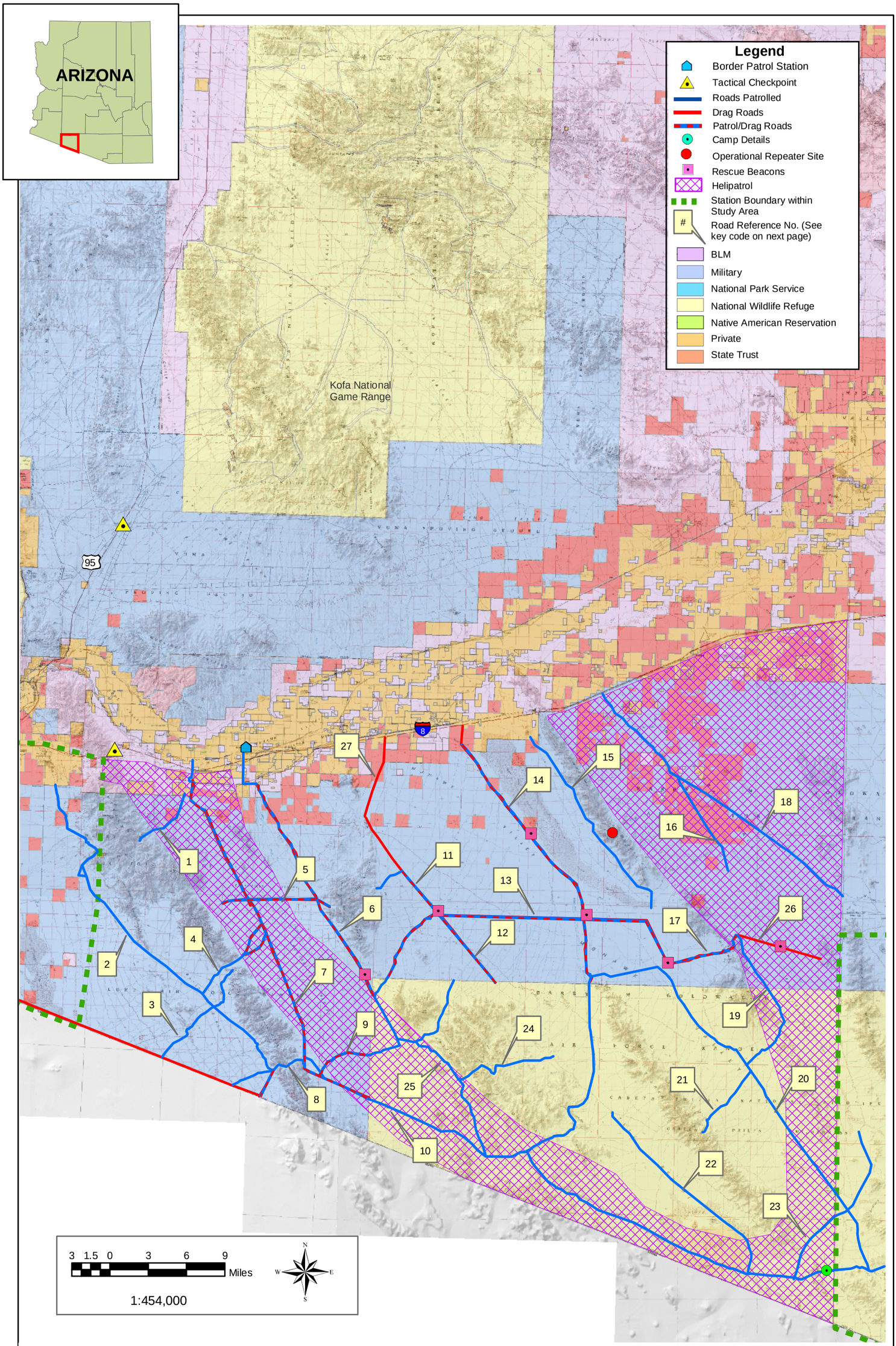

Source: El Centro, Ajo, Salton Sea, and Phoenix, Arizona USGS 1:250,000 topographic quads

NOTE: Road designated as "roads patrolled" are subject to operational needs

Figure 2-11: Border Patrol Activities within the Wellton Station's Area of Operations

gsrc GULF SOUTH RESEARCH CORPORATION

Date: September 2004

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Key to Figure 2-11: Wellton Station

Road Number	Road Name
1	Dripping Springs
2	El Camino Del Diablo
3	Ciprano Pass
4	Smugglers Pass
5	Hobbs Drag*
6	Avenue 29E*
7	Avenue 25E*
8	High Tanks Pass
9	Tractor Road*
10	Lower Drag Road*
11	Big Pass Drag*
12	Little Pass Drag*
13	Mohawk Drag *
14	Papago Road
15	E. Sand Dunes Road
16	Stoval Road
17	Culver Canyon Road*
18	Growler's Wash Road
19	Monreal Well Road
20	Old Papago Road
21	Eagle Tank Road
22	Tule Desert Trail
23	Vidrine Smuggler's Path
24	C.P. Tank Road
25	Tule Road
26	Vidrios Drag (Drag)
27	Avenue 40E (Drag)

* Road is used for patrolling and dragging operations

roads, washes and trails at an elevation between 50 and 75 feet above ground level (agl). The helicopter is required to operate between 50 and 200 feet agl. This flight ceiling is imposed by the USAF due to military aircraft maneuvers routinely occurring on BMGR. Approximately 60 miles of the flight route is within the CPNWR, and approximately 90 miles is within Sonoran pronghorn habitat (INS 1998).

Helicopters are also uses as needed for emergency extraction of IEs in life-threatening situations.

Sensors:

The Wellton Station maintains an inventory of up to 120 sensors. Maintenance of sensors is performed as a part of routine operations.

Temporary Camp Details:

Currently, the Wellton Station has two camp detail sites approved for operation on the CPNWR. One site is located at the Los Vidrios camp site. In support of the ABCI, the original Desert Grip camp detail was upgraded from a Conex box style camp to a 3,840 square feet modular building. The second camp detail site (see Figure 2-11) will be established at Tule Well (DHS 2004b).

Observation Points:

The Wellton Station does not maintain an inventory of skywatch towers.

Rescue Beacons:

Currently, six rescue beacons are utilized in the Wellton Station's AO. The rescue beacons are located on the BMGR.

Portable Lights:

Portable lights are not currently deployed in the Wellton Station's AO.

ISIS Components:

One operational repeater is maintained in the Wellton Station's AO.

2.2 ALTERNATIVES CONSIDERED

The definition of viable alternatives for purposes of this evaluation is constrained by those that meet the purpose and need of the CBP and BP. Three separate and distinct alternatives for achieving this mission will be evaluated in detail in this revised draft PEIS: (1) Expand Operations, Technology-Based Systems, and Approved Infrastructure (the preferred alternative); (2) Expand Technology-Based Systems and Approved Infrastructure; and (3) Expand Existing Operations and Technology-Based Systems. Although it does not satisfy the stated purpose and need, the No Action Alternative is also carried forward for evaluation, as required by the NEPA and CEQ regulations. All four alternatives are described in the following paragraphs.

2.2.1 Alternative 1. Preferred Alternative- Expand Operations, Technology-Based Systems, and Approved Infrastructure

This alternative would allow the BP to expand its existing operations/activities (including technology-based systems) and to complete the approved infrastructure projects (*i.e.*, border barriers, border fences, stadium-style lighting) as identified in Table 2-2. The term "approved" as used in this document refers to projects that have been analyzed in previous NEPA environmental documents with signed decision documents (*i.e.*, FONSI or ROD). Alternative 1 would provide sufficient support needed by the BP toward its mission of deterrence by allowing expansion of current operations/activities as dictated by changes in IE strategy. This alternative would give the BP flexibility to combine a balanced level of technology-based operations (*i.e.*, RVS, sensors, etc.), traditional operations/activities (patrols, dragging, checkpoints, etc.), with an appropriate number of tactical fences, vehicle barriers, and patrol roads strategically concentrating resources when and where they are needed most. Alternative 1 includes the expansion of the following BP operational activities and existing and technology-based systems:

- ISIS components;
- Support vehicles;
- Air support;
- Portable lighting;
- Checkpoints;
- Patrols;
- Off-road operations;
- Drag road preparation;
- Rescue beacons;
- Temporary camp details; and
- Additional BP personnel.

The normal routine enforcement operations, like concentrating patrol agents in certain areas, requesting aerial support, and permanent or temporary increases in staff, would not require further NEPA analyses. Under this alternative, the BP would have to evaluate individual projects in accordance with 28 C.F.R. Part 61, Appendix C, and any subsequent regulations promulgated by CBP or DHS to determine if project specific NEPA documents would be required. At this time, the new DHS Environmental Planning Program that covers the DHS NEPA implementation regulations is being published as Management Directive (MD) 5100.1. These regulations were published in the *Federal Register* for public review on 14 June 2004 and are currently being finalized.

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Table 2-2. Existing and Approved Operations/Activities within Tucson and Yuma Sectors, December 2003

Station	Physical Infrastructure	Technology Based Systems	Operations/Activities
Yuma Sector			
Yuma	Maintain approximately 6 miles of landing mat fence Construction of a new Border Patrol Station.	Continue operation of ground sensors Continue operation of 2 operational repeaters Continue operation of 15 RVS sites Continue operation of 5 rescue beacons	Continue off road, marine, and traditional patrolling activities in addition to air patrols Continue routine dragging/ sign detection operations Continue operation of 27 portable generator lights Continue operation of two permanent checkpoints Operation Skywatch-deploys aircraft for low level search and rescue /reconnaissance operations for approximately 125 days per year in conjunction with Wellton, Ajo, Casa Grande, and Tucson stations
Wellton	No infrastructure projects are approved at this time *	Continue operation of ground sensors Operation of 6 rescue beacons Continue operation of 1 operational repeater	Continue off road and air patrol activities, in addition to traditional patrolling activities Continue to conduct routine dragging/sign detection operations Continue operation of one tactical checkpoint Continue operation of one permanent checkpoint Operation Skywatch deploys aircraft for low level search and rescue /reconnaissance operations for approximately 125 days per year in conjunction with Yuma, Ajo, Casa Grande, and Tucson stations Operation Desert Grip – continue to operate a Desert Grip camp for agents and operations and deploy Tule Well camp if needed
Tucson Sector			
Ajo	No infrastructure projects are approved at this time *	Installation and operation of 10 rescue beacons and continue operation of 6 rescue beacons Continue operation of ground sensors Continue operation of 2 operational repeaters Installation and operation of 11 RVS sites	Continue off road, horse, and traditional patrolling activities as part of the ABCI, in addition to air patrols Operation Skywatch deploys aircraft for low level search and rescue /reconnaissance operations for approximately 125 days per year in conjunction with Yuma, Wellton, Casa Grande, and Tucson stations. Operation Desert Grip- continue to operate two temporary field stations for agents and operations Continue operation of 1 tactical checkpoint Continue operation of portable lights at temporary camp details and tactical checkpoint
Casa Grande	No infrastructure projects are approved at this time *	Installation and operation of 6 rescue beacons Continue operation of ground sensors Continue operation of 3 operational repeaters	Continue off road, horse, and traditional patrolling activities, in addition to air patrols Continue to conduct routine dragging/ sign detection operations Operation Skywatch deploys aircraft for low level search and rescue /reconnaissance operations for approximately 125 days per year in conjunction with Wellton, Ajo, and Tucson Stations Operation of 3 tactical checkpoints Continue operation of three remote temporary field station for agents and operations in conjunction with Wellton, Ajo, and Tucson stations. Operation of Joint Processing Center
Tucson	No infrastructure projects are approved at this time *	Continue operation of ground sensors Continue operation of 4 operational repeaters	Continue routine off road, horse, and traditional patrolling activities, in addition to infrequent air patrols (Existing activities) Continue to conduct routine dragging/ sign detection operations (Existing activity) Operation Skywatch- deploys aircraft for low level search and rescue /reconnaissance operations for approximately 125 days per year in conjunction with Wellton, Ajo, and Casa Grande Continue to operate 2 temporary camp details Expansion of Operation Desert Grip by adding 2 remote temporary field stations for agents and operations Construct new Tucson Sector headquarters near the Tucson Station

Table 2-2, continued

Station	Physical Infrastructure	Technology Based Systems	Operations/Activities
Nogales	Maintain approximately 2 miles of stadium-style lights, approximately 3 miles of landing mat fence, approximately 2 miles of vertical fence, approximately 0.1 mile of vehicle barriers, and approximately 0.5 miles of decorative fence Construction of 2 miles of road upgrades and /or new roadway construction with pertinent drainage structures Construction of 1 mile of primary fence barriers along the border (pedestrian fencing); including 1-mile of fence maintenance road Restoration of Ephriam Ridge Continue maintenance and patrol of underground tunnels Purchase a 30-acre site with an existing building to serve as a new and expanded station facility	Continue operation of 10 existing RVS sites and installation and operation of an additional 15 RVS sites Continue operation of 1 operational repeater Continue operation of ground sensors	Continue off road horse, and traditional patrolling activities, in addition to infrequent air patrols Continue to conduct routine dragging/ sign detection operations Continue operation of 1 tactical checkpoint Continue the use of 60 portable lights along a 4-mile corridor
Sonoita	No infrastructure projects are approved at this time *	Continue operation of ground sensors Continue operation of 2 operational repeaters	Continue routine off road, horse and traditional patrolling activities, in addition to infrequent air patrols Continue to conduct routine dragging/ sign detection operations Continue operation of 1 tactical checkpoint
Naco	Maintain approximately 5 miles of stadium style lights, approximately 6 miles of fence, and approximately 6 miles of permanent vehicle barriers, and approximately 12 miles of temporary vehicle barriers Installation and operation of 7 miles of permanent lighting along the US-Mexico border Construction of 17 miles of primary barriers (pedestrian fencing and /or vehicle barriers) Construction of 9 miles of secondary pedestrian fencing positions 60 feet to 270 feet north of the border. Fencing includes construction of an additional15.4 miles of fence maintenance roadways Construction of 20 miles of road upgrades and/or new roadway construction with pertinent drainage structures Construction of 5 additional miles of roads for dragging /detection operations	Continue operation of 9 existing RVS sites and installation and operation of an additional 8 RVS sites (INS 2003b) Continue operation of ground sensors Continue operation of 1 operational repeate Continue operation of four rescue beacons	Continue routine off road patrols, horse, infrequent air and traditional patrolling activities Continue to conduct routine dragging/ sign detection operations Continue operation of 2 tactical checkpoint stations Continue the use of 35 portable lights along a 10-mile corridor

Table 2-2, continued

Station	Physical Infrastructure	Technology Based Systems	Operations/Activities
Douglas	Maintain approximately 3 miles of permanent lighting, approximately 4 miles of landing mat fence, approximately 2 miles of decorative fence, approximately 1 mile of permanent vehicle barriers, approximately 0.5 mile of bollard fence, and approximately 2 miles of temporary vehicle barriers Construction of 14 miles of primary barriers (pedestrian fencing and /or vehicle barriers) (INS 2003) Installation and operation of 6 miles of permanent lighting along the US-Mexico border (INS 2001b). Approximately 8 miles of additional permanent lighting was assessed in a previous NEPA document and was directed to undergo additional NEPA documentation prior to construction (USACE 2001c) Construction of approximately 9 miles of secondary pedestrian fencing positions 60 feet to 270 feet north of the border. Construction of an additional 14 miles of fence maintenance roadways Construction of 24 miles of road upgrades and/or new roadway construction with pertinent drainage structures; Upgrade the international ditch to a concrete channel Construction of approximately 8 additional miles of drag roads for dragging /detection operations	Continue operation of 13 existing RVS sites and Installation and operation of an additional 1 RVS sites (INS 2003b) Continue operation of ground sensors Continue operation of 2 operational repeaters	Continue off road patrols, horse, infrequent air and traditional patrolling activities (Existing activities) Continue to conduct routine dragging/ sign detection operations Continue operation of 2 tactical checkpoint stations and establish a third tactical checkpoint station Continue operation of an intermittent horse patrol camp Continue the use of 97 portable lights along a 66-mile corridor
Willcox	Construction of a new station headquarters	Continue operation of ground sensors Continue operation of 1 operational repeater	Continue routine off road patrols, horse, air and traditional patrolling activities Continue operation of 3 tactical checkpoints

* No specific infrastructure has been identified. The projects in the original draft PEIS were conceptual infrastructure systems.

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Implementation of Alternative 1 would increase the effectiveness of the BP and enhance the safety and welfare of BP agents, IEs and the general public. The expansion of BP operations and technology-based systems and the completion of approved infrastructure would increase the effectiveness of the BP agents to apprehend and rescue IEs within proximity of the border, thereby reducing the footprint of illegal activities. The implementation of Alternative 1 would increase the BP enforcement area and cause short-term impacts to resources within the project area until sufficient control of the border area is achieved. However, the combination of increased operations, technology-based systems and infrastructure will minimize the long-term environmental impacts associated with illegal activities by providing the BP with an increased level of deterrence through enhanced detection and apprehension.

2.2.2 Alternative 2. Expand Technology-Based Systems and Approved Infrastructure

This alternative promotes the expansion of technology-based systems and approved infrastructure over traditional operations/activities as identified previously in Table 2-2. Border Patrol operations would not be expanded in Alternative 2 in comparison to Alternative 1 (preferred action). Technology-based systems would expand the use of RVS sites and operation of ground sensors positioned at strategic locations along the border. Alternative 2 would include the construction/expansion of two BP stations to house and store equipment required for these types of operations and it would also allow for the completion of approved infrastructure projects. Implementation of this alternative would be designed to maintain traditional daily operations conducted by BP agents and limit new personnel needs. Alternative 2 includes the expansion of ISIS components (*i.e.*, RVS, sensors, operational repeaters, etc.) and the maintenance and completion of approved border roads, border barriers, and stadium style lighting.

While an increase in the technology-based systems would enhance the deterrence and detection abilities of the BP, these systems alone do not provide the same level of deterrence, as do existing daily operational activities. Although cameras and sensors would aid agents in the detection of IEs, they would not enhance the effectiveness of apprehensions. Without a certainty of detection and apprehension, deterrence is reduced. Traditional patrols and aerial support would still be required to pursue and apprehend IEs after the border is breached. Alternative 2 would still require BP agents to deploy to remote areas to apprehend IEs. It is likely that more agents would be required to monitor RVS systems and to respond to the likely

increase in non-deterred IE attempted crossings. This alternative would not effectively reduce the amount of natural resource damage due to trampling by IEs attempting to escape apprehension or reach safety inside the US. This alternative would have fewer direct impacts to the region's natural environment than Alternative 1; however, indirect impacts would be greater because increased illegal foot and vehicle traffic would increase patrol activity. Consequently, patrol activity (*i.e.*, off-road pursuits) would occur further from the border.

2.2.3 Alternative 3. Expand Existing Operations and Technology-Based Systems

This alternative strictly relies on the employment and expansion of existing operations/activities (including technology-based systems) identified previously in Table 2-2. It does not include the completion of currently approved infrastructure projects evaluated through the NEPA process. Expanding all operations/activities including technology-based systems would rely almost solely on detection of IEs as the means of effectively enhancing deterrence or apprehension. An invisible technology barrier would be the primary deterrence to illegal entry. Alternative 3 includes the expansion of the following BP operational activities and technology-based systems:

- ISIS components;
- Support vehicles;
- Air support;
- Portable lighting;
- Checkpoints;
- Patrols;
- Off-road operations;
- Drag road preparation;
- Rescue beacons;
- Temporary camp details; and
- Additional BP personnel.

This alternative would increase operational activities and technology-based systems (*i.e.*, manpower for patrols, checkpoints, RVS units and supporting utilities, support from existing programs such as Operation Skywatch and Operation Desert Grip, and the ABCI). In combination with existing operations and infrastructure, use of technology–based systems, such as the approved RVS sites and portable lighting, would further enhance effectiveness of detection. In areas or instances where there is adequate BP manpower, this alternative would enhance deterrence. However, at the present level of physical infrastructure on the border and without construction of any of the currently approved infrastructure projects, the amount of physical deterrence devices would be inadequate to gain and maintain control of the border region. Even with an increase in manpower and ability to detect breaches of the border, agent

response times would be diminished without adequate access to remote areas. Response times would not be short enough to effectively apprehend IEs or rescue distressed individuals within proximity of the border. The BP agents would consistently be required either to pursue IEs across sensitive habitat or be forced to wait until they reveal their location or come in contact with checkpoints. This alternative would not effectively limit the amount of natural resource damage due to trampling by IEs once they breach the US-Mexico border. This alternative would have fewer direct impacts to the region's natural environment than Alternative 1; however, indirect impacts would be greater because increased illegal foot and vehicle traffic might require BP apprehension activity further from the border.

2.2.4 No Action Alternative. Maintain All Operations/Activities, Technology-Based Systems, and Infrastructure at Current Level of Effort

This alternative would not allow for the expansion of BP operations (including technology-based systems) and would eliminate all currently approved construction projects identified in Table 2-2. The BP use and maintenance of patrol and drag roads would continue. This alternative would allow operations and any normal maintenance and operational requirements associated with existing infrastructure to continue. The continuing increase in IE traffic would likely overwhelm the current BP level of effort. Indirectly, this alternative would likely increase IE and drug smuggling activity and the potential threat for terrorists entering the US. The No Action Alternative would not facilitate the BP's mission to gain and maintain control of the border.

2.3 SUMMARY OF ALTERNATIVES

A summary matrix that illustrates whether each of the alternatives satisfies the stated purpose and need is presented in Table 2-3. A summary of the environmental impacts anticipated as a result of the remaining viable alternatives, as compared to the No Action Alternative is presented in Table 2-4.

Table 2-3. Summary Matrix for Alternatives Considered in the PEIS

Project Purpose and Need	Alternatives			
	Alt 1	Alt 2	Alt 3	No Action
Enhance the BP mission to prevent the entry of terrorists and their weapons and to enforce the laws that protect the US homeland by the detection, interdiction, and apprehension of those who attempt to illegally enter or smuggle any person or contraband across the sovereign borders of the US	Yes	Yes	No	No
Provides a safe, effective, and efficient environment for BP Agents in which to accomplish the BP mission	Yes	Yes	No	No
Enhances the effectiveness of the apprehension activities through the combined use of manpower, technology, and infrastructure and to increase deterrence	Yes	Partially	Partially	No
Increase deterrence through enhanced detection and apprehension	Yes	Partially	Partially	No
Creates a limited zone of certain apprehension in proximity to the US-Mexico border	Partially	Partially	Partially	No
Prevents the loss of life of IEs traversing the desert	Yes	Partially	Partially	No
Protects sensitive resources, public and private lands, and US residents from IEs, illegal activities, and terrorists	Yes	Partially	Partially	No

Alternative 1. Expand operations, technology-based systems, and approved infrastructure (Preferred Alternative)
Alternative 2. Expand technology-based systems and approved infrastructure
Alternative 3. Expand operations and technology-based systems
No Action Maintain all operations,technology-based systems and infrastructure at current levels

Table 2-4. Summary Matrix of Potential Impacts by Alternative[1]

Natural and Cultural Resources									
Alternatives	**Land Use**	**Soils**	**Prime Farmland**	**Water Supply and Quality**	**Air Quality**	**Noise**	**Aesthetics**	**Socio-economics**	**Environmental Justice**
No Action	No additional direct effect to land use.	No additional direct effects; indirect effects (*e.g.* soil disturbance and erosion) from increased illegal off-road traffic.	No additional direct impacts would occur. However, indirect impacts from illegal traffic would continue and likely increase.	No additional direct impacts.	No direct impacts.	Minor indirect effects from BP vehicles in pursuit of IEs.	No additional direct effects; indirect effects from increased environmental damage from illegal traffic.	No additional direct impacts; indirect adverse effects to residential areas, recreation areas, and commercial developments associated with increased illegal activity. Likely increase in IE loss of life.	No impacts.
Alternative 1. Expand Operations, Technology Based Systems, and Approved Infrastructure	Additional permanent conversion of 587 acres from potential commercial developments and open lands to border infrastructure, technology-based systems, and operations. Expanded operations would increase potential impacts by approximately 10% over existing levels.	Additional 587 acres of soil disturbed as a result of the expansion of infrastructure, operations, and technology-based systems and an additional 10% over existing levels of potential disturbance due to expanded operations.	The expansion of operations would increase the potential for additional impacts. Adverse impacts would be short-term; however, long-term beneficial impacts would be expected as IE activities are deterred by expanded BP actions.	Some temporary impacts to water quality in ephemeral streams during construction; would be minimized through BMPs; all unavoidable impacts to wetlands/ other waters and groundwater supplies would be quantified, permitted, & mitigated in site-specific NEPA documents.	Insignificant emissions; below *de minimus* thresholds, if projects are conducted in phases with implementation of environmental design measures.	Additional noise from expanded operations including increased patrol vehicles (ATVs, trucks, and aircraft) as well as short-term construction noise and noise from vehicles and portable light generators could impact visitors to recreation areas; adjacent residential areas.	Potential beneficial and adverse effects on those areas valued for their aesthetic qualities (*e.g.*, Wilderness Areas, National Parks, Wildlife Refuges, etc.)	No relocation of houses or commercial facilities; some minor benefits due to purchase of materials from local suppliers; indirect beneficial effects to land values would occur by stabilization of border. Some effects to tax base if landownership is transferred to DHS. Potential decrease in IE loss of life by increased deterrence, better detection, and confined crossing sites.	No impacts.
Alternative 2. Expand Technology-Based Systems and Approved Infrastructure	Additional permanent conversion of 587 acres from potential commercial developments and open lands to border infrastructure and technology-based systems.	Additional permanent disturbance to soils estimated at 587 acres; no prime farmlands impacted.	No additional direct impacts are expected. However, indirect adverse effects from increased illegal traffic would likely occur.	Some temporary impacts to water quality in ephemeral streams during construction; would be minimized through BMPs; all unavoidable impacts to wetlands/ other waters would be quantified, permitted, & mitigated in site-specific NEPA documents.	Insignificant emissions; below *de minimus* thresholds.	Temporary construction noise would return to ambient conditions upon completion of projects	Potential beneficial and adverse effects on those areas valued for their aesthetic qualities (*e.g.*, Wilderness Areas, National Parks, Wildlife Refuges, etc.)	No displacements of houses or commercial facilities; some minor benefits due to purchase of materials from local suppliers; indirect beneficial effects to land values would occur. No impact to current level of IE loss of life.	No impacts.
Alternative 3. Expand Operations and Technology-Based Systems	Additional permanent conversion of 2 acres as a result of the expansion of operations and technology-based systems. Impacts would be expected to increase by approximately 10% as a result of increased operations.	Additional disturbance to soil estimated at 2 acres and an additional 10% over existing levels of potential disturbance for expanded operations; no impact to prime farmlands.	Effects would be similar to those described for Alternative 1.	Very minimal chance of impact to water quality in ephemeral streams during expanded operations use.	Insignificant emissions; below *de minimus* thresholds.	Additional noise from expanded operationsincluding increased patrol vehicles (ATVs, trucks, and aircraft).	Potential beneficial and adverse effects on those areas valued for their aesthetic qualities (*e.g.*, Wilderness Areas, National Parks, Wildlife Refuges, etc.)	No displacements of houses or commercial facilities; some minor benefits due to purchase of materials from local suppliers. No impact to current level of IE loss of life.	No impacts.

Table 2-4, continued

Natural and Cultural Resources							
Alternatives	**Vegetation Communities**	**Wildlife**	**Fisheries**	**Unique and Sensitive Areas**	**Threatened and Endangered Species**	**Hazardous Waste**	**Cultural Resources**
No Action	No additional direct impacts; potential significant indirect effects from increased illegal traffic.	No additional direct effects; indirect effects to wildlife in all areas due to continued and increased IE traffic.	No impacts.	No additional direct impacts to sensitive areas.	No impacts.	No impacts.	No additional direct effects would occur to historic properties or cultural sites; indirect impacts would continue on potentially eligible sites from illegal and BP traffic as well as intentional looting.
Alternative 1. Expand Operations, Technology-Based Systems, and Approved Infrastructure	Additional 587 acres of vegetation cleared as a result of the expansion of proposed BP border infrastructure and technology-based systems construction areas, and an additional 10% over existing levels of potential disturbance for expanded operations. An additional 430 acres would be impacted by illumination. Extant disturbed habitat (Sonoran desert scrublands) would be most impacted.	Additional 587 acres removed as potential habitat due to the expansion of approved infrastructure and technology-based systems, and an additional 10% over existing levels of potential disturbance for expanded operations. Additional 430 acres of indirect impacts (increased lighting). Impacts to neotropical migrants and other wildlife from noise avoided by minimizing construction during nesting seasons.	No impacts.	Approximately 4.8 acres within seven different Unique & Sensitive Areas would be permanently removed and an additional 10% over existing levels of potential disturbance to account for expanded operations. Some effects to T&E critical habitat and occupied habitats.	Some species may be adversely impacted by the expansion of BP operations. Mitigation measures would be implemented to not jeopardize the continued existence of any protected species.	No impacts.	Potential for direct impact to historic properties or cultural sites. Requires site-specific surveys and Section 106 coordination. Testing and/or data recovery may be required.
Alternative 2. ExpandTechnology-Based Systems and Approved Infrastructure	The construction of on-going and technology-based systems and infrastructure would directly affect 587 acres of vegetation. An additional 334 acres would be directly affected by illumination.	Additional 587 acres of potential habitat affected due to the expansion of infrastructure and technology-based systems.	No impacts.	Approximately 4.8 acres within seven different Unique & Sensitive Areas would be permanently removed. Potential effects to T&E critical habitat and occupied habitat.	Existing and ongoing T&E species concerns surrounding BP infrastructure and operations would continue. Reduced potential for additional direct impacts associated with expanded operations only (no construction of BP additional infrastructure). Minimal additional indirect impacts. Potential impacts reduced compared to Alternative 1.	No impacts.	Potential for direct impact to historic properties or cultural sites. Requires site-specific surveys and Section 106 coordination. Testing and/or data recovery may be required.
Alternative 3. Expand Operations and Technology-Based Systems	Impact to approximately 2 acres of vegetation as a result of the expansion of technology-based infrastructure and an additional 10% over existing levels of potential disturbance for expanded operations.	Additional impacts to 2 acres. Minimal direct effects to wildlife due to extant disturbances and developed areas.	No impacts	Approximately 0.6 acre of Unique and Sensitive Areas would be impacted as well as an additional 10% over existing levels of potential disturbance for expanded operations	No direct impacts associated with expanded construction of BP infrastructure. Minimal indirect impacts. Impacts similar to Alternative 2.	No impacts.	No impacts to historic properties; potential impacts to unknown cultural sites require site-specific surveys. Testing and/or data recovery may be required.

[1] Please refer to Tables 4-1 and 4-2 for a detailed summary of impacts. Acreage impacts were derived from approved and ongoing CBP operations/activities and infrastructure provided by the Tucson and Yuma Sectors. Values were derived from previous environmental analysis and geographic information systems data of existing BP infrastructure as of October 1, 2003.

[2] The impacts presented for Alternatives 1 and 3 include only those impacts that are quantifiable at this time (*e.g.* approved infrastructure and technology-based systems). Additional impacts are expected from the expansion of operations; however, the expansion of off-road enforcement activities, increased road patrols, and air patrols are unquantifiable at this time.

SECTION 3.0
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

Discussions in this chapter shall be limited to only those resources that could potentially be affected by the BP activities, as per CEQ guidance (40 C.F.R. §1501.7). Therefore, discussions of resources such as geology, utilities, communications, hazardous waste, and climate would not be impacted by BP daily operations and thus are not included for evaluation in this PEIS. Furthermore, detailed descriptions about the existing conditions of the human and natural environment along the Arizona border were presented in the Technical Support Documents for the Supplemental Programmatic Environmental Impact Statement (SPEIS) for INS and Joint Task Force Six (JTF-6) activities (USACE 2001a). These discussions are incorporated herein by reference, as allowed by the CEQ regulations for implementing NEPA (40 C.F.R. §1508).

Four Arizona counties (Cochise, Pima, Santa Cruz, and Yuma) within 50 miles of the US-Mexico border comprise the portions of AOs within the Tucson or Yuma Sectors that are addressed in this PEIS. As mentioned previously, this is not the entire area under the Tucson or Yuma Sectors' jurisdictions. Both the Tucson and Yuma Sectors' jurisdictions extend beyond the study area to encompass all of the State of Arizona and include Maricopa, Pinal, Graham, La Paz, Greenlee, Yavapai, Mohave, and Coconino counties. In addition, portions of Imperial, Riverside, and San Bernardino counties in California are contained in the Yuma Sector; however, because this assessment only includes those counties in Arizona affected by BP activities, these California counties are not included as part of this revised draft PEIS.

3.1 LAND USE

The major land uses in the study areainclude agriculture, rangeland, urban, forest, wildlife management, recreation/special use, military, wilderness, and water. The major Federal agencies controlling large land areas are the USFS, NPS, BLM, and the Department of Defense (DoD). The major state agencies controlling large areas of land are the Arizona State Land Department and Arizona State Parks. Native American Tribes also own significant areas of land. Private and corporate uses are classified as urban areas, intensive specialized agriculture land, and large areas of rangeland. "Other" land ownership includes land controlled by other Federal agencies, such as the USFWS, along with county and municipal lands.

3.1.1 Cochise County

The total area of Cochise County, Arizona is approximately 6,170 square miles. The estimated 2001 census population was 119,281 with a population density of 19.3 persons per square mile (US Census Bureau 2003d). The major population centers are Sierra Vista and Fort Huachuca. The largest land use in the entire county is in the private and corporate ownership category (42 percent). The principal land uses outside the urban areas are rangeland and agriculture (cotton, alfalfa, barley, corn, and vegetables). Fort Huachuca is located within Cochise County and the DoD controls approximately 841,000 acres (21 percent). The USFS controls approximately 490,000 acres (12 percent) of land in this county. The majority of the USFS land is the multiple-use Coronado National Forest. The USFWS controls the San Bernardino National Wildlife Refuge (SBNWR) within Cochise County. The BLM controls approximately 391,000 acres (9 percent). The BLM lands include the SPRNCA and numerous multiple use areas used primarily for recreation and grazing. The State of Arizona controls approximately 1,368,000 acres (34 percent), which is used primarily for recreation, historical, and natural areas. The Cochise County portion of the study areahas three small to medium sized urban areas, Douglas, Bisbee, and Naco, that range in population from less than 1,000 to over 15,000 inhabitants.

3.1.2 Pima County

The total area of Pima County, Arizona is 9,187 square miles. The 2001 estimated population was 863,049 with a population density of 93.9 persons per square mile (US Census Bureau 2003d). Major industries located in Pima County include agriculture and tourism. Major land uses in the county include: CPNWR, OPCNM, TON, BLM managed lands, and the Buenos Aires National Wildlife Refuge (BANWR). According to the Arizona Department of Commerce (2003), the primary urban areas and their estimated 2002 populations are Tucson (507,085), Oro Valley (34,050) and Marana (17,770), Arizona.

3.1.3 Santa Cruz County

The total area of Santa Cruz County, Arizona is 1,238 square miles. The estimated 2001 population was 39,590 with a population density of 31.9 persons per square mile (US Census Bureau 2003d). Major industries located in Santa Cruz County include tourism, international trade, and manufacturing. According to the Arizona Department of Commerce (2003), the primary urban areas and their estimated 2001 populations are Nogales (21,110) and Patagonia (905).

3.1.4 Yuma County

The total area of Yuma County, Arizona is 5,514 square miles. The estimated 2001 population was 164,942 with a population density of 29.9 persons per square mile (US Census Bureau 2003d). Major industries located in Yuma County include tourism, international trade, agriculture, and manufacturing. The northeast portion of the county consists of the Fort Yuma Quechan Indian Reservation. The Cocopah Indian Reservation is located in the southwestern portion of Yuma County and consists of three separate areas; West Reservation, East Reservation, and North Reservation. Other land uses in the County include: Kofa National Wildlife Refuge, MCAS-Yuma, BMGR-West, BLM managed lands, and the CPNWR. According to the Arizona Department of Commerce (2003), the primary urban areas and their estimated 2001 populations are Yuma (81,380), San Luis (18,345), and Somerton (7,985).

3.2 TRANSPORTATION

3.2.1 Roads

The Interstate highway system within the study area is well developed (Rand McNally 1997). The following paragraphs describe the Interstates and US Highways found within each county.

3.2.1.1 Cochise County

I-10 extends through Cochise County, Arizona and continues west through the cities of Tucson and Phoenix. SR 90 extends from I-10, through Sierra Vista, and intersects with US Highway 80. SR 80 extends from I-10 (at Benson, Arizona) to the New Mexico border, passing through Bisbee and Douglas, Arizona. US Highway 92 also extends from Sierra Vista to Bisbee, Arizona, but takes a more southern route near Naco, Arizona. From Graham County (north of Cochise County, Arizona), US Highway 191 intersects I-10 and extends south to Douglas, Arizona. SR 181 connects US Highway 191 to the Chiricahua National Monument. SR 186 also provides access to the Chiricahua National Monument via I-10 at Willcox, Arizona. Two POEs are located in Cochise County at Douglas and Naco, Arizona.

3.2.1.2 Pima County

SR 86 is the major east-west artery through central Pima County. There are no major roadways that parallel close to the US-Mexico border. There are two POEs from Mexico via Pima County, Arizona. The first is located along SR 85 at Lukeville and the second is along SR 286 at Sasabe.

3.2.1.3 Santa Cruz County

SR 289 generally parallels the US-Mexico border in the southern portion of Santa Cruz County. Access to Mexico is provided through two POEs at Nogales, Arizona. Vehicles can access the border crossing from the north along I-19, which is the major roadway in the county. Vehicles from the eastern portion of Santa Cruz County or western Cochise County can access I-19 and the border from SR 82.

3.2.1.4 Yuma County

The primary roadway access provided from I-8 to the border crossing at San Luis is US Highway 95. Highway 95 is a north-south artery that proceeds from the San Luis POE through Yuma and Blythe, California, Las Vegas, Nevada, and Boise, Idaho to the Canadian border. It intersects with I-8, as well as with Interstates 10, 15, 40, 80, 84, and 90.

3.2.2 Airports

There are two major airports within the area of operation: Tucson International Airport and Yuma International Airport. In addition to these major airports, there are numerous small and medium airports located throughout the area of operation. These small to medium sized airports do not conduct regularly scheduled commercial or commuter flights. Most of these airports are not located in the vicinity of the border area; however, aircraft providing surveillance and search and rescue missions of the US-Mexico border could utilize some of these smaller airports (*e.g.*, Sierra Vista).

3.3 SOILS

Soil composition and other attributes are a function of source material, climate, and topography. Many parts of the study areahave not been mapped for soils including parts of Cochise, Pima, and Yuma counties. The counties within the study area share a similar climate and similar types of parent material: unconsolidated stream sediments, consolidated sedimentary rocks, and crystalline igneous and metamorphic rocks. There are 42 general soil associations within the Basin and Range Province, which can be grouped by topography: mountains, uplands/foothills, valley slope, and alluvial fan/floodplain. The counties where these soils occur are listed in Table 3-1, and briefly described in the following paragraphs.

Table 3-1. Soil Characteristics for Counties within the Basin and Range Province

Topography/ Soil Association	Counties	Permeability Range	Flood/Erosion Hazard	Limits to Construction
Mountains				
Luzena-Faraway	Cochise	Moderate-slow	Rare/severe	Low-high shrink-swell
Barkerville-Gaddes	Cochise	Moderately rapid	Rare/severe	Low shrink-swell
Tortugas-Rock Outcrop	Cochise, Santa Cruz	Moderate	Rare/severe	Low shrink-swell
Faraway-Rock Outcrop-Barkerville	Santa Cruz	Slow	Slight/high	Low shrink-swell
Cherioni-Gachado-Rock Outcrop	Pima	Slow	Slight/slight	Low shrink-swell
Lomitas-Rock Outcrop	Yuma, La Paz	Moderate	Rare/severe	Low shrink-swell
Uplands/Foothills				
White House-Bernadino-Carulampi	Pima, Santa Cruz	Slow-moderate	Rare/severe	High shrink-swell
Kimbrough-Cave	Cochise	Moderate	Rare/severe	Moderate shrink-swell
Hathaway-Nickel	Cochise, Santa Cruz	Moderate	Rare/severe	Low shrink-swell
Rilloso-Latene	Cochise	Moderate	Rare/severe	Moderate shrink-swell
Graham-Lampshire-Ustollic	Cochise	Slow-rapid	Rare/severe	Low-high shrink-swell
Mabray	Cochise	Moderate	Rare/severe	Low
Krentz	Cochise	Moderate	Rare/severe	Low shrink-swell
Rough Broken Land-Gullied Land	Cochise	Moderate	Rare/severe	Low-moderate shrink-swell
Granite Rock Land	Cochise	Moderate-slow	Rare/severe	Low-high shrink-swell
Pinaleno-Nickel-Palos Verdes	Pima	Slow-rapid	Rare/slight	Low shrink-swell
Lamphshire-Chiricahua-Graham	Santa Cruz	Slow-moderate	Rare/moderate-high	Low-high shrink-swell
Superstition-Rositaas	Yuma	Rapid	Rare/moderate	Low shrink-swell
Valley Slope				
Sonoita-Anthony	Cochise, Pima Santa Cruz	Moderate	Slight/slight	Low shrink-swell
White House Tubac-Forrest	Pima, Cochise	Slow	Slight/severe	High shrink-swell
Eba	Cochise	Slow	Rare/moderate	Moderate shrink-swell
Martinez	Cochise, Santa Cruz	Very slow	Slight/moderate	High shrink-swell
Casto	Cochise, Santa Cruz	Slow	Rare/severe	Low shrink-swell

Table 3-1. Continued

Topography/ Soil Association	Counties	Permeability Range	Flood/Erosion Hazard	Limits to Construction
Cruces	Cochise	Moderate	Rare/severe	Low shrink-swell
Bonita-Sontag	Cochise	Slow-very slow	Slight/moderate	High shrink-swell
Laveen-Coolidge	Pima	Moderate-rapid	Severe/severe	Moderate shrink-swell
Alluvial Fan/Valley Floor				
Gothard-Crot-Stewart	Cochise	Moderately slow	Slight-severe/slight	High shrink-swell
Elfrida	Cochise	Moderately slow	Slight/slight	Moderate shrink-swell
Karro	Cochise	Moderately slow	Slight/slight	Moderate shrink-swell
McAllister	Cochise	Slow	Slight/slight	Moderate shrink-swell
Mohave	Cochise	Moderately slow	Slight/slight	Moderate shrink-swell
Dry Lake-Playa	Cochise	Rapid-slow	Severe/severe	High shrink-swell
Comoro-Anthony-Grabe	Cochise	Moderately rapid	Slight/slight	Low shrink-swell
Vinton-Gila	Cochise Pima	Rapid	Slight/severe	Low shrink-swell
Guest	Cochise	Slow-very slow	Slight/slight	High shrink-swell
Coolidge-Wellton-Antho	Yuma	Moderately rapid	Slight/slight	Low shrink-swell
Antho-Valencia-Gilman	Pima	Moderate-slow	Severe/moderate	Low shrink-swell
Rillito-Gunsight-Pinal	Pima, Yuma	Moderate	Slight/moderate	Low shrink-swell
Gilman-Vint-Brisos	Yuma	Moderate-rapid	Severe/slight	Low shrink-swell
Imperial-Glenbar-Holtville	Yuma	Slow-moderate	Frequent/slight	Moderate-high shrink-swell
Comora-Pima	Santa Cruz	Occasional/slight	Occasional/slight	Low-high shrink-swell
Harqua-Perryville-Gunsight	Yuma	Occasional/slight	Occasional/slight	Low-moderate shrink-swell

Source: US Department of Agriculture 1971; Richardson and Miller 1974; Maricopa Planning Department 1977; Richardson et al. 1979

The mountainside soils are shallow, steep, and, where sufficient soil is present, well-drained. There are four general soil associations present in this group that can be found throughout the mountain ranges of the area of operation.

Soils formed on uplands/foothills are transitional and show a variety of features that reflect local topography. They are shallow to deep, gently to steeply sloping, and well drained. The surface can be deeply dissected, and rock outcrops may be exposed. Twelve general soil associations are present in this group. Transitional soils are rarely found in western Pima and Yuma counties except in the Supersitition-Rositas association in Yuma County where sand dunes are present.

The soils of the valley slopes are deep, well drained, and on slopes of up to 10 degrees. They form on and from older alluvial layers. Sediments are unsorted and have variable textures. There are eight general soil associations present in this group. These soils are extensive in Cochise, Santa Cruz, and eastern Pima counties.

The alluvial fan/floodplain soils contain 16 soil associations and are generally level to near level, deep soils formed from older alluvium. Composition and texture are variable depending upon host material. Examples of these soils include: Dry Lake-Playa found in the Willcox Playa, Vinton-Gila found in the San Pedro River Basin, Grabe-Gila-Pima found in the Santa Cruz River Basin, and Rillito-Gunsight-Pinal found in the Lower Colorado River and Lower Gila River basins (US Department of Agriculture 1971; Richardson and Miller 1974; Richardson et al. 1979; Barmore 1980).

3.4 PRIME FARMLANDS

The Farmland Protection Policy Act of 1980 and 1995 was established to preserve the Nation's farmland. In Section 7 of the Code of Federal Regulations (CFR) 657.5, prime farmlands are defined as having the best combinations of physical and chemical properties to be able to produce fiber, animal feed, food, and are available for these uses. All prime farmlands in Arizona are classified as "Category 1" based on the requirement of irrigation to be arable. Prime farmlands in Arizona occur mainly within the San Pedro Valley and the Lower Colorado River area near Yuma. Many of the soils identified within the study area require irrigation in order to be considered prime farmlands. The prime farmlands located within the study area are presented in Table 3-2. As can be seen from this table, most of the prime farmland soils are found in Pima County (Breckenfield 2000).

Table 3-2. Study Area Soils Considered Prime Farmland When Irrigated

Soil Name	Counties
Antho fine sandy loam	Yuma
Anthony fine sandy loam, 0 to 3 percent slopes	Pima
Anthony sandy loam	Yuma
Bucklebar-hayhook-tubac complex, 0 to 3 percent slopes	Pima
Chucum loam, 1 to 3 percent slopes	Pima
Comoro sandy loam, 0 to 2 percent slopes	Pima
Comoro soils, 0 to 5 percent slopes	Santa Cruz
Date land fine sandy loam	Yuma
Date land loamy fine sand	Yuma
Dateland-denure association, 1 to 3 percent slopes	Pima
Dateland-denure association, 1 to 3 percent slopes	Pima
Denure-panaka complex, 1 to 3 percent slopes	Pima
Diasnar sandy loam, 1 to 5 percent slopes	Pima
Gadsden clay	Yuma
Gadsden silty clay loam, 0 to 1 percent slopes	Pima
Gilman loam	Yuma
Gilman very fine sandy loam, 0 to 1 percent slopes	Pima
Ginland silty clay, 0 to 1 percent slopes	Pima
Glenbar loam, 0 to 1 percent slopes	Pima
Glenbar silty clay loam	Yuma
Glendale clay loam, 0 to 2 percent slopes	Pima
Glendale silt loam, 0 to 3 percent slopes	Pima
Glendale silt loam, 1 to 3 percent slopes	Pima
Glendale-pajarito complex, 1 to 3 percent slopes	Pima
Grabe soils	Santa Cruz
Grabe-Comoro complex, 0 to 5 percent slopes	Santa Cruz
Guest fine sandy loam, 0 to 1 percent slopes	Pima
Guest soils	Santa Cruz
Hantz clay loam, 0 to 1 percent slopes	Pima
Hantz loam, 0 to 1 percent slopes	Pima
Holtville clay	Yuma
Indio silt loam	Yuma
Kofa clay	Yuma
Mohall loam, 0 to 2 percent slopes	Pima
Mohall loam. 0 to 2 percent slopes	Pima
Mohall-pahaka complex, 1 to 3 percent slopes	Pima
Mohall-pahaka complex, 1 to 3 percent slopes	Pima
Mohall-trix complex, 0 to 1 percent slopes	Pima
Mohall-trix complex, 0 to 1 percent slopes	Pima
Pajarito-sahuarita complex, 1 to 3 percent slopes	Pima
Pima soils	Santa Cruz
Ripley silt loam	Yuma
Rive road and Comoro soils, 0 to 2 percent slopes	Pima
Sasco loam, 0 to 1 percent slopes	Pima
Tubac complex, 0 to 2 percent slopes	Pima
Tucson-Mohall Valencia complex, 1 to 3 percent slopes	Pima
Vecent clay loam, 0 to 1 percent slopes	Pima
Vecont clay loam, 0 to 1 percent slopes	Pima
Winterburg loam, 0 to 1 percent slopes	Pima
Antho fine sandy loam	Yuma

Table 3-2, continued

Soil Name	Counties
Anthony fine sandy loam, 0 to 3 percent slopes*	Pima
Anthony sandy loam	Yuma
Bucklebar-hayhook-tubac complex, 0 to 3 percent slopes	Pima
Chucum loam, 1 to 3 percent slopes	Pima
Comoro sandy loam, 0 to 2 percent slopes*	Pima
Comoro soils, 0 to 5 percent slopes	Santa Cruz
Date land fine sandy loam	Yuma
Date land loamy fine sand	Yuma
Dateland-denure association, 1 to 3 percent slopes	Pima
Dateland-denure association, 1 to 3 percent slopes	Pima
Denure-panaka complex, 1 to 3 percent slopes	Pima
Diasnar sandy loam, 1 to 5 percent slopes	Pima
Gadsden clay	Yuma
Gadsden silty clay loam, 0 to 1 percent slopes*	Pima
Gilman loam	Yuma
Gilman very fine sandy loam, 0 to 1 percent slopes*	Pima
Ginland silty clay, 0 to 1 percent slopes*	Pima
Glenbar loam, 0 to 1 percent slopes*	Pima
Glenbar silty clay loam	Yuma
Glendale clay loam, 0 to 2 percent slopes*	Pima
Glendale silt loam, 0 to 3 percent slopes*	Pima
Glendale silt loam, 1 to 3 percent slopes*	Pima
Glendale-pajarito complex, 1 to 3 percent slopes*	Pima
Grabe soils	Santa Cruz
Grabe-Comoro complex, 0 to 5 percent slopes	Santa Cruz
Guest fine sandy loam, 0 to 1 percent slopes*	Pima
Guest soils	Santa Cruz
Hantz clay loam, 0 to 1 percent slopes*	Pima
Hantz loam, 0 to 1 percent slopes*	Pima
Holtville clay	Yuma
Indio silt loam	Yuma
Kofa clay	Yuma
Mohall loam, 0 to 2 percent slopes	Pima
Mohall loam. 0 to 2 percent slopes	Pima
Mohall-pahaka complex, 1 to 3 percent slopes	Pima
Mohall-pahaka complex, 1 to 3 percent slopes	Pima
Mohall-trix complex, 0 to 1 percent slopes	Pima
Mohall-trix complex, 0 to 1 percent slopes	Pima
Pajarito-sahuarita complex, 1 to 3 percent slopes	Pima
Pima soils	Santa Cruz
Ripley silt loam	Yuma
Rive road and Comoro soils, 0 to 2 percent slopes*	Pima
Sasco loam, 0 to 1 percent slopes	Pima
Tubac complex, 0 to 2 percent slopes	Pima
Tucson-Mohall Valencia complex, 1 to 3 percent slopes*	Pima
Vecent clay loam, 0 to 1 percent slopes*	Pima
Vecont clay loam, 0 to 1 percent slopes*	Pima
Winterburg loam, 0 to 1 percent slopes	Pima

Table 3-2, continued

Soil Name	Counties
Bonita clay, 0 to 1 percent slopes	Cochise
Courtland sand loam, 0 to 2 percent slopes	Cochise
Courtland – diaspar complex, 0 to 3 percent slopes	Cochise
Diaspar sandy loam, 0 to 2 percent slopes	Cochise
Dona ana – Mohave complex, 1 to 5 percent slopes	Cochise
Elgin – mcallister – stronghold complex, 1 to 8 percent slopes	Cochise
Forrest clay loam, 1 to 3 percent slopes	Cochise
Forrest sandy loam, 1 to 3 percent slopes	Cochise
Forrest silt loam, 0 to 1 percent slopes	Cochise
Forrest – bonita complex, 0 to 3 percent slopes	Cochise
Glendale very fine sandy loam, 0 to 2 percent slopes	Cochise
Guest silty clay loam, 0 to 1 percent slopes	Cochise
Guest silty clay loam, 0 to 3 percent slopes	Cochise
Kahn complex, 0 to 3 percent slopes	Cochise
Mcallister loam, 1 to 3 percent slopes	Cochise
Mcneal gravelly sandy loam, 1 to 3 percent slopes	Cochise
Sasabe gravelly sandy loam, 0 to 2 percent slopes	Cochise
Tenneco fine sandy loam, 0 to 2 percent slopes	Cochise

* These soils are also considered prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season.

Source: Breckenfield 2000.

3.5 BIOLOGICAL RESOURCES

3.5.1 Vegetation Communities

The rich floral communities (3,666 species of native and naturalized plants) of Arizona can be defined on the basis of the interaction of geomorphology, soils, climate, animals, and humans. These vegetation areas set the stage for a wide array of land uses varying from intensive cropland agriculture to ranching and urban development. There are four biotic provinces in Arizona, two of which are in the study area. These two provinces are: 1) the Apachian province which runs west from the New Mexico-Arizona state line through a large portion of Cochise, Santa Cruz, and parts of Pima counties, and 2) the Sonoran province which includes the northwestern part of Santa Cruz, Pima, Yuma, and La Paz counties (Dice 1943). The Apachian biotic province covers the high grassy plains and mountains of southeastern Arizona and consists of plant and wildlife species adapted to semiarid conditions. The Sonoran biotic province covers the desert region of southwestern Arizona and is characterized by extensive plains from which isolated small mountains and buttes rise abruptly.

The ecosystems, or vegetation communities, found within the study area include both upland (Forest, Woodland, Grassland, and Desertland) and wetland (Forest) formations (Brown 1994; Brown and Lowe 1983). The distribution of both upland and wetland formations is a function of integrated environmental factors, primarily moisture. Vegetation communities of a specific formation are further classified by climate. Vegetation communities with shared formation and climate are termed biomes, and can be further classified by their dominant species to form vegetation-types. Each of the biomes found in the study area have been organized by formation and is discussed below.

3.5.1.1 Forest

Forest vegetation communities consist of large trees and are frequently characterized by closed or multilayered canopies. Forest trees generally attain heights greater than 50 feet in upland communities and 30 feet in wetland communities. Limited in distribution to areas of high elevation where precipitation and lower temperatures provide relatively high amounts of available moisture, and to riparian zones where ground water is readily available for respiration, forests are the least represented formation in southern Arizona.

Two upland forest biomes are present in the study area. The Madrean Montane Conifer Forest biome is found at middle elevations of the Chiricahua Mountains in Cochise County, and the highest elevations of the Santa Rita Mountains and the Huachuca Mountains in Santa Cruz County, Arizona (Arizona Board of Regents 2003). Two vegetation-types are found in this montane biome. Ponderosa pine (*Pinus ponderosa*) forests dominate lower elevations and Douglas fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), limber pine (*Pinus flexilis*), and aspen (*Populus tremuloides*) are more abundant in cooler areas of higher elevations, canyons, and north facing slopes. In the Chiricahua Mountains, this biome grades into the Rocky Mountain Subalpine Conifer Forest at the highest elevations where forests include Mexican white pine (*Pinus ayacahuite*) and, on northern slopes, the endemic Chihuahuan spruce (*Picea chihuahuana*). At lower elevations, both grasses and forbs in forest openings and edges represent the herbaceous component of upland forest biomes. At higher elevations, the herbaceous component consists of mosses, lichens, and fungi.

Two wetland forest biomes occur within the western half of the study area. The Sonoran Riparian Deciduous Forest biome is associated with riparian zones and floodplains of the larger rivers. Vegetation in this biome consists of tropic-subtropic species of willow (*Salix gooddingii*

var. *variabilis*), cottonwood (*Populus freemonti* var. *macdougalii)*, Alamo (*P. dimorpha*), and velvet mesquite (*Prosopis velutina*). Willow and cottonwood forests are restricted to the immediate floodplain, while extensive mesquite bosques (woodlands) develop in on alluvium of old dissected floodplains at the confluence of larger rivers and their major tributaries. The second wetland forest biome is the Sonoran Oasis Forest and is represented by groves of California fan palm (*Washingtonia filifera*) restricted to certain isolated, permanent springs, seeps, and moist canyons in the western edge of the Sonoran Desert.

3.5.1.2 Woodland

Woodland vegetation communities are dominated by shorter trees (less than 50 feet in height) forming an open to very open, single layered canopy. The only upland woodland biome in the study area is the Madrean Evergreen Woodland. It is warm-temperate woodland found throughout the mountains of Cochise, Santa Cruz, and eastern Pima counties starting at an elevation of 4,000 feet msl. Although composition varies with edaphic factors, gymnosperms and encinal, or semi-evergreen, oaks dominate vegetation communities in this biome. Dominant species in this biome include alligator bark juniper (*Juniperus depeana*), one-seed juniper (*J. monosperma*), Chihuahua pine (*Pinus leiophylla* var. *chihuachuana*), Arizona pine (*P. ponderosa* var. *arizonica*), Arizona white oak (*Quercus arizonica*), Mexican blue oak (*Q. oblongifolia*), and Chihuahua oak (*Q. chihuahuensis*) (Brown 1994).

3.5.1.3 Grasslands

Grasses and other herbaceous species dominate grassland vegetation communities. The grassland communities of this province consist of the Semi-desert Grassland and the Plains Grassland. The Semi-desert Grassland is found in the valley areas of Cochise, Santa Cruz, and eastern Pima counties. This vegetation community is dominated by grama grasses (*Bouteloua* sp.), tobosa grass (*Pleuraphis mutica*), alkali sacaton (*Sporobolus airoides*), curly mesquite grass (*Hilaria belangeri*), and scrub-shrubs such as honey mesquite (*Prosopis glandulosa*), one-seed juniper, little leaf sumac (*Rhus microphylla*), false-mesquite (*Calliandra eriophylla*), and desert hackberry (*Celtis pallida*) (Brown 1994).

The Plains Grassland community is located between 4,000 and 7,500 feet amsl in Cochise and Santa Cruz counties. Dominant species include grama grasses, buffalo grass (*Buchloe dactyloides*), Indian rice grass (*Achnatherum hymenoides*), galleta grass (*Pleuraphis* sp.), prairie June grass (*Koeleria macrantha*), and plains love grass (*Eragrostis intermedia*), vine

mesquite (*Panicum obtusum*), and alkali sacaton. Shrubs such as four-wing saltbush (*Atriplex canescens*), sagebrush (*Artemisia* sp.), and snakeweed (*Gutierrezia* sp.) are often scattered throughout.

3.5.1.4 Desertlands

Desertland communities are represented in the most extreme of arid environments where plants are separated by significant areas of bare soil. Desertland comprises the vast majority of the habitat within the AO. The Desertland formation in southern Arizona is subdivided into Chihuahuan Desertscrub and Sonoran Desertscrub biomes. Chihuahuan Desertscrub is found only in Cochise and eastern Pima counties. Creosote bush (*Larrea* tridentata) is the dominant vegetation, but cacti, tarbush (*Flourensia cernua*), ocotillo (*Fouquieria splendens*), and honey mesquite are also common associates (Brown 1994).

West of the Beunos Aires, precipitation is unreliable and follows an uneven biseasonal pattern separated by periods of spring and fall drought. The Sonoran Desertscrub biome covers this portion of the project area. The Arizona Upland subdivision forms in southeastern Yuma County and the Lower Colorado River Valley (LCRV) subdivision forms to the west and continues past the Colorado River into California.

The Arizona Uplands subdivision supports diverse vegetation communities consisting of cacti and woody plants that are often spiny or have chemical defenses against herbivores. Cacti best represented in this subdivision include chollas (*Opuntia* sp.), desert Christmas cactus (*O. leptocaulis*), saguaro (*Carnegia gigantea*), organ pipe (*Senocereus thurberi*), night-blooming cereus (*Peniocereus greggii* var. *transmontanus*), fishhook pincushion (*Mammillaria microcarpa*), Thronber pincushion (*M. thornberi*), fishhook barrel cactus (*Ferocactus wislizenii*), and compass barrel cactus (*F. acanthodes*). Many of the trees that are confined to washes in the more arid portions of the Sonoran Desertscrub biome are interspersed among open layers of shrubs, cacti, and other succulents giving vegetation communities the appearance of an open scrubland. The dominant vegetation-type in the Arizona Upland subdivision is the paloverde-cacti-mixed scrub series and is dominated by yellow paloverde (*Parkinsonia microphylla*), and secondarily by ironwood (*Olneya tesota*), with saguaros reaching above this stratum.

The LCRV Subdivision is the driest of the Sonoran Desertscrub and perennial vegetation is often restricted to temporary drainages while interfluvial surfaces support only ephemeral

species. Shrubs and small trees lining these drainage ways have a high proportion of their chlorophyll in or beneath the bark of stems and either have small leaves or no leaves at all. These species include western honey mesquite, ironwood, blue paloverde (*P. florida*), and smoke tree (*Psorothamnus spinosus*). In sandier soils with better infiltration, the two common vegetation-types are dominated by creosote bush and white bursage (*Ambrosia dumosa*) or by saltbush (*Atriplex* sp.). Within the creosote bush-white bursage vegetation-type, creosote bush is evenly spaced while white bursage tends to have a more clumped spacing. The saltbush vegetation type is less common and occurs on finer soils where water retention is greater.

3.5.2 Fish and Wildlife Resources

Arizona contains an enormous diversity of environments for wildlife ranging from hot, dry deserts at low elevations through rich upland deserts, grasslands, and woodlands at mid-elevations to cold, moist montane/alpine habitats. The distribution of these environments is controlled by climatic conditions and topographic factors. Physiographic features such as scarps, plateaus, plains, mountains, and drainage systems along with soil types and pedogenic and biotic elements influence wildlife distribution. Due to the difference in climate and topography within the area of operation, the terrestrial wildlife will be divided into wildlife found in southeastern Arizona and wildlife found in southwestern Arizona.

The native faunal components of southeastern Arizona include 370 species of birds, including owls. The study area is dominated by sparrows and towhees (35 species); wood warblers (32 species); swans, geese, and ducks (31 species); tyrant flycatchers (30 species); sandpipers and phalaropes (26 species); and kites, eagles, and hawks (15 species). The majority of these bird species occur in spring and fall when Neotropical migrants (*e.g.*, flycatchers and warblers) pass through on their way to summer breeding or wintering grounds and in the winter when summer resident birds (*i.e.*, robins, kinglets, and sparrows) from the north arrive to spend the winter. The majority of the 109 mammalian species found in the study areaare bats and rodents (*i.e.*, mice, rats, and squirrels) with rodents being the most commonly encountered mammals. Of the 23 amphibian species, which inhabit southeastern Arizona, spade foot toads and true toads are dominant and the most widespread. A total of 72 species of reptiles can be found in the area with the iguanid lizards and colubrid snakes being the most prevalent along with whiptails (Lowe 1964; Hoffmeister 1986; Lane 1988; US Department of the Interior [USDOI] 1989; USACE 1990; Davis and Russell 1991; Lowe and Holm 1992).

Distribution patterns of freshwater fish in Arizona are controlled by climatic and geological factors. A total of 47 fish species can be found in the major river basins and springs in the AO. The Santa Cruz River system, 12 species; the Rio Yaqui Basin, 11 species; Monkey Spring, 10 species; Sycamore Bear Canyon, four species; and Quitobaquito Spring, two species. Historically, the San Pedro River contained 14 species of native fish. Today, these have been largely replaced by introduced species such as the common carp, yellow bullhead, and mosquito fish. Only the longfin dace and desert sucker remain from the original San Pedro populations. The lower Gila River system contains 11 fish species of which only the Desert pupfish is a native species. The Lower Colorado River system supports 36 fish species, of which only four are native (Minckley 1973; Rinne and Minckley 1991; Robbins et al. 1991).

The USFS identifies Management Indicator Species (MIS) in the Land and Resource Management Plans of each national forest and are intended to represent habitat types that occur within the national forest boundary and/or because they are thought to be sensitive to National Forest System management activities. MIS for the Coronado National Forest, which covers large areas of Cochise, Santa Cruz, and Pima counties, are presented in Table 3-3.

3.5.3 Threatened/Endangered Species and Critical Habitat

The Endangered Species Act (ESA) of 1973 (16 U.S.C. §1532 *et. seq.*), as amended, was enacted to provide a program for the preservation of endangered and threatened species and to provide protection for the ecosystems upon which these species depend for their survival. All Federal agencies are required to implement protection programs for designated species and to use their authorities to further the purposes of the ESA. The Secretary of the Interior and the Secretary of Commerce have the responsibility for the identification of a threatened or endangered species, development of any potential recovery plans, and designation of critical habitat.

The USFWS and the National Marine Fisheries Service (NMFS) are the primary agencies responsible for implementing the ESA. The ESA applies to both plant and animal species. The implementing agencies' responsibilities under the ESA include: (1) the identification of threatened and endangered species, (2) the identification of critical habitats for listed species, (3) implementation of research on, and recovery efforts for, these species, and (4) consultation with other Federal agencies concerning measures to avoid harm to listed species (known as Section 7 consultation).

Table 3-3. Coronado National Forest Management Indicator Species by Habitat Type

	Indicator Group	Species	
1	Cavity Nesters	Coppery-tailed (Elegant) Trogon Sulphur-bellied Flycatcher Other primary and secondary cavity nesters*	
2	Riparian Species	Gray hawk Blue-throated hummingbird Coppery-tailed (elegant) trogon Rose-throated becard Thick-billed kingbird	Sulphur-bellied flycatcher Northern Beardless tyrannulet Bell's vireo Black bear
3	Species Needing Diversity	White-tailed deer Merriam's turkey Coppery-tailed (elegant) trogon Sulphur-bellied flycatcher Buff-breasted flycatcher Black bear	
4	Species Needing Herbaceous Cover	White-tailed deer Mearn's quail Pronghorn antelope Desert massassauga Baird's sparrow	
5	Species Needing Dense Canopy	Bell's vireo Northern beardless tyrannulet Gray hawk	
6	Game Species	White-tailed deer Mearn's quail Pronghorn antelope Desert bighorn sheep Merriam's turkey Black bear	
7	Special Interest Species	Mearn's quail Gray hawk Blue-throated hummingbird Coppery-tailed (elegant) trogon Rose-throated becard	Thick-billed kingbird Sulphur-bellied flycatcher Buff-breasted flycatcher Northern beardless tyrannulet Five-striped sparrow
8	Threatened and Endangered Species	Desert bighorn sheep Gray hawk Peregrine falcon Blue-throated hummingbird Coppery-tailed (Elegant) trogon Rose-throated becard Thick-billed kingbird Sulphur-bellied flycatcher Buff-breasted flycatcher Northern beardless tyrannulet Bell's vireo Baird's sparrow Five-striped sparrow Mexican stoneroller	Arizona (Apache) trout Gila topminnow Gila chub Sonora chub Desert massassauga Twin-spotted rattlesnake Arizona ridge-nosed rattlesnake Huachuca (Sonora) tiger salamander Tarahumara frog Western barking frog Spikedace Arizona treefrog Mt. Graham spruce (red) squirrel Gould's turkey

Source: US Forest Service 2004c

An endangered species is a species in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Proposed species are those formally submitted to the implementing agency for official listing as threatened or endangered. Species may be considered endangered or threatened when any of the five following criteria occurs: (1) the present or threatened destruction, modification, or curtailment of their habitat or range; (2) overuse of the species for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; or (5) other natural or man-made factors affecting its continued existence.

In addition, the USFWS has identified species that are candidates for listing as a result of identified threats to their continued existence. The candidate (C) designation includes those species for which the USFWS has sufficient information on hand to support proposals to list as endangered or threatened under the ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.

The ESA also calls for the conservation of what is termed Critical Habitat - the areas of land, water, and air space that are essential to the survival of a threatened or endangered species. Critical habitat includes such things as food and water, breeding sites, cover or shelter, and sufficient habitat area to provide for normal population growth and behavior. One of the primary threats to many species is the destruction or modification of essential habitat by uncontrolled land and water development.

3.5.3.1 Federal

A total of 39 Federally endangered, threatened, proposed threatened, and candidate species are present within Cochise, Pima, Santa Cruz, and Yuma counties. A total of 22 species are listed as endangered, 10 as threatened, 2 as proposed threatened, and 5 as candidate. Information pertaining to these federally protected species is included in Table 3-4. This list includes 10 birds, 6 mammals, 3 reptiles, 2 amphibians, 11 fishes, and 8 vascular plants. In addition to threatened, endangered, proposed and candidate species, the USFS lists species classified as sensitive. These USFS sensitive species are presented in Appendix B. The following paragraphs briefly describe these species and their habitat requirements that are listed, or proposed for listing, by the ESA.

Table 3-4. Federally Listed, Proposed, and Candidate Species Potentially Occurring within Cochise, Pima, Santa Cruz, and Yuma Counties, Arizona

Common/Scientific Name	Status	Date Listed	Counties	BP Stations	Habitat
PLANTS					
Acuna cactus *Echinomastus erectocentrus acunensis*	C	7/1/75	Pima	SON, NGL, TUS CAG, AJO	Well drained knolls and gravel ridges in Sonoran desert scrub
Canelo Hills ladies' tresses *Spiranthes delitescens*	E	1/6/97	Cochise, Santa Cruz	WCX, DGL, NCO SON, NGL, TUS	Finely grained, highly organic, saturated soils of cienegas
Cochise pincushion cactus *Coryphantha robbinsorum*	T	1/9/86	Cochise	WCX, DGL, NCO	Semi desert grassland with small shrubs, agave, other cacti, and grama grass
Huachuca water umbel *Lilaeopsis schaffneriana ssp. recurva*	E	1/6/97	Cochise, Pima, Santa Cruz	WCX, DGL, NCO SON, NGL, TUS, CAG, AJO	Cienegas, perennial low gradient streams, wetlands
Kearney's blue star *Amsonia kearneyana*	E	1/19/89	Pima	SON, NGL, TUS, CAG, AJO	West-facing drainages in the Baboquivari Mountains
Lemmon fleabane *Erigeron lemmonii*	C	7/1/75	Cochise	WCX, DGL, NCO	Crevices, ledges, and boulders in canyon bottoms in pine-oak woodlands
Nichol's turk's head cactus *Echinocactus horizonthalonius* var. *nicholii*	E	10/26/79	Pima	SON, NGL, TUS, CAG, AJO	Sonoran desert scrub on limestone slopes in desert hills
Pima pineapple cactus *Coryphantha scheeri robustispina*	E	4/20/92	Pima, Santa Cruz	SON, NGL, TUS, CAG, AJO	Sonoran desert scrub or semi-desert grassland communities
BIRDS					
Bald eagle *Haliaeetus leucocephalus*	T	1/12/95	Cochise, Pima, Santa Cruz, Yuma	WCX, DGL, NCO, SON, NGL, TUS, CAG, AJO, WEL, YUM	Large trees or cliffs near water with abundant prey
Brown pelican *Pelecanus occidentalis*	E	10/13/70	Yuma	WEL, YUM	Feed in shallow estuarine waters; nest on small coastal islands
Cactus ferruginous pygmy-owl *Glaucidium brasilianum cactorum*	E	3/10/97	Cochise, Pima, Santa Cruz, Yuma	WCX, DGL, NCO, SON, NGL, TUS, CAG, AJO, WEL, YUM	Mature cottonwood/willow, mesquite bosques, and Sonoran Desert scrub
Masked bobwhite *Colinus virginianus ridgewayi*	E	3/11/67	Pima	SON, NGL, TUS, CAG, AJO	Desert grasslands with diversity of dense native grasses, forbs and brush

Table 3-4, continued

Common/Scientific Name	Status	Date Listed	Counties	BP Stations	Habitat
Mexican spotted owl *Strix occidentalis lucida*	T	3/15/93	Cochise, Pima, Santa Cruz	WCX, DGL, NCO, SON, NGL, TUS, CAG, AJO	Nests in canyons and dense forests with multi-layered foliage structure
Mountain plover *Charadrius montanus*	PT	2/18/99	Cochise, Pima, Yuma	WCX, DGL, NCO SON, NGL, TUS, CAG, AJO, WEL, YUM	Open arid plains, short-grass prairies, and scattered cactus
Northern aplomado falcon *Falco femoralis septentrionalis*	E	1/25/86	Cochise, Santa Cruz	WCX, DGL, NCO, SON, NGL, TUS	Grassland and Savannah
Southwestern willow flycatcher *Empidonax traillii extimus*	E	2/27/95	Cochise, Pima, Yuma	WCX, DGL, NCO, SON, NGL, TUS, CAG, AJO, WEL, YUM	Cottonwood/willow and tamarisk vegetation communities along rivers and streams
Yellow-billed cuckoo *Coccyzus americanus*	C	NA	Cochise, Pima, Santa Cruz	WCX, DGL, NCO, SON, NGL, TUS, CAG, AJO	Large blocks of riparian woodlands
Yuma clapper rail *Rallus longirostris yumanensis*	E	3/11/67	Yuma	CAG, AJO, WEL, YUM	Cattail and bulrush marshes along the Colorado River, Gila River, and Salton Sea
AMPHIBIANS					
Chiricahua leopard frog *Rana chiricahuensis*	T	7/15/02	Cochise, Pima, Santa Cruz	WXC, DGL, NCO SON, NGL, TUS, CAG, AJO	Streams, rivers, backwaters, ponds, and stock tanks
Sonora tiger salamander *Ambystoma tigrinum stebbinsi*	E	1/6/97	Cochise, Santa Cruz	WCX, DGL, NCO SON, NGL, TUS	Stock tanks and impounded cienegas in San Rafael Valley, Huachuca Mountains
MAMMALS					
Black-tailed prairie dog *Cynomys ludovicianus*	C	10/4/99	Cochise	WCX, DGL, NCO	Short-grass prairie habitats
Jaguar *Panthera onca*	E	7/22/97	Cochise, Pima	NGL	Variety of habitats from Sonoran desert to conifer forests
Lesser long-nosed bat *Leptonycteris curasoae yerbabuenae*	E	9/30/88	Cochise, Pima, Santa Cruz	WCX, DGL, NCO SON, NGL, TUS, CAG, AJO	Desert scrub habitat with agave and columnar cacti present as food plants

Table 3-4, continued

Common/Scientific Name	Status	Date Listed	Counties	BP Stations	Habitat
Mexican gray wolf *Canis lupus baileyi*	E	3/11/67	Cochise, Pima, Santa Cruz	WCX, DGL, NCO SON, NGL, TUS, CAG, AJO	Chaparral, woodland, and forested areas; may cross desert areas
Ocelot *Leopardus pardalis*	E	7/21/82	Cochise, Pima, Santa Cruz	WCX, DGL, NCO SON, NGL, TUS, CAG, AJO	Humid tropical and sub-tropical forests, savannahs, and semi-arid thorn scrub
Sonoran pronghorn *Antilocapra americana sonoriensis*	E	3/11/67	Pima, Yuma	AJO, WEL	Broad, intermountain alluvial valleys with creosote-bursage/palo verde-mixed cacti
REPTILES					
New Mexico ridge-nosed rattlesnake *Crotalus willardi obscurus*	T	4/4/78	Cochise	WCX, DGL, NCO	Presumably canyon bottoms in pine-oak and pin-fir communities
Sonoita mud turtle *Kinosternon sonoriense longifemorale*	C	9/19/97	Pima	SON, NGL, TUS, CAG, AJO	Ponds and streams
FISHES					
Beautiful shiner *Cyprinella Formosa*	T	8/31/84	Cochise	WCX, DGL, NCO	Small to medium sized streams and ponds with sand, gravel, and rock bottoms
Desert pupfish *Cyprinodon macularius*	E	3/31/86	Pima, Santa Cruz, Imperial	SON, NGL, TUS, CAG, AJO, WEL, BLY, YUM	Shallow springs, small streams, and marshes; tolerates saline and warm water
Gila chub *Gila intermedia*	PT	8/9/02	Cochise, Pima, Santa Cruz	WCX, DGL, NCO SON, NGL, TUS, CAG, AJO	Pools, springs, cienegas, and streams
Gila topminnow *Poeciliopsis occidentalis occidentalis*	E	3/11/67	Pima, Santa Cruz	SON, NGL, TUS, CAG, AJO	Small streams, springs, and cienegas vegetated shallows
Loach minnow *Tiaroga cobitis*	T	10/28/86	Cochise, Pima	WCX, DGL, NCO SON, NGL, TUS, CAG, AJO	Cool to warm water, low gradient streams and rivers in the Gila River basin
Razorback sucker *Xyrauchen texanus*	E	5/22/90	Yuma	CAG, AJO, WEL, YUM	Rivers with strong, uniform currents over sandy bottoms

Table 3-4, continued

Common/Scientific Name	Status	Date Listed	Counties	BP Stations	Habitat
Sonora chub *Gila ditaenia*	T	4/30/86	Santa Cruz	SON, NGL, TUS	Large, deep, and permanent pools with bedrock-sand substrates
Spikedace *Meda fulgida*	T	7/1/86	Cochise, Pima	WCX, DGL, NCO SON, NGL, TUS, CAG, AJO	Cool to warm water streams and rivers of moderate gradient in the Gila River basin
Yaqui catfish *Ictalurus pricei*	T	8/31/84	Cochise	WCX, DGL, NCO	Moderate to large streams with slow current over sand and rock bottoms
Yaqui chub *Gila purpurea*	E	8/31/84	Cochise	WCX, DGL, NCO	Deep pools of small streams, pools, or ponds near undercut banks
Yaqui topminnow *Poeciliopsis occidentalis sonoriensis*	E	3/11/67	Cochise	WCX, DGL, NCO	Vegetated springs, brooks, and margins of backwaters. Found generally in the shallows

Source: USFWS 2003.

E – Endangered
T – Threatened
C – Candidate
PT – Proposed Threatened
NGL – Nogales Station
WCX – Willcox Station
DGL – Douglas Station
NCO – Naco Station
SON – Sonoita Station
TUS – Tucson Station
CAG – Casa Grande Station
AJO – Ajo Station
WEL – Wellton Station
YUM – Yuma Station

Acuna Cactus

The Acuna cactus (*Echinomastus erectocentrus acunensis*) is a small cactus, varying in height from three to nine inches. The flowers have been observed to be pollinated by at least ten species of native bees (Johnson 1992). The Acuna cactus is found on well-drained knolls and gravel ridges at 1,300 to 2,000-feet amsl in the Sonoran desert scrub. Of the four known populations in Arizona (USFWS 1992a), three occur in Pima County on federal, state, and private lands. OPCNM has the largest and healthiest known population (Johnson 1992). The population may be threatened by illegal take and natural causes such as parasitism. A population may occur on BMGR (USFWS 1992a).

The Acuna cactus is a candidate species for the Threatened and Endangered list. The plant is protected by the Arizona Native Plant Law, and is protected for international trade by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (USFWS 1992a).

Canelo Hills Ladies' Tresses

Canelo Hills ladies' tresses (*Spiranthes delitescens*) is a white-flowered orchid (USFWS 2004). The plant is slender and may reach as much as 20 inches in height when in flower. Mature plants flower in consecutive years and in some years, have no visible above ground structures. This orchid is known from five sites in cienega and streamside habitats within the San Pedro River watershed in Santa Cruz and Cochise counties, Arizona. These sites occur where scouring floods are unlikely. Soils supporting the populations are finely grained, highly organic, and seasonally or perennially saturated. Springs are the primary water source, but a creek near one locality contributes near-surface groundwater.

The Canelo Hills ladies' tresses were listed as a Federally endangered species on January 6, 1997 (62 FR 665). Primary potential threats to this species include a number of activities that result in wetland habitat degradation such as groundwater overdrafts, surface water diversions, impoundments, channelization, improper livestock grazing, agriculture, mining, invasive exotic species, and recreation. This orchid is also potentially threatened by collection.

Cochise Pincushion Cactus

The Cochise pincushion cactus (*Coryphantha robbinsorum*) is a small unbranched cactus (2 inches tall) with few, if any, central spines. The Cochise pincushion cactus occurs in semi-

desert grasslands associated with small shrubs, agave (*Agave* sp.), grama grass (*Bouteloua* sp.), and other cacti (USFWS 1993a). Soils are composed of thin, gravelly loam over Permian limestone rock, usually with fist-sized limestone rocks, or rubble (USFWS 1993a). In addition to requiring high calcium limestone substrates, plants may also require the well-drained substrate offered by the coarse limestone chips and rock crevices in bedrock. Most individuals of Cochise pincushion cactus are in the open and exposed to bright sunlight (USFWS 1993a).

The total range of the Cochise pincushion cactus is southeastern and southwestern Cochise County, Arizona and northern Sonora, Mexico (Arizona Game and Fish Department [AGFD] 2001a). The Cochise pincushion cactus is known from private or state land in the San Bernardino Valley, southwestern Cochise County, Arizona (Lopresti 1984, USFWS 1993a).

The Cochise pincushion cactus was listed as a Federally threatened species on January 9, 1986 (51 FR 952). The USFWS (1986) did not designate critical habitat for this species because of its restricted distribution, accessibility, and the potential threat of poaching by cactus collectors. The Cochise pincushion cactus was listed as "highly safeguarded" by the Arizona Department of Agriculture in 1993, and "sensitive" by the USFS for Region 3 in 1990. Threats to this species include illegal collection, habitat degradation from cattle and wildlife, and extended periods of drought.

Huachuca Water Umbel

Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*), a member of the parsley family, is a herbaceous semi-aquatic perennial. Flowering has been observed from March through October. It appears that the Huachuca water umbel flowers are self fertile, and rapid colonization of ponds in SBNWR is evidence that this species may have extended seed dormancy (AGFD 1997a). According to the AGFD, Huachuca water umbel habitat is described as cienegas and associated vegetation within Sonoran desertscrub, grassland or oak woodland, and conifer forest. It requires perennial water, gentle stream gradients, small to medium sized drainage areas, and mild winters. It is usually found in water depths averaging from 2.0 to 16.0 inches. Optimum substrate consists of submerged sand, mud and/or silt. Habitat elevation ranges from 4,000 to 6,500 feet amsl (AGFD 1997a).

In Arizona, Huachuca water umbel has been found in three counties. In Pima County, it has been found in Tucson. In Cochise County, it has been found in the Huachuca Mountains, the

San Pedro area, and at Saint David. In Santa Cruz County, it has been found near Sonoita Creek, Canelo Hills/Turkey Creek, Sonoita Creek, and San Rafael Valley (AGFD 1997a).

The Huachuca water umbel was listed as an endangered species in the 1997 *Federal Register* [62(3): 665-689] with critical habitat designated in *Federal Register* 63 FR 71838. The Huachuca water umbel was also listed as "highly safeguarded" by the Arizona Department of Agriculture in 1993, and as "sensitive" in Region 3 by the USFS in 1990. The species appears to be lost from four historic sites in Arizona (Saint David, 2 sites; Tucson; Monkey Springs) because of the loss of cienegas; however, in 1993 and 1994 it was observed to be naturally recolonizing San Pedro River at several locations including the Hwy 90 crossing and Boquillas Ranch (AGFD 1997a), apparently as a result of improved aquatic habitat stability following improvement in management of the BLM San Pedro Riparian National Conservation Area.

The Huachuca water umbel's major reasons for decline are limited distribution and destruction of wetland habitat. Its habitat has been affected by watershed degradation due to livestock grazing development; and trampling by livestock; diversion of water and dewatering of habitats; flash flooding; and lowering of the water table (AGFD 1997a).

Kearney's Blue Star

Kearney's blue star (*Amsonia kearneyana*) is a perennial herb in the dogbane family. Mature plants grow up to 2.3 feet in height and nearly 3.3 feet across. Kearney's blue star is known to occur naturally only on the western slopes of the Baboquivari Mountains in South and Sycamore Canyons in Pima County. These plants have been introduced into Brown Canyon, which is on the east side of the Baboquivari Mountains (AGFD 1997b). They inhabit elevation ranges from 3,750 to 4,500 feet amsl. The Kearney's blue star habitat is defined as canyon bottoms on sandy alluvium in partial shade under deciduous riparian trees, and the optimum substrate is granitic alluvium (AGFD 1997b). Its plant community can be described as "Mexican Blue Oak association, Sonoran Desertscrub, Semidesert Grassland plant communities, or a transition zone between the two" (Reichenbacher and Welch 1993).

The Kearney's blue star was listed as an endangered species in the 1989 *Federal Register* [54(12): 2131-2134] with no designated critical habitat. It was also listed in 1993 as "highly safeguarded" by the Arizona Department of Agriculture, and in 1990 as "sensitive" in Region 3 by the USFS. In 1982, McLaughlin found a total of eight individuals in the entire population in

South Canyon, and a follow-up survey in 1987 revealed no new individuals (AGFD 1997b). An introduced population in Brown Canyon declined from approximately 130 to 35 following a flood in 1990. The one native population consists of approximately 10 to 15 individuals (AGFD 1997b). The native population exists on land owned by the Tohono O'odham Nation, and the introduced sites exist on land owned by BANWR. Because of the vulnerable canyon bottom habitat, Kearney's blue star is greatly affected by flooding. It is also threatened by disturbance and damage from livestock.

Lemmon Fleabane

Lemmon fleabane (*Erigeron* lemmonii) is a perennial aster found growing in dense clumps in crevices and on ledges of vertical cliffs. It is known only from Scheelite Canyon in the Huachuca Mountains, where a total of 108 clumps (Gori et al. 1990) can be found on shady cliffs of the canyon walls and on the tops of large boulders in the canyon bottom. This species is candidate for Federal listing, but its remote location reduces the probability of human disturbance.

Nichol's Turk's Head Cactus

Nichol's turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*) is a barrel-shaped cactus with spines growing from vertical, spiraling ridges. This plant grows to a maximum height of 20 inches with a diameter of 8 inches. This plant blooms from April to mid-May, displaying large pink or purplish flowers. The cactus is found within the Sonoran desert of southern Arizona at sites in full sun on limestone slopes, often growing in soils rich in calcium carbonate. The most current information available (Matthews 1990) indicates that most of the populations of this species are grouped at two locations within the Waterman and Vekol Mountains of Pima and Pinal counties in south-central Arizona. Other smaller populations have been reported elsewhere in Arizona and northwestern Mexico. This species is not expected to occur within the Action Area since there are no areas of limestone or soils rich in calcium carbonate within the Yuma and Wellton Stations' AOs to provide suitable habitat for this species.

The Nichol's turk's head cactus is listed as Federally threatened (44 FR 61927, 26 October 1979), is protected by the Arizona Native Plant Law, and is included in the Convention on International Trade in Endangered Species (CITES) of Wild Flora and Fauna. The most

significant threat to the survival of this species in recent times has been harvesting by plant collectors (Matthews 1990).

Pima Pineapple Cactus

The Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina)* is a succulent perennial measuring between 4 and 18 inches in height and between 3 and 7 inches in diameter. Flowering occurs in mid-July with the onset of summer rains (AGFD 2001b). The Pima pineapple cactus community is defined by the AGFD as lower Sonoran desertscrub and semi-desert grassland dominated by white-thorn acacia (*Acacia constricta*), velvet mesquite, thread snakeweed (*Gutierrezia microcephala*), triangle-leaf bursage, and various other cacti and grasses (AGFD 2001b). The range of the cactus in Arizona is bounded on the east by the Santa Rita Mountains in Santa Cruz County, on the west by the Baboquivari Mountains in Pima County, in the north by Tucson, and on the south by the Arizona-Mexican border (AGFD 2001b). Only five to 10 percent of species range is on Federal land. Small isolated tracts of BLM land are critical to the survival of species (AGFD 2001b).

The Pima pineapple cactus was listed as an endangered species in the 1993 *Federal Register* [58(188): 51159] with no critical habitat designation. It was also listed as "highly safeguarded" by the Arizona Department of Agriculture in 1993, and as "sensitive" in Region 3 by the USFS in 1990. Seeds are currently being collected and stored at the Arizona-Sonora Desert Museum. Limited range and sparse distribution appear to be the greatest potential threat to the Pima pineapple cactus. Other factors include loss of habitat due to urban development, off-road vehicle use, road construction, agriculture, and mining, habitat degradation due to livestock grazing; and alteration of habitat due to aggressive non-native grasses, illegal collecting, and range management practices that cause surface disturbances (AGFD 2001b).

Bald Eagle

In Arizona, bald eagles *(Haliaeetus leucocephalus)* nest primarily on the Salt and Verde Rivers in the central part of the state where large trees or cliffs provide nest sites near fish inhabited waters. In western Arizona, they nest on the Bill Williams River near Alamo Lake. Most of the state's major river systems, including the mainstem of the Colorado, support wintering bald eagles. Important food items in the southwest include fish, waterfowl, rabbits and carrion. Food availability and perch sites may limit wintering bald eagle abundance in Arizona. Other factors potentially limiting abundance include human disturbances and loss of aquatic habitat. The

entire state is considered within the range of wintering bald eagles; however, the important habitat characteristics are not present within the study area. This species would be an uncommon transient, if it would occur at all within the Yuma and Wellton AOs. The bald eagle is Federally listed as threatened (60 FR 35999, 12 July 1995).

Brown Pelican

The brown pelican *(Pelecanus occidentalis)* is a large water bird that is found on coastal land and islands of the Pacific coast. It is an uncommon transient in Arizona on the Lower Colorado River, when individuals migrate from Mexico in the summer and fall. There are no breeding records for this species in Arizona (INS 1999a). Occurrence of this species within the Yuma and Wellton stations' AOs is highly unlikely as there is no suitable habitat present. The brown pelican is Federally listed as endangered (35 FR 167047, 13 October 1970).

Cactus Ferruginous Pygmy-Owl

The cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) is a small bird weighing approximately 2.3 to 3.1 ounces and measuring 5.8 to 7.2 inches (AGFD 2001c). The diet of the pygmy-owl consists of various reptiles, insects, birds, small mammals and frogs. The pygmy-owl begins nesting activities in late winter to early spring. Three to six eggs are laid in cavities in trees or large columnar cacti (USFWS 1997). In Arizona, the pygmy-owl occurs in Sonoran Riparian Deciduous Woodlands, and dense vegetation-types in the Sonoran Desertscrub biome. Cavities for nesting and roosting, generally found in saguaros, are an important component of pygmy-owl habitat (Lesh and Corman 1995). In Arizona, the owl has been historically documented as far north as New River and Cave Creek in northern Maricopa County. The eastern-most record was along the Gila River near the community of Fort Thomas. This species has been documented in the southeastern part of Arizona near Dudleyville along the San Pedro River, near the Mexican border in Santa Cruz County, near Patagonia, and in Sycamore Canyon west of Nogales. Records for Pima County exist from the Santa Cruz River and its tributaries near Tucson, and in southwestern Pima County at OPCNM and Sasabe. One sighting was recorded in 1955 at Cabeza Prieta Tanks in CPNWR (Monson 1998) and two males have recently been sighted near Papago Well on the CPNWR (Coffeen 2002). Present day locations have been documented in Pima, Santa Cruz, and Southern Pinal counties. The owls inhabit areas within OPCNM, BANWR, TON, and privately owned lands in the northwest Tucson area and southern Pinal County (INS 1999a).

The cactus ferruginous pygmy-owl was listed as an endangered species in the 1997 *Federal Register* 62(46): 10730-10747. This species was listed as "Wildlife of Special Concern" by the AGFD in 1996, and as "sensitive" for Region 3 by the USFS in 1988. Critical habitat (730,000 acres) for this species was delineated in 1999 (*Federal Register* 64(132): 37419-37440); however, a US Districtt Court ruling in 2001 rescinded the critical habitat designation for the cactus ferruginous pygmy-owl (Center for Biological Diversity [CBD] 2001a). On November 27, 2002 the USFWS proposed the redesignation of 1.2 million acres as critical habitat for the cactus ferruginous pygmy-owl (*Federal Register* 67 [229]: 71032-71064). The pygmy-owl's decline is believed to be due to the loss of riparian habitat and competition for nest sites with European starlings. Urban and agricultural development, channelization, water diversion, groundwater pumping, livestock overgrazing, and timber harvesting account for the various causes of riparian habitat destruction (Lesh and Corman 1995).

Masked Bobwhite

The masked bobwhite (*Colinus virgiananus ridgwayi*) male is distinguished by its rich red breast and black head and throat. Masked bobwhite habitat in the Sonora desert is relatively open, subtropics, and summer-active savanna grassland with dry-tropic scrub. The scrub components are characteristic of Sinaloan thornscrub and Sonoran desertscrub (USFWS 1995b). Favored habitats require moderately dense native grass cover characterized by Rothrock grama grass (*Bouteloua rothrockii*), cane beardgrass (*Andropogon barbinoides*), tanglehead (*Heteropogon contortus*), and three-awn grass (*Aristida hamulosa*) (Goodwin 1985).

Recent studies were conducted in detail on reintroduced bobwhites from 1979 to 1981 on the Buenos Aires Ranch, now the BANWR, north of Sasabe, Arizona (Goodwin 1982). These studies suggested that masked bobwhite used the bottomlands of the main and side drainages extensively. Furthermore, they displayed a specific range of preferences for understory shrub cover and grass-forb density and diversity within a general habitat type. Individuals were generally absent in areas having less than 8 percent shrub cover. Instead, overstory shrub cover of 15 to 30 percent was preferred. Young mesquite with low, pendulous branches close to the ground appeared ideal. Large mesquite provided little cover at ground level. Goodwin believed size and distribution of overstory cover was a key factor in masked bobwhite habitat (Goodwin 1982).

According to the AGFD, the masked bobwhite was extirpated from the US by 1900 (AGFD 1998a). In 1985, AGFD established a refuge population and captive-rearing program at BANWR in Pima County, Arizona. There was an estimated population between 300 and 500 individual birds at the refuge in 1996. Historically, the masked bobwhite inhabited the Sonoran savanna grasslands, the Sonoran desertscrub, and the Sinaloan thornscrub of extreme south central Arizona and adjacent central Sonora, Mexico (AGFD 1998a). Historic accounts and collections indicate that this subtropical subspecies was always restricted to level plains and river valleys in Sonora and extreme south-central Arizona, between elevations of approximately 492 and 3,950 feet amsl (Brown 1985; Van Rossem 1945; Ligon 1952; Tomlinson 1972).

The masked bobwhite was considered to be endangered shortly after being first identified in 1884 (USFWS 1995b). As a result, this species was included among the first fauna identified as endangered. The masked bobwhite was listed as endangered by the USFWS on March 11, 1967 (35 FR 8495) with no designated critical habitat. A Recovery Plan was completed in February 1978 and revised in 1984 and 1985. The masked bobwhite is listed as a "Species of Special Concern" by the State of Arizona, and endangered in Mexico's Secretaría de Desarollo Social. Destruction of native grass ecosystems by grazing, periodic droughts, erosion, and wildfire suppression have reduced natural food supplies. Another threat is that several areas in Sonora, Mexico are being converted to buffelgrass (*Cenchrus ciliaris*), which provides no food source for the masked bobwhite (AGFD 1998a).

Mexican Spotted Owl

The Mexican spotted owl (*Strix occidentalis lucida*) is a medium-sized owl measuring approximately 17.5 inches in length, with a wingspan of 3.5 feet. It is generally brownish and heavily spotted with white or beige. Unlike most owls, Mexican spotted owls have dark eyes and no ear tufts. Several thin white bands mark an otherwise brown tail (USFWS 1995a).

Mexican spotted owls nest, roost, and forage in a diverse array of biotic communities. Mixed-conifer forests are the type of habitat commonly used throughout most of its range (USFWS 1995a). In general, Douglas fir (*Pseudotsuga menziesii*) and/or white fir (*Abies concolor*) dominate these forests, with codominant species including southwestern white pine (*Pinus strobiformis*), limber pine, and ponderosa pine (Brown 1994). In southern Arizona, Madrean pine-oak forests are also commonly used for habitat (USFWS 1995a). Nesting occurs in canyons and older forests of mixed-conifer or ponderosa pine/Gambel's oak (*Quercus gambelii*)

with a multi-layered foliage structure, usually at elevations between 4,100 and 9,000 feet amsl. Foraging and juvenile dispersion corridors are often in more open, oak-dominated habitat. Sites with cool microclimates appear to be of importance or are preferred for nesting (USFWS 1995a).

The Mexican spotted owl's historic range is southern Utah and Colorado south through Arizona and New Mexico to the Mexican Plateau (Michoacan and Guanajuato). It currently occupies most of its historic range; however, it does not occur uniformly throughout its range (USFWS 1995a). The Mexican spotted owl has not recently been reported along major riparian corridors in Arizona and New Mexico, nor in historically documented areas in southern Mexico (USFWS 1995a). In Arizona, the Mexican spotted owl is patchily distributed in forested mountains statewide (AGFD 2001b).

The Mexican spotted owl was listed as Federally threatened on March 16, 1993 (58 FR 14248), and is one of three spotted owl subspecies (USFWS 1995a). The Regional Director of the USFWS approved a Recovery Plan for the Mexican spotted owl on October 16, 1995. The Mexican spotted owl was listed by the AGFD as "Wildlife of Special Concern" in 1996, and by the USFWS as "sensitive" for Region 3 in 1988.The USFWS published critical habitat for the Mexican spotted owl on June 6, 1995 (60 FR 29914). Since that time, the USFWS had been in consultation with action agencies on the affects of proposed and ongoing actions on critical habitat. However, on March 25, 1998 the USFWS amended the list of threatened and endangered wildlife to rescind the critical habitat designation for the Mexican spotted owl (50 FR 14378). This revocation also gave notice to Federal agencies that the USFWS would no longer consider critical habitat for the Mexican spotted owl for the purpose of conducting Section 7 consultation. On July 21, 2000 the USFWS re-proposed critical habitat designation for the Mexican spotted owl (65 FR 45336-45353) and on February 1, 2001 the final designation of critical habitat for the Mexican spotted owl was released (66 FR 8530-8553). The final designation of critical habitat only included 4.7 million acres of the 13.5 million acres originally re-proposed for critical habitat designation in 2000. All USFS lands in Arizona and New Mexico and certain tribal lands were removed as critical habitat in the final designation in 2001. On August 27, 2001 the Center for Biological Diversity filed a complaint challenging the USFWS decision to exclude these lands. A US District Court ordered the USFWS to repropose critical habitat. The USFWS issued the final designation of critical habitat for the Mexican spotted owl on August 31, 2004 (*Federal Register* 69[168]: 53182-53298). Approximately 8.6 million acres

were designated as critical habitat in Arizona, Colorado, New Mexico, and Utah on Federal lands.

Mountain Plover

The mountain plover (*Charadrius montanus*) is a small bird, measuring approximately 7 inches. The mountain plover is a bird of both short-grass prairie and shrub-steppe landscapes at both breeding and wintering locales. The majority of breeding occurs in Colorado and Montana, and wintering occurs in California, Arizona, Texas, and Mexico. Short vegetation, bare ground, and a flat topography are now recognized as habitat-defining characteristics at both breeding and wintering locales. Mountain plovers generally nest in or near black-tailed prairie dog (*Cynomys ludovicianis*) towns. They also show a strong affiliation for sites that are heavily grazed by domestic livestock and also attempt breeding on fallow and cultivated fields that mimic natural habitats (USFWS 1999).

The mountain plover was listed as a proposed threatened species in the 1999 *Federal Register* [64(30): 7587-7601]. No recovery plan has been approved for this species. Conversion of grassland habitat for agricultural purposes and the decline of native herbivores are factors that likely have contributed to the mountain plover's decline. Pesticides may be a factor contributing to the decline, but the effects are not completely understood.

Northern Aplomado Falcon

Northern aplomado falcons (*Falco femoralis septentrionalis*) are long-tailed falcons intermediate in size between American kestrels (*Falco sparverius*) and prairie falcons (*Falco mexicanus*) (AGFD 1998a). Essential components of the habitat of the include open terrain with scattered trees, relatively low ground cover, an abundance of small to medium sized birds, and a supply of nesting platforms, particularly yuccas and mesquite (Hector 1983). In Arizona, the birds nest in mesquite, soaptree yucca (*Yucca elata*), cottonwood, western soapberry (*Sapindus saponaria* var. *drummondii*), and cholla (AGFD 1996).

The northern aplomado falcon was designated as an endangered species by the USFWS on January 25, 1986 (51 FR 6686). Critical habitat has not been designated for this species. A species Recovery Plan was completed in June 1990. The northern aplomado falcon is also listed as a "Species of Special Concern" by the State of Arizona. The northern aplomado falcon is declining because of habitat degradation and habitat-type conversion due to brush

encroachment fostered by decades of livestock overgrazing and fire suppression, overcollecting and reproductive failure of the species caused by organochlorine pesticide use (AGFD 1998b).

Southwestern Willow Flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus*) is a small bird, approximately 6 inches long. It has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish body. The southwestern willow flycatcher is found on breeding territories by mid-May; nest building and egg laying typically occur in late May and early June; and fledglings can be found in early to mid-July (Muiznieks et al. 1994; Sogge et al. 1994). The southwestern willow flycatcher occurs in riparian habitats with dense growths of willows (*Salix* sp.), marsh broom *(Baccharis* sp*.)*, arrowweed (*Pluchea* sp.), buttonbush (*Cephalanthus* sp.), tamarisk (*Tamarix* sp.), Russian olive (*Eleagnus* sp.), and often with a scattered overstory of cottonwood (*Populus* sp.). These habitats tend to be rare, widely separated, or small, and usually separated by vast expanses of arid lands.

The southwestern willow flycatcher was listed as Federally endangered on February 27, 1995 (60 CFR 10693). Critical habitat was designated totaling 599 river miles within Arizona, California, and New Mexico on July 7, 1997 (62 CFR 39129); however during a hearing on March 25, 2001 the courts overturned the final ruling and the critical habitat designation no longer exists. This species is endangered due to the extensive loss and modification of its habitat. In addition, brood parasitism by the brown-headed cowbird (*Molothrus ater*) has significantly contributed to the endangered status of the southwestern willow flycatcher (Muiznieks et al. 1994; Sogge et al. 1997).

Yellow-billed Cuckoo

The yellow-billed cuckoo (*Coccyzus americanus*) is a medium-sized bird of about 12 inches in length and about 60 grams in weight. The yellow-billed cuckoo is primarily a foliage gleaning insectivore, but also hover gleans, hawks, and even hops on the ground to obtain prey (Ehrlich et al. 1992). In the east, the cuckoo's prey consists mostly of hairy caterpillars, with lesser numbers of bird eggs, frogs, lizards, berries, and fruit (Ehrlich et al. 1988). Breeding often coincides with the appearance of massive numbers of cicadas, caterpillars, or other large insects during summer rains (Ehrlich et al. 1992). Clutch size is one to five (commonly two to three) eggs and is largest when prey is abundant (Hughes 1999). Development of young is very rapid, with a breeding cycle of 17 days from egg-laying to fledging of young (NatureServe 2004).

Restricted in their distribution to large, continuous blocks of mature cottonwood/willow riparian habitat, the yellow-billed cuckoo has one of the most restrictive macro-habitat requirements of any bird species (Laymon 2004). In Arizona, preferred migration and breeding habitat is found in streamside cottonwood, willow groves, and larger mesquite bosques (Corman 1992). Several studies suggest that forest area, continuity, shape, composition, and structure are important characters affecting habitat suitability (Gaines and Laymon 1984, Laymon and Halterman 1985, Biosystems Analysis 1989, Halterman 1991, Laymon 2004).

The primary threat to western cuckoos, both historically and recently, is due primarily to habitat loss on the breeding grounds. Principal causes of riparian habitat losses are conversion to agricultural and other uses, dams and river flow management, stream channelization and stabilization, and livestock grazing. Other serious threats include habitat fragmentation, degradation of riparian woodland due to agricultural and residential development (Dobkin 1994), stochastic extinctions and low colonization rates, flood control (Laymon and Halterman 1987, 1989), and riparian habitats invaded by less desirable tamarisk (Huges 1999).

Yuma Clapper Rail

The Yuma clapper rail *(Rallus longirostris yumanensis)*, a hen-like marsh bird, is one of seven North American subspecies of the clapper rails. The Yuma clapper rail usually walks upright with up twitching of short tails. They generally are slow and weak in flight. The adults are good swimmers for short distances. This species may occur only as an uncommon transient. The Yuma clapper rail feed on crawfish, small fish, clams, isopods, and a variety of insects. The birds remain on their US breeding grounds from mid-April to mid-September, when they migrate south to Mexico for the winter.

The Yuma clapper rail occurs in Arizona along the Colorado River in marsh habitat that has formed behind dams, and occasionally occurs in the Salt River marshes north of Phoenix. This is the only clapper rail that breeds in freshwater marshes, although it also inhabits brackish water marshes and backwaters. Along the lower Colorado River it is a common summer resident and breeds as far north as Topock Marsh on the Havasu National Wildlife Refuge. The primary reasons for the Yuma clapper rail's decline are habitat destruction due to stream channelization and drying and flooding of marshes. Yuma clapper rail habitat in the study area occurs along the Colorado River.

The Yuma clapper rail is Federally listed as endangered (32 FR 4001, March 11, 1967; 48 FR 34182,July 27, 1983). There has been no habitat designated as critical for this species.

Chiricahua Leopard Frog

One of seven known leopard frogs found in Arizona, the Chiricahua leopard frog (*Rana chiricahuensis*) is greenish-brown usually with a green face. This species is highly aquatic, living in a variety of water sources including rocky streams with deep rock-bound ponds, river overflow pools, oxbows, permanent springs, stock tanks, and ponds (AGFD 2001d). The riparian habitat along these water bodies generally consist of oak and mixed oak and pine woodlands, but it can also range into areas of chaparral, grassland, and even desert.

Its Arizona range is divided into two portions: from montane central Arizona east and south along Mogollon Rim to montane parts of western New Mexico; and the southeastern montane Sector of Arizona and portions of Sonora, Mexico (Platz and Mecham 1979).

The Chiricahua leopard frog was listed as threatened without critical habitat on July 15, 2002 (*Federal Register* 67(117): 40790-40811). It was also listed in 1996 as "Wildlife of Special Concern" by the AGFD, in 1988 as "sensitive" for Region 3 by USFS, and in 1994 as threatened in Mexico's Secretaría de Desarollo Social. Of all of Arizona's leopard frogs, the Chiricahua leopard frog has undergone perhaps the largest, most dramatic decline (Sredl and Waters 1995). In the petition to list the Chiricahua leopard frog, the USFWS cited known threats as habitat alteration, destruction, and fragmentation; predation by nonnative organisms; introduced species such as bullfrogs and fish; and disease. Habitat loss has resulted from water diversions, dredging, livestock grazing, mining, degraded water quality, and groundwater pumping. Problems associated with small population numbers and size also threaten the species (AGFD 2001d).

Sonora Tiger Salamander

The Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) is a large, stocky salamander. The Sonora tiger salamander is restricted to the San Rafael Valley in Santa Cruz County, Arizona. Its habitat varies from rolling grassland to mountain forests (AGFD 2001c).

The Sonora tiger salamander was listed as an endangered species in the 1997 *Federal Register* [62(3): 665-689] with no designated critical habitat. It was also listed as "Wildlife of Special

Concern" in 1996 by the AGFD, and as "sensitive" for Region 3 by USFS. By 1988, the Sonora tiger salamander was extirpated from at least three of the 18 known colonies (AGFD 2001c). The major threats to this species are disease and predation by introduced nonnative fish and bullfrogs. Additional threats include habitat destruction, reduced fitness due to inbreeding, and increased probability of random extirpation characteristic of small populations (AGFD 2001c).

Black-tailed Prairie Dog

The black-tailed prairie dog (*Cynomys ludovicianus*) is a medium-sized, short-tailed ground squirrel measuring approximately 11.0 to 12.9 inches from nose tip to rear end and weighing from 3.5 to 0.03 ounces. Black-tailed pririe dogs inhabit flat, dry, open grasslands containing low, relatively sparse vegetation. Historically, the prairie dog ranged from the west side of the Huachuca Mountains eastward, but is believed to be extirpated from Arizona. The species was listed as a candidate species on October 4, 1999.

Jaguar

The jaguar (*Panthera onca*) is the largest and most robust of the North American cats. The jaguar is found near water in the warm tropical climate of savannah and forests. Individuals in Arizona have been found in Sonoran desertscrub up through subalpine conifer forests (AGFD 1998a). It dens in rocky caves and dense thickets (USFWS 1980).

In Arizona, the species range included the mountainous parts of eastern Arizona to the Grand Canyon (AGFD 1998a). There are no known breeding populations in the US. Individuals are believed to be transients and may cross into Texas, New Mexico, and Arizona. The most recent confirmed account in southwest Arizona was captured on film by Jack Childs in December of 2001 by a motion-activated camera (Associated Press 2002). This was the first jaguar photographed in approximately six years in North America (INS 2002f). Prior to that, the last confirmed sighting of a jaguar was in 1996 near the Baboquivari Mountains in Pima County, Arizona (INS 2002c). According to AGFD the nearest known population occurs in Mexico approximately 135 miles south of Tucson, Arizona (AGFD 1998a).

The jaguar was designated as an endangered species by the USFWS on August 21, 1997 (*Federal Register* 62(140): 39147-39157). Critical habitat has not been designated for this species. The jaguar is listed as "Wildlife of Special Concern" by the State of Arizona. The jaguar is also protected from international trade by the Convention on International Trade in

Endangered Species of Wild Fauna and Flora (CITES). Deliberate persecution, excessive and illegal hunting, over-exploitation by the fur industry, and predator control activities have extirpated this species from much of its original range and seriously reduced numbers in most of the rest (USFWS 1980). Timber and brush clearing have degraded and destroyed habitat to the point where reestablishment of populations in the northern part of the range is doubtful (USFWS 1980).

Lesser Long-nosed Bat

The lesser long-nosed bat *(Leptonycteris curasoae yerbabuenae)* is a medium-sized bat that has a distinctively elongated nose with a leaf-shaped tip. The bat's long muzzle and tongue are adaptations that allow it to collect nectar from the flowers of columnar cactus, such as the saguaro (*Carnegiea gigantea*) and organ pipe *(Lemaireocercus thurberi),* and from paniculate agaves (Arizona Ecological Field Services Office [AEFSO] 2001). They appear to need no standing water, surviving on water from fruits and flower nectar (Petryszyn and Cockrum 1990). In general, foraging takes place from dusk to dawn during the months of May through September.

Lesser long-nosed bats migrate into Arizona in the spring starting in early April, apparently following the flowering of columnar cacti (Dalton and Dalton 1993). When they arrive, the females are pregnant and congregate in maternity colonies while males occupy separate roosts. The young are born between early May and late June. They migrate south in the fall, leaving Arizona in September or early October. Their fall migration appears to be linked to the flowering of the agave (Dalton and Dalton 1993).

In Arizona, the lesser long-nosed bat is found during the summer within desert grasslands and scrubland (Hoffmeister 1986). Maternity colonies are formed at lower elevations near concentrations of flowering columnar cacti. After the young are weaned, some females and young move to higher elevations, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agave (AEFSO 2001). During the day, they roost in mine tunnels and natural caves.

The lesser long-nosed bat occurs in southern Arizona from the Picacho Mountains southwest to the Agua Dulce Mountains and southeast to the Chiricahua Mountains and south to Mexico (AEFSO 2001). Of the approximately 12 known major maternity roosts throughout their range in

Central and North America, there are only three verified major maternity roosts of this species in the US, all of which are in Arizona (Cockrum and Retryszyn 1991).

The lesser long-nosed bat was listed (originally, as Sanborn's long-nosed bat) as endangered on September 30, 1988 (53 FR *38456).* No critical habitat has been designated for this species. Loss of roost and foraging habitat, interdependence with its food resources, and direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current status of the species (AEFSO 2001). This species is particularly vulnerable due to the fact that pregnant females concentrate their numbers by roosting in only a few sites. Thus, destruction of a single major roost could have serious impacts on the entire species (Henshaw 1972).

Mexican Gray Wolf

The Mexican gray wolf (*Canis lupus baileyia*) ranges in weight from 68 to 91 pounds for males and 58 to 68 pounds for females (McBride 1980). Wolves do not have any specific habitat requirements and can exist in forests of all types, rangelands, brushlands, steppes, agricultural lands, wetlands, mountaintops, deserts, tundra, and barren ground areas. The only habitat feature of potential importance is the presence of natural water sources such as springs, seeps, pools, riffles, vernal pools, and arid riparian habitat. Dens are usually dug in slopes where tree roots, rocks, or firmness of soil will lessen the likelihood of a cave-in (McBride 1980).

The gray wolf (*Canis lupus)* was listed as endangered by the USFWS on March 11, 1967. The subspecies *C. lupus baileyi* (Mexican wolf) was added as an endangered species on April 28, 1976. The species' decline was primarily due to bounties offered by the livestock industry, which almost extirpated wolves from the region (Rutter and Pimlott 1968, AGFD 1996). Habitat destruction was an indirect factor in the extirpation because as native habitat was destroyed and livestock introduced, opportunities for wolves to prey on livestock increased. In the southwest, continued urbanization places demands on southwestern forests for recreation, big game hunting, increased production of timber and livestock, and continuing attempts to utilize the soils and water for growing non-native farm crops (AGFD 1998b).

A recovery program for the Mexican gray wolf is currently operational on the Apache-Sitgreaves National Forest in eastern Arizona. Reintroduced wolves are allowed to disperse and colonize an area referred to as the Blue Range Wolf Recovery Area, which includes a

portion of Apache-Sitgreaves National Forest and adjacent Gila National Forest in western New Mexico. The USFWS, USDA Wildlife Services, the AGFD, the New Mexico Department of Game & Fish, and Turner Endangered Species Fund have formed an Interagency Field Team to conduct wolf releases and monitor and manage the wolves (USFWS 2004).

Ocelot

The ocelot (*Leopardus pardalis*) is a medium-sized cat measuring 30 to 41 inches and weighing 15 to 40 pounds (AGFD 1998b). In Arizona, the ocelot is believed to inhabit Sonoran Desertscrub communities. Little is known of the ocelot in Arizona, but reports of ocelots in southeastern Arizona warrant further investigation of its status in Arizona and northern Sonora (USFWS 1990). Since 1980, four ocelots have been inadvertently trapped in Arizona: two from the San Pedro Valley, one from the Holbrook-Concho area, and one from Sasabe (USFWS 1990a). One ocelot sighting was reported in the last two years in Mexico near Douglas, Arizona (INS 2002c). Sightings have been reported in Maricopa County, Arizona, but these are probably due to escaped or released captive animals (USFWS 1990a).

The ocelot was listed as endangered by the USFWS on July 21, 1982 (47 FR 31670). Critical habitat has not been designated for this species. This species is listed as a "Wildlife of Special Concern" and "Prohibited Wildlife" in the State of Arizona, and endangered in Mexico's Secretaría de Desarollo Social. In North America, the greatest threat is fragmented habitat. For example, in the Lower Rio Grande, ocelots rely upon thick vegetation for hunting, resting and establishing dens. Biological corridors, such as rivers, shorelines, and natural drainages are essential, for travel between core habitat areas. In northeastern parts of Mexico, ocelots also suffer from habitat loss, as areas are destroyed primarily for charcoal production, agriculture and ranches. Road construction and land use changes have recently become a greater cause for concern.

Sonoran Pronghorn

The Sonoran pronghorn *(Antilocapra americana sonorienses)* is recognized as a distinct subspecies of the American pronghorn *(Antilocapra americana).* It is distinguished from other subspecies by its small size, pale coloration and distinctive cranial features (Goldman 1945*).* In contrast to the northern subspecies of pronghorn, the Sonoran does not congregate in large groups at any time of the year (AGFD 1981).

Sonoran pronghorn mate from July to September, and give birth from February through May (USFWS 1998). However, the majority of the births occur in April (Coffeen 2004). The diet of Sonoran pronghorn consists of a variety of plant materials. Sonoran pronghorn have been observed eating triangle-leaf bursage (*Ambrosia deltoidea)*, chain fruit cholla, mesquite *(Prosopis velutina)*, and mistletoe (*Phorandendron* spp) (USFWS 1998). The fruit of cholla constitutes a large portion of the Sonoran pronghorn diet (USFWS 1998). Although pronghorn have been observed near natural and man-made water sources (AGFD 1986, INS 1999a), their dependency upon a source of water is debated (Monson 1968, Hughes and Smith 1990, Hughes 1991) and cholla fruit is considered their primary water source (USFWS 1998).

Sonoran pronghorn inhabit creosote bush-bursage vegetation-types in broad alluvial valleys of the Sonoran Desert, which is an extremely harsh environment subject to extended drought (USFWS 1996a). Within this vegetation type, Sonoran pronghorn utilize open areas with high visibility and a diversity of palatable forage (AGFD 1981, Hughes and Smith 1990).

Sonoran pronghorn range from the plains of central and western Sonora, Mexico north to southwestern Arizona (AGFD 1986). In Arizona, Sonoran pronghorn occur on the CPNWR, the BMGR, and OPCNM, from Highway 85 west to the Cabeza Prieta Mountains and from approximately the Wellton-Mohawk Canal south to the US-Mexico border (Snow 1994, USFWS 1982). Recent unconfirmed sightings suggest that some animals may also occur on the TON and in the Lechuguilla Desert, west of the Cabeza Prieta Mountains (USFWS 1996b).

The Sonoran pronghorn was listed as an endangered species on March 11, 1967 (32 FR 4001). Review of the literature indicates that historic population declines and localized extirpation are attributable to previous unregulated hunting, current illegal hunting in Sonora, degradation of habitat by livestock grazing, disturbance of habitat resulting from military ground-based activities, loss of riparian habitat on the Gila River and the Rio Sonoyta, and conversion of habitat to agriculture, particularly in the Gila River Valley and Imperial Valley, California (deVos 1990; USFWS 1982, 1996b). While all of these factors may have historically contributed to the decline, drought has apparently caused most of the population fluctuations in recent time. Detected changes in the Sonoran pronghorn population are believed to be the result of less favorable environmental conditions. Sonoran pronghorn must have substantial winter rains followed by early, summer rains to produce the conditions necessary for survival to be successful (Hervert 1999b). As a result of the lack of rainfall, all the fawns produced in 2002

were lost, and the adult population decreased 85 percent (Morgart 2003). Currently, the size of the Sonoran pronghorn population in the US is estimated at 30, plus or minus 10 individuals (Coffeen 2004). At this population level the US Sonoran pronghorn population is in danger of extirpation. In an effort to protect the species, the USFWS has established a captive breeding facility for the Sonoran pronghorn on the CPNWR. The facility is a 1 square mile fenced area in Childs Valley. Currently three animals are located within the captive breeding facility with plans to add three more Sonoran pronghorns from the US population during the winter of 2004-2005 (Coffeen 2004). The USFWS would like to include individuals from the Mexico Sonoran pronghorn population in the future (Coffeen 2004).

New Mexico Ridge-nosed Rattlesnake

The New Mexico ridge-nosed rattlesnake (*Crotalus willardi obscurus*) is distinguished by its upturned internasal and canthal scales that form a ridge around the front of the snout (Stebbins 1966). This subspecies has never been documented in Arizona although it has been observed near the Arizona border in the Peloncillo Mountains. The New Mexico ridge-nosed rattlesnake is most commonly found in moist canyons in coniferous forests to pine and pine-oak woodland, but it is also found in adjacent, more arid woodland and ecotonal grassland habitats (AGFD 1996).

The New Mexico ridge-nosed rattlesnake was listed as threatened by the USFWS on August 4, 1978 (43 FR 34479). A Recovery Plan was completed in March 1985, and critical habitat was designated in a portion of Hidalgo County, New Mexico. The New Mexico ridge-nosed rattlesnake is listed as a "Species of Special Concern" by the State of Arizona. This species is listed as "threatened" because of its limited range, vulnerability, and past collecting. After the species was discovered in 1957 in the Animas Mountains of New Mexico, collectors came from all parts of the country (Applegath *et. al* 1980). Collectors also destroyed or altered habitat in their collecting efforts. Other threats include destruction of habitat due to excessive grazing and infestation by certain flagellates and bacterium (Johnson 1983).

Sonoita Mud Turtle

In Arizona, the Sonoita mud turtle (*Kinosternon sonoriense longifemorale*) is known from one pond and limited stream habitat at Quitobaquito Springs in OPCNM (AEFSO 2002). The population of approximately 130 turtles at Quitobaquito is relaitvely stable. However, dredging activities reduced the area of previously available habitat and recently examined, dead turtles

have shown signs of inadequate diet and exposure to agrichemicals. The Sonoita mud turtle was listed as a candidate species on September 19, 1997.

Beautiful Shiner

The beautiful shiner (*Cyprinella formosa mearnsi*) is a small fish rarely exceeding 3.5 inches total length, characterized by an elliptical, compressed, and elongated body. This species inhabits riffles of smaller streams or intermittent pools of creeks that have a high percentage of riffles (Hendrickson *et al*. 1980). The beautiful shiner was extirpated from the US in 1970, but in 1990 it was re-introduced into four ponds on the SBNWR (AGFD 2001f). The beautiful shiner is currently only found in San Bernardino Creek within the SBNWR, where its population is relatively scarce (AGFD 2001f).

The beautiful shiner was listed as a threatened species in the 1984 *Federal Register* [49(171): 34490-34497]. Critical habitat was established in 1984 and includes all aquatic habitats on the SBNWR. This species was also listed in 1996 as "Wildlife of Special Concern" by the AGFD, in 1988 as "sensitive" in Region 3 by the USFS, and in 1994 as threatened in Mexico's Secretaría de Desarollo Social. The primary reasons for the decline of this species are arroyo erosion due to overgrazing and the removal of riparian vegetation, pumping of groundwater, damming of watercourses, and the introduction of exotic species (USFWS 1995c). More specifically, within the US, capping of the artesian well leading to what is now Twin Ponds on the SBNWR in 1970 destroyed a short spring-fed run that served as a breeding habitat and refuge. Capping of the well forced the fish into a pond inhabited by predatory fishes causing extirpation of the species in the US (Minckley 1973).

Desert Pupfish

The desert pupfish (*Cyprinodon macularius macularius*) is a small, 3-inch long, laterally compressed fish with a smoothly rounded body. They are found in shallow water of desert springs, small streams, and marshes below 5,000 feet amsl elevation. It was once common in desert springs, marshes, backwaters, and tributaries of the Rio Sonoyta, lower Gila River, and lower Colorado River drainages in Arizona, California, and Mexico (USFWS 2001). They are often associated with areas of soft substrates and clear water (USFWS 1993b). These fish are capable of withstanding extreme environmental conditions. They have been known to survive in water with low oxygen content, temperatures over 95°F, and salinities almost three times that of sea water (Minckley 1973).

There are no natural populations of this subspecies remaining in Arizona. Reintroduced populations exist in small springs, streams, and ponds in Pima, Pinal, Maricopa, Graham, Cochise, La Paz, and Yauapai Counties, Arizona (USFWS 2001). The Quitobaquito pupfish (*Cyprinodon macularis cremus*), a subspecies of *Cyprinodon macularis*, exists at the Quitobaquito Spring in the OPCNM (USFWS 2001).

The desert pupfish was listed as an endangered species in the 1986 *Federal Register* [51(61): 10842-10850] with designated critical habitat. Critical habitat was designated at Quitobaquito Springs in Pima County, Arizona. This species was also listed in 1996 as "Wildlife of Special Concern" by the AGFD, and in 1988 as "sensitive" in Region 3 by the USFS. The desert pupfish population continues to decline as a result of stocking exotic predatory and competitive fishes, water impoundment and diversion, water pollution, groundwater pumping, stream channelization, and habitat modification (USFWS 2001).

Gila Chub

The Gila chub (*Gila intermedia*) has a chunky body with large, thick, and broadly imbricated scales. Gila chubs are normally found in the smaller headwater streams, cienegas and springs or marshes of the Gila River basin. Adults prefer habitats that consist of deep pools with heavily vegetated margins and undercut banks. Juveniles prefer habitats with rifles, pools, or undercut banks of runs. The associated plant community is a broadleaf riparian habitat consisting of cottonwood, willow, ash, alder, sycamore, walnut, and *Baccharis* spp. in association with submerged aquatic vegetation typical of cienega/marsh habitats. Gila chubs are usually found in association with Gila topminnow, desert and Sonora sucker, and longfin and speckled dace (AGFD 2001g).

In Arizona, Gila chubs are found in the following drainages: Cienega Creek, Sabino Canyon, and Sheehy Spring of the Santa Cruz River; Eagle, Bonita and Harden Cienega Creeks, San Carlos River, and Blue River of the Middle Gila River; Bass, O'Donnell and Redfield Canyons; Babocomari River and Turkey Creek of the San Pedro River; Silver and Sycamore Creeks of the Agua Fria River; and Spring and Walker Creeks of the Verde River. In Arizona, this species has been extirpated from Monkey Spring of the Santa Cruz River and Fish and Cave Creeks of the Salt River (AGFD 2001g).

The Gila chub was listed as a proposed endangered species in its entire range (Arizona, New Mexico, Mexico) on August 9, 2002 in the *Federal Register* (67 FR 51947-51985) with no designated critical habitat. This species was also listed in 1996 as "Wildlife of Special Concern" by the AGFD, in 1988 as "sensitive" in Region 3 by the USFS, and in 1994 as endangered in Mexico's Secretaría de Desarollo Social. Threats to the Gila chub include the cumulative effects of the introduction of exotic fish and land management activities that affect watersheds, alter stream flow characteristics, affect the amount of perennial water in streams, increase erosion, and destroy stream banks (AGFD 2001g). Gila chubs currently co-exist with green sunfish (*Lepomis cyanellus*) in several streams; however, they have been extirpated from one location by largemouth bass (*Micropterus salmoides*) (AGFD 2001g).

Gila Topminnow

The Gila topminnow (*Poeciliopsis occidentalis occidentalis*) is one of two subspecies of the Sonoran topminnow (*Poeciliopsis occidentalis*). The reproductive season normally lasts from January through August. Yet, in thermal waters, reproduction occurs all year long. Gila topminnows are omnivorous, utilizing a broad spectrum of foods such as detritus and amphipods, but feed voraciously on aquatic insect larvae, especially mosquitoes, when abundant (AGFD 2001h).

This species prefers lower-elevation (below 5,000 feet msl) shallow, warm, fairly quiet waters dense aquatic vegetation and algae mats, usually along stream margins or below riffles, with sandy substrates sometimes covered with organic muds and debris (Weedman 1998). Topminnows usually occupy pools, glides, and backwaters more frequently than marshes or areas of fast flow. They can withstand water temperatures from near freezing to 90 to 100° F. They also can live in a fairly wide range of water chemistries, with pH ranging from 6.6 to 8.9, dissolved oxygen levels from 2.2 to 11 parts per million (ppm), and salinity ranging from tap water (near zero parts per thousand [ppt]) to sea water (32 to 36 ppt) (Weedman 1998).

Eleven of the 13 locations currently supporting the Gila topminnow are in the Santa Cruz River system: Redrock Canyon, Cottonwood Spring, Monkey Spring, upper Sonoita creek, Fresno Canyon, Coal Mine Canyon, lower Sonoita Creek, Santa Cruz River north of Nogales, Cienega Creek, Sharp Spring, and the upper Santa Cruz River (Weedman 1998). The other remaining naturally occurring localities are Bylas Springs, Middle Spring, and Salt Creek, all of which are located next to the Gila River on the San Carlos Apache Indian Reservation (Weedman 1998).

Reestablished populations currently exist on the Lower Mine Spring, Mud Spring, Dutchman Cave Spring, Walnut Spring, Johnson Wash Spring, Kayler Spring, Yerba Manga, Hidden Water Spring, Charlebois Spring, Unnamed Drainage, Tule Creek, Heron Creek, Mescal Warm Spring, Cold Spring, Watson Wash, AD Wash, and Lime Wash (Weedman 1998).

The Gila topminnow was listed as an endangered species in the 1967 *Federal Register* 32:4001 with no critical habitat designation. This species was also listed in 1988 as threatened by the AGFD, in 1996 as "Wildlife of Special Concern" by the AGFD, in 1988 as "sensitive" in Region 3 by the USFS, and in 1994 as threatened in Mexico's Secretaría de Desarollo Social. Threats to the Gila topminnow include habitat alteration and destruction, drought, aquifer pumping, and predation by and competition with nonnative fishes, principally the western mosquitofish (*Gambusia affinis*) (AGFD 2001h and Weedman 1998).

Loach Minnow

The loach minnow (*Tiaroga cobitis*) is a small, slender, elongated fish less than 3 inches in length. This species is found in small to large perennial streams. Specifically, it inhabits shallow, turbulent riffles with primarily cobble substrate and swift currents. It uses the spaces between large substrate for resting and spawning (USFWS 2000f). Recurrent flooding is required to maintain loach minnow habitat and to provide the species with a competitive advantage over non-native aquatic species. The loach minnow occupies mainstream reaches and moderate-gradient perennial tributaries up to 6,500 feet amsl elevation (USFWS 2000f). In Arizona, the loach minnow is restricted to the following areas: the Blue River and its tributaries Dry Blue, Campbell Blue, Little Blue, Pace, and Frieborn creeks (Greenlee County, AZ and Catron County, NM); Aravaipa Creek and its tributaries Turkey and Deer creeks (Graham and Pinal counties, AZ); Eagle Creek (Graham and Greenlee counties, AZ); the White River (Apache, Gila, and Navajo counties, AZ); and the Black River (Apache and Greenlee counties, AZ) (USFWS 2000f).

The loach minnow was listed as a Federally threatened species in the *Federal Register* on October 28, 1986 (51 FR 39468-39478). Critical habitat was originally designated for the species on March 8, 1994 (59 FR 10906-10915); however, this critical habitat designation was rescinded on March 25, 1998 (63 FR 14378-14379). Critical habitat was re-proposed and approved on April 25, 2000 (65 FR 24327-24372). The critical habitat designation was vacated by a Tenth Circuit Court decision in 2004 (Tenth Circuit 2004). Habitat destruction and

competition and predation by non-native aquatic species have greatly reduced the loach minnow's range and abundance (USFWS 2000f).

Razorback Sucker

The razorback sucker *(Hyrauchen texanus)* is one of the largest sucker fishes in North America. This fish is native to North America and found only in the Colorado River Basin, where it was once abundant. The razorback sucker is now restricted to a few remnant populations, the largest of which is in Lake Mohave, Arizona/Nevada (US Geological Survey [USGS] 1998). Several thousand mature razorback suckers spawn in Lake Mohave but few of the young fish survive to reach breeding age. Competition and predation by over 40 introduced fish species and habitat loss due to channelization and reservoir construction contributed to the overall population decline. Existing populations of the razorback sucker occur within the Action Area. The razorback sucker is Federally listed as endangered (55 FR 21159, 22 May 1990; 59 FR 13374, 21 March 1994). Critical habitat for this species is discussed in Section 3.5.3.2.

Sonora Chub

The Sonora chub (*Gila ditaenia*) is a fine-scaled, medium-sized cyprinid. In Arizona, it occurs in Sycamore Creek (Bear Canyon), a tributary of the Rio Altor, 15.5 miles west of Nogales in Santa Cruz County. In addition, it occurs in two tributaries of Sycamore Creek (Penasco Creek and an unnamed stream) (AGFD 2001i). The Sonora Chub is found in the largest, deepest, and most permanent pools, with bedrock-sand substrates, and areas free of thick pads of floating algae (Carpenter and Maughan 1993).

The Sonora Chub was listed as a threatened species in the 1986 *Federal Register* (51(83): 16042-16047). This species was also listed in 1996 as "Wildlife of Special Concern" by the AGFD, in 1988 as "sensitive" in Region 3 by the USFS, and in 1994 as endangered in Mexico's Secretaría de Desarollo Social. Critical habitat was proposed in 1986 and signed into effect. Critical habitat includes Sycamore Creek, extending downstream from and including Yanks Spring. Also designated were the lower 1.2 miles of Penasco Creek and the lower 0.25 miles of an unnamed stream entering Sycamore Creek from the west, about 1.5 miles downstream from Yanks Spring. In addition, critical habitat includes a 39.4 feet-wide riparian area along each side of Sycamore and Penasco Creeks. The major threat to the Sonora Chub is the modification of Sycamore Creek by human activities including grazing, mining, recreation, and the

introduction of exotic taxa (USFWS 1992b). The predation by exotic green sunfish is also a cause of concern.

Spikedace

The spikedace (*Meda fulgida*) is a small, slim fish less than 3 inches in length. It is characterized by very silvery sides and spines in the dorsal and pelvic fins (USFWS 2000f). The spikedace is found in moderate to large perennial streams within shallow riffles with moderate to swift currents and swift pools with sand, gravel, and rubble subtrates. Specifically, it inhabits shear zones where rapid-flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars; and eddies at downstream riffle edges. Recurrent flooding is required to maintain spikedace habitat and to provide the species with a competitive advantage over non-native aquatic species. The spikedace occupies mainstream reaches and moderate-gradient perennial tributaries up to 6,500 feet amsl elevation (USFWS 2000f). It currently occupies approximately 10 to 15 percent of its historical range. The spikedace is restricted to the following areas: upper Gila River (Grant, Catron, and Hidalgo counties, NM); middle Gila River (Pinal County, AZ); lower San Pedro River (Pinal County, AZ); Aravaipa Creek (Graham and Pinal counties, AZ); Eagle Creek (Graham and Greenlee counties, AZ); and the Verde River (Yavapai County, AZ) (USFWS 2000f).

The spikedace was listed as a Federally threatened species in the *Federal Register* on July 28, 1986 (51 FR 23769-23781). Critical habitat was originally designated for the species on March 8, 1994 (59 FR 10906-10915); however, this critical habitat designation was rescinded on March 25, 1998 (63 FR 14378-14379). Critical habitat was re-proposed and approved on April 25, 2000 (65 FR 24327-24372). In 2004, a Tenth Circuit Court decision vacated designated critical habitat for the spikedace. Habitat destruction and competition and predation by non-native aquatic species have greatly reduced the spikedace's range and abundance (USFWS 2000f).

Yaqui Catfish

The Yaqui catfish (*Ictalurus pricei*) is a moderately large, fork-tailed species characterized by a distinguished pattern of wrinkles on the skin (USFWS 1995c). Habitat for the Yaqui catfish includes ponds or streams, primarily in larger rivers but also in streams where it prefers quiet, clear pools. It is primarily found in larger rivers in areas of medium to slow currents over sand and rock bottoms (AGFD 2001j). This species was formerly found in extreme southeast Arizona to include San Bernardino Creek as far up as San Bernardino Ranch. The Yaqui catfish

survived in San Bernardino Creek until spring flows diminished because of groundwater pumping. Remaining habitat was severely trampled by livestock. Other catfish introduced into the Yaqui basin have out-competed the Yaqui catfish (AGFD 2001j). In November 1997, a small population of 350 Yaqui catfish was re-introduced into the Rio Yaqui (San Bernardino Creek) on the northern most portion of the SBNWR in 1996 (AGFD 2001j).

The Yaqui catfish was listed as a threatened species in the 1984 *Federal Register* [49(171): 34490-34497]. The USFWS has designated all aquatic habitat in the SBNWR as critical habitat and a recovery plan has been approved for this fish (USWFS 1995c). This species was also listed in 1996 as "Wildlife of Special Concern" by the AGFD, in 1988 as "sensitive" in Region 3 by the USFS, in 1994 as rare in Mexico's Secretaría de Desarollo Social, and a "Special Concern Species" by the American Fisheries Society.

Yaqui Chub

The Yaqui chub (*Gila purpurea*) is a relatively small (less than 6 inches) fish but deep bodied with large scales. In the US, the Yaqui chub is found only in Arizona, where it is limited to SBNWR and Leslie Canyon National Wildlife Refuge (LCNWR) in Cochise County. On SBNWR, the current distribution of the Yaqui chub includes Leslie Creek; House, Twin, North, and Mesquite Ponds; Black Draw; and El Coronado Ranch (Turkey Creek and ponds) (AGFD 2001k). The Yaqui chub is heavily dependent on artesian wells and spring flows on SBNWR. Yaqui chub habitat is described as deeper pools of small streams near undercut banks or debris and often in association with dense aquatic vegetation. The Yaqui chub is also found in swifter areas with clean, gravel bottoms and abundant growths of algae (AGFD 2001k).

The Yaqui chub was listed as an endangered species in the 1984 *Federal Register* [49(171): 34490-34497]. Critical habitat was established in 1984 and includes all aquatic habitat on the SBNWR. The Yaqui chub is included in the recovery plan for the fishes of the Rio Yaqui approved by USFWS in 1995 (USWFS 1995c). This species was also listed in 1996 as "Wildlife of Special Concern" by the AGFD, in 1988 as "sensitive" in Region 3 by the USFS, and in 1994 as endangered in Mexico's Secretaría de Desarollo Social. Threats to the Yaqui chub include water development and pumping of underground aquifers, the introduction of nonnative species, and overgrazing with subsequent erosion (AGFD 2001k).

Yaqui Topminnow

The Yaqui topminnow (*Poeciliopsis occidentalis sonoriensis*) is a small live-bearing fish. Males rarely exceed 0.98 inches in length; females average 1.18 to 1.77 inches. Its range is limited to the Rio Yaqui basin and in Arizona it is limited to the portion of the Rio Yaqui (San Bernardino Creek) basin in the SBNWR (AGFD 2001l). It is found in lowland and some upland streams of desert and grassland, and margins of large, lowland rivers (AGFD 2001l). It is a typical inhabitant of vegetated springs, brooks, and margins and backwaters of larger bodies of water (Minckley 1973). Topminnows live near the surface in shallow water and are often associated with aquatic vegetation or other cover (Rinne and Minckley 1991). The Yaqui topminnows seem to prefer streams with riparian communities consisting of cottonwood/willow or burrobrush/seep willow (USFWS 1983).

The Yaqui topminnow was listed as an endangered species in the 1967 *Federal Register* [32:4001] with no designated critical habitat. This species was also listed 1996 as "Wildlife of Special Concern" by the AGFD, in 1988 as "sensitive" in Region 3 by the USFS, and in 1994 as threatened in Mexico's Secretaría de Desarollo Social. The Yaqui topminnow is included in the recovery plan for the fishes of the Rio Yaqui (USFWS 1995c). The main threats posed against the subspecies are loss of habitat and the competition and predation by the mosquitofish, which have caused the elimination of three introduced Yaqui topminnow sites (Bagley *et al.* 1991). Other factors include water development, aquifer pumping, and erosion due to overgrazing.

3.5.3.2 State

The Arizona Game and Fish Department (AGFD) maintains lists of Wildlife of Special Concern (WC). This list includes species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines. These species are not necessarily the same as those protected by the Federal Government under the ESA. Information pertaining to WC potentially occurring in Cochise, Pima, Santa Cruz, and Yuma counties is presented in Appendix C.

Flat-tailed horned lizard

The flat-tailed horned lizard *(Phrynosoma mcallii)* is a moderate-sized (2 to 3 inches), gray, tan, reddish-brown, or whitish horned lizard. Unlike other iguanid lizards, the flat-tailed horned lizard burrows in the sand to avoid detection rather than fleeing (Foreman 1996). Flat-tailed horned lizards also hibernate in burrows that are rarely dug deeper than 4 inches below the surface

(Foreman 1996). Their diet consists mainly of ants with the most important ant species being the harvester ants in the genera *Veromessor* and *Pogonomyrmex* (Foreman 1996).

Flat-tailed horned lizards occur entirely within the Lower Colorado River Valley subdivision of the Sonoran Desertscrub biome. In Arizona, they are apparently restricted to sandy and hardpan flats. This may be due to the presence of big galleta grass, which is highly correlated with the presence of flat-tailed horned lizards in Arizona (Foreman 1996).

In Arizona, the flat-tailed horned lizard is found in Yuma County south of I-8 and west of the Gila Mountains (Foreman 1996). Suitable habitat is found east and south of the City of Yuma outside the Colorado River floodplain and adjacent croplands (Foreman 1996). Threats to the flat-tailed horned lizard may include one or more of the following: commercial and residential development, agricultural development, off-road vehicle activity, energy developments, military activities, introduction of nonnative plants, and pesticide use.

The flat-tailed horned lizard is listed as a WC with the AGFD. It was originally proposed for listing as a Federally threatened species on November 29, 1993 (*Federal Register* 58:62624-62629). On July 5, 19997, the proposed lisitng was withdrawn by the USFWS (*Federal Register* 62:37852-37860). On December 26, 2001, the USFWs published a notice (*Federal Register* 66FR66384 66385) reinstating its proposed rule to list the flat-tailed horned lizard as a threatened species. However, the USFWS withdrew its 1993 proposed rule to list the flat-tailed horned lizard as a threatened species (USFWS 2003). The decision to withdraw the proposed ruling was based on 1997 Conservation Agreement signed by seven Federal and state agencies. Parties of the Conservation Agreement include the USFWS, BLM, BOR, US Marine Corps, US Navy, AGFD, and the California Department of Parks and Recreation (USFWS 2003). These agencies agreed to implement a Rangewide Management Strategy, which includes taking specific actions to conserve and manage the species and its habitat and establishing five separate management areas. The management areas encompass approximately 35 percent of the remaining flat-tailed horned lizard habitat in the US (USFWS 2003)

The Arizona Department of Agriculture maintains a list of protected plant species within Arizona. The Arizona Native Plant Law (1993) defines five categories of protection within the state. These include: Highly Safeguarded, no collection allowed; Salvage Restricted, collection only

with permit; Export Restricted, transport out of state prohibited; Salvage Assessed, permit required to remove live trees; and Harvest Restricted, permits required to remove plant by products (Arizona Game and Fish Department [AGFD] 2000a). Information pertaining to state protected plant species potentially occurring in Cochise, Pima, Santa Cruz, and Yuma counties is presented in Appendix B.

3.5.3.3 Critical Habitat

Critical habitat, as defined by the ESA, has been designated for 15 species and proposed for two species identified as potentially occurring in the area of operation. Although critical habitat has been designated for the New Mexico ridge-nosed rattlesnake, none of the designated critical habitats are present within the AO. The remaining 13 species with designated critical habitat include eight fishes, three birds, one reptile, and one vascular plant. The BP will continue coordination with the USFWS and incorporate any future designated critical habitat for listed species such as the jaguar.

Fifteen areas were designated as critical habitat for the razorback sucker within waterways in Colorado, Utah, New Mexico, and Arizona on March 21, 1994 (59 FR 13374). Only one area is located within the Wellton Station's AO, but is north of the project area.

One area was designated as critical habitat for the desert pupfish in Arizona on March 31, 1986 (51 FR 10842). This area includes the Quitobaquito Springs and a 100-feet riparian buffer zone around the spring and pond located on the OPCNM that is located in the Ajo Station's AO, Pima County (Figure 3-1).

Four areas were designated as critical habitat for the Sonoran chub in Arizona on April 30, 1986 (51 FR 16042). These areas are located in the Coronado National Forest within the Tucson and Nogales stations' AO, Santa Cruz County (Figure 3-2). The critical habitat for Sonoran chub is defined as Sycamore Creek, and a riparian zone 25-feet wide along each side of the creek, from Yank's Spring downstream approximately five stream miles to the international border with Mexico; Yank's Spring; Penasco Creek, including a riparian zone 25-feet wide along each side of the creek from its confluence with Sycamore Creek upstream approximately 1.25 miles; and an unnamed tributary to Sycamore Creek upstream approximately 0.25 miles.

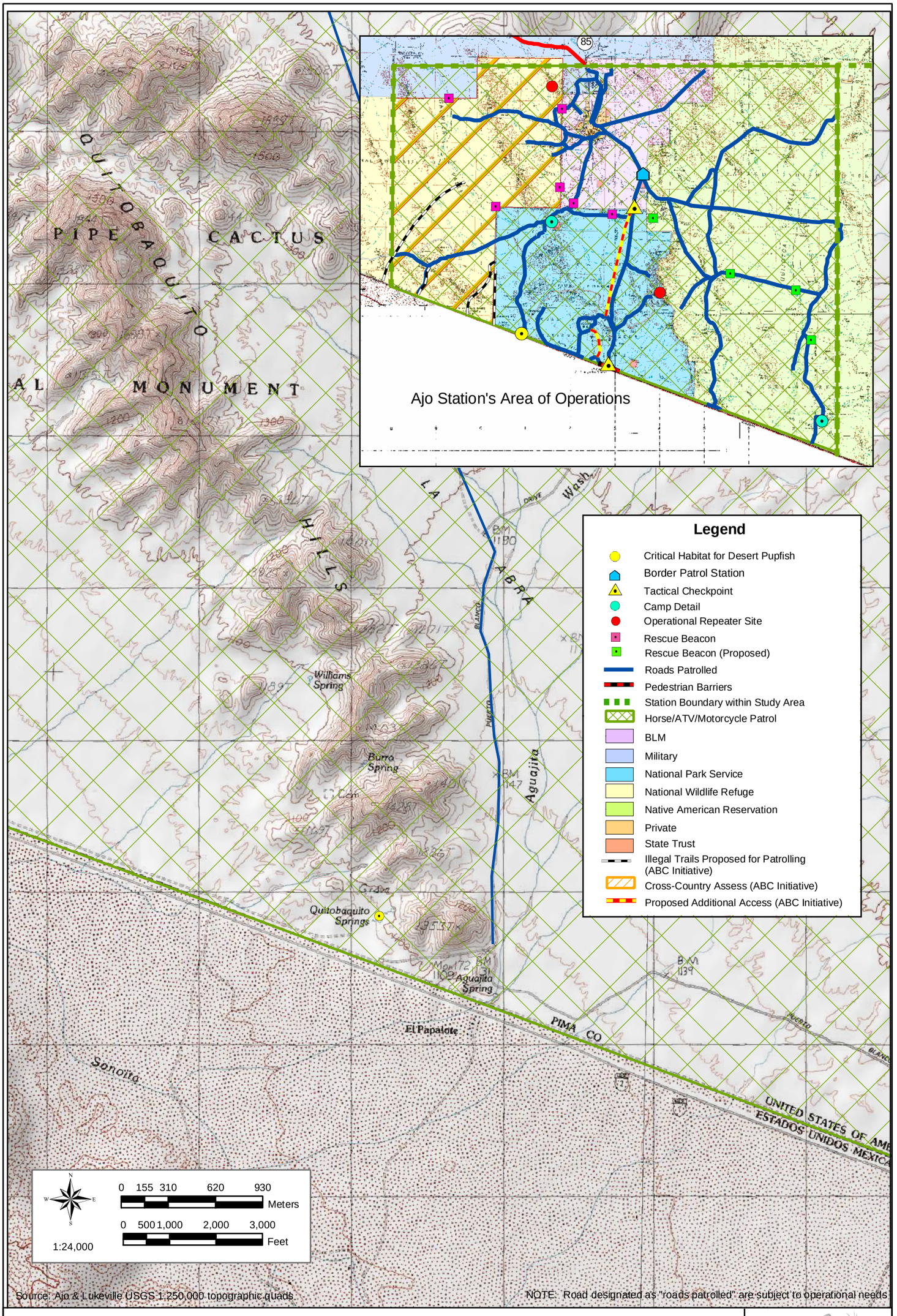

Figure 3-1: Critical Habitat for the Desert Pupfish (Ajo Station)

Date: September 2004