatus</i>	Sighted Upper and Lower Reaches. Resident
Desert spiny lizard	<i>Sceloporus magister</i>	Sighted Upper Reach. Resident
Whiptail lizard	<i>Cnemidophorus</i> spp.	Sighted T/O corridor. Resident
Amphibians		
Lowland leopard frog	<i>Rana yavapaiensis</i>	Sighted at George's Pond and Gila Confluence. Resident in noted areas – Open water obligate
Bullfrog	<i>Rana catesbeinana</i>	Vocalizations at Upper Reach and Gila Confluence – Open water obligate
Avian		
Cactus wren	<i>Campylorhynchus brunneicapillus</i>	Sighted in Upper and Middle Reaches, nesting noted in northern region. Resident
Roadrunner	<i>Geococcyx californianus</i>	Sighted in upper reach, tracks T/O corridor. Resident
Gambel's Quail	<i>Lophortyx gambeli</i>	Sighted in upper reach. Resident
Mourning dove	<i>Zenaida asiatica</i>	Sighted T/O corridor. Nest T/O. Resident
Red-tailed hawk	<i>Buteo borealis calurus</i>	Sighted T/O corridor. Active nest in northern portion. Resident
Swainson hawk	<i>Buteo swainsoni</i>	Pair sighted in Upper Reach, nest in Lower Reach. Likely Resident.
Screech owl		Upper Reach Dense woody vegetation
Curved-bill Thrasher	<i>Toxostoma curvirostre</i>	Sighted Upper Reach. Resident
Western Meadowlark	<i>Sturnella neglecta</i>	Sighted Upper and Lower Reaches. Resident
Pyrrhuloxia	<i>Pyrrhuloxia sinuata</i>	Sighted T/O Upper Reach. Resident
Western mockingbird	<i>Mimus polyglottos leucopterus</i>	Sighted T/O. Resident
Sparrows	<i>Passer</i> spp.	Sighted T/O. Resident
Gila woodpecker	<i>Melanerpes uropygialis</i>	Sighted Upper Reach. Burrows in saguaro. Resident.
Hummingbirds	<i>Archilochus</i> species	Single sighting Middle Reach. Likely Resident
Killdeer	<i>Charadrius vociferus</i>	Sighted in Upper and Lower reaches

Table 4. Agua Fria River Corridor Wildlife Population (con't.)

Common Name	Scientific Name	Comment
Great blue heron	<i>Ardea herodias</i>	Sighted nesting at Gila confluence (Lower Reach) – Open water obligate – Historical Records (1930s) note a 60 bird rookery south of Avondale, AZ on the Gila River
White-faced ibis	<i>Plegadis chihi</i>	Sighted at confluence w/ Gila River (Lower Reach) – Open water obligate
Mammals		
California Myotis	<i>Myotis californicus</i>	Sighting in upper Reach. Likely Resident along rock cliffs.
Coyote	<i>Canis latrans</i>	Sighted/tracks/den Upper and Lower Reaches. Resident
Kit Fox	<i>Vulpes macrotis</i>	Sighted and den (?) Upper Reach. Likely Resident
Pecary	<i>Dicotyles taiacu</i>	Sighted Upper Reach. Resident
Bobcat	<i>Felis rufus</i>	Single sighting along ridgeline immediately north of dam site (Upper Reach). Likely Area Resident
Feral burro	<i>Equus asinus</i>	Upper Reach Area Resident
Mule deer	<i>Odocoileus henionus</i>	Northern region of Upper Reach, assumed from tracks, white tail species possible. Area Resident
Raccoon	<i>Procyon lotor</i>	Sighted and tracks T/O corridor. Resident
Black-tailed jackrabbit	<i>Lepus californicus</i>	T/O corridor. Resident
Mouse	<i>Peromyscus</i> and <i>Perognathus</i> spp.	Never sighted. Numerous burrows, scat, tracks T/O. Assumed Resident
Desert cottontail	<i>Sylvilagus auduboni</i>	Sighted T/O. Resident
Kangaroo rat	<i>Dipodomys</i> spp.	Burrows/wallows in northern portion of Upper Reach. Resident

It appears, based on the limited data, that the channel and immediately surrounding area provides a viable habitat for wildlife. The northern quarter (northern portion of the Upper Reach) and the southern terminus (extreme southern portion of Lower Reach) are the most productive and likely provide sustainable wildlife populations. Additionally, both areas provide a riparian and open water environment that is very valuable. These areas are supporting, as residences, several trophic levels (predator-prey relationships) of species and appear to be part of the home range of several more mobile species, such as songbirds, raptors, and small mammals. The areas relative isolation from anthropogenic influences and its location within a large habitat area contribute to its high usage.

The central portion of the corridor (middle reach and portions of the central portions of the Lower and Upper Reaches) provides less productive wildlife habitat. While these areas support some resident wildlife populations the diversity is much lower and much of the usage is opportunistic. The surrounding development reduces the wildlife population pool that might otherwise colonize the area and reduces the species diversity necessary to develop sustainable systems. The field evaluations noted passerine avian usage (songbirds), small reptile and small mammal activity in numerous locations. However, the number



of burrows, nests and other evidence of seasonal residency were reduced in comparison to the areas previously noted. Most of the species noted in this section were less mobile species with small home ranges, and were probably confined to the channel area. With the exception of occasional sign of a coyote and some raptors, predator species are almost absent. Feral or roaming cats and dogs may fill this niche in the system.

There are several inclusions of more viable habitat through the central portion of the river corridor, such as the I-10 Bridge site, Buckeye Bridge site, and the Avondale Waste Water Treatment facility. Several aggregate operations within the central portion of the corridor contain open water/wetland areas that are also utilized by waterfowl and small mammals. Additionally, Luke Air Force Base WWTP/Colter Channel outfall provides a short riparian corridor along the Glendale Road Bridge crossing. These sites are viable habitat areas, but their isolation from supporting habitat reduces their ecological significance.

The surveys did not provide sufficient data to estimate resident populations, nor to determine the potential carrying capacity of the habitat system. In general, arid habitat communities have a very sensitive threshold for carrying capacity and can be easily overloaded. Many times the system can be stressed by the addition of an outside source, such as grazing and human uses, which further reduces system viability.

Wildlife Habitat Evaluation

The wildlife population data indicate that the river corridor provides wildlife habitat for a variety of species. The upper and lower most sections of the corridor provide the most ecologically significant habitat, but the entire corridor has some habitat value. The following discussion provides a generalization of the value of the Agua Fria River vegetation communities. There is also a discussion of specific wildlife habitat issues that may be pertinent to the study area.

Several special considerations were included in the habitat evaluation for the corridor. These considerations are a function of the corridor's location in relation to the large landscape. The considerations include:

Migratory Corridor – The Agua Fria River corridor is within a migratory corridor for neotropical (species that breed/nest in northern climates and over-winter in tropical or near tropical climates) migratory and for several insect species. It may also serve as a wintering range for some avian species. The corridor may contain important stopover habitat (resting areas for migrating species) and destination habitat.

Limited/Unique/Rare Habitat – The corridor contains hydric riparian habitat, which is a limited and increasingly rare habitat in the southwest. The interface between this habitat and the Sonoran Upland is another limited resource. As the surrounding area develops and undisturbed upland areas become scarce, the undeveloped river channel (otherwise undistinguished habitat) will be an increasingly unique habitat.

Travel Link – The corridor serves as a restricted travel link, but suffers from lack of true destination habitat along the corridor. This may change as plans for enhancement on the Agua Fria River and on

the Gila River are implemented. Small mammals and other less mobile wildlife use the corridor for travel and for residency.

Mortality Sink – The corridor’s proximity to high traffic road corridors such as I-10 increase the potential for vehicular and wildlife conflicts. The proximity of the Glendale Municipal Airport also poses the concern for aircraft interference with avian species

The functional value of wildlife habitat is dependent on numerous factors including site topography, vegetation, soils, moisture regime, location, and the level of human intervention. The wildlife functional value is also determined by the requirements of the resident species. Some species, such as blue heron, are open water obligates (require open water to survive) while other species, such as the coyote, are considered multi-habitat species (can successfully utilize different habitats). Still other species are multi-habitat dependent and require several habitats to survive through their complete life cycle.

Most habitat functional values are interrelated and affect each other. As an example, for a wildlife travel corridor to be effective it must provide cover for the species and normally serves as a connection between destination habitats (forage or cover habitats). Similarly, most species would not nest in areas of good cover unless adequate nesting material was available and the nesting area was near adequate foraging areas. For this evaluation, three basic habitat functions were considered in the evaluation:

- **Cover Function** – Cover provides the species protection from predators and from exposure to the elements both for nesting and resting. Parcel size and shape, landscape position, and vegetation community influence the functional value.
- **Forage Function** - Forage functional value refers to the habitat's ability to provide the species adequate food. Vegetation community, moisture regime, and habitat size influence this function. In some instances the vegetation is a secondary factor in forage issues. Raptor and other predatory food web members rely on small mammal populations, which are influenced by vegetation but might also be influenced by disease, anthropological factors, or breeding cycles.
- **Travel Function** - This functional value provides the species an opportunity for diurnal range movements and migration. It requires some type of cover (vegetative, topographic, etc.) and requires connectivity. Darkness can also provide some limited cover for travel linkages. It also normally requires the need for the species to travel the area (i.e. destination habitat or some specific resource otherwise lacking in the remainder of the species range).

Table 5 summarizes the results of an evaluation of the Agua Fria River corridor vegetation communities’ ability to provide the habitat functions described above. It should be noted that the evaluation was conducted based on habitat values in general for avian, small mammal and reptile usage and not for a specific species.

Table 5. Vegetation Communities Habitat Functional Values

Vegetation Community	Functional Value		
	Cover	Travel	Forage
Early Level Successional	<ul style="list-style-type: none"> Moderate/good for small mammal & avian species Minor migratory value 	<ul style="list-style-type: none"> Moderate for small mammal & avian species. Potential mortality sink near road and aggregate sites 	<ul style="list-style-type: none"> Moderate/good for all species Moderate migratory (shrubs provide food source)
Sonoran Upland	<ul style="list-style-type: none"> Good/high for all species Unique habitat at interface with M/H Riparian High migratory 	<ul style="list-style-type: none"> Good/high for all species Ephemeral washes main travel route 	<ul style="list-style-type: none"> High for all species Limited habitat at interface with M/H Riparian Good migratory
Mesic/Hydric Riparian	<ul style="list-style-type: none"> High for all species Requirement for water obligate species High migratory 	<ul style="list-style-type: none"> High for all species Requirement for water obligate species High migratory 	<ul style="list-style-type: none"> High for all species Requirement for water obligate species High migratory
Agricultural	<ul style="list-style-type: none"> Fair for small mammal & avian Moderate migratory 	<ul style="list-style-type: none"> Moderate for small mammal & avian Limiting factor is connectivity and lack of destination habitat 	<ul style="list-style-type: none"> High for most species Moderate/High Migratory
Commercial Residential	<ul style="list-style-type: none"> Poor/Fair for small mammal & avian 	<ul style="list-style-type: none"> Green belts provide linkages Golf course, parks may provide destinations 	<ul style="list-style-type: none"> Moderate for small mammal & avian

An evaluation was conducted of potential habitat enhancement areas, which discusses in more detail the specific habitat attributes of numerous areas along the Agua Fria River Corridor. That document entitled *Habitat Enhancement Opportunities/Techniques on the Agua Fria River – New Waddell Dam to Confluence with Gila River, Kimley-Horn and Associates, Inc., 2001*, is a separate Technical Memorandum.

4.3 Protected Species

The U.S. Fish and Wildlife Service Endangered Species Act database was accessed for a list of threatened and endangered species in Maricopa County. Additionally, the Arizona Game and Fish Department (AGFD) Heritage Program was queried for recorded sightings of state or federal species of concern and a list of species within Maricopa County that have been assigned an additional protection or management status. The following table lists the species obtained from both database sources.

Raptors and migratory birds are afforded levels of protection during nesting and breeding season by provisions in several federal acts including the Migratory Bird Species Act. It should be noted that many of the species listed in the following table do not have protection status under the Endangered Species Act (ESA) or direct protection under another regulation. However, various federal and state resources management agencies have identified the species as requiring specific management or enhancement



efforts. When practical the various management agencies recommendations should be considered in the habitat enhancement procedures. If the proposed activity takes place on land managed by the particular agency, compliance with the recommendations is required. A brief summary of some of the regulatory constraints for protected species follows the table.

The table lists the common and scientific name, the protection status, and comments about critical habitat designation, special circumstances or other pertinent information. The table also notes the residency and potential habitat within the corridor. Species listed under the ESA are listed in bold. A key for the various acronyms listed in the Protection Status column is included at the end of the table.

Table 6. Protected Species

Common Name	Scientific Name	Protection Status	Study Corridor Habitat Status	Comment
Avian				
Bald eagle	<i>Haliaeetus leucocephalus</i>	ESA- Threatened	Nesting habitat throughout corridor (T/O), most prevalent in northern portion	On ESA delisting track
Cactus ferruginous pygmy-owl	<i>Glaucidium brasilianum cactorum</i>	ESA – Endangered	Habitat exists in northern portion	Project is north of species recognized range
Mexican spotted owl	<i>Strix occidentalis Lucida</i>	ESA – Threatened	Below habitat elevation range, no suitable habitat	Critical habitat designated
Western burrowing owl	<i>Athene cunicularia hypugea</i>	ESA – SC BLM – S WCSA –WC	Lower and Middle Reaches, Open Areas	None sighted, likely resident
Great Egret	<i>Ardea alba</i>	WCSA –SC	Upper and Lower Reach, Open Water	Rookery nester
Snowy Egret	<i>Egretta Thula</i>	WCSA – WC		
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	ESA – Endangered	Potential habitat at Gila confluence and at George’s pond	Coordinate w/USFWS and AGFD for survey requirements
Yuma clapper rail	<i>Rallus longirostris Yumanensis</i>	ESA – Endangered	Potential at Gila River. Marginal at George’s pond	Coordinate w/USFWS and AGFD for survey requirements
Western snowy plover	<i>Charadrius Alexandrinus Nivosus</i>	Forest –S WCSA – WC	Northern Upper and Gila River, Shorelines	Migrant
Western yellow-billed Cuckoo	<i>Coccyzus Americanus Occidentalis</i>	Forest –S WCSA – WC	Upper and Lower Reaches, Riparian	Parasitic Nester Migrant
Black-bellied Whistling-Duck	<i>Dendrocygna Autumnalis</i>	WCSA –WC	Northern Upper and Gila River, Open Water	
Fulvous Whistling Duck	<i>Dendrocygna Bicolor</i>	ESA – SC BLM –S	Northern Upper and Gila, Open Water/Marsh	
American Peregrine Falcon	<i>Falco Peregrinus Anatum</i>	ESA –SC Forest S WCSA – WC	Upper Reach, Cliff nesting	Unlikely
Mississippi Kite	<i>Ictinia Mississippiensis</i>	WCSA – WC	Possible T/O	Extreme western edge of range

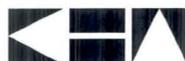


Table 6. Protected Species (con't.)

Common Name	Scientific Name	Protection Status	Study Corridor Habitat Status	Comment
Western Least Bittern	<i>Ixobrychus Exilis Hesperis</i>	ESA – SC WSCA – WC	Northern Upper and Gila, marshes	
Black Hawk	<i>Buteogallus anthracinus</i>	Forest – S WSCA – SC	Northern Upper and Gila, Riparian	
Mammals				
Sonoran Pronghorn	<i>Antilocapra Americana Sonoriensis</i>	ESA –SC Forest – S	Upper Reach, Sonoran Upland	Outside of current range, but within historic, Recovery Plan
Greater Western Mastiff Bat	<i>Eumops Perotis Californicus</i>	ESA – SC	Upper Reach, Nest in rock crevices near forage areas	Known colonies in Sun City. Annual resident
Western Red Bat	<i>Lasiurus Blossевillii</i>	WSCA – WC	Marginal northern Upper Reach and Gila	Scattered reports in County. Summer resident only
Lesser Long-nosed Bat	<i>Leptonycteris Curasoae Yerbabuenaе</i>	ESA –Endangered Forest – S WSCA – WC	Upper and Middle Reaches (Succulents, paloverde)	Extreme northern portion of range Summer migrant
California Leaf-nosed Bat	<i>Macrotus Californicus</i>	ESA – SC BLM –S WSCA – WC	Upper and Middle Reach, Sonoran Upland	Unidentified bats sighted in Upper Reach
Cave Myotis	<i>Myotis Velifer</i>	ESA –SC BLM – S	All Reaches, best in Upper, Desert scrub	Will nest under bridges. Sighted in Middle Reach
Yuma Myotis	<i>Myotis Yumanensis</i>	ESA – SC	Upper and Gila (water obligate for insects)	Likely winter migrant
Pocketed Free-tailed Bat	<i>Nyctinomops Femorosaccus</i>	BLM – S	Upper Reach, Rocky cliffs in southern deserts	Will nest under bridges etc. Year round resident
Pale Townsend’s Big- eared Bat	<i>Plecotus Townsendii Palleescens</i>	ESA – SC	Upper and Middle Reaches, Desert scrub and cave	Year round resident
Black-footed ferret	<i>Mustela nigripes</i>	ESA –Endangered	None	
Fish				
Desert pupfish	<i>Cyprinodon macularius</i>	ESA – Endangered	Lower Gila River	Reintroduced in four locations outside study corridor
Longfin Dace	<i>Agosia Chrysogaster</i>	ESA – SC BLM – S	Gila River basin	Adapted to flash flood prone waters
Desert (Gila Mountain) Sucker	<i>Catostomus Clarki</i>	ESA – SC BLM – S	Gila River basin	
Sonora (Gila) Sucker	<i>Catostomus Insignis</i>	ESA – SC BLM – S	Gila River basin	
Bonytail chub	<i>Gila Elegans</i>	ESA – Endangered WSCA – WC	Gila River basin	Expirtated from Gila River
Roundtail Chub	<i>Gila Robusta</i>	ESA – SC Forest – S WSCA – WC	Not likely in study area	Critical Habitat in Virgin River
Speckled Dace	<i>Rhinichthys Osculus</i>	ESA – SC BLM – S	No Habitat	Below elevation range
Gila topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	ESA – Endangered	Gila River	Currently limited to 7 natural sites



Table 6. Protected Species (con't.)

Common Name	Scientific Name	Protection Status	Study Corridor Habitat Status	Comment
Razorback sucker	<i>Xyrauchen texanus</i>	ESA – Endangered	Extirpated from Gila River basin, Gila River is suitable habitat	Critical habit designated, re-introduced in Gila and Salt?
Insects				
Maricopa Tiger Beetle	<i>Cicindela Orgona Maricopa</i>	ESA – SC BLM – S Forest – S		
Squaw Peak Talussnail	<i>Sonorella Allynsmithi</i>	ESA – SC Forest – S		
Herptofauna				
Great Plains Narrowmouth Toad	<i>Gastrophryne olivacea</i>	WSCA – WC	Potential Habitat Present (Open water areas surrounded by creosote/mesquite etc)	Very secretive species. Diet is almost exclusively ants. Unlikely Resident
Arizona toad	<i>Bufo microscaphus microscaphus</i>	ESA-SC Forest – Sensitive	Potential Habitat Present (Permanent ponds, rock bottomed creeks)	Also called Southwestern toad. Known in Gila River drainage.
Lowland leopard frog	<i>Rana Yavapaiensis</i>	ESA – SC Forest – S WSCA – WC	Habitat Present (Deep pools along streams/rivers)	Known in Gila River
Redback Whiptail	<i>Cnemidophorus Burti Xanthonotus</i>	ESA – SC BLM – S Forest – S	Potential Habitat	Positive identification difficult
Arizona Skink	<i>Eumeces Gilberti Arizonensis</i>	ESA – SC BLM – S Forest – S WSCA – WC		
Sonoran Desert Tortoise	<i>Gopherus Agassizii</i> (Sonoran Population)	ESA – SC WSCA – WC	Potential Habitat	AGFD recommended Survey and Handling Guidelines
Maricopa Leafnose Snake	<i>Phyllorhynchus Browni Lucidus</i>	Forest – SC		
Mexican Garter Snake	<i>Thamnophis Eques Megalops</i>	ESA – SC Forest – S WSCA – WC	Habitat present (Dense vegetation surrounding water)	Historical records in Gila River
Desert Rosy Boa	<i>Charina trivirgata gracia</i>	ESA – SC BLM – S Forest – S		
Plants				
Arizona cliffrose	<i>Purshia subintegra</i>	ESA – Endangered	No Suitable Habitat (Requires limestone lakebeds)	
Arizona hedgehog cactus	<i>Echinocereus triglochidiatus Arizonicus</i>	ESA – Endangered	No Suitable Habitat (Requires transition between Madrean evergreen/Interior chaparral)	
Ironwood Tree	<i>Olneya testoa</i>	State identified	Scattered species in all three reaches. Most evident Upper Reach	No official status Task Force formed to devise management

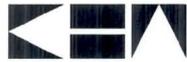


Table 6. Protected Species (con't.)

Common Name	Scientific Name	Protection Status	Study Corridor Habitat Status	Comment
Pima Indian Mallow	<i>Abutilon Parishii</i>	ESA – SC Forest – S NPL – SR	Habitat Present (Dry Slopes 1000 –4000 feet)	
Arizona Agave	<i>Agave Arizona</i>	ESA – Endangered Forest – S NPL – HS	No Suitable Habitat Present (Requires oak-scrub/oak-juniper transition zone)	Outside of Elevation and Range
Tonto Basin Agave	<i>Agave Delamateri</i>	ESA – SC Forest – S NPL – HS	Minimal Habitat Present	Possible Scattered Occurrence
Hohokam Agave	<i>Agave Murpheyi</i>	ESA – LE BLM – S Forest – S NPL – HS	Minimal Habitat Present	Possible Scattered Occurrence
Toumey Agave	<i>Agave Toumeyana Var Bella</i>	NPL – SR	Minimal Habitat Present	Possible Scattered Occurrence
Kofa Barberry	<i>Berberis Harrisoniana</i>	BLM – S	No Habitat Present (Ajo Mountains)	
Fish Creek Fleabane	<i>Erigeron Piscaticus</i>	ESA – SC BLM – S Forest – S NPL – SR	No Likely Habitat	
Ripley Wild-Buckwheat	<i>Eriogonum Ripleyi</i>	ESA –SC Forest – S NPL – SR	No Habitat Present (Above 4000 feet Ponderosa pine)	
Flannel Bush	<i>Fremontodendron Californicum</i>	BLM – S NPL – SR		
Eastwood Alum Root	<i>Heuchera Eastwoodiae</i>	Forest – S	No Habitat Present (Moist slope above 5000 feet)	
Alamos Deer Vetch	<i>Lotus Alamosanus</i>	Forest –S	No Habitat Present (Pine/juniper woods/)	
Mapleleaf False Snapdragon	<i>Mabrya Acerifolia</i>	Forest – S	Potential Habitat Upper Reach (Shaded Rock Ledges)	Known in Superstition Mountains
Varied Fishhook Cactus	<i>Mammillaria Viridiflora</i>	NPL – SR	Habitat present. Species noted in all three reaches	Salvage where practical
Straw-top Cholla	<i>Opuntia Echinocarpa</i>	NPL – SR	Habitat Present (Xeric sand and gravel areas)	
Fish Creek Rock Daisy	<i>Perityle Saxicola</i>	ESA –SC Forest – S	Habitat Present (Dry rock slopes/washes)	
Tumamoc Globeberry	<i>Tumamoca Macdougalii</i>	BLM – S Forest – S		
Arizona Rosewood	<i>Vauquelinia Californica SSP Sonorensis</i>	ESA – SC BLM – S Forest – S	Potential habitat (Requires desert paloverde/cacti, creosote/bursage)	Outside of current range



Table 6. Protected Species (con't.)

Common Name	Scientific Name	Protection Status	Study Corridor Habitat Status	Comment
Listed Habitats				
Wetlands. Perennial streams, riparian areas	<i>N/A</i>	Arizona Recommendation Considered Resource Category I	Northern most Upper Reach, Southern Most Lower Reach	No loss of existing habitat value. Conserve areas, recharge groundwater, manage for ecosystem
Old Growth Conifer	<i>Pinus and</i>	Arizona Recommendation Considered Resource Category II	No Habitat Present	
Plains Grassland		Arizona Recommendation Considered Resource Category III	No Habitat Present	
Sonoran deserts scrub	<i>Cacti/paloverde</i>	Arizona Recommendation Considered Resource Category II	Upper Reach	No Net Loss. Avoid habitat fragmentation, restore movement corridors, control exotic plants

Table Key

ESA – Threatened, listed under the Endangered Species Act (ESA) as threatened, with imminent jeopardy of becoming endangered. Regulation prohibits taking or in some instances impacts to habitat without permit and mitigation (protection status similar to endangered)

ESA – Endangered, listed under the Endangered Species Act (ESA) as endangered, with imminent jeopardy of extinction. Regulation prohibits taking or in some instances impacts to habitat without permit and mitigation

ESA – SC, listed under the Endangered Species Act (ESA) as species of concern. The USFWS has concerns about their conservation status. They are former C2 species and do not have a regulatory status.

BLM – S, Species listed by the Bureau of Land Management as sensitive species and might have special management requirements.

Forest – S, US Forest Service listing for species considered sensitive by Regional Forester. Most have management requirements.

Arizona Department of Game and Fish as species that may be in jeopardy identify WSCA – WC, Wildlife of Special Concern in Arizona. Same listing as Threatened Native Wildlife in Arizona AGFD has established management guidelines for many of these species.

NPL – HS, Arizona Native Plant Law - Highly Sensitive. No collection allowed. Does not prohibit removal, requires opportunity to salvage.

NPL – SR, Arizona Native Plant Law - Salvage Restricted Collection permit required Does not prohibit removal, requires opportunity to salvage

Endangered Species Act (ESA –Threatened, ESA – Endangered, ESA –SC)

Species listed under the ESA were not sighted, nor was evidence of residency identified (field sign – such as nests, tracks, scat etc). Portions of the Gila/Agua Fria River confluence contain closed canopy dense stands of tamarisk that are potential southwestern willow flycatcher habitat, and the George’s Pond area (northern most portion of Upper Reach) may also contain marginal habitat. These areas may also provide suitable habitat for the Yuma Clapper Rail. Historical records indicate clapper rails in the general area in the early 1970’s. If activity is planned in these areas, coordination with Arizona Game and Fish Department and the Arizona Field Office of the US Fish and Wildlife Service should be contacted and protocol specific surveys conducted.



The bald eagle may be a transient species through the Agua Fria River study area and potential nesting habitat is noted along the corridor. If activity is planned with potential habitat areas a field reconnaissance should be conducted to verify nesting activity.

The Upper and Middle Reaches of the Agua Fria River may also have suitable habitat for the lesser long nosed bat. The bat forages in areas of Sonoran Upland vegetation and roosts in rock crevices. It is a summer migrant. If activity is planned in potential lesser long nosed bat habitat the USFWS should be contacted.

Bureau of Land Management (BLM – S)

Some portions of the corridor are in or near areas managed by the BLM. If activity occurs within these areas or will affect these areas the BLM management guidelines for the listed species may apply. If practical, the BLM species management guidelines should be considered in the development of habitat enhancement and in flood control management techniques wherever they might impact the particular species. The BLM guidelines do not have regulatory status outside of BLM managed lands.

U. S. Forest Service (Forest –S)

The U.S. Forest Service Region 3 has identified certain species as sensitive and in need of additional management. The management guidelines apply only to those areas within the boundaries of United States National Forest or areas managed by the Forest Service. There are no Forest Service managed lands within the Agua Fria River corridor. However, to the extent practical the Forest Service guidelines should be considered when planned activities may affect the designated species.

State of Arizona Wildlife of Special Concern (WSCA –WC)

The Arizona Game and Fish Department (AGFD) has prepared a listing of plant and animal species (State of Arizona – Wildlife of Special Concern) that are believed to be in peril within the State of Arizona. These species may have management guidelines established by the state. The species do not have a regulatory status under WSCA. The State has also published the Habitats in Jeopardy listing with recommended management techniques. The guidelines recommend that Resource Category I habitats (wetlands, perennial streams) be protected with a goal of no loss of habitat and Resource Category II habitats (Sonoran Upland) be managed for no net loss. Where practical proposed activities should be conducted within the AGFD guidelines.

State of Arizona Native Plant Law (NPL-SR, NPL HS)

The State of Arizona Department of Agriculture coordinates the implementation of the Arizona Native Plant Law. This law prohibits the transportation and salvage of specific native species without a salvage permit. The regulation does not prohibit the removal of vegetation from private property, but does require that the species be offered for salvage. There are several lists of different species including the Highly Safeguarded Plants (HS), Salvage Restricted Plants (SR), Salvaged Assessed (SA) and Harvest Restricted (HR). Many municipalities require additional protection for native species. To the extent practical the proposed activities should adhere to the regulations and guidelines of the Arizona Native Plant Law to properly manage and enhance the native plant populations.



4.4 Section 404 Jurisdictional Determination

As part of regulatory compliance for Section 404 of the Clean Water Act a Nationwide Permit authorization was requested for the scientific studies required for the development of the Master Plan. The application process requires that the corridor be evaluated to determine the approximate boundaries of the waters of the United States (jurisdictional under Section 404). The study team prepared a Jurisdictional Determination report for submittal to the US Army Corps of Engineers Arizona Field office.

The Section 404 Jurisdictional Determination field methodology varied based on the hydroperiod of the various sections of the river channel. In limited areas where wetlands or suspected wetlands were noted, the field evaluation was conducted based on the three – parameter methodology of the 1987 US Army Corps of Engineers Wetland Delineation Manual. These areas were evaluated for potential hydric soils, dominant hydrophytic vegetation, and demonstrative wetland hydrology. Where a wetland area occurred within the confines of the otherwise dry river channel its boundary was approximated and noted on the aerial photography. Riparian areas or other potentially higher functional value areas were also noted on the aerial photography. The suspected hydrologic source for each wetland/riparian area was also noted; although, the delineation process did not differentiate between artificial or natural water sources.

Where ephemeral hydrologic conditions were present, the field evaluation was concerned with establishing an ordinary high water mark as the boundary of the jurisdictional channel. The ordinary high water mark delineation is based on discernable field evidence such as erosion scars, bank definition, sediment deposition, debris flows, vegetation patterns and other field indicators. The aerial photography was utilized to determine overall trends and channel patterns that were combined with the field information to develop a likely ordinary high water mark boundary. In some areas, more than one low-flow channel may be evident, and the sub-braided channel may be best represented as a dynamic system that meanders within an established zone. As an example, after infrequent flow events, the low flow channel may relocate within the braided system or isolated incidental flows from the surrounding area may alter the local flow pattern.

Therefore, in some instances an “outer” defined bank was chosen as representing the ordinary high water mark for the channel reach. This approach may identify the overall channel within which the next ordinary flow event (generated by a storm of undefined frequency) will establish one or more low flow channels. It seems reasonable that this “outer boundary” can be considered the limits of the potential ordinary high water mark flow path. This approach may result in the inclusion of interfluvial areas within the jurisdictional boundary that otherwise might not be considered jurisdictional under the strictest of field interpretations. Where the Agua Fria Channel is confined within armored or stabilized banks, the armored bank was noted as the boundary.

This information was transferred to black and white aerial photography and submitted to the Corps in June 2000. The Corps has issued the necessary authorizations for the scientific study and is reviewing several other separate 404 applications based on the submitted delineation. The Corps has not approved the corridor delineation but has accepted the established boundary on a case-by-case basis.



5.0 Summary

This ecological study, conducted as part of the Agua Fria Watercourse Master Plan, evaluated the approximately 32-mile reach of the Agua Fria River from the New Waddell Dam to the confluence with the Gila River. The evaluation was conducted to identify existing natural resources along the river corridor and to identify potential regulatory compliance and resource management issues relating to those resources.

The entire 3-2 mile reach is an ephemeral channel with several isolated areas of near perennial or intermittent surface water discharge. The river varies from a deeply incised channel in the northern reaches to a flat gradient shallow braided channel in the central and southern portions. Numerous sections have been altered by excavation, road or utility crossings, channel stabilization techniques, and the construction of levees.

Much of the area surrounding the channel has been developed for commercial and residential use and the southern portion is developed for agricultural use. The area surrounding the northern reach of the channel has not been developed with concentrated commercial or residential use. However, the area has several utility or road crossings and excavation areas, and has been subject to periodic cattle grazing. These activities have affected the natural resources of the channel.

The evaluation identified five general vegetation communities along or within the Agua Fria River channel from the New Waddell Dam to the confluence with the Agua Fria River. These communities have developed based on land use, level of disturbance, substrate, and moisture regime. The amount and periodicity of the available moisture is the single most controlling factor for the development of each of the vegetation communities.

The five communities include:

Early Level Successional Community – A community comprised of ruderal, invasive, and early level successional species. This community is generally limited to the periodically disturbed river channel bottom from below the CAP crossing to near the confluence with the Gila River. It does contain some areas of more established vegetation and inclusions of some of the other communities.

Sonoran Upland Community – A community of succulents and woody species normally associated with the Arizona Upland Sonoran Desert subdivision. This community is primarily located along the upper banks, terraces, and upland areas along the northern portion of the river channel. Much of the southern extent of this community has been altered or removed by development.

Agricultural – A community composed of active and fallow agricultural fields. The community includes areas of grazing range and the irrigation and other infrastructure ancillary to the agricultural production. The community is concentrated in the southern portion of the corridor with isolated inclusions in the northern and central areas. Much of this community has also been altered or eliminated by residential and urban development.



Commercial/Residential – A community composed of landscape species associated with residential and urban development. This community includes golf courses, trails, greenways, and roadside landscaping. The majority of this category is irrigated and actively maintained. The community is concentrated in the central portion of the corridor, with inclusions throughout.

Mesic/Hydric Riparian – A community comprised of the woody vegetation along the intermittent or perennially wet areas of the river channel and the herbaceous vegetation associated with these areas and the limited open water areas. The community is very limited along the corridor, with the largest areas in the northern-most portion of the channel and along the confluence with the Gila River. Several other areas such as the I-10 Bridge and Buckeye Road are also contained in this community.

Wildlife usage and habitat values correspond to the various vegetation communities and the surrounding land use. The entire corridor provides some level of wildlife habitat, although nearby activity significantly reduces that value in many areas. The Mesic/Hydric Riparian vegetation areas provide significant small mammal and avian habitats. Portions of the northern reach of the channel are surrounded by high quality wildlife habitat and the corridor serves as an important linkage for small to large mammals, reptiles, and avian species. The confluence with the Gila River (southern-most portion of the corridor) also provides high quality avian and mammal habitats.

The corridor contains potential habitats for several species currently listed on the USFWS Threatened and Endangered Species list for Maricopa County. While no species were sighted during the field reconnaissance, further evaluations will be necessary prior to activity in certain areas. Additionally, the corridor contains potential habitats for species considered as a special concern by the AGFD and the federal land management agencies. The corridor contains vegetation species listed under the Arizona Native Plant law and also contains vegetation communities (habitats) listed by the AFGD as communities with special management concerns.

The evaluation included the development of the approximate boundaries of the jurisdictional waters of the United States as defined by current U.S. Army U.S. Army Corps of Engineers (Corps) methodology. The ordinary high water mark of the Agua Fria River was estimated to be the lower terrace of the channel. This designation includes most of the sub-braided areas of the channel. In areas of significant disturbance (i.e. levees or excavation areas), the boundary was approximated as the extent of the disturbed area. The complete evaluation has not been approved by the Corps.



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- Ecology of Plant and Animal Species in Western Riparian and Wetland Systems. USGS c/o U.S. Bureau of Reclamation, Douglas C. Anderson danderson@do.usbr.gov <http://mesc.usgs.gov/>



Environmental Determinants of Exotic Riparian Tree Distribution in Western Riparian Ecosystems. USGS-MESC, Jonathan Friedman jonathan_friedman@usgs.gov, <http://mesc.usgs.gov/>

Internet Resources

Arizona Game and Fish Department (AGFD) Teaming with Wildlife – Habitats in Jeopardy. <http://>

ARIA Image Gallery: <http://aria.arizona.edu/gallery>

Arizona Herpetological Association: <http://www.geocities.com/rainforest/canopy/8558/snakes.html>

Arizona State Library, Archives and Public Records: <http://www.dlapr.lib.az.us/>

Butterflies of Southeastern Arizona: <http://nitro.biosci.arizona.edu/zeeb/butterflies/seazlist.html>

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International Arid Lands Consortium: <http://ialcworld.org/>

State of Arizona Game and Fish Department <http://www.gf.state.az.us/>

Sonoran Arthropod Studies Institute: <http://www.sasionline.org/>

Tucson Botanical Gardens: <http://www.tucsonbotanical.org/>

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