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AESO/SE
2-21-00-F-131 April 30, 2002

Mr. Terry Oda, Manager
CWA Standards and Permits Office
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, California 94105-3901

Subject: Biological Opinion on the Effects of the Proposed Chaparral Heights Development in Pima County, Arizona

Dear Mr. Oda:

This responds to the Environmental Protection Agency's (EPA) March 21, 2002, request for formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) on the effects of the proposed Chaparral Heights Development Project on the endangered cactus ferruginous pygmy-owl (CFPO or owl) (*Glaucidium brasilianum cactorum*) without critical habitat, and the endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) without critical habitat.

The Federal action under consideration is the issuance of a National Pollutant Discharge Elimination System (NPDES) storm water permit under section 402 of the Clean Water Act (CWA) from the EPA. Mira Loma Investments, (applicant) was designated by the EPA as their non-federal representative for this consultation.

The EPA has requested Service concurrence that the proposed action is not likely to adversely affect the lesser long-nosed bat. We concur with this determination for the lesser long-nosed bat. The rationale for our concurrence is provided in Appendix A of this document.

This biological opinion is based on information provided in the March 2002, Chaparral Heights Biological Assessment (BA) (WestLand Resources 2002); numerous correspondence and meetings with the applicant, their consultant and lawyers; numerous telephone conversations; correspondence and meetings with the EPA and Arizona Department of Environmental Quality (ADEQ); correspondence and meetings with the Arizona Game and Fish Department (AGFD);

and other sources of information. A complete administrative record of this consultation is on file at this office. We have assigned log number 2-21-00-F-131 to this project. Please refer to that number in future correspondence on this consultation.

Consultation History

The applicant and their representatives have met with the Service several times to discuss this project, and the details of those meetings are in the administrative record for this consultation. The most significant activities in the consultation process are summarized in Table 1.

Table 1: Summary of Consultation History

DATE	ACTIVITY
March 8, 2001	EPA confirms to Service receipt of Notice of Intent (NOI) for Chaparral Heights Development Project
March 14, 2001	Service sends letter to EPA disagreeing with the determination that the proposed action is not likely to adversely affect the CFPO
March 29, 2001	EPA writes Mira Loma indicating that their NOI might not be valid; additional information is requested and EPA recommends no construction activity at the time
April 2, 2001	Mira Loma provides additional information in response to March 29, 2001 letter
August 9, 2001	EPA informs Mira Loma that their NOI did not satisfy the eligibility requirements of the general permit and their discharges are not (and never were) authorized by the general permit
August 16, 2001	Site visit with Service, EPA, AGFD, Mira Loma and their representatives
August 23, 2001	Site visit with AGFD, Service and consultant to verify existence of a pygmy-owl on the property
September 5, 2001	Service sends EPA a letter commenting on Fennemore Craig's August 24, 2001 letter to EPA
September 14, 2001	Fennemore Craig sends EPA a letter responding to the Service's September 5, 2001 letter

September 21, 2001	Court vacates CFPO critical habitat and remands to Service
September 26, 2001	Mira Loma writes EPA to say they have submitted a new NOI and assume general permit coverage will be granted
September 27, 2001	Meeting with Mira Loma, the consultant, AGFD, and ADEQ
October 4, 2001	EPA writes Mira Loma denying general permit coverage; advises Mira Loma to work with EPA and the Service to carry out ESA consultation and obtain permit coverage
October 19, 2001	EPA sends information request letter to Mira Loma
November 7, 2001	Service writes Mira Loma to summarize meeting held on September 27, 2001
December 6, 2001	Mira Loma submits new NOI and sends letter and biological evaluation to EPA asserting they have now met the general permit requirements
December 19, 2001	EPA confirms receipt of new NOI of December 6
January 8, 2002	Service calls EPA to express concern regarding construction activity at Chaparral Heights
January 15, 2002	EPA writes Mira Loma indicating that eligibility for the general permit is still under review and that discharges are not permitted
January 23, 2002	Meeting with Mira Loma and their representatives, EPA, AGFD, and Service
February 25, 2002	Meeting with consultant, AGFD and Service
February 26, 2002	Phone conference between representatives for Mira Loma and Service
March 1, 2002	EPA and Service send letter to Fennemore Craig outlining tentative agreement regarding the Project
March 21, 2002	Initiation of formal section 7 consultation and submittal of Biological Assessment

BIOLOGICAL OPINION

I. DESCRIPTION OF THE PROPOSED ACTION

Chaparral Heights is a 150.62-acre residential subdivision located at the southwest corner of Lambert Lane and La Cholla Boulevard, Oro Valley, Pima County, Arizona. More specifically, the subdivision is located in Township 12 South, Range 13 East, NE ¼ of Section 16. Portions of the project area were cleared by a prior owner and by Pima County for construction of a regional sewer main. A 0.43-acre Metropolitan Domestic Water Improvement District (MDWID) well site is located within the property and will be used for development of a potable water production well. Collectively, the Chaparral Heights subdivision and the MDWID well site are referred to as the Project.

This section is presented in two parts: Project Site Development and Construction Activities, which describe the proposed onsite development activities; and Conservation Measures which address continued survey requirements for CFPO, development constraints if a CFPO is detected, and management provisions for protected open space within the project area.

Project Site Development and Construction Activities

The parcel is zoned CR-1, one residence per acre, and the Applicant proposes development of 69 new residential lots, and improvements and renovations to an existing residence on Lot 66[1]. Lots within the proposed subdivision range in size from 1.0 to 6.86 acres. The average density of the site is one home per 2.18 acres. Building envelopes within undeveloped residential lots will vary depending upon lot size and access limitations and will range from 10,000 square feet for smaller lots to a maximum of 21,400 square feet for the larger residential lots. Lots 1, 26, and 47 will not be developed and will become part of conservation easements on the property. The surface disturbances, a total of 36,000 square feet, proposed for these lots will be applied to other lots on the property provided those increases do not encroach on open space conservation easements.

Residential development in the west half of Chaparral Heights is distinctly different from the east half. The west half of the parcel is primarily composed of one-acre lots, consistent with the parcels existing in CR-1 zoning. The lot sizes on the west half of the parcel range from 1 to 3.19 acres and average 1.28 acres. The eastern half of the project is entirely composed of large lots ranging from 1.62 to 6.86 acres in size and the average lot size is 3.06 acres. Lots 66 and 51 have been disturbed from prior development activities. Surface disturbance for residential

[1] Lot 66 was developed a number of years ago and still has an existing residential structure in place. The lot at the northeast corner of the subject property (the southwest corner of Lambert and La Cholla; Lot 57), while not currently allowed by the project's existing zoning, is being retained by Mira Loma for future commercial uses.

development on lot 51 will be restricted to the 16,000 square feet. Existing disturbed areas within lot 51 that are not included in the final footprint will be revegetated and will not count against the grading limit for the lot. Lot 66 has been developed, and has a house and driveway constructed.

The lot located at the northeast corner of the subdivision (lot 57) will be used for retail or other commercial use. Approximately 5,400 square feet along the western boundary of the lot will be natural open space, undisturbed by future commercial activities. Commercial set-backs on the north and east will be 20 feet and 10 feet on the south. The rest of the lot will be disturbed by planned development activities, but building restrictions on this lot will minimize lighting and noise impacts to CFPO as well as surrounding residential lots. The 5,400-square feet of open space will be applied to other lots on the property.

All of the residential lots will be sewered and connected to the existing regional sewer main running along the west side of the La Cholla Wash except lots 58 through 73, which will be on septic. With few exceptions, sewer and other utility infrastructure have been constructed within the roadway footprint. The east side of the property will be connected to the regional sewer system with a line extending through the center of lot 50 west to the regional sewer main. The western portion of the property will be sewered through a connection to the regional sewer main that extends along the southern boundary of the subject property. Additionally, a sewer stub-out will be provided at the western edge of the property by the extension of service from the southerly most cul-de-sac to the west. The acreage of disturbance from these utility extensions totals approximately 1.26 acres. A water line connecting the eastern and western portions of the property was constructed within the Lambert Lane ROW. Construction of the water line disturbed approximately 1.76 acres. All other utilities will be located within the road footprint to minimize the total surface disturbance associated with the subject project.

Approximately 3.11 acres of habitat along the existing Pima County sewer ROW and within portions of lot 51 will be restored as xeroriparian or upland habitat. The areas being restored were disturbed prior to the acquisition of the property by Mira Loma and do not currently contain habitat suitable for CFPO. The restoration of these areas will enhance the overall habitat value of the parcel and mitigate for some of the permanent habitat loss associated with project development.

The subdivision has three entrances, two from Lambert Road and one from La Cholla Boulevard. Entry monumentation will be constructed at each entrance. These areas will be landscaped with low intensity lighting. The total square feet of surface disturbance assumed for these areas is 6,000 square feet.

The total acreage of surface disturbance that will result after full build-out of the project is 39.44 acres (Table 2). Table 3 lists each lot, the maximum building envelope allowed for that lot, and the total lot area.

Metropolitan Domestic Water Improvement District Well Lot Development

The commitment by the MDWID to provide water service to the Chaparral Heights development was conditioned on Mira Loma's agreement to allow development of a useable well site on the property. A well lot between lots 47 and 48 was set aside for this purpose.

In November 2001, MDWID constructed a monitoring well at the well lot. This development activity resulted in approximately 5,705 square feet of surface disturbance. After completion of aquifer testing at the monitoring well, MDWID determined that the site was suitable for construction of a potable water production well. The monitoring well will remain in place for long-term aquifer monitoring activities. Engineering drawings and site plans have not been prepared for the production well facilities. The following description of planned facilities is based upon conversations with MDWID staff. The production well site will be approximately 50 x 150 feet in size. The first phase of the development process is the drilling of the well. The well would be drilled with a reverse rotary drill rig and will take approximately two months to complete. The well will be drilled at a time when it would have the least potential to cause adverse impacts to dispersing CFPO. Well drilling activities will not occur during CFPO dispersal periods identified by the Service to occur between August 1 and September 15. In the event that CFPO disperse earlier or later than the normal period, the Service will notify Mira Loma so that drilling schedules can be adjusted accordingly. Drilling will not occur until CFPO surveys have been completed pursuant to the requirements outlined in section 3.2.1 of the BA.

Following the drilling of the well, site improvements would be implemented to equip the well and to integrate the well site into the MDWID water system. The well would be equipped with either a submersible or vertical turbine pump. The vertical turbine pump is what is typically used for large production wells. The motor of a vertical turbine pump is located above ground and would be enclosed in a sound-proof enclosure. Many of the more recent well sites developed by MDWID use a bladder-type surge tank, rather than an air-charged hydropneumatic tank. If a hydropneumatic tank is used, an air compressor will have to be installed, and it would be enclosed in a sound-proof enclosure. There will not be a large water storage tank constructed on the site. The production facilities will be enclosed in a block wall. Floodplain limitations will require that the production well facilities be restricted to the eastern 50 feet of the well lot and that fill material be used to raise the surface elevation one foot within this area. Fill material will be obtained from off of the project site. These materials will be free of contamination and will be suitable for their intended construction purpose. In the absence of a site plan, we have presumed that the entire 0.43-acre well lot would be impacted by site development activities.

Native trees (or large shrubs, such as desert hackberry) will be planted around the perimeter of the 50 x 150 foot developed well site. Trees salvaged from the site will be planted along with nursery stock. A total of 15 trees and/or large shrubs will be planted at an approximately 20 to 30-foot spacing.

Table 2 Chaparral Heights project habitat impact summary.

Total Property	150.62 acres		
ROW Work Area	1.83 acres		
Total Area for % Dist. Calc.	152.45 acres		
1. Original BE Disturbance Acreage			**37.61 acres**
1a. Building Envelopes		24.25 acres	
1b. Roads (including existing)		8.6	
1c. Existing Monumentation	0.06		
1d. Water & Sewer Utility (Construction Outside of Roads)		2.13	
1e. Existing County Sewer Line		1.91	
1f. Lot 51 Outside Building Envelopes		0.21	
1g. MDWID Well Lot		0.43	
2. Planned and Existing Off-Site Disturbance			**1.83 acres**
2a. Water line along Lambert Lane	1.76		
2b. La Cholla ROW Construction	0.07		
3. Total Disturbance Area			**39.44 acres**
4. Restoration Areas			**7.04 acres**
4a. Restoration Areas One and Four		2.29	
4b. Restoration Area Two (Recent Disturbance)		1.64	
4c. Restoration Area Two (Prior Disturbance)		3.11	
5. Restoration Credits (4c ONLY)			**3.11 acres**
6. Net Surface Disturbance (Item 3 minus Item 5)			**36.33 (23.82 %)**

Table 3. Chaparral Heights Lots and Acreage

Lot No.	Building Envelope (Square Feet)	Lot Size (Acres)	Lot No.	Building Envelope (Square Feet)	Lot Size (Acres)	Lot No.	Building Envelope (Square Feet)	Lot Size (Acres)
WEST LOTS			WEST LOTS (CONT.)			EAST LOTS (CONT)		
1	Note 3	1.01	29	10,000	1.08	54	16,000	2.14
2	12,000	1.01	30	16,000	2.82	55	16,000	1.70
3	12,000	1.00	31	10,000	1.53	56	16,000	1.62
4	12,000	1.00	32	10,000	1.55	57	108,189	2.61
5	12,000	1.00	33	10,000	2.00	58	17,400	2.12
6	12,000	1.00	34	10,000	1.66	59	17,400	2.77
7	12,000	1.00	35	10,000	1.71	60	17,400	3.18
8	12,000	1.00	36	10,000	1.57	61	17,400	2,90
9	12,000	1.00	37	10,000	1.74	62	17,400	3,56
10	12,000	1.00	38	10,000	1.61	63	17,400	3.12
11	12,000	1.01	39	10,000	1.69	64	21,400	4.45
12	12,000	1.00	40	16,000	2.57	65	17,400	2.94
13	12,000	1.00	41	16,000	3.19	66	Note 2	2.81
14	12,000	1.00	42	10,000	1.13	67	21,400	3.63
15	12,000	1.00	43	10,000	1.00	68	21,400	3.94
16	12,000	1.01	44	10,000	1.29	69	21,400	6.86
17	12,000	1.01	45	10,000	1.10	70	17,400	2.09
18	12,000	1.01	46	10,000	1.26	71	17,400	2.31
19	12,000	1.00				72	21,400	6.37
20	10,000	1.00	**EAST LOTS**			73	17,400	4.69
21	10,000	1.01						
22	10,000	1.00	47	Note 3	1.86			
23	10,000	1.00	48	16,000	1.71			
24	10,000	1.18	49	16,000	2.45			
25	10,000	1.11	50	16,000	3.37			
26	Note 3	1.08	51	Note 1	2.64			
27	10,000	1.08	52	16,000	2.0			
28	10,000	1.08	53	16,000	2.30			

Note 1: Lot 51 has been impacted by previous development activities which total approximately 0.57 acres of surface disturbance, some of which occurs on adjacent lot 66. Development in this lot will be restricted to the 16,000 square-foot standard, existing disturbed areas not incorporated into the 16,000-square foot grading limitation will be revegetated and will not count against the grading limit for the lot. Existing disturbed areas have been incorporated into the net surface disturbance calculations presented in the BA.

Note 2: Lot 66 has been developed and has a house and driveway constructed. The existing levels of surface disturbance have been included in the calculations of net surface disturbance and additional vegetation clearing within this lot will not occur.

Note 3: These lots will not be developed pursuant to conservation recommendations provided by the USFWS. The 36,000 square feet of disturbance associated with originally planned development activities on these lots has been incorporated into the net surface disturbance calculations for the project. This 36,000 square feet of surface disturbance can be used on other residential lots within the Project.

Conservation Measures

Survey during Development Period

If grading or well drilling activities have not commenced at a site prior to January 1st of any given year, surveys will be conducted for CFPO following the protocol adopted by the Service in January 2000. Should a CFPO be detected during these surveys, an effort will be made to determine its breeding status and nest site location. If a CFPO is detected within 600 meters of the project site, and if the detection is determined to be a territory[2], then development/construction activities may proceed only under the circumstances described below.

If an Owl is detected Prior to or During Development

Four zones (presented here as Zone I through Zone IV) describe scenarios to address if an owl establishes a territory in the vicinity of the proposed project prior to or after the initiation of construction. These zones are based upon the distance of construction activity from a known nest or activity center. Situations that fall outside of the parameters described in the zone descriptions described below will require re-initiation of informal or formal consultation and the authorization of the Service prior to proceeding with the construction activities in question. The specific development restrictions that apply to each of the four zones are described in the following sections.

ZONE I - 0-100 Meters from the Activity Center

1. No additional clearing of vegetation will be permitted without authorization from the Service.

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2 For purposes of this BO and land-use restriction, a "territory" is considered 280 acres in size centered on a known nest site or activity center that meet the criteria outlined below.

The presence of a CFPO territory will be determined and based upon CFPO surveys conducted between January 1 and June 30 using the adopted CFPO protocol. If a CFPO is detected during this period, reasonable effort shall be expended, in cooperation with the USFWS and Arizona Game & Fish Department (AGFD), to ascertain if the area is indeed part of a pair's or unpaired CFPO's home range. The USFWS and AGFD shall cooperate expeditiously in their assistance in this effort.

In regard to determination that a CFPO is detected within 600 meters of the property during the fall dispersal period, the Applicant, in cooperation with the USFWS and AGFD, will make reasonable effort to determine if the CFPO is establishing a territory. The 280-acre area centered on the known locations of the CFPO will be considered a territory unless telemetry or other data indicate otherwise.

In the event that a territory is determined to exist without knowing the nest site location, then the center of the territory shall be determined based upon the centroid of known CFPO locations. This shall be determined by plotting all known locations of the detected CFPO on available aerial photography or topographic maps. A minimum convex polygon shall be drawn around these known locations and the center of this polygon shall be considered the territory center. Points that do not reflect the regular pattern of movement exhibited by the individual and can be eliminated as "outliers" for purposes of determining the territory center if it is felt that including the outlying point(s) would unreasonably skew the results of the analysis. The location of an activity center will be based upon the best available scientific information. The USFWS will make the final determination of this location based upon these data.

2. Construction-related activities may continue on lands that have already been cleared of vegetation provided that they do not exceed the levels/intensity of activity that was occurring during the period of time that the territory was established.

3. Activities that would be more intense or cause greater levels of noise disturbance than was occurring during the period of time that the territory was established cannot proceed without authorization from the Service.

ZONE II - 100-400 Meters from the Activity Center

1. No additional clearing of vegetation will be permitted without authorization from the Service.

2. No restrictions on the nature or type of construction activity (excluding the clearing of vegetation) from August 1st through January 31st of the following calendar year.

3. Construction activities during the breeding season (February 1st to July 31st) cannot exceed the levels or intensity of activity that occurred at the time the territory was established.

ZONE III - 400 to 600 Meters from the Activity Center

1. No additional clearing of vegetation will be permitted without authorization from the Service.

2. No restrictions on the levels or intensity of construction activity (excluding the clearing of vegetation) at any time of the year.

ZONE IV - Greater than 600 Meters from the Activity

3. No restrictions – any activity consistent with the project description provided in the BA is allowed.

Management of Protected Open Space

Conservation Easements

All open space preserved within the project area will be within individual lots. However, all designated natural open space areas shall be subject to a permanent, natural, undisturbed open space and conservation easement (the Conservation Easement) held by the Homeowners' Association (HOA) for the Project. The Applicant will form a non-profit Arizona corporation to act as the HOA for the planned subdivision by preparing and filing articles of incorporation and such other initial corporate documents as may be reasonably required with the Arizona Corporation Commission.

The Conservation Easement will be designated on the property in two phases. Initially, three areas, totaling approximately 68.8 acres (45.1 percent of the property; Figure 5 in BA), will be designated to preserve documented and potential dispersal corridors for the CFPO. These areas are all within platted lots in the Project. The Conservation Easement will be recorded to the benefit of the HOA. The 4.24-acre Conservation Easement along the western border and the 45.41-acre Conservation Easement along La Cholla Wash include areas in which CFPO movements have been documented by the AGFD. The 19.16-acre area initially placed into the Conservation Easement on the eastern side of the property includes xeroriparian habitats that are similar to those found in other CFPO movement corridors. No development activities, except for the utility construction activities (described in section 3.1.1 in BA) and associated repair and maintenance activities necessary to ensure the safe, efficient operation of these utilities, will be permitted within established conservation easements.

The balance of the property that will be set aside as open space areas (approximately 48.45 acres, 31.8 percent), including public utility easements within the property will also be protected by the Conservation Easement, however, the establishment of Conservation Easements within these areas will occur over a period of time and will be part of the HOA's approval process for individual lots. After the site plan and approved clearing limits have been established for each lot and approved by the HOA, the remainder of the natural open space areas within the lot that were not encumbered by the initial establishment of Phase 1 will become part of the Conservation Easements held by the HOA. Development activities within of each lot cannot proceed until the Conservation Easement has been recorded for the remainder of the lot outside of the ultimate clearing limits.

Management of Conservation Easement

The Applicant will prepare a master set of Covenants, Conditions and Restrictions (CC&Rs) that will include the specific conservation elements outlined in this document. These CC&Rs will encumber the entire project and be recorded in the official records of Pima County. The HOA will be responsible for ensuring that protected open space within each lot remains undisturbed, for the benefit of CFPO and adjacent lot owners. The HOA will provide an annual report to the Service listing any planned lot development within the project, providing documentation of compliance with CFPO survey requirements for any planned development activity, and documenting any trespass into protected open space and the steps taken to correct the trespass and repair habitat damage that may have resulted. The specific conservation elements of the CC&Rs that will govern the management and conservation of protected natural open space within the project are outlined below.

CC&R Conservation Element 1 - Surface Disturbance

The maximum allowable size of areas disturbed within each lot by grading and vegetation clearing for the building site utility, any septic system or sewer connection, driveway, and

other landscape features within the project area is described in the Project Site Development and Construction Activities Section of this document. Appropriate control techniques, such as t-post fencing and the preservation of individual trees, shrubs, and cacti as practical within cleared areas will be used to minimize surface disturbance.

Prior to the initiation of any future utility and road construction activities, the Applicant will have t-post and wire fence or its equivalent placed at the clearing limits. This fence shall remain in place until all road construction and utility construction activities are completed.

Prior to the initiation of any clearing activities within each lot, permanent, relocatable, and surveyable pins or other permanent markers indicating all of the corners of the clearing limits/Conservation Easement boundaries within each lot will be installed. These will be placed prior to any clearing activities within each lot and shall be maintained by the homeowner as a condition of the CC&Rs to facilitate long-term monitoring (Figure 6 in BA).

Any modifications of a lot plan previously authorized by the HOA architectural review must be reviewed and approved by the Architectural Review Committee and must be contained within the maximum allowable surface disturbance area for each lot. Unauthorized use of any portion of the lot identified as natural open space shall be restored through appropriate revegetation techniques.

CC&R Conservation Element 2 – Lot Splitting

No lot within the subdivision as described in the Table 3 will be divided or split to form two or more individual lots.

CC&R Conservation Element 3 – Restrictions within the Conservation Easements

The lands encumbered by the Conservation Easement (Conservation Property) will be maintained as natural open space, consistent with the conservation of CFPO, and in connection there with, the landowner, their successor or designee will make periodic inspections of the Conservation Property for vandalism, dumping, and other habitat damage on the Conservation Property. Management of the conservation lands will specifically exclude the following: motorized vehicle use, application of pesticides, artificial lighting (e.g., light poles or other permanent lighting fixtures), organized events that consist of more than 10 individuals, any vegetation salvage or disturbance of native vegetation except as required for construction along the electric and trail easements, use of fires or outdoor cooking, equestrian use by parties of 10 people or more, boarding of horses, or staging of equestrian events.

CC&R Conservation Element 4 - Landscape Restrictions

Landscape restrictions will be incorporated into the CC&Rs. Traditional xeriscape planting zones will be utilized for all residential lots. The use of native vs. non-native vegetation[3] will be guided by the xeriscape zone concepts summarized below. Wherever possible, native species should be used for landscape purposes.

The Oasis Zone

This zone includes fully enclosed yards within each approved building envelope and unenclosed areas within 30 feet of residential structures. There are no restrictions on plantings and landscaping in this zone. Landscaping within the designated Oasis Zone that requires the clearing of native vegetation (by hand or mechanized equipment) is considered part of the grading limits established in the plan.

The Drought Tolerant Zone

This area is transitional between the Oasis Zone and the Natural Zone, and includes highly visible locations (e.g., driveway entrances and borders). Within the Drought Tolerant Zone, plants will be utilized that may require occasional watering after establishment to maintain a healthy, aesthetically acceptable appearance. The plant pallet for this zone will be restricted. A specific list of appropriate plant species for this zone is provided in Appendix B of BA.

The Natural (Xeric) Zone

This zone will occupy the remainder of each individual lot and include all areas outside of the grading envelope. Landscaping efforts within this zone will generally be limited to habitat restoration efforts and the plant pallet will be restricted to plant species indigenous to the immediate vicinity of the project area.

Roadways and Common Areas

Areas temporarily disturbed by construction, except as otherwise required by law, will be seeded with species native to the project area. Temporary irrigation may be used in these areas to facilitate revegetation efforts.

Vegetation Management

Vegetation management activities (including weed control, selective thinning, or other activity) within the natural landscape zone of each lot, whether this area is currently disturbed

[3]Unless specified otherwise in this document for a specific application, native vegetation is defined here to include all plant species native (not introduced or naturalized) to the Lower Colorado or Arizona Upland subdivisions of the Sonoran desertscrub biotic community.

from existing land uses or is undisturbed upland Sonoran desertscrub or xeroriparian habitat, is restricted to the control of non-native plant species only. Management activities that restrict the ability of the disturbed area(s) to recover are not allowed.

CC&R Conservation Element 5 - Native Plant Preservation Plan Compliance

Each lot owner will be responsible for compliance with applicable Native Plant Preservation Ordinance (NPPO) requirements. To the extent possible, large trees and saguaros will be preserved in place. Where preservation in place is not possible, the lot owner will comply with applicable NPPO regulations.

CC&R Conservation Element 6 - Domestic Animals

The lot owners will be required to contain all domestic animals within an enclosed area on their lot within the established clearing limits and/or under strict control at all times. Dogs found outside of enclosed areas will be leashed in conformance with Pima County Code 6.04.030. For the protection of domestic cats and native wildlife, all domestic cats will be restricted to the home or leashed.

CC&R Conservation Element 7 -- Trails and Roadways

Roadways within the Project will be private. Pedestrian activities will be confined to existing roadways and trails within the Project vicinity. No unauthorized clearing of paths through natural undisturbed portions of lots is authorized. Any paths within an individual lot will be counted as part of the allowable surface disturbance for that lot.

CC&R Conservation Element 8 - Fence Restrictions

To maintain a network of interconnected open space, the construction of fence of any type along the perimeter of each lot is prohibited. Fencing within the boundaries of the clearing limits of each lot shall be placed at the perimeter of the Oasis Zone or at the limits of the conservation easement. No woven-wire or chain-link fencing will be used at the boundaries of the Conservation Easement. Recommended fencing types/materials include masonry, wood, wrought iron or tubular steel-iron, tubular steel, or other equivalent materials. There will be no gates opening to the back of each lot.

CC&R Conservation Element 9 - CFPO Survey and Monitoring Restrictions

Development activities will be subjected to the CFPO survey and monitoring restrictions described in the BA. After the master developer is no longer involved in project activities, the HOA will contract with a qualified biologist to ensure that two consecutive seasons of survey exist prior to the clearing of vegetation on any lot.

CC&R Conservation Element 10 – Horse Restrictions

The boarding of horses on any given lot will not be restricted; however, the allowable acreage of surface disturbance will include any pasture areas and any such areas will be clearly indicated on the site plans for each individual lot and included in annual reporting to the Service.

CC&R Conservation Element 11 – Monitoring and Reporting

The Chaparral Heights HOA will be responsible for all management, monitoring, and reporting to the Service in regard to compliance with these conservation restrictions. An annual report will be submitted to the Service during the fourth quarter of each calendar year. The report will provide a brief summary of development activities completed in the previous year, CFPO survey results, NPPO compliance reports, monitoring results of restoration efforts described in the BA, and the Project's compliance with these conservation restrictions. Individual lot site plans (half-size [~11x17]) for each of the lots developed during the reporting year will be submitted with the annual report. The individual lot site plan will clearly delineate the vegetation clearing limits and a calculation and summary table, prepared by the design architect or engineer that demonstrates the Project's compliance with the established grading limitations. The annual monitoring report will also provide a cumulative summary of the Project's clearing activities, demonstrating compliance with the overall grading limitations allowed by the BA. The annual report will be submitted on a standard form (Appendix C of BA) and will include as attachments, all necessary documentation.

A portion of the monthly HOA fees will be allocated to cover the cost of CFPO survey, site monitoring to ensure that clearing limits are adhered to, and annual reporting activities. The HOA's monthly fees will be a perpetual source of funding for the management and monitoring of the Conservation Easements.

CC&R Conservation Element 12 – Amendments

Any changes to the conservation elements of the CC&Rs are subject to approval by the Service. Upon written request of the HOA, the Service may approve amendments to these conservation restrictions. The Service will have no authority over elements of the CC&Rs that are not identified specifically as conservation elements nor will they have the authority to impose additional restrictions without the unanimous approval of the membership of the HOA.

Habitat Restoration

Restoration Areas

Four areas requiring revegetation or restoration have been identified (Figure 7 in the BA). Each of these areas is described below.

Area One

The construction of utilities in areas outside of proposed roadways, but within the Chaparral Heights Project area was to occur only in designated utility easements, however, additional clearing occurred outside these areas. Within these easements, continued access for routine and emergency maintenance is required. Revegetation of these areas will be restricted to seeding activities using a mix of native sub-shrubs, forbs, and grasses to stabilize the soil. No containerized plants will be used in these areas. Area One totals approximately 0.525 acre.

Area Two

Mira Loma will revegetate 4.75 disturbed acres using containerized plantings, transplanted succulents, and hydroseed to restore upland and xeroriparian habitat. Approximately 3.11 acres were disturbed prior to Mira Loma's ownership. The remaining 1.64 acres was disturbed after Mira Loma acquired the property. These areas are depicted on Figure 7 in the BA.

Area Three

Mira Loma will plant native trees (such as paloverde or mesquite) approximately 20 feet on center along the western boundary of lots 8 and 15.

Area Four

The Lambert Lane waterline (approximately 1.76 acres of disturbance) will be hydroseeded with native plant species typical of the subject project area. In addition and subject to the written approval of Pima County and any other entity holding an interest in the ROW containing the water line, restoration will occur using containerized plantings as outlined in the restoration requirements for Area 2.

Restoration Planting and Implementation Plans

Areas One, Two, and Four identified in the previous section will use the native seed mix provided below. Mira Loma will restrict the seeding plant palette, except as otherwise required by law, to species native to the Project area. Temporary irrigation may be used in areas that will be reseeded to facilitate revegetation efforts. All areas to be revegetated will be seeded with the proposed seed mix (Table 4) comprised of species native to the Sonoran Desert. At no time will the seed mix proposed for revegetation contain species not native to the Sonoran Desert. The seed mix in Table 4 may be modified based upon seed availability at the time of reseeding. Any changes must be consistent with the foregoing requirements.

Table 4. Native Revegetation Seed Mix		
Common Name	**Scientific Name**	**Pounds Pure-Live seed/Acre**
GRASSES		
Purple Three Awn	Aristida purpureas	2.0
Sand Dropseed	Sporopolus cryptandrus	1.0
Needle grass	Bouteloua aristidoides	1.0
Bush Muhly	Muhlenbergia porteri	1.0
Bristlegrass	Setaria marostachya	2.0
FORBS		
Desert Globe Mallow	Sphaeralcea ambigua	1.0
Desert Marigold	Baileya multiradiata	1.0
SHRUBS		
Bursage	Ambrosia deltoides	2.0
Desert zinnia	Zinnia acerosa	1.0
Burroweed	Isocoma tenuasecta	1.0

In addition to the reseeding efforts, Areas Two and Four will use containerized plantings and/or salvaged cacti to achieve restoration objectives for upland and xeroriparian areas. The specific species composition proposed for upland and xeroriparian areas is provided in Table 5 and 6, respectively. All containerized plantings will be provided with drip irrigation until established.

Table 5. Plant species composition and planting densities for upland restoration areas		
Plant Species	**Number to be planted per acre**	**Size**
Mesquite (Prosopis velutina)	20	5-gallon nursery stock
Palo Verde (Cercidium microphyllum)	20	5-gallon nursery stock
Prickly Pear (Opuntia spp.)	10	3 to 6 pads each
Cholla (Opuntia spp.)	10	1 to 3 feet tall

Table 6. Plant species composition and planting densities for xeroriparian restoration areas

Species	Number Planted per Acre	Size
Trees		
Prosopis velutina	36	5-gallon
Cercidium floridum	23	5-gallon
Chilopsis linearis	1	5-gallon
Total Trees	60	
Shrub Species		
Ambrosia ambrosioides	12	1-gallon
Celtis pallida	12	1-gallon
Acacia constricta	12	1-gallon
Lycium spp.	12	1-gallon
Ziziphus obtusifolia	12	1-gallon
Total Shrubs	60	

The containerized plantings planted within the restoration areas will require supplemental irrigation during the establishment period. An irrigation schedule will be developed to: 1) provide sufficient water to ensure initial plant survivorship, particularly after first planting and during the summer; and 2) facilitate deep root growth. The objective will be achieved by varying the depth of water applied and the amount of available water depleted from the root zone between irrigations (allowable depletion).

To meet initial survivorship requirements, enough water will be provided during the first year after planting to meet all of the plants' water needs. Prior to planting, the irrigation system will run for an extended period to deep-water the site. During the initial summer season, following planting, allowable depletion is small (10 to 30 percent) to minimize plant stress, and facilitate growth and establishment.

During the next two years of the five-year establishment period, allowable depletion will gradually increase, eventually reaching 80 percent. As water becomes depleted near the top of the soil column, the plant will get water from deeper in the soil. To ensure that deep water is available, each irrigation event is designed to provide some deep percolation below the root zone.

During the fourth year of the five-year establishment period, plants will be closely monitored to avoid excessive mortality. If during this period, plant stress indicates that supplemental watering is still required, the irrigation system will be reactivated.

The following maintenance activities will occur on a regular basis at the restoration areas:

1. Monitor and repair the irrigation systems as needed.

2. Replace dead vegetation on an annual basis.

3. Police areas to remove trash and debris.

Mira Loma will ensure that the restoration areas are inspected at least once a month during the five-year establishment period. Inspection of the areas will include irrigation system inspection, removal of trash and other debris, and replacing dead vegetation, as necessary. Table 7 summarizes specific maintenance activities and their anticipated frequency at the mitigation areas.

Table 7. Maintenance activities and scheduled frequency for Chaparral Heights mitigation areas.

Description and Schedule	
Filters	Irrigation filters shall be inspected and cleaned on a quarterly basis or more frequently if needed.
Emitters	Emitters to all trees will be visually inspected while the system is working on a monthly basis throughout the growing season. As irrigation frequency diminishes, emitter inspections will be completed during each irrigation session.
Clocks and Distribution System	These systems will be inspected on the same schedule as the emitters.
Overall System Inspection	An irrigation system visual inspection will be conducted on a monthly basis.

Restoration Monitoring and Success Criteria

The trees will be monitored for survival annually. Monitoring will occur in September of each year until the success criteria have been achieved. The results of monitoring efforts will be included in annual monitoring reports submitted to the Service. Survival of 80 percent of the tree and shrub plantings one year after irrigation has been stopped will be the standard for satisfactory completion of the restoration. If the 80 percent criterion is not achieved one year after the cessation of irrigation activities, Mira Loma will provide a contingency plan and schedule to achieve the targeted success standard with the annual monitoring report.

II. STATUS OF THE SPECIES/CRITICAL HABITAT

A detailed description of the life history and ecology of the CFPO may be found in the Birds of North America (Proudfoot and Johnson 2000), Ecology and Conservation of the Cactus Ferruginous Pygmy-owl in Arizona (Cartron and Finch 2000), and other information available at the Arizona Ecological Services Field Office. Information specific to the CFPO in Arizona is limited. Research in Texas has provided useful insights into the ecology of the subspecies, and in some instances represents the best available information; however, habitat and

environmental conditions are somewhat different in Arizona and conclusions based on Texas information are tentative.

Species/critical habitat description

The Service listed the Arizona population of the CFPO as a distinct population segment (DPS) on March 10, 1997, (U.S. Fish and Wildlife Service 1997 [62 FR 10730]). The past and present destruction, modification, or curtailment of habitat is the primary reason for the decrease in population levels of the CFPO. On July 12, 1999, we designated approximately 731,712 acres of critical habitat supporting riverine, riparian, and upland vegetation in seven critical habitat units, located in Pima, Cochise, Pinal, and Maricopa counties in Arizona (U.S. Fish and Wildlife Service 1999 [64 FR 37419]). However, on September 21, 2001, the U.S. District Court for the District of Arizona vacated this final rule designating critical habitat for the CFPO, and remanded its designation back to the Service for further consideration.

Life history

CFPOs are small birds, averaging 6.75 inches in length. CFPOs are reddish-brown overall, with a cream-colored belly streaked with reddish-brown. The CFPO is crepuscular/diurnal, with a peak activity period for foraging and other activities at dawn and dusk. During the breeding season, they can often be heard calling throughout the day, but most activity is reported between one hour before sunrise to two hours after sunrise, and late afternoon/early evening from two hours before sunset to one hour after sunset (Collins and Corman 1995).

A variety of vegetation communities are used by CFPOs, such as: riparian woodlands, mesquite *(Prosopis spp.)* "bosques" (Spanish for woodlands), Sonoran Desertscrub, and semidesert grassland communities, as well as nonnative vegetation within these communities. While plant species composition differs among these communities, there are certain unifying characteristics such as the presence of vegetation in a fairly dense thicket or woodland, the presence of trees or saguaros large enough to support cavity nesting, and elevations below 4,000 feet. Historically, CFPOs were associated with riparian woodlands in central and southern Arizona. Plants present in these riparian communities include cottonwood, willow *(Salix spp.)* and hackberry *(Celtis spp.)*. Cottonwood trees are suitable for cavity nesting, while the density of mid- and lower-story vegetation provides necessary protection from predators and an abundance of prey items for the CFPO. Mesquite bosque communities are dominated by mesquite trees, and are described as mesquite forests due to the density and size of the trees.

Over the past several decades, CFPOs have been primarily found in the Arizona Upland Subdivision of the Sonoran Desert, particularly Sonoran Desertscrub (Brown 1994). This community in southern Arizona consists of paloverde, ironwood, mesquite, acacia, bursage (*Ambrosia spp.*), and columnar cacti (Phillips et al. 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985, Johnsgard 1988). However, over the past several years, CFPOs have also been found in riparian and xeroriparian habitats and semidesert

grasslands as classified by Brown (1994). Desertscrub communities are characterized by an abundance of saguaros or large trees, and a diversity of plant species and vegetation strata. Xeroriparian habitats contain a rich diversity of plants that support a wide array of prey species and provide cover. Semidesert grasslands have experienced the invasion of velvet mesquites *(Prosopis velutina)* in uplands and linear woodlands of various tree species along bottoms and washes.

The density of trees and the amount of canopy cover preferred by CFPOs in Arizona is unclear. However, preliminary results from a habitat selection study indicate that nest sites tend to have a higher degree of canopy cover than random sites (Wilcox et al. 2000). For areas outside Arizona, CFPOs are most commonly characterized by semi-open or open woodlands, often in proximity to forests or patches of forests. Where they are found in forested areas, they are typically observed along edges or in openings, rather than deep in the forest itself (Binford 1989, Sick 1993), although this may be a bias of increased visibility. Overall, vegetation density may not be as important as patches of dense vegetation with a developed canopy layer interspersed with open areas. The physical settings and vegetation composition varies across G. brasilianum's range and, while vegetation structure may be more important than composition (Wilcox et al. 1999, Cartron et al. 2000a), higher vegetation diversity is found more often at nest sites than at random sites (Wilcox et al. 2000).

CFPOs typically hunt from perches in trees with dense foliage using a perch-and-wait strategy; therefore, sufficient cover must be present within their home range for them to successfully hunt and survive. Their diverse diet includes birds, lizards, insects, and small mammals (Bendire 1888, Sutton 1951, Sprunt 1955, Earhart and Johnson 1970, Oberholser 1974) and frogs (Proudfoot et al. 1994). The density of annuals and grasses, as well as shrubs, may be important to the CFPO's prey base. Shrubs and large trees also provide protection against aerial predation for juvenile and adult CFPOs and cover from which they may capture prey (Wilcox et al. 2000).

CFPOs are considered non-migratory throughout their range by most authors, and have been reported during the winter months in several locations, including Organ Pipe Cactus National Monument (OPCNM) (R. Johnson unpubl. data, T. Tibbitts, Organ Pipe Cactus National Monument unpubl. data). CFPOs begin nesting activities in late winter to early spring. In Arizona differences between nest sites may vary by as much as two months (Abbate et al. 1996, S. Richardson, Arizona Game and Fish Department unpubl. data). As with other avian species, this may be the result of a second brood or a second nesting attempt following an initial failure (Abbate et al. 1996). In Texas, juveniles remained within approximately 165 feet of adults until dispersal. Dispersal distances (straight line) of 20 juveniles monitored from their natal sites to nest sites the following year averaged 5 miles (ranged from 0.75 to 19 miles (G. Proudfoot unpubl. data). Telemetry studies of dispersing juveniles in Arizona during 1999 and 2000 ranged from 1.4 to 12.9 miles (straight line distance) (n=6, mean 6.2 miles) in 1999, and 1.6 to 11.7 miles (n=6, mean 5.8 miles) in 2000 (S. Richardson and M. Ingraldi, Arizona Game and Fish Department unpubl. data). Telemetry data from 2001 is not yet available. CFPO telemetry studies have documented movement of owls between southern

Pinal County and northwestern Tucson (S. Richardson and M. Ingraldi, Arizona Game and Fish Department unpubl. data). Typically, juveniles dispersed from natal areas in July, but did not appear to defend a territory until September. They may move up to one mile in a night; however, they typically fly short distances from tree to tree instead of long single flights (S. Richardson, Arizona Game and Fish Department unpubl. data). Subsequent surveys during the spring have found that locations of male CFPOs are in the same general location as last observed the preceding fall.

Apparently, unpaired females may also remain in the same territory for some period of time. In the spring of 2001, an unpaired female (the male died in 2000) remained in the same territory as was occupied in previous years well into the spring, exhibiting territorial behavior (calling) for approximately two months until ultimately switching territories, pairing with an unpaired male and successfully nesting (S. Richardson, Arizona Game and Fish Department unpubl. data). Researchers suspect that if this unpaired female could have attracted an unpaired male during that time, she would have likely remained in her original territory. Apparently at some point the urge to pair is too strong to remain and they seek out new mates.

In Texas, Proudfoot (1996) noted that, while CFPOs used between 3 and 57 acres during the incubation period, they defend areas up to 279 acres in the winter. Therefore, a 280 acre home range is considered necessary for CFPOs. Proudfoot and Johnson (2000) indicate males defend areas with radii from 1,100 - 2,000 feet. Initial results from ongoing studies in Texas indicate that the home range of CFPOs may also expand substantially during dry years (G. Proudfoot unpubl. data).

Species status and distribution range wide

The CFPO is one of four subspecies of ferruginous pygmy-owl. CFPOs are known to occur from lowland central Arizona south through western Mexico to the States of Colima and Michoacan, and from southern Texas south through the Mexican States of Tamaulipas and Nuevo Leon. It is unclear at this time if the ranges of the eastern and western populations of the ferruginous pygmy-owl merge in southern Mexico. Recent genetic studies suggest that ferruginous pygmy-owl populations in southern Arizona and southern Texas are distinct subspecies, and that there is no genetic isolation between populations in the United States and those immediately south of the border in northwestern or northeastern Mexico (Proudfoot and Slack 2001). Results also indicate a comparatively low haplotypic diversity in the northwestern Tucson population, suggesting that it may be recently separated from those in the Altar Valley, Arizona, and in Sonora and Sinaloa, Mexico.

The Service is currently funding habitat studies and surveys in Sonora, Mexico to determine the distribution and relative abundance of the CFPO there. Preliminary results indicate that CFPOs are present in northern and central Sonora (U.S. Fish and Wildlife Service unpubl. data). Further studies are needed to determine their distribution in Mexico.

The range of the Arizona DPS of the CFPO extends from the International Border with Mexico north to central Arizona. The northernmost historic record for the CFPO is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the CFPO to be "quite common" in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, the CFPO, prior to the mid-1900s, was "not uncommon," "of common occurrence," and a "fairly numerous" resident of lowland central and southern Arizona in cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). Additionally, CFPOs were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (Arizona Game and Fish Department unpubl. data, Hunter 1988).

Records from the eastern portion of the CFPO's range include a 1876 record from Camp Goodwin (nearby current day Geronimo) on the Gila River, and a 1978 record from Gillard Hot Springs, also on the Gila River. CFPOs have been found as far west as the Cabeza Prieta Tanks, Yuma County in 1955 (Monson 1998).

Hunter (1988) found fewer than 20 verified records of CFPOs in Arizona for the period of 1971 to 1988. Formal surveys for the CFPO on OPCNM began in 1990, with one located that year. Beginning in 1992, survey efforts conducted in cooperation with the AGFD, located three single CFPOs on OPCNM (U.S. Fish and Wildlife Service unpubl. data and Organ Pipe Cactus National Monument unpubl. data). In 1993, surveys were conducted at locations where CFPOs had been sighted since 1970. Only one CFPO was detected during these survey periods, and it was located in northwestern Tucson (Felley and Corman 1993). In 1994, a pair and single owl of unknown breeding status were located in northwestern Tucson during informal survey work by AGFD (Abbate et al. 1996). In 1995, AGFD confirmed 5 adult CFPO and one juvenile, one of which was the first nest in many years. In 1996, AGFD focused their survey efforts in the Tucson Basin. A total of 12 CFPOs were detected, including one known nesting pair and their 2 fledglings which successfully fledged. Three additional CFPOs and three other unconfirmed reports were also recorded at OPCNM in 1996.

While the majority of Arizona CFPO detections in the last seven years have been from the northwestern Tucson area in Pima County, CFPOs have also been detected in southern Pinal County, at OPCNM, Cabeza Prieta National Wildlife Refuge (CPNWR), Buenos Aires National Wildlife Refuge (BANWR), and on the Coronado National Forest. The following is a brief summary of recent owl numbers and distribution[4]:

In 1997, survey efforts of AGFD located a total of five CFPOs in the Tucson Basin study area (the area bounded to the north by the Picacho Mountains, the east by the Santa Catalina and Rincon mountains, the south by the Santa Rita and Sierrita Mountains, and the Tucson Mountains to the west). Of these owls, one pair successfully fledged (young that left their nest

[4] To a large degree, survey effort plays an important factor in where owls have been documented. Survey effort has not been consistent over the past several years in all areas of the state, affecting the known distribution and numbers of owls in any particular area.

cavity) two young which were banded. Two adult males were also located at OPCNM, with one reported from a previously unoccupied area (T. Tibbitts, Organ Pipe Cactus National Monument pers. comm. 1997).

In 1998, survey efforts in Arizona increased substantially and, as a result, more CFPOs were documented, which may at least in part account for a larger number of known owls. In 1998, a total of 35 CFPOs were confirmed (S. Richardson, Arizona Game and Fish Department unpubl. data, U.S. Fish and Wildlife Service unpubl. data, T. Tibbitts, Organ Pipe Cactus National Monument unpubl. data, D. Bieber, Coronado National Forest unpubl. data).

In 1999, a total of 41 adult CFPOs were found in Arizona at 28 sites. Of these sites, 11 had nesting confirmed by AGFD and the Service. CFPOs were found in three distinct regions of the state: Tucson Basin, Altar Valley, and OPCNM. Almost half of the known owl sites were in the Altar Valley. Overall, mortality was documented for a number of fledglings due to natural (e.g., predation) or unknown causes. Of the 33 young found, only 16 were documented as surviving until dispersal (juveniles known to have successfully dispersed from their natal area). It is unclear what the survival rate for CFPOs is; however, as with other owls and raptors, a high mortality (50% or more) of young is typical during the first year of life.

Surveys conducted in 2000 resulted in 24 confirmed CFPO sites (i.e. nests and resident CFPO sites) and several other unconfirmed sites (S. Richardson, Arizona Game and Fish Department unpubl. data, T. Tibbitts, Organ Pipe Cactus National Monument unpubl. data, U.S. Fish and Wildlife Service unpubl. data). A total of 34 adult CFPOs were confirmed. Nesting was documented at 7 sites and 23 fledglings were confirmed. A total of 9 juveniles were known to have successfully dispersed from their natal areas in 2000. Successful dispersal was not confirmed at two nests with four fledglings. The status of the remaining fledglings was unknown; however, they were presumed dead.

Surveys conducted during the 2001 season resulted in a total of 47 adult CFPOs confirmed at 29 sites[5] in Arizona (S. Richardson, Arizona Game and Fish Department unpubl. data, T. Tibbitts, Organ Pipe Cactus National Monument unpubl. data, U.S. Fish and Wildlife Service unpubl. data). There were also several other unconfirmed sites that are not included in these totals. Nesting was documented at 17 sites and 24 young were confirmed to have successfully fledged. In addition, there were 2 nests with young that potentially could have fledged young; however, this was not confirmed. Similar to the previous three years, there was over a 50% fledgling mortality documented in 2001 (S. Richardson, Arizona Game and Fish Department unpubl. data). The following regions of the state are currently known to have CFPOs:

- Tucson Basin (northwestern Tucson and southern Pinal County) - A total of 8 adults (3 pairs and 2 single resident males) were confirmed at 5 sites, all of which were in Pima County. One single unpaired male CFPO was documented in southern Pinal County. Three nests in northwestern Tucson were confirmed, all with young.

[5] CFPO sites are nests and resident male CFPO sites that have been confirmed by AGFD or the Service.

- Altar Valley - A total of 18 adult CFPOs were documented at 12 sites[6]. As a result of increased access to portions of the valley, the number of known owls increased to 7 pairs and 4 resident single owls. A total of 7 nests were confirmed.

- OPCNM and CPNWR - Twelve adults, consisting of 2 pairs and 4 single CFPOs were confirmed at 8 sites. Three nests were active. Two new sites were documented on the CPNWR and 1 north of OPCNM near Ajo, Arizona.

- Other Areas - A total of 9 adults, consisting of 4 pairs and 1 single CFPO at 5 sites documented elsewhere in southern Arizona. Nesting was confirmed at 4 of these sites. It is unknown how many of these young successfully dispersed. There were several other possible CFPO detections reported elsewhere in the state, but they were not confirmed.

One factor affecting the known distribution of CFPOs in Arizona is where early naturalists spent most of their time and where recent surveys have taken place. For example, a majority of surveys in the recent past (since 1993) have taken place in OPCNM and in the Tucson Basin, and these areas are where most owl locations have been recorded. However, over the past three years, large, previously unsurveyed areas have been inventoried for owls, resulting in a much wider distribution than previously thought. As a result, our knowledge is changing as to CFPO distribution and habitat needs as new information is collected. For example, before 1998, very few surveys had been completed in the Altar Valley in southern Pima County. Prior to 1999, the highest known concentration of CFPOs in the state was in northwestern Tucson. However, in 1999, after extensive surveys in Altar Valley, more owls were found there (18 adults) than in northwestern Tucson (11 adults), although until 2001, there have been fewer nest sites in Altar Valley than in the Tucson Basin (S. Richardson, Arizona Game and Fish Department unpubl. data). As a result, our knowledge is changing as to their distribution and habitat needs as new information is collected.

Range wide trend

One of most urgent threats to CFPOs in Arizona is thought to be the loss and fragmentation of habitat (U.S. Fish and Wildlife Service 1997, Abbate et al. 1999). The complete removal of vegetation and natural features required for many large-scale and high-density developments directly and indirectly impacts CFPO survival and recovery (Abbate et al. 1999).

Habitat loss, degradation, and fragmentation are widely accepted causes contributing to raptor population declines worldwide (Snyder and Snyder 1975, Newton 1979, LeFranc and Millsap 1984). Habitat fragmentation is the process by which a large and continuous block of natural habitat is transformed into much smaller and isolated patches by human activity (Noss and Csuti 1994). Fragmentation has two components (1) reduction of the total amount of habitat

[6] There was one additional female found in Altar Valley dead in a saguaro cavity, suspected to have been killed by a screech owl (S. Richardson, Arizona Game and Fish Department unpubl. data).

type and (2) apportionment of remaining habitat into smaller, more isolated patches (Harris 1984, Wilcove et al. 1986, Saunders et al. 1991). Casualties caused by pest control, pollution, collisions with cars, radio towers, glass windows, power lines, and cat predation are often underestimated, although likely increasing in occurrence due to human population growth (Banks 1979, Klem 1979, Churcher and Lawton 1987). Even where human-related deaths are uncommon, they may still substantially affect populations of rare birds (Cartron et al. 2000a). Because of the proximity of CFPO sites to residential areas in northwestern Tucson, these interactions may be a significant cause of owl mortality there (Cartron et al. 2000a).

Nesting in small natural patches may have additional risks. For example, Haug (1985) found burrowing owl home range size increases with the percentage of vegetation disturbance. In fragmented landscapes, burrowing owls may forage greater distances and spend more time away from the nest, making them more vulnerable to predators, and therefore, less efficient at reproduction (Warnock and James 1997). As fragmentation increases, competition for fewer productive CFPO territories may occur (Abbate et al. 1999). Unlike other larger birds that can fly long distances over unsuitable or dangerous areas to establish new territories, CFPOs, because of their small size, and their short style of flight are exposed to greater risks from predation and other threats (Abbate et al. 1999).

Site tenacity in birds is one of many factors that may create time lags in response to fragmentation and other disturbances. Individuals may remain in sites where they bred successfully in the past, long after the habitat has been altered (Wiens 1985). Because of lack of data, it is unclear whether site tenacity for CFPOs, in increasingly fragmented landscapes, such as exists in the action area, is a factor. For example, researchers have been closely monitoring an established CFPO site (documented each year since 1996) in which the male died in 1999, apparently from a collision with a fence (S. Richardson, Arizona Game and Fish Department unpubl. data.). This site has not been known to be active since 1999. It has one of the highest amount of development (33%) within its estimated home range of any other known nest site (S. Richardson, Arizona Game and Fish Department unpubl. data.). The site will continued to be monitored to determine if new owls reestablish a nest site.

In northwestern Tucson, all known CFPO locations, particularly nest sites, are in low-density housing areas where abundant native vegetation separates structures. Additionally, they are adjacent to or near large tracts of undeveloped land. CFPOs appear to use non-native vegetation to a certain extent, and have been observed perching in non-native trees in close proximity to individual residences. However, the persistence of CFPOs in areas with an abundance of native vegetation indicates that a complete modification of natural conditions likely results in unsuitable habitat conditions for CFPOs. While development activities are occurring in close proximity to owl sites, particularly nest sites, overall noise levels are low. Housing density is low, and as a result, human presence is also generally low. Roads in the areas are typically dirt or two-lane paved roads with low speed limits that minimizes traffic noise. Low density housing areas generally have lower levels of traffic noise because of the limited number of vehicles traveling through the area.

Other factors contributing to the decline of CFPO habitat include the destruction of riparian bottomland forests and bosques. It is estimated that 85 to 90% of low-elevation riparian habitats in the southwestern U.S. have been modified or lost; these alterations and losses are attributed to woodcutting, non-native plant invasions, urban and agricultural encroachment, water diversion and impoundment, channelization, groundwater pumping, livestock overgrazing, and hydrologic changes resulting from various land-use practices (e.g., Phillips et al. 1964, Carothers 1977, Kusler 1985, Jahrsdoerfer and Leslie 1988, U.S. Fish and Wildlife Service 1988, U.S. General Accounting Office 1988, Szaro 1989, Dahl 1990, State of Arizona 1990, Bahre 1991). Cutting of trees for domestic and industrial fuel wood was so extensive throughout southern Arizona that, by the late 19th century, riparian forests within tens of miles of towns and mines had been decimated (Bahre 1991). Mesquite was a favored species because of its excellent fuel qualities. In the project area, the famous vast forests of "giant mesquites" along the Santa Cruz River in the Tucson area described by Swarth (1905) and Willard (1912) fell to this threat, as did the "heavy mesquite thickets" where Bendire (1888) collected CFPO specimens along Rillito Creek, a Santa Cruz River tributary, in present-day Tucson. Only remnant fragments of these bosques remain.

Regardless of past distribution in riparian areas, it is clear that the CFPO has declined throughout Arizona to the degree that it is now extremely limited in distribution in the state (Johnson et al. 1979, Monson and Phillips 1981, Davis and Russell 1984, Johnson-Duncan et al. 1988, Millsap and Johnson 1988, Monson 1998). A very low number of CFPOs in riparian areas in recent years may reflect the loss of habitat connectivity rather than the lack of suitability (Cartron et al. 2000b).

In recent decades, the CFPO's riparian habitat has continued to be modified and destroyed by agricultural development, woodcutting, urban expansion, and general watershed degradation (Phillips et al. 1964, Brown et al. 1977, State of Arizona 1990, Bahre 1991, Stromberg et al. 1992, Stromberg 1993a and 1993b). Sonoran Desertscrub has been affected to varying degrees by urban and agricultural development, woodcutting, and livestock grazing (Bahre 1991). Pumping of groundwater and the diversion and channelization of natural watercourses are also likely to have reduced CFPO habitat. Diversion and pumping result in diminished surface flows, and consequent reductions in riparian vegetation are likely (Brown et al. 1977, Stromberg et al. 1992, Stromberg 1993a and 1993b). Channelization often alters stream banks and fluvial dynamics necessary to maintain native riparian vegetation. The series of dams along most major southwestern rivers (e.g., Colorado, Gila, Salt, and Verde rivers) have altered riparian habitat downstream of dams through hydrological and vegetational changes, and have inundated former habitat upstream.

In the United States, CFPOs are rare and highly sought by bird watchers, who concentrate at a few of the remaining known locations. Limited, conservative bird watching is probably not harmful; however, excessive attention and playing of tape-recorded calls may at times constitute harassment and affect the occurrence and behavior of the CFPO (Oberholser 1974, Tewes 1993). For example, in 1996, a resident in Tucson reported a CFPO sighting which subsequently was added to a local birding hotline and the location was added to their website

on the internet. Several car loads of birders were later observed in the area of the reported location (S. Richardson, Arizona Game and Fish Department pers. comm. 1999).

One of the few areas in Texas known to support CFPOs continues to be widely publicized as having organized field trips and birding festivals (American Birding Association 1993, Tropical Birds of the Border 1999). Resident CFPOs are found at this highly visited area only early in the breeding season, while later in the season they could not be detected. O'Neil (1990) also indicated that five birds initially detected in southern Texas failed to respond after repeated visits by birding tours. It is unknown if the birds habituate to the playing of taped calls and stopped responding, or if they abandoned the area. Oberholser (1974) and Hunter (1988) additionally indicated that in southern Texas, recreational birdwatching may disturb owls at highly visited areas.

Human activities near nests at critical periods of the nesting cycle may cause CFPOs to abandon their nest sites. In Texas, 3 of 102 CFPO nests monitored from 1994-1999 were abandoned during the early stage of egg laying. Although unknown factors may have contributed to this abandonment, researchers in Texas associated nest abandonment with nest monitoring (G. Proudfoot pers. comm.). Some outdoor recreational activities (e.g., off road vehicle [ORV] and motor bike use/racing, firearm target practicing, jeep tours, etc.) may disturb CFPOs during their breeding season (particularly from February through July (G. Proudfoot pers. comm. 1999 and S. Richardson, Arizona Game and Fish Department pers. comm. 1999). Noise disturbance during the breeding season may affect productivity; disturbance outside of this period may affect the energy balance and, therefore survival. Wildlife may respond to noise disturbances during the breeding season by abandoning their nests or young (Knight and Cole 1995). It has also become apparent that disturbance outside of a species' breeding season may have equally severe effects (Skagen et al. 1991).

All known nesting CFPOs within northwestern Tucson are located in areas containing no development or low-density housing developments that are adjacent to undeveloped tracts of land with varying amounts of noise disturbance. Individual CFPOs may react differently to noise disturbances, some individuals exhibiting less tolerance than others. Noise can affect animals by disturbing them to the point that detectable change in behavior may occur. Such behavioral changes can affect their activity and energy consumption (Bowles 1995). Dangerous or unfamiliar noises are more likely to arouse wildlife than harmless and familiar noises. Habituation is the crucial determinant of success in the presence of noisy disturbances. The habituation process can occur slowly, so it may not be detected in the short-term. In the long-term, some nesting birds become more tenacious and less responsive in the presence of human disturbance if they are not deliberately harassed (Burger and Gochfeld 1981). It is unknown if noise habituation occurs in some CFPOs as it does with other bird species. Robert and Ralph (1975), Schreiber et. al (1979), Cooke (1980), Parsons and Burger (1982), Ainley et al. (1983), and McNicholl (1983) found that adult birds, and chicks to some extent, habituated to the presence of humans, and their responses to people seemed to be less than those of undisturbed birds.

Because of the lack of data specific to this subspecies in Arizona, we must also rely in part on our knowledge of effects this type of action may have on CFPOs elsewhere and other species, particularly raptors. Raptors in frequent contact with human activities tend to be less sensitive to additional noise disturbances than raptors nesting in remote areas. However, exposure to direct human harassment may make raptors more sensitive to noise disturbances (Newton 1979). Where prey is abundant, raptors may even occupy areas of high human activity, such as cities and airports (Newton 1979, Ratcliffe 1980, White et al. 1988). The timing, frequency, and predictability of the noise disturbance may also be factors. Raptors become less sensitive to human disturbance as their nesting cycle progresses (Newton 1979). Studies have suggested that human activities within breeding and nesting territories could affect raptors by changing home range movements (Anderson et al. 1990) and causing nest abandonment (Postovit and Postovit 1987, Porter et al. 1973).

Application of pesticides and herbicides in Arizona occurs year-round, and these chemicals pose a potential threat to the CFPO. The presence of CFPOs in proximity to residences, golf courses, agricultural fields, and nurseries may cause direct exposure to pesticides and herbicides. Furthermore, ingestion of affected prey items may cause death or reproductive failure (Abbate et al. 1999). Illegal dumping of waste also occurs in areas occupied by CFPOs and may be a threat to CFPOs and their prey; in one case, drums of toxic solvents were found within one mile of a CFPO detection (Abbate et al. 1999).

Little is known about the rate or causes of mortality in CFPOs; however, they are susceptible to predation from a wide variety of species. In Texas, eggs and nestlings were depredated by racoons (Procyon lotor) and bullsnakes (Pituophis melanoleucus). Both adult and juvenile CFPO are likely killed by great horned owls (Bubo virginianus), Harris' hawks (Parabuteo unicinctus), Cooper's hawks, and eastern screech-owls (Otus asio) (Proudfoot and Johnson 2000, G. Proudfoot unpubl. data). CFPOs are particularly vulnerable to predation and other threats during and shortly after fledging (Abbate et al. 1999). Therefore, cover near nest sites may be important for young to fledge successfully (Wilcox et al. 1999, Wilcox et al. 2000). Although nest depredation has not been recorded in Arizona, only a relatively small sample of nests have been monitored (n = 37 from 1995-2001). Additional research is needed to determine the effects of predation, including nest depredation, on CFPOs in Arizona and elsewhere.

Another factor that may affect CFPOs is interspecific competition/predation. In Texas, depredation of two adult female CFPOs nesting close to screech-owls was recorded. These incidences were recorded as "depredation by screech-owl" after examination of the CFPO corpses and assessment of circumstances (i.e., one CFPO attempted to nest in a box that was previously used as screech-owl roost site, the other established a nest in a box within 5 meters (16 feet) of screech-owl nest site). In 2001, an unpaired female CFPO was found dead in a tree cavity, apparently killed by a screech-owl (S. Richardson, Arizona Game and Fish Department unpubl. data). Conversely, CFPOs and screech-owls have also been recorded successfully nesting within 2 meters (7 feet) of each other in the same tree without

interspecific conflict (G. Proudfoot unpubl. data). The relationship between CFPO and other similar small owl species needs further study.

Direct and indirect human-caused mortalities (e.g., collisions with cars, glass windows, fences, power lines, domestic cats [Felis domesticus], etc.), while likely uncommon, are often underestimated, and probably increase as human interactions with owls increase (Banks 1979, Klem 1979, Churcher and Lawton 1987). This may be particularly important in the Tucson area where many CFPOs are located. CFPOs flying into windows and fences, resulting in serious injuries or death to the birds, have been documented twice. A CFPO collided into a closed window of a parked vehicle; it eventually flew off, but had a dilated pupil in one eye indicating serious neurological injury as the result of this encounter (Abbate et al. 1999). In another incident, an adult owl was found dead on a fence wire; apparently it flew into a fence and died (S. Richardson, Arizona Game and Fish Department unpubl. data). AGFD also has documented an incident of individuals shooting BB guns at birds perched on a saguaro which contained an active CFPO nest. In Texas, two adult CFPOs and one fledging were killed by a domestic cat. These owls used a nest box about 75 meters (246 feet) from a human residence. In 2001, predation by domestic cats is also suspected by researchers in two instances in northwestern Tucson (S. Richardson, Arizona Game and Fish Department unpubl. data). Two female juvenile owls, located 2 ½ miles apart, were found dead from apparent wounds sustained from a cats. Free roaming cats can also affect the number of lizards, birds, and other prey species available to CFPOs; however, very little research has been done in the southwest on this potential problem.

CFPOs have been observed moving around the perimeter of golf courses, avoiding non-vegetated areas. Roads and other openings may act as barriers to their movements (Abbate et al. 1999, S. Richardson, Arizona Game and Fish Department unpubl. data). On one occasion, a radio-tagged dispersing juvenile stopped within 0.7 mile of Interstate 10 where there were large openings and few trees or shrubs, and reversed its direction (Abbate et al. 1999). However, radio-tagged, juvenile CFPOs have crossed two-lane roads with low to moderate vehicular traffic, where trees and large shrubs were present on either side (Abbate et al. 1999). Most recently, CFPOs monitored during the summer 2001 dispersal period were observed near two lane roads on several occasions (Arizona Game and Fish Department unpubl. data). Although owls were not directly observed crossing roads, radio telemetry data were collected on either side of roadways. Movement across roads appeared to occur during the night, although transmittered owls were not continuously monitored. Because of a lack of funds and personnel, AGFD researchers are at best only able to collect relocations during 2 random times during a 24-hour period, therefore, the time and location of this crossing is unknown.

CFPOs are capable of flying short distances up to 100 feet or more over undisturbed vegetation (e.g., Sonoran Desertscrub, semidesert grasslands, or riparian areas) with little or no human activities or structures such as roads, fences, buildings, etc. (G. Proudfoot, unpubl. data, S. Richardson, Arizona Game and Fish Department unpubl. data). However, as opening size (i.e., gaps between trees or large shrubs) increases, coupled with increased threats (e.g., moderate to high traffic volumes and other human disturbances) relatively wide roads (greater

than 40 feet), may act as barriers or significantly restrict owl movement. Wide roadways and associated clear zones cause large gaps between tree canopies on either side of roadways, resulting in lower flight patterns over roads. This low flight level can cause owls to fly directly in the pathway of oncoming cars and trucks, significantly increasing the threat of owls being struck. Measures can be implemented in roadway design to minimize these threats and allow successful movement across roadways. Among other measures, decreasing the canopy openings between trees on either side of roads and increasing the density of trees along roadways to provide greater shelter and cover from predators and human activities can be utilized to minimize adverse effects to owls attempting to cross roads. Specific research is needed to determine at what distance do road and clear zone widths significantly affect successful owl movement, types of vegetation needed, roadway and landscaping designs, speed limits, etc.

Telemetry data collected by AGFD in 2001 indicate that owl movement is affected by roads and traffic (S. Richardson, Arizona Game and Fish Department, unpubl. data). On two separate occasions within the action area, juvenile owls fitted with radio transmitters were tracked moving along washes and upland areas with native vegetation until they came upon busy roads with relatively wide clear zones on either side of the roadways. These owls stopped and were repeatedly observed reacting to passing vehicular traffic by retreating from the road edge vegetation to nearby trees as cars and trucks passed by. They appeared to be affected by road width, the density of vegetation on either side of the roadway, and traffic volume. In both cases, they eventually crossed these roads during lower traffic periods at areas with narrower gaps in vegetation where trees were present on either side of the road. More research is needed to fully understand how these and other factors affect owl movement.

Researchers in Arizona have found that CFPOs require habitat linkages, within and between territories for movement and dispersal of young. Continuous cover or patches of trees and large shrubs spaced at close, regular intervals, to provide concealment and protection from predators and mobbing, as well as shade and cool temperatures is necessary (S. Richardson, Arizona Game and Fish Department unpubl data, Abbate et al. 1999). CFPOs, particularly juveniles because of their inexperience, are susceptible to predation, weather extremes, human-related injury/mortality factors (e.g., cars, buildings, fences, domestic cats, etc.) and other mortality factors (mortality of juveniles is typically 50% or more for owls and other raptors). Therefore, it is essential to maintain habitat conditions that reduce their exposure to these threats and provide protection as they disperse from their natal areas. A high degree of cover throughout the landscape increases the likelihood of survivorship to the next breeding season. Limiting these mortality factors is critical, especially for small, depressed populations, such as CFPOs in Arizona.

Fires can affect CFPOs by altering their habitat (Abbate et al. 1999). A recent fire altered habitat near an active CFPO nest site (Flesch 1999) and although four mature saguaros in the area survived (at least in the short-term), post-fire mortality of saguaros has been recorded (Steenbergh and Lowe 1977 and 1983, Mclaughlin and Bowers 1982). Flesch (1999) also noted that approximately 20 to 30% of the mesquite woodland within 50 meters (164 feet) of

the nest was fire- or top-killed, and ground cover was also eliminated until the summer monsoons. Careful use of prescribed fires in areas potentially suitable for CFPOs is necessary so that habitat is not lost or degraded (Flesch 1999).

Low genetic variability can lead to a reduction in reproductive success and environmental adaptability. Caughley and Gunn (1996) further note that small populations can become extinct entirely by chance even when their members are healthy and the environment favorable. The pairing of siblings or parents with their offspring, particularly in raptors, is rare, and has been documented in only 18 cases, representing 7 species (Carlson et al. 1998). Four of these species were owls: barn owls, burrowing owls *(Athene cunicularia)*, screech-owls, and spotted owls *(Strix occidentalis)*. In 1998 and 1999, two cases of sibling CFPOs pairing and breeding were documented (Abbate et al. 1999). In both cases, young were fledged from the nesting attempts. These unusual pairings may have resulted from extremely low numbers of available mates within their dispersal range, and/or from barriers (including fragmentation of habitat) that have influenced dispersal and limited the movement of young owls (Abbate et al. 1999). Further, because the CFPO is nonmigratory, there may be an additional limitation on the flow of genetic material between populations which may reduce the chance of demographic and genetic rescue from immigration from adjacent populations.

Recent genetic research suggests that CFPOs in the action area may be isolated from other populations in Arizona and Mexico (Proudfoot and Slack 2001). They have found that the low level of genetic variation and the absence of shared haplotypes between owls in northwestern Tucson and the remainder of the state and Mexico may be indicative of natural divergence of this population from the rest of the CFPO population in Arizona. Specifically, this study found that CFPOs in northwestern Tucson are in a distinct clade and suggests a current separation between populations in northwestern Tucson and elsewhere in the state and Mexico. In addition, these owls have extremely low levels of average haplotype diversity. Researchers acknowledge this may also be a product of sampling (i.e., sampling from one maternal lineage) and or an extremely high level of inbreeding as a result of low population numbers and geographic isolation. Given the low number of CFPOs in the action area, their potential isolation from source populations, the fact that inbreeding has occurred to the second generation in two documented cases, and potential pressure from urban development, there is a high level of concern for the Tucson Basin population of CFPOs.

Environmental, demographic, and genetic stochasticity, and catastrophes have been identified as interacting factors that may contribute to a population's extinction (Hunter 1996). Environmental stochasticity refers to random variation in habitat quality parameters such as climate, nutrients, water, cover, pollutants, and relationships with other species such as prey, predators, competitors, or pathogens. Demographic stochasticity is uncertain due to random variation in reproductive success and survivorship of individuals. Genetic stochasticity is the random variation in gene frequencies of a population due to genetic drift, bottlenecks, inbreeding, and similar factors. Catastrophes are events such as droughts or hurricanes that occur randomly. When these factors interact with one another, there are likely to be a combination of effects, such that a random environmental change like habitat fragmentation

can result in population and genetic changes by preventing dispersal. These factors are much more likely to cause extinction when a species' numbers are already extremely low. The small, fragmented population of CFPOs in Arizona may not have the ability to resist change or dramatic fluctuations over time caused by one or more of the factors mentioned above.

Soule (1986) notes that very small populations are in extreme jeopardy due to their susceptibility to a variety of factors, including demographic stochasticity, where chance variations in birth and death rates can result in extinction. A series of environmental changes, such as habitat reduction, reduce populations to a state in which demographic stochasticity takes hold. In small populations such as with the CFPO, each individual is important for its contributions to genetic variability of that population. As discussed above, low genetic variability can lead to a lowering in reproductive success and environmental adaptability, affecting recovery of this species.

III. ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area; the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation; and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR §402.02). The applicant has determined the action area to be the project area plus a 600 meter buffer area (WestLand Resources 2002). We disagree with this determination. The Service has determined the action area to include the project parcels and off-site utilities and areas within 19 miles. We based this determination on the dispersal distance of juvenile CFPOs in Texas and Arizona (G. Proudfoot unpubl. data, S. Richardson, Arizona Game and Fish Department unpubl. data). With so few individual CFPOs in Arizona, the maximum dispersal distance may be periodically needed to maintain genetic interchange between groups of owls. This is particularly important when there is a limited gene pool available. On two separate occasions in the action area, siblings of the same nest were documented breeding with each other the following year (Abbate et al. 1999) (see Range wide Trend section below). Instances of sibling breeding may be a reflection of small isolated populations of owls, and maintaining genetic diversity within depressed populations is important to maintain genetic stochasticity and fitness.

The project parcel is within the Arizona Upland Subdivision of the Sonoran Desertscrub vegetation community (Brown 1994). This subdivision is limited in its distribution, forming a narrow, curved band along the northeast edge of the Sonoran Desert from the Buckskin Mountains, southeast to Phoenix, Arizona, and south to Altar, Sonora, Mexico. It is described

as a low woodland of leguminous trees with an overstory of columnar cacti and with one or more layers of shrubs and perennial succulents.

Over the past 12-month period, we have conducted over approximately 60 informal section 7 consultations for projects within the action area (e.g., capitol improvements, residential, commercial, and other developments) that have either yet to undergo formal section 7 consultation, or were not likely to adversely affect the CFPO. In addition, we have provided technical assistance to approximately 500 individual projects without a federal nexus (i.e., projects not requiring a federal permit, authorization, or funding [e.g., development of single family residences, churches, fire stations, etc on individual lots]). These projects individually were not likely to adversely affect CFPOs, or their adverse effects were insignificant or discountable due to their location, size, and scope. Collectively however, these projects without a federal nexus have taken place since listing, and continue to occur in areas that are within known CFPO territories, dispersal corridors, and areas that are important for survival and recovery within the action area. The Service has provided technical assistance to many of these landowners and project proponents to reduce and minimize these adverse effects of their projects by retaining suitable habitat on their parcel (generally limiting vegetation disturbance to 20-25% of their parcel and maintaining the remainder portion in a natural condition) and providing connectivity for owl movement. However, this assistance is not always requested, nor has it always been followed. Overall, suitable CFPO habitat in this area continues to be lost, and movement corridors continue to be affected. Because of the continued loss of suitable habitat raising the overall disturbance level above the acceptable limits for the owl, it is the conservative approach to develop those projects with a federal nexus at the lower end of the tolerable disturbance range.

Within the action area, the Town of Marana experienced 467% growth and Oro Valley 310% growth from 1990-1999; the Arizona State Department of Economic Security stated that Marana is one of the two fastest growing communities in Arizona (The Arizona Daily Star 2000b). Housing starts in the area have continued to increase with Marana issuing over 1,000 permits for the first time in 1999 (The Arizona Daily Star 2000a). As increasingly more houses are built, commercial developments and capitol improvements all continue to affect the survival and recovery of the CFPO. Pima County's population has grown from 666,000 in 1990 to estimates of at least 850,000 in 2000 or a 30% increase. This annual growth rate has varied from 15,000 to 30,000 persons each year, consuming at the present urban density approximately 7-10 square miles of Sonoran Desert each year (Pima County 2001). Also see Status section above for additional threats to the CFPO that have occurred since listing.

In addition, there have been several projects that have occurred, or are on-going at this time that have not undergone formal section 7 consultation with a federal agency. In December 1999, approximately 40 acres were graded for the Amphitheater High School site in northwestern Tucson. We did not receive a request for consultation on this activity prior to

grading. Since that time, there have been four other federally permitted projects[7] that we are aware of within the project area that have resulted in (or are currently causing) the destruction of approximately 550 acres of suitable habitat without undergoing section 7 consultation. This has further reduced the amount and availability of suitable habitat and movement corridors within the action area.

We have completed livestock grazing consultations with the USDA Forest Service and Bureau of Land Management (BLM) in southern and central Arizona that addressed adverse impacts to CFPOs. These projects have adversely affected suitable habitat from continued livestock grazing and associated gathering activities. Also, within the project area, we have completed several other consultations with the EPA and COE: In September 1999 we completed an informal consultation with the EPA for approximately 90 acres (parcels, 4a, 4b, 5 and 6) of Heritage Highlands, a 587-acre master-planned community, approximately 3 miles to the northwest of this parcel. In July 2000, we completed a consultation with the EPA for a 20-acre residential development (Countryside Vistas Blocks 5 and 6) approximately 3 miles to the southwest. In October 2000, we completed a consultation with the EPA for a 5,924-acre residential and commercial development (Dove Mountain) approximately 4 miles to the northwest. In December 2000, we completed a consultation with the EPA for a 29-acre residential development (Tecolote de Oro) immediately adjacent to the south. In July 2001, we completed a consultation on the 7-acre Crescent Ridge Apartments, approximately 1 ½ miles to the west. In December 2001, we completed two consultations with the EPA: a 7.86-acre project for Mountain View High School approximately 1 ½ miles to the southwest, and on a 141-acre residential development Hartman Vistas, approximately 3 ½ miles southwest. In February 2002, we completed a consultation with the EPA on improvements to Thornydale Road which will remove 9 acres of suitable habitat approximately 2 miles to the southwest. In March 2002, we completed consultation with the EPA on a 100-acre residential development, Butterfly Mountain approximately 3 miles to the northwest.

We have also completed consultations on several smaller projects including a utility substation, water recharge facility, recreation facility, and 5-year hiking trail work plan. For each of these projects, suitable CFPO habitat will be removed; however, they all incorporated conservation measures that are consistent with the best scientific and commercial information available and with draft recommendations of the CFPO Recovery Team. These measures maintain connectivity and movement corridors through the affected areas, and provide suitable habitat at levels consistent with those where successful breeding owls have occurred elsewhere within the action area (e.g., maintaining a 20-25% vegetation disturbance level [see discussion below for this analysis]). All of these consultations resulted in no jeopardy and no adverse modification of critical habitat (which was designated at that time) determinations by the Service.

[7] Section 402 and/or 404 permits under the CWA issued by the EPA and COE, respectively.

In December 1998, an ESA section 10(a)(1)(B) permit for the CFPO was issued by the Service for a guest ranch (Lazy K Bar) which may eventually be converted to low density residential housing in northwestern Tucson. This project contained conservation measures to minimize adverse effects that were based on the best available information at that time. Although breeding, sheltering, and foraging were adversely affected, their functions and movement of CFPOs through this area were maintained.

Several thousand acres of State Trust land are located in large continuous blocks to the west and north of the project parcel. This land contains suitable CFPO habitat. Surveys in this area have not been comprehensive, but there is documentation of dispersing juveniles moving through the area. Nests have not been documented in this area, but this may be due to the low level of survey efforts to date. At present, this land is not developed. Presently, State Trust lands are being leased for grazing. Other activities (e.g., recreational off-road vehicle [ORV] use, shooting/target practice, hunting, etc.) also occur on these lands.

CFPOs were first documented in the action area around 1872 (see Status and Distribution section above) and were historically widespread. Collections of CFPOs were fairly regular in this region compared to elsewhere in the state until 1918 (Johnson et al. in prep.). Only one CFPO observation was recorded between 1918 and the 1970's (Hunter 1988, Johnson et al. in prep.). Several sightings of CFPOs were documented during the 1970's in the Tucson Basin; however, systematic surveys did not take place until 1993 by AGFD. Survey efforts in this area have dramatically increased since listing, particularly in the last 4 years (U.S. Fish and Wildlife Service unpubl. data). In addition, AGFD initiated radio telemetry research in the action area in 1998, which has provided valuable information on habitat use and movement patterns of adult and juvenile CFPOs.

The action area supports one of the highest known concentrations of breeding CFPOs in the state. We currently know of a small population (8 adults in 2001) of CFPOs in the action area (northwestern Tucson and southern Pinal County). However, the information regarding owl use in the action area, and particularly the vicinity of the project parcel, represents only limited data, collected primarily over the past few years. For example, telemetry equipment, which provides detailed information on use patterns and areas, was not utilized until 1998, and its use has been limited by the small number of birds transmittered and available resources (i.e., limited personnel for intensive monitoring and equipment). In addition, battery life on radio transmitters is only 90 days because of the small size that must be used on these small owls, which further limits the amount of telemetry data that can be collected.

Current information suggests that CFPOs can live and breed successfully in areas which have undergone at least some degree of low-density human development; however, they do not appear to be able to tolerate all types of development, particularly high-density development. Since widespread surveys began in Arizona in 1999, more owl sites have been documented in areas with little or no human activity or development. For example, in 2001, of the 29 known CFPO sites in the state, 24 sites (83%) were in undeveloped areas with very little human activity, compared to only 5 sites (17%) that were in areas with some level of low-density

development (S. Richardson, Arizona Game and Fish Department unpubl. data, U.S. Fish and Wildlife Service unpubl. data). No CFPOs have been documented in high-density commercial or residential developments. Of the known nest sites in 2001, 14 (82%) of the 17 nest sites were in undeveloped areas with little or no ground disturbance or human activity.

To determine the level of vegetation disturbance nesting CFPOs may be able to tolerate, a group of CFPO experts on the Recovery Team completed an analysis of all known 2001 and earlier nest site home ranges (n=9) occurring in developed areas in northwestern Tucson that successfully produced offspring. They calculated the amount of vegetation disturbance (e.g., roads, buildings, horse corals, pastures, parking lots, golf courses, etc.) within the estimated home range (280 acres) at each nest site. They calculated their average percent disturbance to be 23% (also the median). However, over one-half (5 of the 9 home ranges [55%]) had levels below that average, and two-thirds (6 of the 9 sites [66%]) were at or below the 25% disturbance range. This, when added to the total number of nesting CFPO breeding sites in the state as indicated above, indicates the selection preference of CFPOs to areas with very little or no human development. In addition, because the majority of surveys are conducted in areas already with some level of development as a result of a proposed project, these areas are sampled in higher proportion to areas with no current or planned development, potentially under sampling areas without development.

It should be noted that one of the nest sites with one of the highest amounts of vegetation disturbance (33%) is that of a long established pair that was documented from 1997 through 1999. Development in the general vicinity of this site continued during this time. As noted above, the male of this pair was found dead in 1999. Surveys in 2000 and 2001 did not locate any CFPOs at this site, therefore it remains inactive. Site tenacity in the short-term may have been a factor in this pair's ability to withstand this higher level of vegetation disturbance compared to other sites in Arizona; however, the long-term effect of this amount of disturbance is unknown. There were three new nest sites[8] in 2001 with disturbance levels of 21%, 30%, and 34% (S. Richardson, Arizona Game and Fish Department, unpubl. data). Each of these territories successfully produced fledglings that dispersed to other areas in 2001. This was the first year these sites were reproductively successful and it is unknown whether they will be able to continue to remain in these territories in subsequent years. Preliminary surveys of these territories in 2002, indicate the loss of 2 females and one male from each of the sites. The remaining female from the territory with 34% disturbance has apparently paired with the male from an adjacent territory. As indicated above, two of these new nest sites, together with the other nest site that has been inactive since 1999 are at the extreme range of the amount of development occurring within all other CFPO nesting territories in Arizona (greater than 30% disturbance).

[8] Two were resident male CFPOs establishing territories in the fall of 1999, remaining at their respective sites until paired with females in the spring of 2001.

Although there have been some nesting territories in the upper range of disturbance, other factors also play an import role in developing a recovery strategy for this species. For example, these data represent a very limited sample size for breeding sites within developed areas (n=9); little is understood regarding the long-term effects of increasing levels of development occurring within nest sites in higher developed areas and how this will affect their suitability for breeding and movement in the future; and the potential cumulative effects that increasing levels of development have on owls in this region are not fully understood. The long-term productivity and success of breeding sites in these higher disturbed areas is unknown. In 2001, all of the nest sites were in new areas, resulting in a relatively large proportion (67%) of sites where nesting had occurred in the past but that were inactive in 2001 (S. Richardson, Arizona Game and Fish Department unpubl. data). More research and monitoring is needed to better understand habitat needs and the long-term relationship between development and CFPO requirements.

There also appears to be a difference in the tolerance to the amount of vegetation disturbance (i.e., development) between nesting and non-breeding CFPOs. Single owls may be able to tolerate higher levels of development and more marginal habitats, while breeding owls may need less disturbed vegetation within their home ranges. An analysis of all known CFPO sites in northwestern Tucson resulted in a considerably lower amount of vegetation disturbance at nest sites compared to non-breeding sites (e.g., unpaired males) (S. Richardson, Arizona Game and Fish Department unpubl. data). As stated above, the average amount of vegetation disturbance within the home range of 1998-2001 nesting sites in developed areas was 23%. The amount of vegetation disturbance within the home range of non-breeding sites in developed areas was considerably higher, averaging 37% during the same period. Although these overall results are based on a small sample size, they represent the best available information and indicate that nesting CFPOs may require less disturbed areas than unpaired owls. For example, a juvenile male CFPO established a new territory in the fall of 2000, which is surrounded on three sides by densely developed residential and commercial properties. This male has remained there throughout the 2000 and 2001 breeding seasons and failed to pair with a female owl, even after vigorous calling throughout the spring and summer months both years. In September 2001, a juvenile female CFPO dispersed from its nest and paired with this resident male. They remained together for approximately 2 weeks until the female was found dead, apparently as a result of cat predation. At this time, the male remains unpaired. Within this territory the habitat is highly fragmented, containing the highest degree of development (approximately 50%) of any other known CFPO territory (S. Richardson, Arizona Game and Fish Department unpubl. data.). It is unclear whether the amount of development and vegetation disturbance is too high for successful breeding. The Service and AGFD will continue to monitor this owl, using radio telemetry and direct observations.

Differences in the tolerance of vegetation disturbance between breeding and non-breeding owls are important because nesting owls are necessary for recruitment of young owls and demographic support to achieve recovery of the CFPO in Arizona. Although also important to the population from a demographic standpoint, non-breeding males do not directly contribute to the increase of the population by producing young. Therefore, the Service and Recovery

Team believe that because successful breeding sites are necessary to produce offspring for the survival and eventual recovery of the CFPO Arizona population, vegetation disturbance levels found at breeding sites should be used as guidelines rather than those in non-breeding territories. These guidelines are particularly important within specific areas of the state recommended by the CFPO experts on the Recovery Team as Special Management Areas (SMAs).

Recovery of the CFPO will require not only protection of all known sites, but also the conservation of other areas not currently known to have nesting owls, which can be measured at two spatial scales. At a large scale, connectivity is necessary among large blocks of suitable habitat that are either currently known to be occupied by owls or are important for recovery. An example is habitat connecting the Tucson Mountains west of Interstate10 to the high concentration of owls in northwest Tucson. At a finer scale, the protection of habitat within the vicinity of known owl sites for establishment of new sites and movement between them is also essential. For example, the area located south of the 136000 N street alignment in northwest Tucson, which recently contained the highest number and density of breeding CFPOs known in Arizona also contains areas not currently known to have nesting owls and is particularly important for the expansion of the population. Based on the analysis by CFPO experts on the Recovery Team, the best available science indicates the maximum amount of ground disturbance CFPOs are able tolerate is 20 - 25% (average of 23%), combined with other conservation measures that provide connectivity for movement, etc. This level of disturbance is within the range of where most owls in northwest Tucson were found and best describes their tolerance for ground disturbance based on current data.

Surveys in 1996 found 16 CFPOs in the action area, including one pair and two fledged young. In 1997, surveys located 9 CFPOs, including one pair and four fledged young. In 1998, researchers found 3 nests where 11 juveniles were successfully raised in this area alone, which is at least twice the number of young documented in any prior year. In 1999, 11 sites and 6 nesting pairs of CFPOs were documented in the action area (S. Richardson, Arizona Game and Fish Department unpubl. data). In 2000, three nests were confirmed (S. Richardson, Arizona Game and Fish Department, unpubl. data). In 2001, nesting was documented at 3 nests with 9 young known to have fledged. Surveys for the 2002 breeding season are on-going.

There are 3 nesting territories within ½ mile of the project site, and within a 5-mile radius, there are 14 different CFPO sites that have been documented by AGFD since 1996 (S. Richardson, Arizona Game and Fish Department, unpubl. data, U.S. Fish and Wildlife Service, unpubl. data).

Transmittered pygmy-owls were documented using the project site and adjacent areas in 1998, 1999, and 2001 (S. Richardson, Arizona Game and Fish Department, unpubl. data). A pygmy-owl was detected by the project's consultants during surveys of the Chaparral Heights property on February 5, 2002. It is assumed this owl was a female from a territory adjacent to this parcel.

The Chaparral Heights parcel is surrounded by large expanses of undeveloped land and a mix of low and high-density residential developments. It is bounded on the north by Lambert Lane and the east by La Cholla Boulevard. Improvements to these roads are not planned in association with this project. It is currently zoned by Pima County as CR-1 (one residence per acre.) The areas immediately to the north and east are zoned SR (one residence per 3.3 acres) and are undeveloped. The area to the west is zoned CR-1 and contains some existing development. The area to the southwest is developed at CR-4 zoning (four homes per acre). The area to the south is zoned CR-1 and is currently undeveloped.

IV. EFFECTS OF THE ACTION

The proposed action will occur in one of the areas of greatest concern to the Service (between Cortaro Farms Road to the south and the 13600 N street alignment to the north, east of Interstate 10 and west of La Cholla Boulevard), because it contains not only a very high concentration of owls, but also nesting owls. In addition, we have documented usage of this parcel for dispersal, sheltering and foraging by pygmy-owls on four occasions between 1998 and 2001. The action area contains a considerable amount of residential and commercial development. Survival and recovery of the CFPO will be dependent on the availability of suitable habitat in this area for offspring to be able to successfully disperse and establish new territories.

The proposed action will result in the permanent loss of approximately 39.44 acres of Sonoran desertscrub and xeroriparian vegetation which provides habitat for CFPO for sheltering, feeding, movement/dispersal, and nesting. The proposed action will cause short-term noise disturbance and human activity associated with construction and long-term noise disturbance and human activity from use of the residential development.

Residential development proposed for the western half of the Chaparral Heights property is distinctly different from the eastern half. The lot sizes on the western half of the parcel range from 1 to 3.2 acres and average 1.3 acres. The net surface disturbance in this portion of the parcel is 31.2 percent. The eastern half of the project is entirely composed of large lots ranging from 1.6 to 6.9 acres in size, and the average lot size is 3.1 acres. Net surface disturbance in this parcel including the existing paved roadway and potential commercial development of lot 57 is approximately 19.1 percent.

Construction of lots 2 - 46 (lots 1 and 26 will not be developed to benefit pygmy-owl dispersal) on the western half of the property may result in additional losses of up to 47.6 acres of suitable habitat because pygmy-owls are not known to utilize areas for nesting at development densities proposed on this portion of the parcel. Combining the net surface disturbance of the development footprint on the eastern half (29.1 acres) and the overall development on the western half (47.6 acres) results in the permanent loss of up to 76.7 acres of suitable habitat.

Approximately 117.26 acres of the project will be placed into a conservation easement; 68.81 acres initially and the remaining 48.45 acres on a lot-by-lot basis. Existing and planned development activities will result in 39.44 acres of surface disturbance, including 4.25 acres of disturbance in areas that will be included in the conservation easement. Approximately 3.11 acres of disturbed and degraded habitat withing the conservation easements will be restored, resulting in a net surface disturbance for the project of 36.33 acres (23.82 percent) (Table 2). This net surface disturbance value does not include any value for restoration of the 1.64 acres of area temporarily impacted by more recent development activities. The Service, using information from the CFPO experts of the Recovery Team, recommends that disturbance be within 20-25% disturbance range in Northwest Tucson. The proposed action is withing the range of the best scientific information available, for the level of disturbance owls may tolerate.

CFPOs require habitat linkages, within and among territories for movement and dispersal, consisting of continuous cover or patches of trees and large shrubs spaced at regular intervals, to provide concealment and protection from predators and mobbing, as well as shade and cover to moderate temperature extremes (S. Richardson, Arizona Game and Fish Department unpubl data, Abbate et al. 1999). The project proponents will place conservation easements on portions of the property that include the areas used by pygmy-owls in the past to retain dispersal corridors and provide for suitable habitat in the future. Conservation easements will be recorded in two phases. In Phase 1, three areas, totaling 68.81 acres, will be designated to preserve documented and potential dispersal corridors for the pygmy-owl. These areas are all within platted lots in the project. The Conservation Easement will be recorded to the benefit of the HOA. The 4.24-acre Conservation Easement along the western border and the 45.41-acre Conservation Easement along La Cholla Wash include areas in which pygmy-owls movements have been documented by AGFD. It is expected that the Conservation Easement placed along the western edge of the property will maintain the integrity of the dispersal corridor used by pygmy-owls in the past. The 19.16-acre area initially placed into the Conservation Easement on the eastern side of the property contains suitable dispersal vegetation and structure and will also be conserved as a potential movement corridor. No development activities, except for the utility construction activities and associated repair and maintenance activities described in section 3.1.1 of the BA will occur within these Conservation Easements. Phase 2 of the Conservation Easements will be recorded on the undeveloped portions of each lot (i.e., outside the building envelope) resulting in an additional 48.45 acres conserved on-site.

As described in the Conservation Elements section in the Project Description of this document, these lands will be monitored and managed under CC&R's by the HOA with reporting requirements to the Service to ensure these protective measures are met. Development on this currently undisturbed parcel will fragment a block of suitable habitat increasing potential for human-related mortality of CFPOs. Adjacent areas are currently open space and a mix of high and low-density residential areas. Due to the conservation of the remaining undeveloped lands on this parcel, and to the management that will occur, the

Service finds this development consistent with the recommendations provided by the CFPO experts of the Recovery Team.

The Conservation Elements outline acceptable uses within the conservation areas and measures that will be taken to minimize adverse effects to the CFPO that are consistent with the management of the CFPO. Activities that will be prohibited from all conservation areas are: use of any motorized vehicles (i.e. off-road vehicles [ORVs]), use of herbicides and insecticides, use of artificial lights, organized events that consist of more than 10 people, any type of vegetation salvage or activities that result in the removal or disturbance of natural vegetation, equestrian gathering, and use of fires or other outdoor cooking equipment. Permitted uses include foot traffic (hiking), walking of leashed dogs or pets, and equestrian use of groups less than 10 per party. In addition, because the use of fires will be prohibited in conservation areas, the risk of the loss of habitat from wildfire will be minimized. Due to their proximity to residential areas, the use of firearms is not expected to be permitted within conservation areas, thereby avoiding adverse effects to owls as well. These measures will minimize adverse effects to CFPOs, and will ensure the areas on the eastern portion of the property will continue to provide breeding, sheltering, foraging, and movement habitat for CFPOs along the western, central and eastern portions of the property.

Approximately 3.11 acres of habitat along the existing Pima County sewer ROW and within portions of lot 51 will be restored as xeroriparian or upland habitat. The areas being restored were disturbed prior to the acquisition of the property by Mira Loma and do not currently contain habitat suitable for CFPO. The restoration of these areas will enhance the overall habitat value of the parcel and mitigate for some of the permanent habitat loss associated with project development.

CFPOs, particularly juveniles, are susceptible to predation, weather extremes, human-related injury/mortality factors (e.g., cars, buildings, fences, domestic cats, etc.) and other mortality factors (mortality of juveniles is typically 50 percent or more for raptors). Therefore, it is essential to maintain habitat conditions that reduce their exposure to these threats and provide protection as they disperse from their natal areas. A high degree of cover throughout the landscape increases the likelihood of survivorship to the next breeding season. Limiting these mortality factors is critical, especially for small, depressed populations, such as CFPOs in Arizona. Conservation areas within this parcel will be established, and based on current information, will be of sufficient size and configuration to support breeding activities on the eastern portion of the parcel. It is unknown at this time as to what will occur on adjacent parcels, but if land uses are not compatible with CFPO conservation, dispersing juvenile owls will need to move greater distances from their natal areas to establish new territories, increasing their exposure to threats beyond what would otherwise occur if the parcel is not developed.

Casualties caused by pest control, pollution, collisions with cars, radio towers, glass windows, power lines, and domestic cat predation are often underestimated, although likely increasing in occurrence due to human population growth (Banks 1979, Klem 1979, Churcher and Lawton

1987). Even where human-related deaths are uncommon, they may still substantially affect populations of rare birds (Cartron et al. 2000a). Because of the proximity of CFPO sites to residential areas, these interactions may be a significant cause of owl mortality (Cartron et al. 2000a). Scott Richardson (Arizona Game and Fish Department unpubl. data) has documented two separate instances where a CFPO has been severely injured or died as a direct result of a collision with a window or fence. The facilities, structures, and increased human activities resulting from the proposed project will increase the likelihood of CFPO mortality. In addition, the use of pesticides will likely increase within the proposed residential areas, indirectly affecting owls by reducing the availability of their prey base and potentially injuring or killing them from exposure. Use of pesticides will not occur within the conservation area to preserve its value to owls, and neither chainlink nor woven-wire fencing will be used within the project boundaries.

Predation by domestic cats has been now documented in both Arizona and Texas (Cartron et al. 2000a, S. Richardson, Arizona Game and Fish Department, unpubl. data). As is expected with residential developments, the number of cats will likely substantially increase, resulting in increased possibility of predation of CFPOs and a reduction in the abundance of CFPO prey species (e.g., lizards, birds) in this area, resulting in additional adverse impacts to CFPOs. The CC&R's will educate homeowners about the allowable activities within the conservation areas, and those that are restricted. However, even with these measures, unattended cats and dogs may still enter these areas and may adversely affect owls and their prey base.

With respect to CFPOs and noise disturbance at the project site, activity levels will substantially increase with construction activities and the resulting residential and commercial developments. It is expected that owls will avoid use of the high-density residential and commercial developed areas, and it is expected that owl use will be restricted to the conservation and low-density residential areas where natural vegetation is retained and has not been disturbed. Studies have suggested that human activities within breeding and nesting territories could affect raptors by changing home range movements (Anderson et al. 1990) and causing nest abandonment (Postovit and Postovit 1987, Porter et al. 1973). The construction of the residential development will be a relatively short-term event, with a foreseeable end in noise disturbance activities. However, noise disturbance, increased vehicle traffic, and human activity within developed and conservation areas after development is a permanent effect. Increased noise levels may significantly disrupt normal behavioral patterns including breeding, feeding, and sheltering. CFPOs may be tolerant, to some extent, of certain low-level noise disturbances associated with a few scattered residences and light traffic. These disturbances include daily activities in residential areas such as people walking, voices, children playing, horses and other livestock, dogs, low to moderate vehicle and large truck traffic, and some occasional construction equipment activity.

If a new CFPO site is established prior to or after a construction phase has been initiated on the project parcels, the applicant will take adequate conservation measures as defined in the development constraints above to ensure noise disturbances will not cause the CFPOs to

abandon their nest or activity center. In addition, a sufficient amount and configuration of suitable habitat will be present within their territory for it to remain viable for CFPOs.

Summary

Survival and recovery of the CFPO will require not only protection of all known sites, but also the conservation of other areas not currently known to have nesting owls, which can be measured at two spacial scales. At a large scale, connectivity is necessary among large blocks of suitable habitat that are either currently known to have nesting owls or are important for recovery. The project site provides important corridors for habitat within Northwest Tucson.

At a finer scale, the protection of habitat within the vicinity of known owl sites for establishment of new sites and movement between them is also essential. Connectivity between breeding and non-breeding owls and areas where juvenile owls can establish new nesting territories or replace owls as they die are essential for the conservation of the CFPO. Based on the current data, this project will maintain existing movement corridors for CFPOs.

The project will remove approximately 39.44 acres of suitable habitat that provides for CFPO nesting, sheltering, foraging, and dispersal. Additional suitable habitat will likely be lost in the areas developed at higher densities along the western edge of the parcel. To minimize these adverse effects, approximately 117.26 acres will be managed on-site, in perpetuity for the conservation of the CFPO. Activities that are not conducive to the conservation of the CFPO (e.g., ORV use, application of herbicides and insecticides, disturbance of vegetation, large groups of people, etc.) will not take place in these conservation areas. These lands have the potential to directly benefit CFPOs by providing nesting, foraging, sheltering, and dispersal habitat. We believe this approach to be consistent with the best available science and the intent of preliminary recommendations made by the Recovery Team and Service for conservation of Arizona CFPO population.

The conservation measures will be administered by the HOA through the CC&R's with reporting requirements to the Service to ensure the protective measures are met.

V. CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The action area is subject to ongoing residential and commercial development, capitol improvements, and state, local, and private actions are expected to continue development in the immediate vicinity of the project site and elsewhere in the action area. Any activity clearing five acres or more requires a NPDES section 402 permit under the CWA from the EPA, and activities occurring within jurisdictional waters and wetlands of the U.S. require a

section 404 permit under the CWA from the COE. As a result, a substantial number of these anticipated projects will be subject to future section 7 consultations and are not considered cumulative effects. However, we are aware of at least 5 other projects greater than 5 acres in size within the project area that have initiated or completed grading of suitable habitat either without filing for a section 402 or 404 permit, or they have submitted a notice of intent (NOI) for a 402 permit with the EPA but not undergone section 7 consultation with the Service. Many individual undeveloped parcels will not require a federal permit or other federal nexus and will continue to be built, and not subject to future consultation. For example, we have become aware of an estimated 500 private actions without a federal nexus[9] (e.g., single family residences, churches, fire stations, etc) that have taken place within northwestern Tucson over the past 12 months. This is particularly important in the action area due to the large number of undeveloped small parcels zoned as SR and low-density residential areas that, when developed, will further reduce the amount of suitable habitat, increase fragmentation, and degrade habitat conditions.

We are aware of many planned residential and commercial developments, schools, churches, etc. in the action area that may further reduce and fragment CFPO habitat in this area. As stated above (Species Distribution section), this area supports one of the highest known concentrations of CFPOs in the state (3 active nest sites in 2001). Additionally, this area is currently experiencing a rapid growth in new home sales. Since the listing of this distinct population segment in Arizona, housing construction has continued to increase in the Tucson area, and this trend is expected to continue into the foreseeable future. For example, in May 1999, new-home closings were a record 467 units, higher than in any other May within the past decade (The Arizona Daily Star 1999). In 1999, Tucson-area building permits were 10.9% more than in 1988, and topped 7,000 for the first time. Permits were highest in northwestern Tucson and, for the first time, Marana issued more than 1,000 permits, with a strong building trend expected to continue steady or increasing (The Arizona Daily Star 2000a). We have received, and continue to receive notification of numerous new housing subdivisions and commercial developments in this region as well. Many of these activities will require a Federal permit or authorization, and may enter into consultation with the Service in the future. However, as stated above, some projects are resulting in adverse effects to the CFPO and affecting the survival and recovery of the species but are not undergoing consultation. Therefore, these activities continue to reduce the amount of habitat and reduce possible movement corridors within the project area, further degrading the baseline condition. In addition, projects not having a Federal nexus (such as single family residences) are expected to continue in undeveloped areas within the project area until build-out, which will further affect the survival and recovery of the CFPO if not done in a manner that maintains a high proportion of conservation areas that is available for use by CFPOs.

[9] Such as a section 402 or 404 permit under the CWA, or some other Federal authorization or funding.

VI. CONCLUSION

After reviewing the current status of the CFPO, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the CFPO. There currently is no critical habitat for the CFPO, therefore none will be affected. These conclusions are based on the record of this consultation including the BA, Supplemental Report, project description, and the following:

1. The loss of approximately 39.44 acres of suitable habitat will be offset with the protection in perpetuity of approximately 117.26 acres of habitat managed for CFPO conservation purposes. In addition, 3.11 acres of previously disturbed areas within the project site will be restored using native vegetation. These lands will be managed in a manner that will protect suitable habitat for the CFPO and contribute to its conservation.

2. Management of the conservation areas within the parcel will be conducive to the CFPO by limiting in perpetuity, those activities that might adversely affect the owl.

3. CFPO habitat connectivity within the parcel and to adjacent suitable habitat areas will be maintained.

4. The parcel will continue to provide habitat suitable for breeding, sheltering, feeding, and dispersal for CFPOs along the eastern portion of the property, and feeding, sheltering and dispersal along the western portion of the property.

5. Conservation measures will be implemented to minimize noise and vegetation disturbance within the project parcels.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Amount or Extent of Take Anticipated

We do not anticipate the proposed action will incidentally take any CFPOs.

Disposition of Dead or Injured Listed Animals

Upon finding a dead or injured threatened or endangered animal, initial notification must be made to the Service's Division of Law Enforcement, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (602/261-6443) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animal species shall be submitted as soon as possible to the nearest Fish and Wildlife Service or AGFD office, educational, or research institutions (e.g., University of Arizona in Tucson) holding appropriate state and federal permits.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any treated listed animal survive, the Service should be contacted regarding the final disposition of the animal.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the ESA direct federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for the CFPO. In furtherance of the purposes of the ESA, we recommend implementing the following discretionary actions:

1. The EPA should conduct or fund studies using both monitoring and telemetry, to determine CFPO habitat use patterns and relationships between owls and the human interface in northwestern Tucson. Surveys involving simulated or recorded calls of CFPOs require an appropriate permit from the Service. AGFD should also be contacted in regard to state permitting requirements.

2. The applicant should distribute educational materials explaining the importance and rationale of the conservation areas and measures to the landowners. The Service will assist in the development of these materials.

3. The EPA should continue to actively participate in regional planning efforts, such as Pima County’s SDCP, and other conservation efforts for the CFPO.

4. The EPA should assist in the implementation of recovery tasks identified in the CFPO Recovery Plan when approved by the Service.

REINITIATION NOTICE

This concludes formal consultation for the Chaparral Heights Development Project in Pima County, Arizona. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) any incidental take not authorized herein occurs, (2) new information reveals effects of the agency action that may adversely affect listed species or critical habitat in a manner or to an extent not considered in this draft opinion, (3) the agency action is subsequently modified in a way that causes an effect to a listed species or critical habitat that was not considered in this draft opinion; or (4) a new species is listed or critical habitat designated that may be affected by this action. In instances where any incidental take not authorized herein occurs, any operations causing such take must cease pending reinitiation.

Effects to the CFPO that are outside of the parameters specified in the Conclusion Section of this opinion will require a case-by-case analysis to determine if reinitiation of consultation is necessary. If reinitiation is necessary, the Service shall expeditiously consult with the EPA to resolve any concerns related to the CFPO and to determine what, if any, measures are needed to minimize potential adverse effects to the CFPO.

We have assigned log number 2-21-99-F-131 to this consultation. Please refer to that number in future correspondence on this consultation. Any questions or comments should be directed to Kim Hartwig (520) 670-4637, or Sherry Barrett (520) 670-4617 of the Arizona Ecological Services Office.

Sincerely,

/s/ David L. Harlow
Field Supervisor

cc: ARD-Ecological Services, Fish and Wildlife Service, Albuquerque, NM (Attn: Cindy Schulz)

Jay Shapiro, Fennemore Craig, Phoenix, AZ
Westland Resources, (Attn: Jim Tress)
Director, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson AZ
Arizona Game and Fish Department, Tucson AZ (Attn: Scott Richardson)
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APPENDIX A - CONCURRENCE

We concur with the applicant's determination that the proposed action may affect, but is not likely to adversely affect the lesser long-nosed bat *(Leptonycteris curasoae yerbabuenae)*. The rationale for this concurrence is detailed in the following discussion.

STATUS OF THE SPECIES

The lesser long-nosed bat is one of four members of the tropical bat family *Phyllostomidae* which are found in the United States. It was formally separated from the Mexican long-nosed bat (*L. nivalis*) as a distinct species (*L. sanborni*) by Hoffmeister (1957). The lesser long-nosed bat is a medium size, leaf-nosed bat. It has a long muzzle, a long tongue, and is capable of hover flight. These features are adaptations that allow the bat to feed on nectar from the flowers of columnar cacti such as the saguaro and organ pipe cactus, and from paniculate agaves such as Palmer's agave *(Agave palmeri)* and Parry's agave *(A. parryi)*.

The lesser long-nosed bat is a medium-sized bat with a forearm measuring 51 to 56 mm (2.0-2.2 in) and weighing 20 to 25 grams (0.7-0.9 oz) as an adult. Adult fur is grayish to reddish-brown; juveniles have gray fur. Its elongated rostrum bears a small, triangular noseleaf, its ears are relatively small and simple in structure, and it has a minute tail. It is generally smaller in external and cranial measurements than *L. nivalis*. *L. curasoae* can be distinguished from the Mexican long-tongued bat *(Choeronycteris mexicana)*, with which it co-occurs in Arizona, by the larger size, less elongated snout, and tiny tail.

The lesser long-nosed bat is migratory and found throughout its historic range, from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador. In southern Arizona lesser long-nosed bat roosts have been found from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Chiricahua Mountains (Cochise County) and south to the international boundary. Individuals have also been observed from the vicinity of the Pinaleno Mountains (Graham County) and as far north as the McDowell Mountains (Maricopa County) (AGFD 1999). This bat is also known from far southwestern New Mexico in the Animas and Peloncillo Mountains (Hidalgo County). It is a seasonal resident in Arizona, usually arriving in early April and leaving in mid-September to early October. It resides in New Mexico only from mid-July to early September (Hoyt et al. 1994).

Roosts in Arizona are occupied from late April to October (Cockrum and Petryszyn 1991, Sidner 1997). In spring, adult females, most of which are pregnant, arrive in Arizona and gather into maternity colonies in southwestern Arizona. These roosts are typically at low elevations near concentrations of flowering columnar cacti. Litter size is one. After the young are weaned these colonies disband in July and August; some females and young move to higher elevations, ranging up to more than 1,818 m (6,000 ft), primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves. Actual dates of these

seasonal movements by lesser long-nosed bats are rather variable from one year to the next (Cockrum and Petryszyn 1991, Fleming et al. 1993). Adult males typically occupy separate roosts forming bachelor colonies. Males are known mostly from the Chiricahua Mountains but also occur with adult females and young of the year at maternity sites (USFWS 1997b). Throughout the night between foraging bouts both sexes will rest in temporary night roosts.

The lesser long-nosed bat consumes nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by a variety of columnar cacti. In Arizona, four species of agave and two cacti are the main food plants (Wilson 1985). The agaves include Palmer's agave, Parry's agave, desert agave (*A. deserti*), and *amole (A. schotti).* Amole is considered to be an incidental food source. The cacti include saguaro and organ pipe cactus. Nectar of these cacti and agaves are high energy foods. Concentrations of food resources appear to be patchily distributed on the landscape and the nectar of each plant species utilized is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available through the summer, primarily from July through early October, though Parry's agave blooms earlier. Columnar cacti occur in lower elevation areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desertscrub areas, desert grasslands and shrublands, and into the mountains. Parry's agave is usually found at higher elevations than Palmer's agave (Gentry 1982). The bats are generally considered to time their movement and feeding to the progression of flowering associated with these cacti and agaves. Many species of columnar cacti and agaves appear to provide a "nectar corridor" for lesser long-nosed bats as they migrate in spring from Central America and Mexico to as far north as southern Arizona, through fall when they return south (Gentry 1982, Flemming et al. 1993, Slauson et al. 1998).

Lesser long-nosed bats appear to be opportunistic foragers and efficient fliers, capable of flight speeds up to 23 km per hour (14 mph) (Sahley et al. 1993), and often foraging in flocks. Seasonally available food resources may account for the seasonal movement patterns of the bat. The lesser long-nosed bat is known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 24 km (15 mi), and in Mexico at 40 km (25 mi) and 61 km (38 mi) (one way) (Dalton et al. 1994, V. Dalton, pers. comm., Y. Petryszyn, University of Arizona, pers. comm.). A substantial portion of the lesser long-nosed bats at the Pinacate Cave in Sonora (a maternity colony) fly 40 to 50 km (25-31 mi) each night to foraging areas in OPCNM (USFWS 1997b). Horner et al. (1990) found that lesser long-nosed bats commuted 48 to 58 km (30-36 mi) round trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 80 to 100 km (50-62.5 mi) each night. Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest potential roost site (Petryszyn, pers. comm.).

Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (USFWS 1997b). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever the

factors are that determine selection of roost locations, the species seems sensitive to human disturbance. Instances are known where a single brief visit to an occupied roost is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their day roost and move to another. Perhaps most disturbed bats return to their preferred roost in a few days. However, this sensitivity suggests that the presence of alternate roost sites may be critical when disturbance occurs. Interspecific interactions with other bat species may also influence lesser long-nosed bat roost requirements.

Food requirements of the lesser long-nosed bat are very specific. Adequate numbers of flowers or fruits are required within foraging range of day roosts and along migration routes to support large numbers of this bat. Locations of good feeding sites play an important role in determining availability of potential roosting sites, and roost/food requirements must be considered jointly when discussing the habitat requirements of this bat. A suitable day roost is probably the most important habitat requirement, but potentially suitable roosts must be within reasonable foraging distances of sufficient amounts of required foods before this bat will use them. It seems evident that the lesser long-nosed bat forages over wide areas and that large roosts require extensive stands of cacti or agaves for food. Therefore, destruction of food plants many kilometers from a roost could have a negative impact on this bat (USFWS 1997b).

The lesser long-nosed bat recovery plan (USFWS 1997b) identifies the need to protect foraging areas and food plants. Columnar cacti and agaves provide critical food resources for this bat. Populations of these plants need continued protection to sustain nectar-feeding bat populations. A critical need in this area is information about the size of the foraging areas around roosts so that adequate areas can be protected. This information will show the minimum area needed to support a roost of nectar- and fruit-eating bats, provided the roost locations are known.

Known major roost sites include 16 large roosts in Arizona and Mexico (USFWS 1997b). According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. According to the same surveys, the maternity roosts are occupied by a total of more than 150,000 lesser long-nosed bats. The numbers above indicate that, although many of these bats are known to exist, the relative number of known large roosts is small. Disturbance of these roosts and the food plants associated with them could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species.

ENVIRONMENTAL BASELINE

Current and past environmental conditions in the project area are summarized in the environmental baselines for the CFPO. They are included here by reference.

Leptonycteris bats require suitable forage plants (paniculate agaves and columnar cacti) and suitable roost sites. Mines and caves occurring in southern and central Arizona provide suitable sites for post-maternity roosts of the lesser long-nosed bat. Potential foraging habitat (saguaros) for the lesser long-nosed bat occurs in the project site and vicinity. Agaves are found in varying densities and age classes within residential areas. They are found within the broad vegetation community classification of desertscrub, desert grassland, interior chaparral, oak woodland, pinyon-juniper woodland, pine-oak woodland, and mixed conifer in areas of the Coronado National Forest (Forest) and other areas in the region. The primary agave used by the bat is Palmer's agave, which, as estimated by the Forest, is widely scattered over 390,000 ha (1,000,000 ac) at densities less than 3 to over 40 individuals per ha (10-200 per ac), generally between the elevations of 909 and 1,818 m (3,000-6,000 ft). Parry's agave is found between 1,545 and 2,485 m (5,000-8,200 ft), and begins blooming in mid-spring.

Considerable evidence exists suggesting a dependence of *Leptonycteris* on certain agaves and cacti, although some Palmer's agave has been shown not to be dependent on *Leptonycteris* for pollination (Slauson 1996 and 1999, Slauson and Dalton 1998). Activities that adversely affect the density and productivity of columnar cacti and paniculate agaves may adversely affect populations of lesser long-nosed bats (Abouhalder 1992, USFWS 1997b). Excess harvest of agaves in Mexico, collection of cacti in the United States, and conversion of habitat due to urban expansion, agricultural uses, livestock grazing, and other development may contribute to the decline of long-nosed bat populations (USFWS 1988a).

Status of the Species in the Project Area

No documented lesser long-nosed bat maternity colonies are known from the project site; however, there is a roost in the Picacho Mountains, approximately 30 miles to the northwest and a suspected maternity colony on Saguaro National Park in the Rincon Mountains, approximately 61 km (38 mi) to the southeast (USFWS 1997b). Numbers of bats at this site have fluctuated widely from year to year, from several hundred to zero. Several post-maternity roosts which house from many thousands to only a few individual bats are also known from various locations in the region, the nearest being about 40 km (25 mi) to the northeast of the project site (AGFD 1999). These roosts are generally occupied from July through September, though the bats have been recorded in southeast Arizona in April (Petryszyn, pers. comm.) and they may remain into October (Sidner 1997). Based on distances lesser long-nosed bats have been known to travel from roost sites to foraging areas, potential foraging habitat may extend in a 64 km (40 mi) radius from roosts. From the known roosts in southeastern Arizona, the project site lies within potential foraging range of the lesser long-nosed bat.

EFFECTS OF THE ACTION

The severity of adverse effects to *Leptonycteris* bats resulting from the potential reduction in forage resources is dependent on the importance of forage plants in a specific area to reproduction, survival, and growth of the bat.

Indirect effects from residential developments in the action area on *Leptonycteris* bats may occur through adverse effects to forage plants, primarily paniculate agaves and saguaros. Both direct and indirect impacts, resulting from continued urban development, may occur to forage plants, particularly saguaros. Saguaros occurring on the project site will be preserved in place when possible. When preservation is not possible, saguaros will be salvaged in accordance with Pima County's Native Plant Preservation Ordinance.

The primary food source for the lesser long-nosed bat in southeastern Arizona from mid-summer through fall is Palmer's agave, which does not occur on the parcel, therefore it will not be affected by this action. Documented bat use in the action area consists of few, mostly old records. However, there is a roost in the Picacho Mountains, to the northwest and a suspected maternity colony on the neighboring Saguaro National Park in the Rincon Mountains.

CONCLUSION

Leptonycteris bats are opportunistic foragers and are capable of long distance flights and potentially could forage in the project site. However, because of the distance from known forage, roost, and maternity sites, the limited amount of disturbance proposed on the parcel, and the low number of potential forage species on the project site, we concur with the effect determination that this action, as proposed, may affect, but is not likely to adversely affect the lesser long-nosed bat. Critical habitat has not been designated for the bat; therefore, none will be affected. We base this finding on the following:

1. Potential direct adverse effects to the species are expected to be discountable (i.e., extremely unlikely to occur).

2. Indirect adverse effects are considered insignificant (i.e., small size, extent of the impacts).

3. Saguaros that cannot be preserved in place will be salvaged according to Pima County's Native Plant Preservation Plan which will maintain them on-site.