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In Reply Refer To:
AESO/SE
02-21-04-F-0105

February 11, 2005

Ms. Cindy Lester P.E.
Chief, Arizona Section
Regulatory Branch
U.S. Army Corps of Engineers
Arizona-Nevada Area Office
3636 North Central Avenue Suite 900
Phoenix, Arizona 85012-1939

File Number: 2002-01569-RJD

Dear Ms. Lester:

This letter is in response to your January 15, 2004, request for our review of the effects of the Tangerine Hills Residential Development Project in the Town of Marana, Pima County, Arizona (southwest ¼ of the northwest ¼ of Section 1, Township 12 South, Range 12 East, Gila and Salt River Baseline and Meridian) under section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act). We received your letter on January 16, 2004.

This biological and conference opinion (collectively BO) will address the potential effects of the proposed action on the pygmy-owl and its proposed critical habitat and is based on: (1) information provided in the December 2002 WestLand Resources, Inc. (WestLand, applicant's consultant) *Biological Assessment - Tangerine Hills* (Initial BA), prepared for Region IX of the U.S. Environmental Protection Agency (EPA) on behalf of C&C Construction (applicant) (WestLand 2003a); (2) the April 2003 WestLand *Biological Assessment - Tangerine Hills* (Final BA) (WestLand 2003b), prepared for the U.S. Army Corps of Engineers (ACOE) on behalf of the aforementioned applicant; (3) your May 7, 2004, comments on our March 17, 2004, *Transmittal of the Draft Biological Opinion for Development Activities Associated with the Tangerine Hills Residential Development project in the Town of Marana, Pima County, Arizona* (Draft BO); (4) WestLand's December 2004 *Supplemental Report to the Biological Assessment of Tangerine Hills* (BA Supplement) (WestLand 2004); (5) various correspondence and meetings among the project proponent, their consultant, the Arizona Game and Fish Department (AGFD), and us; and (6) other sources of published and unpublished information. A complete administrative record of this consultation is on file at this office. We have assigned log number 02-21-04-F-0105 to this project. Please refer to that number in future correspondence on this consultation.

BIOLOGICAL OPINION

Consultation History

- January 8, 2003: Initial BA received at the Arizona Ecological Services Field Office-Tucson

- March 4, 2003: We received a courtesy copy of a February 26, 2003, EPA letter transmitting the Initial BA as well as National Pollutant Discharge Elimination System (NPDES) permitting responsibility for the proposed action to the Arizona Department of Environmental Quality (ADEQ).

- April 24, 2003: We received a courtesy copy of an April 23, 2003, Final BA transmittal letter from WestLand to the ACOE.

- July 2003: Telephone conversations between Scott Richardson of my staff and Scott Hart of WestLand regarding the proposed project.

- July 21, 2003: Electronic mail from Scott Hart to Scott Richardson requesting project be considered under the February 24, 2003, *Guidelines to Ensure the Nationwide Permit Program Will Not Adversely Affect the Cactus Ferruginous Pygmy-Owl* (Guidelines).

- January 16, 2004: We received a your January 15, 2004, request for formal consultation on the subject action.

- March 17, 2004: We transmitted our Draft BO to you.

- March 22, 2005: We received a courtesy copy of WestLand's March 18, 2004, letter to you regarding changes to the arrangement of roads within the proposed action and the use of conservation easements to protect habitat.

- May 10, 2004: We received your first May 7, 2004, letter transmitting your comments on our March 17, 2004, Draft BO.

- May 10, 2004: We received your second May 7, 2004, letter explaining your policy of not providing draft biological opinions to other parties, specifically, the Arizona Game and Fish Department.

- December 9, 2004: We received a courtesy copy of WestLand's December 2004 BA Supplement. The BA Supplement included: (1) clarification of the long-term protection, conservation measures, and management of the natural open space areas; (2) modification of the procedures to follow in the event pygmy-owl augmentation activities are initiated by wildlife agencies; and (3) revisions to the project description to reflect a recalculated acreage of impact for the proposed action. We received an electronic version of the BA Supplement on December 7, 2004.

Description of the Proposed Development Action

The following project description was adapted from WestLand's Final BA (WestLand 2003b) and BA Supplement (WestLand 2004), and includes measures intended to avoid and minimize adverse effects on the pygmy-owl and its requisite habitat in the project area.

A 75-foot half-road right-of-way (ROW) is located along the Property's west boundary. This ROW is excluded from this analysis. The resulting area is approximately 38 acres and is referred to as the Project Area. The Applicant is proposing to develop 25 single-family residential lots.[1] In the Project Plan, the average lot size will be 14,960 square feet, including driveway, septic system, and utility services. This is approximately 8.59 acres. Approximately 3.0 acres of disturbance will result from roadway construction on the property. The total acreage of disturbance from onsite residential, utility, and roadway construction totals approximately 11.59 acres, or 30.49 percent of the 38-acre project site.

Access to the Project Area will be provided by a ¼-mile-long, 28-foot-wide offsite access road within a 60-foot easement from Tangerine Road. At the northeast corner of the property, a 28-foot access road will traverse the northern boundary of the property within a 30-foot easement (Figure 4). Access to internal Project Area roadways will be from this east-west offsite roadway. The maximum total disturbance for offsite roadways is approximately 1.62 acres.

Individual lot development will be the responsibility of the Applicant (landowner/developer) and/or the individual lot owner, and grading and clearing activities on each lot will be governed by the applicable conservation measure outlined in Section 3.2 of the BA Supplement (and reiterated below).

Description of the Proposed Land Conservation Measures (BA Supplement Section 3.2)

Conservation measures to be implemented for Tangerine Hills include long-term protection, management, and maintenance of the natural open space areas for the benefit of pygmy-owls. The landowner/developer will implement specific conservation measures as part of the site development activity (Section 3.2.2 of the Supplemental BA) and will record specific conservation element Covenants, Conditions, and Restrictions (conservation CC&Rs) and Restrictive Covenants to run with the land that are beneficial to the pygmy-owl (Section 3.2.3 of the Supplemental BA); continue surveys for pygmy-owls in conformance with recommended survey protocols until such time as grading activities are completed; and implement specific conservation measures should an active pygmy-owl territory be detected on or near the Conservation Land (Section 3.3 of the Supplemental BA). A more detailed description of the conservation measures that will be implemented by the landowner/developer during site development and by the Homeowner's Association (HOA) after development is provided in the following sections.

<u>Conservation Land Ownership, Management, and Funding (BA Supplement Section 3.2.1)</u>

Tangerine Hills includes 26.41 acres of land that will be set aside for the conservation of pygmy-owls. The Conservation Land is entirely within residential lots. These lands are collectively

[1] The Property is zoned R-36 Residential (36,000-square-foot single-family lots zoning) by the Town of Marana. This zoning designation would allow up to 45 lots within the 38-acre Project Area.

referred to as the "Conservation Land." The landowner/developer will establish an HOA for Tangerine Hills that will be responsible for the management of all the Conservation Land.

The landowner/developer will record with the Pima County Recorder's Office Restrictive Covenants to protect the Conservation Land. Within 30 days of receipt of the Section 404 permit, the landowner/developer will submit the draft restrictive covenant and CC&R instruments to the ACOE and FWS, along with a schedule for recordation of these documents, for review and approval. Construction activities can commence upon receipt of the Section 404 permit, prior to the final recordation of the Restrictive Covenants and CC&Rs. Final copies of the recorded Restrictive Covenants and conservation CC&Rs will be submitted to the ACOE and FWS for their files.

The Restrictive Covenant will cover the entire project. This covenant will identify two classes of land. The first will be lands subject to vegetation clearing and disturbance up to a maximum of 30.49 percent of the project. The second class will be the Conservation Lands set aside to benefit pygmy-owls. The final boundaries of the clear limit area along the roadways in the project and within each lot will be delineated on the final plat (roadways and utility crossing only) and on each lot's approved site plan. As development progresses half-size copies of the plat and site plans for each lot that have been approved by the HOA will be provided to the ACOE with the annual report along with analysis of the compliance with the project-wide 30.49 percent surface disturbance allowed by the BA. For each lot, the site plan depicting the grading limits will be recorded as part of the deed of record once approved for construction by the Town of Marana and the landowner/developer.

If the endangered pygmy-owl becomes delisted and, thus, no longer afforded protection under the ESA, the HOA will continue to maintain the Conservation Land; however, the HOA would reserve the right to modify and/or rescind certain conservation CC&Rs and monitoring requirements that would no longer apply. Should pygmy-owl delisting occur, the HOA will confer with and get concurrence from the FWS and the ACOE to revise: a) any conservation CC&R the FWS and the ACOE previously approved, or b) the Restrictive Covenants. The procedure for such modification/rescission will be further addressed in the restrictive covenants and CC&Rs submitted for FWS and ACOE review and approval.

Management of the Conservation Land by the HOA is defined as: (1) implementing and enforcing the conservation CC&Rs approved by FWS and the ACOE; (2) implementing and enforcing the restrictive covenant; (3) restricting human access for activities not authorized by the BA to the Conservation Land by construction, maintenance, and repair of appropriate gates, wildlife compatible fencing, or other barriers as necessary; (4) maintaining and repairing permanent markers installed to delineate the boundaries of the Conservation Land within each individual lot; (5) periodic inspection/monitoring of the Conservation Land for vandalism, dumping, and other habitat damage and the restoration of such damage; (6) annual removal of trash and inorganic debris; (7) restoring unauthorized trails and paths; and (8) submittal of an annual report to the FWS and ACOE as prescribed in the Restrictive Covenants and conservation CC&Rs.

Management of the Conservation Land will require funding in perpetuity. The articles of incorporation established for the HOA and the CC&Rs will designate separate accounts in the

HOA budget to cover the cost of management, monitoring, and annual reporting activities as provided for in Conservation Element 12 below (Section 3.2.3 of the BA Supplement).

Conservation Measures Implemented by the Landowner/Developer (BA Supplement Section 3.2.2)

The landowner/developer, prior to the HOA assuming control and responsibility of the Conservation Land, shall complete the development conservation measures described below.

Development Conservation Measure 1 – Surface Disturbance: Total project disturbance will not exceed 30.49 percent of the Project Area. The landowner/developer and/or individual lot owner will be responsible for all vegetation clearing activities that will be conducted on each of the lots. Appropriate control techniques, such as t-post fencing, monitoring of vegetation clearing by the landowner/developer, and the preservation of individual trees, shrubs, and cacti where practical within cleared areas will be used to minimize surface disturbance within the Project Area.

Prior to the initiation of utility and road construction activities, the landowner/developer 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 Land 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.

Development Conservation Measure 2 – Native Plant Preservation Ordinance Compliance: The landowner/developer shall be responsible for compliance with applicable Native Plant Preservation Ordinance (NPPO) requirements for the Town of Marana. An approved Native Plant Preservation Plan (NPPP) for the subdivision will be implemented consistent with the NPPO. As required by the NPPP, large trees and saguaros occurring within the development envelope will be preserved in place when practical. Where preservation in place is not possible, the landowner/developer shall comply with applicable NPPO regulations.

Development Conservation Measure 3 – Trails and Roadways: Roadways within the Project Area will be private. The developer has elected for private roadways in order to minimize the overall width of disturbance necessary for roadway construction. The roadway will have six-inch extruded curbing placed along its edge, which will minimize the extent of potential vegetation disturbance from street parking. Pedestrian activities shall be confined to existing roadways and trails within the Project Area. Unauthorized clearing of paths through natural undisturbed portions of lots is not allowed. Any paths within an individual lot will be counted as part of the allowable surface disturbance for that lot.

Development Conservation Measure 4 – Pygmy-owl Survey and Monitoring Restrictions: In the event the landowner/developer or FWS became aware of a pygmy-owl within 600 meters of the Project Area, project activities will be subject to the constraints described in Section 3.3 of the BA. The landowner/developer will conduct pygmy-owl surveys in accordance with FWS

pygmy-owl survey protocol until vegetation activities have been completed. Once vegetation clearing has been completed, further pygmy-owl surveys will not be required.

Development Conservation Measure 5 – Baseline Documentation: Upon completion of grading activities, the landowner/developer will produce a final site plan that clearly delineates the "as-built" condition of road and infrastructure development within the project. The as-built site plan will be submitted to the ACOE and FWS. The landowner/developer will also record baseline conditions of the Conservation Land by establishing a sufficient number of permanent photopoint monuments and photographing the condition of the access roads, future water line access areas, natural drainages, and boundary lines of the Conservation Land prior to the HOA assuming control and/or management responsibility of the Conservation Land. The direction of the photo (compass bearing), the monument identification, and time and date of the photograph will be recorded. These baseline photographs will be given to the HOA to become part of a permanent file on record with the HOA for use in future monitoring efforts.

Development Conservation Measure 6 – Revegetation of Disturbed Areas: Areas temporarily disturbed by construction, except as otherwise required by law, will be seeded with species native to the Project Area. Any trees that are removed in temporary construction areas may be replaced with transplants from the site or native containerized trees. Temporary irrigation may be used in these areas to facilitate re-vegetation efforts.

Development Conservation Measure 7 – Perimeter Fencing: The landowner/developer may install a perimeter fence around the property or around portions of the property. Perimeter fencing shall not be constructed of woven wire, chain link, or other similar fencing materials. Access points through the fence shall be minimized so as to better protect the Conservation Land. Individual lot fencing restrictions are described under CC&R Conservation Element 6.

Development Conservation Measure 8 – Enforcement Actions: The landowner/developer will work with FWS and ACOE, in conformance with Section 3.2.1 of the BA as amended, to develop Restrictive Covenants that clearly define FWS and ACOE authority to pursue enforcement actions if the landowner/developer or HOA are not in compliance with the Restrictive Covenants or conservation CC&Rs.

Restrictive Covenants and Conservation CC&Rs to be Recorded for Tangerine Hills (BA Supplement Section 3.2.3)

The following 14 proposed conservation elements are to be included as part of the recorded Restrictive Covenants and CC&Rs for Tangerine Hills. A more detailed description of the conservation elements will be provided in the Restrictive Covenants and CC&Rs submitted to the FWS and ACOE for review and approval.

Conservation Element 1 – Management of the Conservation Land: The HOA will be responsible for managing the Conservation Land. Management of the Conservation Land by the HOA is defined as: 1) implementing and enforcing the conservation CC&Rs approved by FWS and the ACOE; 2) implementing and enforcing the restrictive covenant; 3) restricting human access for activities not authorized by the BA to the Conservation Land by construction, maintenance, and repair of appropriate gates, wildlife compatible fencing, or other barriers as necessary; 4) maintaining and repairing permanent markers installed to delineate the boundaries of the

Conservation Land within each individual lot; 5) periodic inspection/monitoring of the Conservation Land for vandalism, dumping, and other habitat damage and the restoration of such damage; 6) annual removal of trash and inorganic debris; 7) restoring unauthorized trails and paths; and 8) submittal of an annual report to the FWS and ACOE as prescribed in the Restrictive Covenants and conservation CC&Rs.

Conservation Element 2 – Surface Disturbance: Prior to the initiation of utility and road construction activities, the landowner/developer 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 Land boundaries within each lot will be installed. These will be placed prior to any clearing activities within each lot and shall be maintained in perpetuity by the HOA. No vegetation or surface disturbance will be allowed to occur within the Conservation Land, except as otherwise specifically allowed by the Restrictive Covenants and conservation CC&Rs.

Any modifications of a lot plan originally authorized by 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.

In the event of trespass and damage to habitat within the Conservation Land by a lot owner or others, the HOA will seek compliance with the requirements of this BA and/or restoration of disturbed areas through a process of resolution/agreement with the individual landowner and/or responsible party following the applicable procedures provided in the Restrictive Covenants and conservation CC&Rs for Tangerine Hills. If efforts to resolve the trespass are unsuccessful, the HOA will be responsible for completing necessary restoration efforts. The HOA can then proceed with any enforcement actions available under the law as it deems appropriate to secure reimbursement for the cost of restoration efforts and to ensure future compliance with the conservation CC&Rs and the requirements of this BA.

Conservation Element 3 – Landscape Restrictions: Vegetation management is limited to non-native weed control (list of non-native weeds will be provided as part of recorded Restrictive Covenants and conservation CC&Rs), fire safety measures, and restoration activities. Management activities that restrict the ability of the disturbed area(s) to recover are not permitted. The HOA will hire qualified professionals familiar with the habitat within the Conservation Land to carry out this duty.

Traditional xeriscape planting zones will be utilized for all residential lots. The use of native versus non-native vegetation[2] 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. This document shall not

[2] 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 Arizona upland subdivision of the Sonoran desertscrub biotic community.

restrict 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 such as 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 A of the BA.

The Natural (Xeric) Zone: This zone will occupy the remainder of each individual lot and will 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.

Conservation Element 4 – Domestic Animals: The lot owners will be required to contain domestic pet animals in the enclosed portion of their lot or within the established clearing limits and/or under strict control at all times. Dogs outside of enclosed areas shall be leashed in conformance with Pima County Code 6.04.030. For protection of domestic cats and native wildlife, all domestic cats shall be restricted to the inside of the home or leashed.

Conservation Element 5 – Trails and Paths: Pedestrian activities shall be confined to existing roadways and natural trails and paths. Clearing of trails and paths not authorized by the BA through native habitat in the Conservation Land will not be permitted. The HOA will discourage unauthorized paths through education and enforcement of the Restrictive Covenants and conservation CC&Rs. In the event that an unauthorized trail or path is constructed, the HOA will seek compliance and/or restoration. If the resolution with the trespasser is unsuccessful or if damage resulted from an outside party, the HOA will be responsible for completing restoration, then proceeding with enforcement actions to seek reimbursement and ensure future compliance with the Restrictive Covenants and the conservation CC&Rs.

Conservation Element 6 – Fence Restrictions: To maintain a network of interconnected open space, the construction of fencing beyond the clearing limits of each lot is prohibited. Perimeter fencing along the clearing limits of each lot shall not be constructed of woven wire, chain link fencing, or other similar material. Recommended fencing types/materials include masonry, wood, wrought iron, tubular steel, or other equivalent materials.

Conservation Element 7 – Allowable Uses and Management of the Conservation Land: The Conservation Land encumbered by the Restrictive Covenants and conservation CC&Rs shall be maintained as natural open space, consistent with the conservation of the pygmy-owl, and the landowner/developer (or the HOA after development activities have been completed) will make periodic inspections for vandalism, dumping, and other habitat damage on the Conservation Land.

Conservation Element 8 – Monitoring and Reporting: Following completion of development activities, the HOA will be responsible for implementation and enforcement of the Restrictive Covenants, conservation CC&Rs, and overall management of the Conservation Land. This

includes annual inspection/monitoring and reporting to the FWS and ACOE in regard to compliance with the approved conservation CC&Rs. Annually, during the first quarter of each calendar year, a monitoring report will be submitted to the FWS and ACOE. This report will provide a brief summary of monitoring activities completed over the past year and the project's compliance with the approved Restrictive Covenants and conservation CC&Rs. One requirement of annual monitoring efforts will be to physically locate boundary markers and determine if impacts have occurred within the Conservation Land. For each Annual Monitoring Report, the HOA shall take photographs at each of the permanent photopoints (up to 24) that incorporates as much of the Conservation Land as possible and matches the aspect of the original monitoring point photograph as closely as possible. We expect that the number of permanent photo points will increase each year as lots are developed until the target number (24) is reached. A minimum of six photo points will be established in the first year. The direction of the photo (compass bearing), the monument identification, and time and date of the photograph will be recorded. Each year the monitor will retake a photograph from each of the permanent photo points that matches as closely as possible the aspect of the original monitoring point photograph. At the discretion of the HOA, available commercial aerial photographs may be used to supplement ground photographs.

The HOA shall prepare and submit to the ACOE and FWS an Annual Monitoring Report that will include color copies of monitoring photographs and a monitoring log summarizing results of the ground inspection and maintenance activities or enforcement activities conducted during the past year. The ACOE and FWS will have 90 days from the submittal date to review the Annual Report. If ACOE or FWS do not respond to the Annual Report within the 90-day time limit, the HOA's report will be deemed complete and acceptable.

Conservation Element 9 – Amendments to the Restrictive Covenants and Conservation CC&Rs Subject to FWS and ACOE Approval: Any changes to the conservation elements incorporated into the Restrictive Covenants and CC&Rs are subject to approval by the FWS and ACOE. Upon written request of the HOA, the FWS and ACOE may approve amendments to the Restrictive Covenants and conservation CC&Rs.

Conservation Element 10 – Prohibited Uses: The following uses or activities are expressly prohibited within the Conservation Land:

- Use of herbicides, pesticides, rodenticides, biocides, fertilizers, or other agricultural chemicals or weed abatement activities except as provided in Conservation Element 3;
- Incompatible fire protection activities;
- Use of off-road vehicles and use of any other motorized vehicles except on existing roadways and as necessary to restore native plant communities or accomplish utility construction activities allowed by this BA;
- Livestock grazing or other agricultural activity of any kind;
- Residential, commercial, or industrial uses except that which is allowed by this BA;
- Construction, reconstruction, or placement of any building or other improvement, billboard, or sign except gates, fences, and boundary markers;
- Depositing or accumulation of soil, trash, ashes, refuse, waste, bio-solids or any other material;

- Planting, introduction, or dispersal of non-native or exotic plant or animal species;
- Filling, dumping, excavating, draining, dredging, mining, drilling, removing, or exploring for or extraction of minerals, loam, gravel, soil, rock, sand or other material on or below the surface of the Conservation Land;
- Altering the general topography of the Conservation Land, including but not limited to, building of roads, paths, trails, and flood control work;
- Removing, destroying, or cutting of trees, shrubs or other vegetation, except for: 1) emergency fire protection as required by fire safety officials having jurisdiction over the Project Area, 2) prevention or treatment of disease, and 3) construction, maintenance and repair of the utility lines;
- Manipulating, impounding, or altering any natural watercourse, body of water, or water circulation on the Conservation Land and activities or uses detrimental to water quality, including, but not limited to, degradation or pollution of any surface or sub-surface waters, except as authorized by the Clean Water Act Section 404 permit that may be issued for the Project or general storm water permit issued for the Project;
- Artificial lighting such as light poles or other permanent lighting fixtures;
- Organized events that consist of more than ten individuals;
- Use of fires or outdoor cooking;
- Equestrian use by parties of 10 people or more;
- The boarding of horses; and
- The staging of equestrian events.

Conservation Element 11 – Rights of the ACOE and FWS: The ACOE and FWS shall have all rights set forth in the Restrictive Covenants for the Conservation Land, in the 404 Permit, and below:

- A non-exclusive easement to preserve and protect the Conservation Values of the Conservation Land. The Conservation Values of the Conservation Land include the value of its upland and xeroriparian habitat for the pygmy-owl, the aquatic resource value of the waters of the U.S., the xeroriparian habitat along the waters of the U.S., and the presence of an archaeological site that will be protected within the Conservation Land.

- A non-exclusive easement to enter upon the Conservation Land to monitor compliance with and to otherwise enforce the terms of the Restrictive Covenants and conservation CC&Rs.

- A non-exclusive easement to prevent any activity on or use of the Conservation Land that is inconsistent with the purpose of the Restrictive Covenants or conservation CC&Rs and to require the restoration of such areas or features of the Conservation Land that may be

damaged by any act, failure to act, or any use that is inconsistent with the purpose of the Restrictive Covenants or conservation CC&Rs.

- All present and future development rights, except for making the land available for restoration and other purposes set forth in the Restrictive Covenants and conservation CC&Rs, and provided any exercise of such rights must preserve the Conservation Land in its natural condition as that term is defined in the Restrictive Covenants and CC&Rs. Any exercise of present and future development rights by the ACOE and/or FWS shall not be in conflict with the Conservation Values of the Conservation Land.

- The right to enforce by means, including, without limitation, injunctive relief, the terms and conditions of the Restrictive Covenants and the conservation CC&Rs.

Conservation Element 12 – Conservation Land Funds: The HOA shall establish a Conservation Land Operating Fund for the deposit of Conservation Land Contributions. The payment of the costs of maintaining, managing, and ensuring protection of the Conservation Land shall be from this fund. The Operating Fund shall be evaluated annually by the HOA Board to confirm its adequacy to comply with the obligations of the Restrictive Covenants and conservation CC&Rs. The HOA shall also establish a Conservation Land Contingency Fund, to be maintained with a minimum balance of $5,000, which sum is to be originally contributed by the landowner/developer. The balance of the Conservation Land Contingency Fund shall be increased by the HOA in each successive two (2) year periods by two percent (2%) of the minimum balance in effect during the preceding two (2) year period. This Contingency Fund shall be used to fund extraordinary maintenance, management, or insurance expenses of the Conservation Land and unforeseen shortages in the Conservation Land Operating Fund as may be necessary to comply with the terms of the Restrictive Covenants and conservation CC&Rs. The amount by which the Contingency Fund is reduced by expenditure below the minimum balance shall be replenished by assessment no later than the fiscal year following the expenditure.

Conservation Element 13 – General Obligation: A copy of each Recorded Restrictive Covenant concerning the Conservation Land shall be kept in the office of the HOA for review by all Owners and interested persons. All terms of the Recorded Restrictive Covenants and conservation CC&Rs concerning the Conservation Land shall be incorporated into the general CC&Rs recorded for Tangerine Hills and shall provide a statement that all affected Owners are deemed to have notice of such terms. The HOA and Owners shall not convey any interest in the Conservation Land except in strict compliance with the Restrictive Covenants.

Conservation Element 14 – Conflicts: In the event of any conflict between the provisions of the conservation CC&Rs and the Section 404 Permit, the provisions of the Section 404 Permit shall control.

Description of the Proposed Development Constraints – If a Pygmy-Owl Shows Up (BA Supplement Section 3.3)

The landowner/developer will follow specific guidelines that have been approved by the FWS in the event that a pygmy-owl nest site or territory center is detected within 600 meters of the Project Area. These guidelines establish four zones (Zone 1 through IV) based upon the distance

of construction activity from a known nest or activity center. Certain levels of construction can occur within each of these zones without resulting in levels of effect not already considered in the analysis of Project impacts. Situations falling outside of the parameters established by the guidelines will require that the landowner/developer coordinate with the FWS to determine if consultation is required prior to continuing with the construction activities in question. The specific parameters that apply to each of the four zones are described below.

Should pygmy-owl augmentation in association with a Habitat Conservation Plan (HCP) proceed prior to or concurrent with development of the project and should a pygmy-owl establish a territory within 600 meters of the Project Area, then the HCP restrictions regarding "What Happens if an Owl Shows Up" shall apply if they are less restrictive than the measures proposed in this BA. Similarly, if the HCP procedures are more restrictive, then they shall not apply to the Tangerine Hills project. In the event HCP restrictions regarding "What Happens if an Owl Shows Up" apply to this project, the FWS shall expeditiously provide the Applicant written authorization to proceed with their project in conformance with the requirements of the HCP.

Zone I. 0 to 100 Meters from the Pygmy-owl Activity Center

1. No additional clearing of vegetation will be permitted without authorization from the FWS except as provided in Item (3) below.
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 were 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 FWS.

Zone II. 100 to 400 Meters from the Pygmy-owl Activity Center

1. No additional clearing of vegetation will be permitted without authorization from the FWS.
2. No restrictions on the nature or type of construction activity (excluding the clearing of vegetation) from August 1 through January 31 of the following calendar year.
3. Construction activities during the breeding season (February 1 to July 31) cannot exceed the levels or intensity of activities that occurred at the time the territory was established.

Zone III. 400 to 600 Meters from the Pygmy-owl Activity Center

1. No additional clearing of vegetation will be permitted without authorization from the FWS.
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 Pygmy-owl Activity Center

1. No restrictions – any activity consistent with the project description provided in the BA, as amended by the supplemental reports, is allowed.

Status of the Species/Critical Habitat

A detailed description of the life history and ecology of the pygmy-owl can 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 in other information available from the Arizona Ecological Services Field Office website (arizonaes.fws.gov). Information specific to the pygmy-owl in Arizona is preliminary. Research completed in Texas has provided useful insights into the ecology of this subspecies and, in some instances, represents the best available scientific information. However, habitat and environmental conditions are somewhat different than in Arizona, and conclusions based on information developed in Texas and elsewhere may require qualification.

Species Description

The pygmy-owl is in the avian order Strigiformes and the family Strigidae. They are small birds of prey, averaging 6.75 inches in length. Males average 2.2 ounces with females slightly larger, averaging 2.6 ounces. The pygmy-owl is reddish brown overall, with a cream-colored belly streaked with reddish brown. The crown is lightly streaked, and a pair of dark brown/black spots outlined in white occur on the nape suggesting "eyes." The species lacks ear tufts and the eyes are yellow. The tail is relatively long for an owl and is reddish brown in color with darker brown bars. Pygmy-owls have large feet and talons relative to their size.

Listing and Critical Habitat

The Arizona population of the pygmy-owl was listed as an endangered distinct population segment on March 10, 1997 (62 FR 10730) without critical habitat. In response to a court order, approximately 731,712 acres of critical habitat were designated on July 12, 1999 (64 FR 37419) in areas within Pima, Cochise, Pinal, and Maricopa counties in Arizona. On January 9, 2001, a coalition of plaintiffs filed a lawsuit with the District Court of Arizona challenging the validity of the listing of the Arizona population of the pygmy-owl as an endangered species and the designation of its critical habitat. On September 21, 2001, the Court upheld the listing of the pygmy-owl in Arizona but, at our request, and without otherwise ruling on the critical habitat issues, remanded the designation of critical habitat for preparation of a new analysis of the economic and other effects of the designation (National Association of Home Builders *et al*. v. Norton, Civ.-00-0903-PHX-SRB). The Court also vacated the critical habitat designation during the remand. We published a proposed rule to redesignate critical habitat in the Federal Register on November 27, 2002 (67 FR 71032). The proposal includes approximately 1,208,000 acres in portions of Pima and Pinal counties, Arizona.

The plaintiffs appealed the District Court's ruling on the listing of the pygmy-owl as a distinct population segment. On August 19, 2003, the 9th Circuit Court of Appeals rendered an opinion regarding this appeal which held that, although the FWS did not arbitrarily find the Arizona pygmy-owl population to be discrete, the FWS arbitrarily found the discrete population to be significant. The judgment of the District Court was reversed and the case was remanded to the

district court for further proceedings consistent with the 9th Circuit's opinion. On June 28, 2004, the District Court remanded, but did not vacate, the listing rule to us for further consideration.

Because conservation of the pygmy-owl may rely upon a landscape mosaic of appropriate habitat, we have proposed critical habitat areas that will link a network of State, private, and Federal lands. The proposed system of critical habitat is designed to provide an interconnected system of suitable habitat essential to Arizona pygmy-owl survival and maintain the viability of groups of pygmy-owls that are dependant upon continued genetic interchange and population immigration. Two premises were considered in establishing this system: 1) protecting verified pygmy-owl sites and areas with the presence of one or more of the constituent elements within the mean straight-line dispersal distance (8 km (5 mi)) from nest sites and three of the four recovery team-recommended Special Management Areas (SMAs); and 2) providing for the linkage of these verified sites with areas of suitable habitat for which we have adequate scientific information indicating that they are essential to the conservation of the listed population and in need of special management. A complete description of the primary constituent elements of proposed critical habitat and the proposed critical habitat units can be found in the Federal Register announcement of the proposed rule to designate critical habitat for the pygmy-owl (67 FR 71032). When consulting with Federal agencies on projects that may destroy or adversely modify critical habitat, we evaluate the effects of their project on both the Unit and the-whole-of critical habitat. We can then best evaluate the scope of effects and recommend project modifications that conserve or augment the values that would otherwise potentially be lost to that particular unit.

In September 1998, we appointed the Cactus Ferruginous Pygmy-Owl Recovery Team. The Team is comprised of a Technical Group of biologists (pygmy-owl experts and raptor ecologists) and an Implementation Group which includes representatives from affected and interested parties (i.e., Federal and State agencies, local governments, the Tohono O'odham Nation, and private groups). A draft recovery plan was released for public comment in January 2003. Following consideration of the public comments and resolution of listing litigation, we will work to finalize the recovery plan.

Life History

Pygmy-owls are considered non-migratory throughout their range. There are winter (November through January) pygmy-owl location records from throughout Arizona (University of Arizona 1995, Tibbitts 1996, Abbate *et al.* 1999, 2000). These winter records suggest that pygmy-owls are found within Arizona throughout the year and do not appear to migrate southward to warmer climates during the winter months.

The pygmy-owl is primarily diurnal (active during daylight) with crepuscular (active at dawn and dusk) tendencies. They can be heard making a long, monotonous series of short, repetitive notes. Pygmy-owls are most vocal and responsive during the courtship and nesting period (February through June). Male pygmy-owls establish territories using territorial-advertisement calls to repel neighboring males and attract females. Calling and defensive behavior is also manifested in nesting territories from fledging to dispersal (June through August).

Usually, pygmy-owls nest as yearlings (Abbate *et al.* 1999, Gryimek 1972), and both sexes breed annually thereafter. Territories normally contain several potential nest-roost cavities from which

responding females select a nest. Hence, cavities/acre may be a fundamental criterion for habitat selection. Historically, pygmy-owls in Arizona used cavities in cottonwood, mesquite, and ash trees, and saguaro cacti for nest sites (Millsap and Johnson 1988). Recent information from Arizona indicates that nests were located in cavities in saguaro cacti for all but two of the known nests documented from 1996 to 2002 (Abbate *et al.* 1996, 1999, 2000, AGFD 2003). One nest in an ash tree and one in a eucalyptus tree were the only non-saguaro nest sites (Abbate *et al.* 2000).

Pygmy-owls exhibit a high degree of site fidelity once territories (the area defended) and home ranges (the area used throughout the year) have been established (AGFD 2003). Therefore, it is important that habitat characteristics within territories and home ranges be maintained over time in order for them to remain suitable. This is important for established pygmy-owl sites, as well as new sites established by dispersing pygmy-owls.

Pygmy-owls are more likely to be affected by projects within their home range because of the species' strong site fidelity. Behaviorally, the option to seek alternative areas outside of the home range appears limited, particularly for males.

Data on the size of areas used by pygmy-owls on an annual basis in Arizona are limited. Most of the telemetry data gathered occurs during the breeding season due to the opportunity to capture the pygmy-owls and the limited battery life of transmitters. Until more complete information is available from Arizona, the home range size estimate we are using is based on telemetry work completed in Texas. In Texas, Proudfoot (1996) noted that, while pygmy-owls used between 3 and 57 acres during the incubation period, they defend areas of up to 279 acres in the winter. Proudfoot and Johnson (2000) indicate that males defend areas with radii from 1,100 - 2,000 feet. Initial results from ongoing studies in Texas indicate that the home range of pygmy-owls may also expand substantially during dry years (G. Proudfoot, pers. comm.). Therefore, a 280-acre home range is considered necessary for pygmy-owls to meet their life history requirements on an annual basis.

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. Documented and suspected pygmy-owl predators include great horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), screech-owls (*Otus kennicottii*), and domestic cats (*Felis domesticus*) (Abbate *et al.* 2000, AGFD 2003). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999).

AGFD telemetry monitoring in 2002 indicated that at least three of the nine young produced that year were killed by predators prior to dispersal during a year when tree species failed to leaf out due to drought conditions (AGFD 2003). Therefore, cover near nest sites may be important for young to fledge successfully (Wilcox *et al.* 1999, Wilcox *et al.* 2000). A number of fledgling pygmy-owls have perished after being impaled on cholla cactus, probably due to undeveloped flight skills (Abbate *et al.* 1999). In order to support successful reproduction and rearing of young, home ranges should provide trees and cacti that are of adequate size to provide cavities in proximity to foraging, roosting, sheltering, and dispersal habitats, in addition to adequate cover for protection from climatic elements and predators, and should occur in an appropriate configuration in relation to the nest site.

Vegetation communities which provide a diversity of structural layers and plant species likely contribute to the availability of prey for pygmy-owls (Wilcox *et al.* 2000). Pygmy-owls also utilize different groups of prey species on a seasonal basis. For example, lizards, small mammals, and insects are utilized as available during the spring and summer during periods of warm temperatures (Abbate *et al.* 1999). However, during winter months, when low temperatures reduce the activity by these prey groups, pygmy-owls likely turn to birds as their primary source of food and appear to expand their use area in response to reduced prey availability (Proudfoot 1996). Therefore, conservation of the pygmy-owl should include consideration of the habitat needs of prey species, including structural and species diversity and seasonal availability. Pygmy-owl habitat must provide sufficient prey base and cover from which to hunt in an appropriate configuration and proximity to nest and roost sites.

Free-standing water does not appear to be necessary for the survival of pygmy-owls. During many hours of research and monitoring, pygmy-owls have never been observed directly drinking water (Abbate *et al.* 1999, AGFD 2003). It is likely that pygmy-owls meet much of their biological water requirements through the prey they consume. However, the presence of water may provide related benefits to pygmy-owls. The availability of water may contribute to improved vegetation structure and diversity which improves cover availability. The presence of water also likely attracts potential prey species, improving prey availability.

Habitat

Pygmy-owls were historically recorded in association with riparian woodlands in central and southern Arizona (Bendire 1892, Gilman 1909, Johnson *et al.* 1987, Johnson *et al*. 2003). Plants present in these riparian communities included cottonwood (*Populus fremontii*), willow (*Salix* spp.), ash (*Fraxinus velutina*), and hackberry (*Celtis* spp.). However, recent records have documented pygmy-owls in a variety of vegetation communities such as riparian woodlands, mesquite (*Prosopis velutina*, and *P. glandulosa*) bosques (Spanish for woodlands), Sonoran desertscrub, semidesert grassland, and Sonoran savanna grassland communities (see Brown 1994 for a description of these vegetation communities).

In recent years, pygmy-owls have been primarily found in the Arizona Upland Subdivision of the Sonoran desert, particularly Sonoran desertscrub (Phillips *et al.* 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985, Johnsgard 1988). 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 into 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. Within the United States, columnar cacti include either saguaros (*Carnegiea gigantea*), or organ pipe cactus (*Stenocereus thurberi*). Trees within this subdivision include blue paloverde (*Parkinsonia floridum*), foothills paloverde (*C. microphyllum*), ironwood (*Olneya tesota*), mesquites (*Prosopis* spp.), and cat-claw acacia (*Acacia greggii*). Cacti of many species are found within this subdivision, and include many varieties of cholla (*Cylindropuntia* spp.) and prickly pear (*Opuntia* spp.), fish-hook barrel cactus (*Ferocactus wislizenii*), and compass barrel cactus (*F. acanthodes*) (Brown 1994). The paloverde-cacti mixed scrub series is described as developed on the bajadas and mountain sides away from valley floors. A bajada is the area between level plains and the foot of a mountain and is dissected by arroyos, exhibiting numerous variations in slope and pattern. While there is great variation between bajadas, they are generally characterized by good drainage and slowed

evaporation, resulting in enhanced growing conditions for xerophytic plants. Cacti are particularly prevalent on bajadas, and woody, spiny shrubs and small trees, and annuals are abundant. The increased diversity of plants in turn supports a diversity of wildlife species (Benson and Darrow 1981, Olin 1994). A list of plant and wildlife species associated within this subdivision can be found in Appendix II of Brown (1994), and is incorporated herein by reference.

While there are hundreds of thousands of acres of Sonoran Desertscrub, not all of the areas within this vegetation community are of equal value to the pygmy-owl. Preliminary habitat assessment data appear to indicate that those areas of Sonoran Desertscrub characterized by high plant-species diversity, high structural diversity, and the presence of tall canopy are the areas being used by pygmy-owls (Wilcox *et al.* 2000, Flesch 2003a). These types of areas are typically located along drainages and wash systems, or in areas with better soil and moisture conditions such as bajadas. The occurrence of these areas is more limited than the overall distribution of Sonoran Desertscrub.

Over the past several years, pygmy-owls have also been found in riparian and xeroriparian (dry wash and upper-terrace) communities 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 in uplands, and linear woodlands of various tree species along bottoms and washes.

While plant-species composition differs among these communities, there are certain unifying characteristics such as the presence of vegetation in fairly dense thickets or woodlands, the presence of trees, saguaros, or organ pipe cactus large enough to support cavities for nesting, and elevations below 1,200 meters (m) (4,000 feet (ft)) (Swarth 1914, Karalus and Eckert 1974, Monson and Phillips 1981, Johnsgard 1988, Enriquez-Rocha *et al.* 1993, Proudfoot and Johnson 2000). Large trees provide canopy cover and cavities for nesting, while the density of mid- and lower-story vegetation provides foraging habitat and protection from predators, and it contributes to the occurrence of prey items (Wilcox *et al.* 2000). Perch substrates used by pygmy-owls for calling are typically the tallest trees available within a home range, though pygmy-owls have also been noted calling from within saguaro cavities (Flesch 2003a).

The density of trees and the amount of canopy cover preferred by pygmy-owls in Arizona have not been fully defined. However, preliminary results from a habitat selection study indicate that nest sites tend to have a higher degree of canopy cover and higher vegetation diversity than random sites (Wilcox *et al.* 2000). Overall vegetation density may not be as important as patches of dense vegetation with a developed canopy layer interspersed with open areas. Vegetation structure may be more important than species composition (Wilcox *et al.* 1999, Cartron *et al.* 2000a). This is related to the fact that canopy cover and layers of vegetation provide hunting perches, thermal cover, and promote predator avoidance regardless of species. Larger trees with greater canopy also have a greater potential to support cavities for nesting. Flesch (1999) indicated that areas with large trees and canopy coverage are likely important areas for pygmy-owls in the Altar Valley, though the author also noted (Flesch 2003a) that the presence of large, columnar cacti was also a potentially critical factor due to a greater availability of cavities relative to broadleaf trees. Riparian and xeroriparian areas, which are often used by pygmy-

owls, are generally characterized by increased vegetation layers, higher plant diversity, and larger tree sizes because of increased moisture availability.

Species Status and Distribution

The pygmy-owl is one of four subspecies of the ferruginous pygmy-owl. It occurs 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. Only the Arizona population of the pygmy-owl is listed as an endangered species (U.S. Fish and Wildlife Service 1997).

The northernmost historical record for the pygmy-owl is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the pygmy-owl to be "quite common" in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, the pygmy-owl, 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, pygmy-owls were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (Hunter 1988, AGFD 1999).

Records from the eastern portion of the pygmy-owl's range include an 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. Pygmy-owls 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 pygmy-owls in Arizona for the period of 1971 to 1988.

Documentation of the total number of pygmy-owls and their current distribution in Arizona is incomplete. Survey and monitoring work in Arizona resulted in documenting 41 adult pygmy-owls in 1999, 34 in 2000, 36 in 2001, 24 in 2002, and, most recently, 21 in 2003 (AGFD 2002a). Most of these pygmy-owls were distributed in four general areas: northwest Tucson, southern Pinal County, Organ Pipe Cactus National Monument, and the Altar Valley. We believe that more pygmy-owls exist in Arizona, but systematic surveys have not been conducted in all areas of potential habitat. Table 3, below, summarizes the numbers of pygmy-owls documented since 1993.

Table 3. Numbers and distribution of documented pygmy-owl locations 1993 - 2004 (Abbate *et al*. 1996, 1999, 2000, AGFD 2002a, S. Richardson pers. comm.).

Area	**Year**	**Sites**	**Adults**	**Young**
Northwest Tucson	1993-1997	9	19	6
	1998	4	7	11
	1999	6	10	16
	2000	8	11	11
	2001	5	8	10
	2002	9	9	2
	2003	4	4	0
	2004	3	3	0

Pinal County	1993-1997	2	6	1
	1998	2	2	0
	1999	3	5	5
	2000	2	3	5
	2001	0	0	0
	2002	1	1	0
	2003	0	0	0
	2004	0	0	0
Altar Valley	1998	2	4	Unknown
	1999	14	18	11
	2000	6	8	4
	2001	11	18	12
	2002	8	10	7
	2003	5	9	16
	2004	6	9	11
Organ Pipe Cactus National Monument and Cabeza Prieta National Wildlife Refuge	1993-1997	2	2	0
	1998	1	2	4
	1999	3	4	Unknown
	2000	6	8	0
	2001	7	10	5
	2002	3	4	0
	2003	5	6?	0
	2004	7	7	0

In addition, recent survey information has shown pygmy-owls to be more numerous adjacent to and near the Arizona border in Mexico (Flesch and Steidl 2000). There also exists considerable unsurveyed habitat on the Tohono O'odham Nation, and, although we have no means of quantifying this habitat, the distribution of recent sightings on non-Tribal areas east, west, and south of the U.S. portion of the Tohono O'odham Nation lead us to reasonably conclude that these Tribal lands may support meaningful numbers of pygmy-owls. Consequently, we believe that it is highly likely that the overall pygmy-owl population in Arizona is maintained by the movement and dispersal of pygmy-owls among groups of pygmy-owls in southern Arizona and northern Mexico resulting from the connectivity of suitable habitat. The extent to which pygmy-owls disperse across the U.S./Mexico border is unknown, but recent survey work indicates that pygmy-owls regularly occur along the border (Flesch and Steidl 2000, Flesch 2003b). However, addressing habitat connectivity and the movements of pygmy-owls within Arizona is a primary consideration in the analysis of this project due to the importance of maintaining dispersal and movement among pygmy-owl groups where our management authority exists.

The patchy, dispersed nature of the pygmy-owl populations in Arizona and Mexico (Flesch 2003b) suggests that the overall population may function as a metapopulation. A metapopulation is a set of subpopulations within an area, where movement and exchange of individuals among

population segments is possible, but not routine. A metapopulation's persistence depends on the combined dynamics of the productivity of subpopulations, the maintenance of genetic diversity, the availability of suitable habitat for maintenance and expansion of subpopulations, and the "rescue" of subpopulations that have experienced local extinctions by the subsequent recolonization of these areas by dispersal from adjacent population segments (Hanski and Gilpin 1991, 1997). The local groups of pygmy-owls within Arizona may function as subpopulations within the context of metapopulation theory. However, more information is needed regarding the population dynamics of pygmy-owls in Arizona.

The ability of and opportunity for pygmy-owls to disperse within population segments, as well as emigrate to adjacent population segments, is likely important for the long-term persistence of pygmy-owls in Arizona. Pygmy-owl dispersal patterns are just beginning to be documented. One banded juvenile in Arizona was observed in 1998 approximately 3.9 km (2.4 mi) from its nest site following dispersal. Five young monitored with radio telemetry during 1998 were recorded dispersing from 3.5 km (2.17 mi) to 10.4 km (6.5 mi) for an average of 5.9 km (3.6 mi) (Abbate *et al.* 1999). In 1999, 6 juveniles in Arizona dispersed from 2.3 km (1.4 mi) to 20.7 km (12.9 mi) for an average of 10 km (6.2 mi) (Abbate *et al.* 2000). In Arizona, the maximum documented dispersal distance was formerly reported to be 34.8 km (21.8 mi) (AGFD 2002b). With so few individual pygmy-owls in Arizona, the maximum travel distance may be periodically needed to maintain genetic interchange between groups of pygmy-owls.

Juveniles typically disperse from natal areas in July and August and do not appear to defend a territory until September. They typically fly from tree to tree instead of long flights and may move up to 1.6 km (1 mi) or more in a night (Abbate *et al.* 1999). Trees of appropriate size and spacing appear to be necessary for successful dispersal, but specific data describing this pattern are currently unavailable. Once dispersing male pygmy-owls settle in a territory (the area defended by a pygmy-owl), they rarely make additional movements outside of their home range. For example, spring surveys have found male juveniles in the same general location as observed the preceding autumn (Abbate *et al.* 2000). However, unpaired female dispersers may make additional movements which sometimes continue into the subsequent breeding season (AGFD 2003).

In early 2004, AGFD staff tracked a female pygmy-owl born in late 2003 that traveled a sinuous route of approximately 130 km (80 mi) (Abbate pers. comm.). This dispersing pygmy-owl's route may have crossed Public Lands near the Sierrita Mountains, west of Tucson, and the Silverbell Mountains, possibly including the Ironwood Forest National Monument. The current location for this particular pygmy-owl is not known, as her transmitter has failed, but she was last detected southwest of Casa Grande. We are currently evaluating the relevance of this new information.

Reasons For Listing

Current Threats

The Arizona pygmy-owl DPS faces a number of threats, as detailed in the Final Rule listing the species as threatened (FWS 1997) and in the Draft Recovery Plan. Habitat loss and modification continues to be the primary threat to the species.

The pygmy-owl is threatened by present and potential future destruction and modification of its habitat throughout a significant portion of its range in Arizona (Phillips *et al.* 1964, Johnson *et al.* 1979, Monson and Phillips 1981, Johnson and Haight 1985, Hunter 1988, Millsap and Johnson 1988). One of the most urgent threats to pygmy-owls in Arizona continues 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 affects the pygmy-owl (Abbate *et al.* 1999).

Pygmy-owls are capable flyers, but rarely make flights greater than 100 ft. (observational data from AGFD and FWS). Typical flight patterns are more likely to be from one tree to another nearby tree, avoiding long flights in open areas, presumably to avoid exposure to predation (AGFD 2003). 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 open areas may restrict pygmy-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 may result in pygmy-owls flying directly into the pathway of oncoming cars and trucks, significantly increasing the threat of pygmy-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 pygmy-owls attempting to cross roads. Specific research is needed to determine the distance at which road and clear zone widths significantly affect successful pygmy-owl movement, types of vegetation needed, roadway and landscaping designs, speed limits, etc.

Researchers in Arizona have found that pygmy-owls require habitat linkages, within and among home ranges, 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 to provide shade and cool temperatures, is necessary (Abbate *et al.* 1999, Wilcox et al. 2000). Pygmy-owls, 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 important 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 important, especially for small, depressed populations, such as pygmy-owls in Arizona.

Recent genetic research suggests that pygmy-owls in the action area show evidence of genetic separation 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 pygmy-owls in northwestern Tucson and the remainder of the State and Mexico increases the potential for the natural divergence of this population from the rest of the pygmy-owl population in Arizona. 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 pygmy-owls 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 pygmy-owls.

Application of pesticides and herbicides in Arizona occurs year-round, and these chemicals may pose a threat to the pygmy-owl. The presence of pygmy-owls 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 pygmy-owls and may be a threat to pygmy-owls and their prey; in one case, drums of toxic solvents were found within one mile of a pygmy-owl detection (Abbate *et al.* 1999).

Additional Threats

Although not used as the basis of listing, we identified several other potential threats to the pygmy-owl in the final listing rule (FWS 1997).

The pygmy-owl is highly sought by birders who concentrate at several of the remaining known locations of pygmy-owls in the United States. Oberholser (1974) and Hunter (1988) suggest that recreational birding may disturb pygmy-owls in highly visited areas, affecting their occurrence, behavior, and reproductive success. In the United States, pygmy-owls are rare and highly sought by birders, 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 pygmy-owl (Oberholser 1974, Tewes 1995). For example, in 1996, a resident in Tucson reported a pygmy-owl 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 (AGFD pers. comm. 1999). As recently as 2003, concerns have been expressed by property owners that birders and others have been documented trying to get photos or see pygmy-owls at occupied sites (AGFD pers. comm.).

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. In Texas, eggs and nestlings were depredated by raccoons *(Procyon lotor)* and bullsnakes *(Pituophis catenifer)*. Both adult and juvenile pygmy-owls are likely killed by great horned owls *(Bubo virginianus)*, Harris' hawks *(Parabuteo unicinctus)*, Cooper's hawks *(Accipiter cooperii)*, and eastern screech-owls *(Otus asio)* (Proudfoot and Johnson 2000). Similar predators are suspected in Arizona. Pygmy-owls are particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999). Recent research indicates that predation likely plays a key role in pygmy-owl population dynamics, particularly after fledging and during the post-breeding season (AGFD 2003). Additional research is needed to determine the effects of predation, including nest depredation, on pygmy-owls in Arizona and elsewhere.

Hematozoa (blood parasites) may cause neonatal bacterial diarrhea, marginal anemia, and septicemia (Hunter *et al.* 1987), reducing survival and recruitment of birds. However, no evidence of hematozoa in pygmy-owls in Texas (Proudfoot and Radomski 1997) or Arizona (Proudfoot *et al.* unpubl. data) has been recorded. Trichomoniasis also can cause mortality of raptors (e.g., Cooper's hawks in Tucson) (Boal *et al.* 1998) that ingest doves and pigeons, but the effects of this disease on pygmy-owls in Arizona is unknown. Most species of raptors in the Tucson area, including small owls such as screech-owls and elf owls, have had documented cases of trichomoniasis (AGFD pers. comm.). House finches and doves are prey items for pygmy-owls in Arizona and are carriers of trichomoniasis (Abbate *et al.* 1999). Recent investigations in Texas and Arizona have indicated the regular occurrence of avian parasites in the materials inside of pygmy-owl nest cavities. The numbers of parasites may be high enough to affect nestling pygmy-owls. Hence, further study is needed in Arizona and Texas to assess the potential for diseases and parasites to affect pygmy-owl populations. The West Nile Virus has been identified as the cause of a number of unusual raptor mortalities in some areas of the eastern United States. This virus is expanding to the west and the potential for infecting pygmy-owl warrants investigation and development of monitoring strategies.

Direct and indirect human-caused mortalities (e.g., collisions with cars, glass windows, fences, power lines, domestic cats, etc.), while likely uncommon, are often underestimated, and probably increase as human interactions with pygmy-owls increase (Banks 1979, Klem 1979, Churcher and Lawton 1987). This may be particularly important in the Tucson area where pygmy-owls are located in proximity to urban development. Pygmy-owls flying into windows and fences, resulting in serious injuries or death to the birds, has been documented twice. A pygmy-owl collided into a closed window of a parked vehicle; it eventually flew off, but had a dilated pupil in one eye indicating neurological injury as the result of this encounter (Abbate *et al.* 1999). In another incident, an adult pygmy-owl was found dead at a wire fence; apparently it flew into the fence and died (Abbate *et al.* 1999). AGFD also has documented an incident of individuals shooting BB guns at birds perched on a saguaro which contained an active pygmy-owl nest. In Texas, two adult pygmy-owls and one fledgling were killed by a domestic cat. These pygmy-owls used a nest box about 75 meters from a human residence. In 2001, predation by domestic cats is also suspected by researchers in two instances in northwestern Tucson (AGFD 2003). Free-roaming cats can also affect the number of lizards, birds, and other prey species available to pygmy-owls; however, very little research has been done in the southwest on this potential problem.

Rangewide Trend

Data collection related to the pygmy-owl has only been consistent throughout the state for the past few years (see Table 3). Even with expanded survey efforts since the pygmy-owl was listed as endangered in 1997, there are still many areas within Arizona that have not been surveyed or for which survey efforts are inadequate. Because research has been conducted for only a few years and because research and survey efforts have not been comprehensive or random in nature, it is not possible to determine population size or trend within Arizona. Additionally, the Tohono O'odham Nation supports pygmy-owls, but due to cultural and political constraints, complete information on the numbers or distribution on the Nation are not available. Given the historical distribution of pygmy-owls in Arizona, it is clear that they have declined throughout the state to the degree that they are now extremely limited in distribution (Monson and Phillips 1981, Davis and Russell 1984, Millsap and Johnson 1988, Proudfoot and Johnson 2000, Johnson *et al*. 2003).

Johnson *et al*. (2003) hypothesized that large-scale water development (damming and diversion of the Salt and Verde rivers) led to initial declines in species abundance and distribution.

Information gathered over the past few years indicates that pygmy-owls occur in Arizona in low numbers and are patchily distributed across southern Arizona. They occur in four main areas of the state, and numbers found within each area tend to vary on an annual basis (Table 3). Data are insufficient to determine meaningful trends, but it is likely that for the pygmy-owl to persist in Arizona, additional territories beyond those already known will be necessary, productivity must increase, and population support from Mexico or artificial augmentation is probably required. Currently, within the Northwest Tucson Area, there are only three pygmy-owl sites that are known to be active, and all three contain only unpaired males. Results of preliminary genetic analysis (Proudfoot and Slack 2001) and observations of incestuous breeding provide evidence that genetic variability may be low among these pygmy-owls. On two separate occasions in Northwest Tucson, siblings of the same nest were documented breeding with each other the following year (Abbate *et al.* 1999). Instances of sibling breeding may be a reflection of small isolated populations of pygmy-owls, and maintaining genetic diversity within depressed populations is important to maintain genetic stochasticity and fitness. AGFD (Abbate *et al.* 1999) has documented movement between pygmy-owls in southern Pinal County and northwest Tucson, therefore, maintaining this genetic interchange is important. The immigration of one or more female pygmy-owls into this area is essential to maintaining this group of pygmy-owls and their contribution to the overall survival and recovery of the pygmy-owl in Arizona.

Information about populations of pygmy-owls in Mexico is limited. Based on personal observations and anecdotal information, Russell and Monson (1998) recorded no decline in numbers from Sonora, Mexico. However, the first systematic surveys for pygmy-owls in Sonora were conducted in 2000 and 2001. These surveys resulted in the detection of 524 pygmy-owls along 329 transects, covering 1,113 km (Flesch and Steidl 2000, Flesch 2003b). Pygmy-owls were detected throughout the state of Sonora, from the international border south to the Sonora/Sinaloa border. In 2000 and 2003, AGFD personnel documented, through the use of radio telemetry, the movement of two dispersing juvenile pygmy-owls into Mexico from nests just north of the international border (AGFD pers. comm.). However, while movement of pygmy-owls across the border likely occurs, we have no information regarding the extent to which this happens.

In addition, we are not aware of any management or conservation practices in Mexico that are directed towards pygmy-owls. The expansion of agricultural and urban land uses increases habitat loss and fragmentation in Mexico and the stability of pygmy-owl populations cannot be determined. In Mexico, millions of acres of Sonoran Desert and thornscrub are being converted to buffelgrass (*Pennisetum ciliaris*) which represents both a direct and an indirect loss of habitat because of invasion into adjacent areas and increased fire frequency and intensity (McLaughlin and Bowers 1982, Burquez-Montijo et al. 2002). Burquez and Yrizar (1997) state that "Given the government subsidies to establish exotic introduced grasslands, to maintain large cattle herds, and to support marginal cattle ranching, the desert and thornscrub in Sonora will probably be replaced in the near term by ecosystems with significantly lower species diversity and reduced structural complexity, unless control measures are implemented." Such replacement is and will continue to affect pygmy-owl prey base and habitat availability. In the not-so-distant future, pygmy-owls in Arizona may represent the majority of pygmy-owls occupying the Sonoran Desertscrub and Semi-desert Grasslands.

Under the current taxonomic classification, cactus ferruginous pygmy-owls also occur in southern Texas. However, recent genetic work (Proudfoot and Slack 2001) may indicate that the pygmy-owls in Texas are genetically distinct from the pygmy-owls in Arizona, possibly to the subspecies level. Regardless of the genetic distinction, pygmy-owls in Texas are found primarily on large private ranches where the level of threats to habitat are reduced from those found in Arizona. Additionally, population numbers are higher and appear to be stable. Pygmy-owl populations in Texas are geographically separated from Arizona and currently provide no genetic or demographic support for Arizona populations.

Since listing in 1997, approximately 159 Federal agency actions have undergone informal consultation regarding the potential effects to pygmy-owls. These are actions that included sufficient measures to avoid or minimize impacts to the pygmy-owls so that the effects were insignificant or discountable. At least 46 Federal agency actions have undergone formal section 7 consultation throughout the pygmy-owl's range. Of these, only one resulted in a draft jeopardy opinion, and that was resolved as a non-jeopardy final opinion. Six formal consultations anticipated incidental take of one or more pygmy-owls. However, only non-lethal take was authorized. Given the extremely low number of known pygmy-owls in Arizona, lethal take of even a single owl would make it difficult to avoid jeopardizing the species. Many activities continue to adversely affect the distribution and extent of all types of pygmy-owl habitat throughout its range (development, urbanization, grazing, fire, recreation, native and non-native habitat removal, river crossings, ground and surface water extraction, etc.). Since 1997, we have provided technical assistance to hundreds of non-Federal projects, primarily single-family residences. These actions have no legal requirement to follow the recommendations we provide under technical assistance and we have no way of monitoring if or to what extent the recommendation are incorporated. They may or may not contribute to the conservation of the pygmy-owl, but they certainly contribute to ongoing effects to pygmy-owl habitat. Stochastic events also continue to adversely affect the distribution and extent of pygmy-owl habitat.

Anticipated or actual loss of occupied pygmy-owl habitat due to Federal or federally-permitted projects has resulted in biological opinions that have also led to acquisition of otherwise unprotected property specifically for conservation of the pygmy-owl.

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). In the Final BA, the applicant defined the action area as the project site plus a 600-meter buffer area in which indirect effects could occur to a pygmy-owl if subsequently located in that buffer. We do not believe that this determination acknowledges indirect effects that extend beyond the buffer.

Prior determinations of action area have included the respective actions' project sites and areas of suitable habitat within 21 miles of the project site. We based this determination on the documented maximum straight-line distance traveled from natal areas for juvenile pygmy-owls in Arizona (AGFD unpubl. data). More recently, we have made an effort to determine action area based on the extent of the indirect effects resulting from the proposed action. The revised action area determination thus includes: (1) the area affected by increased traffic and other urban effects; (2) increased predation from subsidized predators and household pets, and domestic cats in particular; and (3) incremental, adverse changes to the geomorphology of the Tortolita Fan.

The presence of roads often degrades and fragments habitat and given that such infrastructure is typically part of a network or system, the effects are often synergistic and widespread (Seiler 2001). Where such features are already present, the initial adverse effects of new residential development are the result of increased use of that infrastructure. Roads can present a mortality hazard to pygmy-owls. While narrower roads or wider roads with medians that incorporate trees can minimize the risk of mortality, it cannot be eliminated. Further, the risk of vehicle-strike mortality is likely related to the number of vehicles using the road; a greater number of vehicles (or a greater frequency of use) can reasonably be expected to increase the probability that a pygmy-owl will be struck. Given the pygmy-owl's rarity and patchy distribution, any vehicle strike mortality could have serious adverse consequences to a regional subpopulation.

The action area can be partially defined by the portion of the existing transportation network likely to be affected by the construction of the Tangerine Hills subdivision. The project area is largely rural, with a patchy distribution of residential and commercial developments of varying densities. The Tangerine Hills subdivision will include no commercial or retail development, so it is likely that an appreciable portion, if not all, of the residents will travel by car to work, regional shopping centers, schools, etc.

It is also reasonable to assume that incremental increases in traffic volume will eventually necessitate the improvement of existing arterial roads. Such improvements are likely to include widening to accommodate additional traffic, left-turn lanes, wider shoulders, etc. Local governing bodies, including Pima County, and the towns of Marana and Oro Valley, assess "impact fees" on new development; roads are included in these surcharges. Marana raises a large proportion of its money for roads from a 2% tax on new-home construction (The Arizona Daily Star 2003), and Oro Valley recently increased its roadway development impact fee to increase the capacity of the town's roadways system (The Northwest Explorer 2003), thus indicating that road construction and/or improvements are indirect, interdependent effects of that construction. As such, the action area thus must include all pygmy-owl territories and dispersal corridors intersected by those roads likely to be affected by the incremental increases in vehicular traffic from the Tangerine Hills subdivision. The extent of those effects may be defined by evaluating average trip distance. The Bureau of Transportation Statistics (2003) determined the average daily mileage of person-trips in personal vehicles to be approximately 10 miles. This average distance must necessarily be applied to the major arterial streets serving the proposed Tangerine Hills subdivision, including Tangerine Road, El Camino de Mañana, Thornydale Road, and Cortaro/Cortaro Farms Road. Further, there is a reasonable certainty that an interchange will be constructed to connect the Linda Vista Boulevard/El Camino de Mañana junction to Interstate 10, and the contribution of impact fees from the proposed project to road projects in Marana renders that road reasonably certain to eventually be subjected to increased traffic volume from the Tangerine Hills subdivision. These arterial routes cross the 600 meter

radii of three (3) pygmy-owl home ranges. The routes also cross the average 5-mile pygmy-owl dispersal routes from additional home ranges not intersected by the aforementioned roads. These home ranges and dispersal routes are all contained within CHU 3.

The action area may be further defined by the area that could be affected by the home range of wild predators fed by residents and by household cats. The scope of this effect is related primarily to the home-range size of the predator. While home range data exist for a variety of predators, the effects of potentially increased prey bases near irrigated urban areas confounds the determination. House cats, however, have been studies in wildland/urban interfaces. Goltz *et al*. (2001) studied feral cat predation of passerine birds in dry, high altitude areas in Hawaii National Park and determined that home ranges of male cats ranged from 10 to 95 square kilometers (2,471 to 23,475 acres). The authors also noted that two of the male cats tracked roamed up to 25 kilometers (15.5 miles) between sites. Edwards *et al*. (2001) studied male feral cats in a semiarid woodland in central Australia and noted long-term mean home ranges as large as 2,210.5 hectares (5,462 acres), 24-hour mean home ranges of 249.7 hectares (617 acres), and movements of up to 34 kilometers (21.1 miles). While these numbers are compelling, they represent movement of feral cats in relatively wild lands; home ranges of house cats are more applicable to this analysis. Regardless, it should be noted that feral cats originate with escaped pet house cats or are their progeny.

Barratt (1995) conducted *house* cat home range and predation studies in Canberra, Australia in a system of suburbs interspersed within remnant grassland, woodland and open-forest habitats and found that the largest day-time home range among the four cats who entered the woodlands was 17 hectares (42 acres), the largest night range was 28 ha (69 acres), and the furthest distance moved into adjoining habitat was 900 meters (0.6 mile). Moreover, in the project area, the animals taken by the cats (small mammals, birds, and reptiles) overlap with the prey base of the pygmy-owl, indicating that interspecific competition for prey could occur. We thus consider the action area defined by the effects of pets (house cats) to include the project site (less the area of the access road) and not less than a 900-meter (0.6 mile, or 2953 feet) buffer around it. This area is also located wholly within CHU 3.

A third category of indirect effects influences the action area for the Tangerine Hills subdivision and is related to incremental changes in surface hydrology across the Tortolita Fan. Alluvial Fans are depositional landforms, developed over geologic time, at the base of mountain ranges where ephemeral streams emerge from the higher gradient channels of the highlands to a markedly lower-gradient valley floor (Hydrologic Engineering Center 1993, Smith 2000). The "fan" terminology arises from the radial shape of the channels and depositional features on the plain. The lowlands surrounding the Tortolita Mountains also exhibit characteristics of alluvial slopes, which are differentiated from fans in that the channels are largely parallel, rather than radiating from the toe of the mountain front.

Rosgen's (1994) hierarchical stream classification system places alluvial fans under the "D" stream type. Rosgen's D-type streams are characterized by the presence of multiple, braided or bar-braided patterns with high channel width-depth ratios and channel slopes generally equivalent to the attendant valley slope. Bank erosion rates are characteristically high and meander-width ratios (the degree of lateral movement; sinuosity) low. The D-type stream system in the Tortolita Fan is typical of arid-region systems in which the flashy (highly variable,

spate-driven) runoff regime generates a high-sediment supply. Indeed, the Tortolita Fan classifies as D-5 stream type, which indicates a sand-dominated system.

We have noted that the Tortolita Fan appears to exhibit a relatively high-gradient landform slope mimicked closely by the attendant channel gradients; the channel-bottom slopes are essentially equal to the slope of the downhill slope of the surrounding uplands. This characteristic, as well as the inverse relationship between sinuosity (meandering) and channel gradient (slope), would indicate that the baseline state of unaffected Tortolita Fan channels is one of relatively straight channels with high lateral stability. We further hypothesize that lateral movement of channels occurs at very slow rates on the Tortolita Fan, as evidenced by the widespread presence of mature examples of slow-growing plants such as ironwood trees and saguaro cactus in close proximity to active channels.

Rosgen (1996) also states that adjustments in channel patterns on D-type streams can be initiated by changes in the encompassing landform, contributing watershed area, and/or the existing channel system. While the landform of the Tortolita Fan remains relatively intact and unconstrained at the regional scale, each of these perturbations have already occurred to varying degrees.

Alterations have been made to the smaller-scale landform through the placement of roads and the construction of structures. Arterial roads in particular intersect numerous channels, and deposition of sediments upon fords (low-water crossings) following runoff events is evidence of the sediment-producing (and depositing) capacity of the system. Roads and bridges can alter a given channel's morphology by imposing on it a "hard" cross section that may differ from the natural cross section existing above the road (Rosgen pers.comm). The changed cross-sectional geometry that flowing water encounters at low-water crossings and at bridges is often results in small-scale channel adjustments that include elevated mid-channel deposition within the road and subsequent lateral scour of xeroriparian vegetation within the reach immediately downstream of the crossing.

A second, small-scale landform-type effect already widespread on the Tortolita Fan is the construction of homes on the land bases between channels. These interfluvial areas were formed by the long-term deposition of sediments by channels and are thus properly viewed as depositional features. During periods of precipitation, however, these interfluves can be expected to contribute runoff and to a lesser degree, sediment, to the adjacent channels. The development of appreciable portions of the land between the Tortolita Fan's various channels has changed runoff and sediment-contribution and thus has likely contributed to geomorphic adjustments.

There have also been changes in the contributing watershed area of the Tortolita Fan. The Dove Mountain development, constructed at the base of the Tortolita Mountains, includes retention basins, lined channels, large golf courses, and an appreciable amount of impervious area. This development has not changed the watershed in terms of its areal extent, but it is likely to have altered the behavior of flowing water in the location where perturbations are likely to have the greatest adverse hydrologic effect: the fan's apex. Stream flow exerts a strong influence on channel morphology (Rosgen 1996). It is therefore likely that there has at least been some alteration in the magnitude, frequency, duration, and/or sediment load of peak flow events

originating above the constructed area, though the linkage between those changes and effects on the ecosystem containing the pygmy-owl cannot yet be measured.

Of the most immediate concern are developments that directly alter the existing channel system via encroachment or channelization. Encroachment on the channel sufficient to trigger geomorphic adjustments is rare due to application of local floodplain development regulations, though it must be understood that the traditional 100-year floodplain restrictions may allow development in close proximity to steeper channels with limited floodplain development. These proximal developments, while theoretically outside of the floodplain, may still have the capability of altering channel morphology during periods of elevated discharge. The Hartman Vistas development just east of Interstate 10 along Linda Vista Boulevard included homes and lots that would encroach on the xeroriparian system, though we are presently unsure if adjustments in channel geometry have developed or will in the future. We have also observed the conversion of formerly-natural channels to trapezoidal, concrete-lined or banked floodways in association with the Dove Mountain development as well as elsewhere in lower reaches of the Tortolita Fan.

Rosgen's (1994, 1996) treatment of fluvial systems thus informs us that alluvial fans are depositional in nature and exist in a state of dynamic equilibrium between sediment supply and surface water runoff. Changes in the flow and/or sediment supply to or within an alluvial fan can affect the fan's downstream surface. Past development has contributed to baseline levels of adverse effects, but we are becoming increasingly concerned with future project's alterations to sediment supply and the timing, magnitude, and frequency of peak flows.

While further changes to the Tortolita Fan's apex (or within the mountain/lowland transition of an alluvial slope) are expected to have the greatest effect, any retention of sediment can affect the sediment transport capacity, or competence, of the flow across the fan (Hydrologic Engineering Center 1992). When competence of the flow exceeds the sediment load available, channel incision and/or widening are likely to occur (Hydrologic Engineering Center 1992). The Tortolita Fan is vulnerable to fluvial readjustment because the decomposed, granitic soils are susceptible to erosion. The erosive nature of the fan likely receives little mitigative effect from the Sonoran desertscrub vegetation, which does not possess the highly rhizominous structure (complex rooting patterns) or density to account for an appreciable level of bank stability. We feel it is more likely that lateral movement is presently restricted by the steep gradient evident in channels on the Tortolita Fan.

Further lateral erosion (meandering, undercutting, mass wasting of banks) within the channels on the Tortolita Fan processes may erode, flank, scour, and ultimately remove xeroriparian vegetation within and adjacent to channels. Vertical erosion (downcutting, headcutting, gully-forming) can reduce alluvial ground water availability via incision of water tables and result in indirect stresses on plants. The latter process is less likely on the Tortolita Fan, as channel slope is already nearly equivalent to the valley slope.

If erosion within the Tortolita Fan's channels advances to the point where existing developments and infrastructure are threatened, or if hydraulic modeling anticipates appreciable future erosion will occur, the placement of structural flood control measures such as bank protection (to arrest the more-likely lateral migration scenario) or gradient-control structures (to mitigate the less-likely vertical erosion scenario) may be indicated. The worst-case scenario, from an ecological

standpoint, would be wholesale channelization. Each of these flood damage reduction schemes is likely to have appreciable impacts on the xeroriparian ecosystem. The existing and future incremental development of the Tortolita Fan may thus precipitate landscape-scale vegetative changes to the fan that are adverse to pygmy-owls.

The portion of the aforementioned, potential, landscape-scale directly attributable to the proposed Tangerine Hills subdivision would likely manifest in the channels from the project area downstream to the Santa Cruz River. These channels intersect the potential dispersal routes from at least 3 pygmy-owl home ranges and thus, influence conservation of the pygmy-owl well beyond the reach of the 600-meter zone of influence discussed in the Final BA. This is significant due to the fact that washes and drainages provide vegetation characteristics utilized by breeding and dispersing pygmy-owls within the entirety of CHU 3.

The direct and indirect effects resulting from this project include the effects of house cats (900 meter radius), increased traffic and road effects (10 mile mean trip distance), and fluvial effects (drainages and associated vegetation downstream to the Santa Cruz River). These effects influence the viability of proposed CHU 3 and the pygmy-owls presently occupying it. The effects to this critical habitat unit are key in our evaluation of whether this project will jeopardize the species or adversely modify proposed critical habitat. Therefore, the action area for this project is the affected proposed critical habitat unit, CHU 3. The action area includes 15 pygmy-owl home ranges and intersects dispersal habitat and known dispersal pathways for these same pygmy-owl home ranges. Critical habitat was proposed based on pygmy-owl occupancy status and/or their contribution to habitat connectivity and habitat availability needed for population expansion. Effects on the past and current function of these areas have occurred as a result of capital improvement projects, residential and commercial development, and agricultural activities. In particular, these activities have affected the amount of available pygmy-owl breeding habitat and have resulted in loss of habitat connectivity and increased fragmentation. Remaining areas of pygmy-owl habitat within the action area are very important. The following discussion further elaborates past and ongoing effects on these units within the action area.

The action area is within the paloverde-cacti-mixed scrub series of the Arizona Upland Subdivision of the Sonoran Desertscrub community. The action area is also characterized by existing and ongoing urbanization, which has had the effect of removing and fragmenting suitable pygmy-owl habitat. During fiscal years 2001 and 2002, we completed 14 formal section 7 consultations and 69 informal section 7 consultations within the action area (e.g., planned residential, commercial, and other developments) and have provided technical assistance to hundreds of individuals seeking to develop single-family residences on individual lots and other non-Federal projects. There are also many projects, primarily single family residences, where we do not have the opportunity for input. At least two commercial projects where clearing of vegetation occurred proceeded without FWS input. All of these projects, combined with existing development, contribute to habitat fragmentation and reduce available habitat, particularly in the southern portion of the action area. Areas large enough to provide for successful breeding and dispersal are most limited in the areas to the south and east of the Project.

Dove Mountain and Heritage Highlands, together covering close to 5,600 acres, are mixed-use developments located in close proximity to the north and west of the project parcel. Consultation was conducted for Dove Mountain and a portion of Heritage Highlands, and actions are being implemented to reduce effects on pygmy-owls. However, approximately 97 acres of the Heritage

Highlands project has been or is being graded and developed without undergoing section 7 consultation. The Section 36 development is situated nearly immediately north of the proposed action's project site, and construction will soon begin on up to 172 acres of the 598 acres of habitat in the project site. These residential, commercial, and golf developments have removed areas of habitat and contribute to habitat fragmentation but have also set aside significant habitat areas that are suitable for dispersal and breeding. A development proposal, Sky Ranch, received an incidental take permit pursuant to section 10(a)(1)(B) of the Act, that covers over 500 acres of pygmy-owl habitat adjacent to this project. This development was planned to reduce effects on pygmy-owls. The clustered development will result in both further fragmentation of the landscape and permanent conservation of 409 acres of pygmy-owl nesting, foraging, and dispersal habitat.

A second development, Tangerine Crossing, will cover approximately 300 acres and is located just one mile to the east of this project. It is unknown what effects this project may have on pygmy-owls and critical habitat, nor do we know what contributions this project may make toward conserving the pygmy-owl within the action area. In March 2002, we completed consultation with the EPA on a 100-acre residential development (Butterfly Mountain) adjacent to the project on the east. Butterfly Mountain will result in approximately 17% surface disturbance, but will retain potentially suitable nesting, foraging, and dispersal habitat. A number of project proponents have submitted development proposals to us for the area south and southwest of the proposed project, but they have not yet entered formal consultation.

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 south. In December 2000, we completed a consultation with the EPA for a 29-acre residential development (Tecolote de Oro) approximately 3.5 miles to the southeast. In July 2001 we completed a consultation on the 7-acre Crescent Ridge Apartments, approximately 3 miles to the south east. In December 2001, we completed two consultations with the EPA: a 7.86-acre project for Mountain View High School approximately 3 mile to the southeast, and a 141-acre residential development (Hartman Vistas), approximately 3 miles to the south. In February 2002 we completed a consultation with the EPA on improvements to Thornydale Road which will remove nine acres of suitable habitat approximately 4 miles to the south. In April 2002 we completed consultation with the EPA on a 150-acre residential and commercial development (Chaparral Heights) approximately 3 miles to the southeast of the project site. In July 2003 we completed consultation on the development of Section 36 in Township 11 North, Range 12 east, in Marana, less than one mile north of the proposed project.

While none of the above actions rose to the level of jeopardy, take of one or more pygmy-owls was anticipated on four of the above projects. It is evident that portions of the action area for this project are experiencing ongoing loss and fragmentation of habitat that may affect the pygmy-owl in northwest Tucson. This trend is expected to continue. However, some of these activities have had a Federal nexus that resulted in consultation with FWS. As a result, we have been able to recommend modifications to activities that would block potential movement or dispersal corridors and permanently set aside either on-site or off-site conservation lands that contribute to the survival and recovery of the pygmy-owl.

The Town of Marana, which contains part of the action area, 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). 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 northwest Tucson and, for the first time, Marana issued more than 1,100 permits, with a strong building trend expected to continue steady or increasing (The Arizona Star 2000a). We have received, and continue to receive, notification of numerous new housing subdivisions and commercial developments in this region as well. 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). Not all of this growth occurs within the action area, nor are pygmy-owls affected by all growth. However, as described above, portions of the action area are experiencing and are highly likely to continue to experience effects from urbanization. New housing construction, and its associated commercial developments and capitol improvements, will continue to contribute to the loss and fragmentation of pygmy-owl habitat within the action area.

The action area includes all of proposed CHU3. This area includes lands that are not suitable habitat for the pygmy-owl. Within the action area, we recognize that active farm fields and areas of intense urban development and associated infrastructure that no longer support appropriate vegetation components do not support suitable habitat.

The Tangerine Hills subdivision is situated south and east of a contiguous block of several thousand acres of State Trust Land, including approximately 2,400 acres leased for pygmy-owl conservation purposes as part of the Dove Mountain development project. The portion of the action area defined by the effects of increased traffic on Tangerine Road and El Camino de Mañana lies adjacent to or within these State lands. Existing development and development proposals in the northern part of the action area are less extensive than in the southern part. However, State Trust lands may be sold or exchanged and could be used by future owners for development. The extent of development and the ability to address effects on pygmy-owls on State Trust lands depends on if they are sold or exchanged, the type of development proposed, and the presence of a Federal nexus. 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.

The Recovery Team has prepared a draft recovery plan dated January 2003 for the pygmy-owl (Draft Recovery Plan) and recommended "Recovery Areas" that they believe are necessary for the survival and recovery of the pygmy-owl in Arizona (FWS 2003). Pertaining to this project, all areas are within a recommended Recovery Area. The team also has recommended specific areas within Recovery Areas for special management (i.e., SMAs) that are of the highest concern because: (1) they contain high concentration of pygmy-owls, particularly nesting pygmy-owls, that are important sources of young pygmy-owls to increase the population; (2) pygmy-owl recovery is dependent on the availability of suitable habitat near breeding areas not currently known to have pygmy-owls where juvenile pygmy-owls can disperse into and successfully breed; and (3) they are threatened by rapid urban development or other immediate threats. Within the action area, two SMAs have been recommended by the Recovery Team: (1) Northwest Tucson SMA – located generally north of Cortaro Farms Road, south of the 136000 N street alignment, east of Interstate 10, and west of La Cholla Blvd; and (2) Tortolita Fan SMA –

containing major washes and upland corridors connecting the Northwest Tucson SMA to southern Pinal County. The project site falls within the Northwest Tucson SMA. The conservation measures that will be incorporated as part of this project are generally consistent with the applicable recommendations of the Draft Recovery Plan.

Researchers in Arizona have found that pygmy-owls 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 cool temperatures (Abbate *et al.* 1999, AGFD unpubl. data). Pygmy-owls, 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% 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 pygmy-owls in Arizona.

In 2002, only a small population (9 adults) of pygmy-owls were known in the action area. Of the known pygmy-owls, only one was a female, increasing the vulnerability of this population segment to extirpation. This emphasizes the need to maintain the ability of pygmy-owls within the action area to breed and disperse, particularly to enhance the pairing of known single males. Pygmy-owl use in the vicinity of this project has been documented since 1994. In 1994, a pair of pygmy-owls was located within 0.5 mile of the project, although no nest was confirmed. In 1995 and 1996, an unpaired pygmy-owl was detected within 0.5 mile of the project. In 1998, a nest was located within 1.5 miles and two dispersing juveniles established a breeding territory approximately 0.5 mile to the west. This pair successfully produced young in both 1999 and 2000. A total of eight pygmy-owl territories have been documented within 3 miles of the project since 2000. In 2002, there were four occupied pygmy-owl territories within three miles of the project. In 2003, three of those territories were known to be occupied. Field work is underway to determine the occupancy of territories in 2004.

In addition to territorial owls, a number of dispersing juveniles have been documented near the project. In 1997 and 1998, a juvenile was documented each year moving in a northerly direction between one and two miles west of the project. In the fall of 1999, a dispersing juvenile was likely to have crossed north of the project within Section 36 based on consecutive telemetry locations. A dispersing juvenile was documented moving west along the south side of Tangerine Road, likely through the project area, during autumn 2001. This same owl crossed Tangerine Road and moved north within one mile of the project's north and west boundaries.

Since 1999, the area intersected by and overlapping with the action area has accounted for approximately 30% of the documented adult pygmy-owls and 40% of the documented nests in Arizona (Abbate *et al.* 1999, 2000, AGFD unpubl. data). Given the substantial proportion of the statewide documented pygmy-owl population that this represents, we believe the pygmy-owl habitat and dispersal corridors found within the action area are important for the survival and recovery of the pygmy-owl statewide.

Effects of the Proposed Action

The residential housing portion of the proposed action will result in the net, permanent loss of 11.59 acres (30.49% of the 38-acre project site) of Sonoran desertscrub vegetation which contributes to foraging, sheltering, movement, and dispersal habitat for pygmy-owls in the project vicinity and has the potential to partially support nesting or territorial pygmy-owls if discovered during surveys or as they disperse from other areas within the action area. This project will also increase habitat fragmentation within the project site. The entire project site contains suitable habitat for the pygmy-owl, and it could provide for each of these life history components. The project site is near existing and proposed urban development. The access road will result in the loss of an additional 1.62 acres of habitat off-site and the introduction of new vehicle strike hazards and hydrologic changes within the two fluvial features it crosses. The total loss of habitat, all of which is proposed critical habitat, is 13.21 acres.

The action area intersects or lies within the Northwest Tucson and Tortolita Fan SMAs identified in the draft Recovery Plan. The Recovery Team recommends that areas within SMAs be conserved in a manner that promotes the successful breeding and dispersal of pygmy-owls. The specifics of how that is to be accomplished should rely upon the best available scientific data. Currently, the best information regarding the amount of development occurring in successfully breeding pygmy-owl home ranges comes from data being gathered by the AGFD. In home ranges (estimated to be 280 acres in size) where successful nests have been located, disturbance ranged from 16% to 54% with a mean of 33%. There are limitations to the data on which these numbers are based such as the small sample size, the limited number of years over which these data have been gathered, and the absence of data qualifying the disturbance types. However, it represents the best information upon which we can currently base our analysis. This project will result in the disturbance of approximately 30.5% of the residential project area. The acreage of disturbance for the road is not included in this calculation, as it exists off site in otherwise undeveloped lands.

Surveys for pygmy-owls were conducted on the project in 1998, 2000, 2001, and 2002. No pygmy-owls were detected during these survey efforts. The Final BA includes the results of AGFD Heritage Data Management System (HDMS) queries which indicate the presence of confirmed pygmy-owl detections approximately 0.25 to 0.75 mile east of the project area during the 1994 to 1999 survey seasons. A cluster of pygmy-owl detections occur approximately 0.5 to 1.0 mile south of Tangerine Road along Camino de Mañana in surveys conducted from 1994 to 1996. A pygmy-owl was detected northeast of the Camino de Mañana/Tangerine Road intersection in 1995, and there was a detection north of Tangerine Road and west of Tortolita Drive in 1999. These detections are within the action area, but we do not believe that this project will directly affect a known breeding site for the pygmy-owl. However, if a pygmy-owl does, in the future, establish a territory on or adjacent to the project site, the project proponent will implement measures to avoid direct effects including the application of adequate conservation measures as defined above in the subsection entitled Development Constraints – If an Owl Shows Up (Final BA: Section 3.4) to ensure noise disturbances will not cause the pygmy-owls to abandon their nest or activity center and a sufficient amount and configuration of suitable habitat will be protected within their territory for it to remain viable for pygmy-owls.

There is a reasonable likelihood that juvenile pygmy-owls may disperse through or onto the project site during construction of this development because: (1) there are active nest sites within the known dispersal distance; (2) the project site contains and will retain suitable dispersal

corridors; and (3) dispersal has been documented in the immediate vicinity of the proposed project site. Dispersing pygmy-owls typically move greater distances during the dispersal period, ranging several miles and over wide areas before selecting a territory, where they will remain throughout the remainder of the fall and winter. The clustered residential development will affect the configuration of dispersal habitat compared to existing conditions but these effects have been reduced through the amount and configuration of open space conserved on-site. Based on the proximity of this project to a known dispersal pathway and the past history of pygmy-owl dispersal in relation to the project site, there is a reasonable likelihood that, over time, one or more dispersing juveniles will use this project site. Because of the inconsistent response of pygmy-owls to the survey protocol, the likelihood that AGFD will not monitor all pygmy-owls in northwest Tucson with telemetry, and the difficulty in defining owl use areas, we anticipate the possibility that a pygmy-owl could establish a territory on or adjacent to the project.

To support the movement of pygmy-owls through the project site and vicinity, and to partially offset adverse effects of the removal of dispersal and movement habitat in the project site, Conservation Property areas have been incorporated into the project description. These Conservation Properties provide approximately 8 acres of habitat in the southwest quarter of the project area and two protected dispersal corridors through the project area. The western-most corridor traverses the project site from the southwestern conservation parcel to the approximate center of the northern project-area boundary. This corridor is 430 feet wide at the southwestern conservation parcel and 473 feet wide at the northern boundary. The eastern-most corridor traverses the project area from the southwestern conservation parcel and birfurcates, with a fork reaching the approximate center of the eastern project boundary and the other reaching the center of the northern quarter of the eastern boundary. This corridor is 135 feet wide where it meets the southwestern conservation parcel, 135 feet wide at the center of the eastern project boundary, and 148 feet wide at the center of the northern quarter of the eastern boundary. The respective minimum widths along the central and northern forks of the eastern-most corridor are 135 feet and 55 feet. It is reasonable to assume that pygmy-owls will be able to utilize these corridors to move from the northeast to the southwest through the project site, though the positioning of houses on the interfluve areas between the channels may render the habitat less suitable and/or preclude movement perpendicular to the washes within the residential area.

There are also a number of potential indirect effects on pygmy-owls that could result from the development of this project. For example, mortality risks associated with 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 pygmy-owl sites to residential areas in northwest Tucson, these interactions may be a significant cause of pygmy-owl mortality there (Cartron *et al*. 2000a). It is expected that with this residential development, the number of cats will increase, resulting in increased possibility of predation of pygmy-owls and a reduction in the abundance of pygmy-owl prey species (e.g., lizards, birds) in this area, causing additional adverse effects on pygmy-owls.

Roads present a mortality hazard to foraging and dispersing pygmy-owls. The tree-to-tree flight pattern of the pygmy-owl can be disrupted by roads; the road's width may prevent the pygmy-

owl from crossing it, and pygmy-owls that do attempt to cross may be struck by passing automobiles. While retaining roads in a narrow state and/or incorporating vegetated medians into a wider road may reduce the potential for habitat fragmentation and vehicle-strike mortality, the risk of both effects can never be completely eliminated. The project can be reasonably expected to generate a greater number of vehicle trips per day. This increase in vehicle trips (or a greater frequency of use) can therefore reasonably be expected to increase the probability that a pygmy-owl will be struck. Given the pygmy-owl's rarity and patchy distribution, and the fact that Tangerine Road and Camino de Oeste cross documented pygmy-owl dispersal routes, any vehicle strike mortality could have serious adverse consequences for the long-term persistence of pygmy-owls in northwest Tucson because there are only two known individuals at this time.

Barratt (1995) studied the home range and predation of house cats within a mosaic of suburban and remnant grassland, woodland and open-forest habitats in Canberra, Australia. Of the 17 cats selected for radio collaring and telemetry work, 10 were house cats (the remainder were feral). It was found that 4 of the 10 house cats entered the woodlands. The home range sizes associated with these cats were discussed in the Environmental Baseline section, above. Barratt (1995) also studied the prey items caught by a larger sample (214) of house cats for a 12-month period. Some 2,000 vertebrate prey items were documented, representing at least 67 species. House mice comprised 56% of the total, black rats 7%. Forty-seven species of birds (41 of which were native species), comprised 27% of the total catch. Reptiles represented 7% of the total, and amphibians 1%.

House cats represent a direct threat to pygmy-owls. Pygmy-owl's small size is typical of many passerine birds, and they are within the size range of birds that may be taken by a house cat. It has been specifically documented in Texas that free-roaming cats have killed both adult and fledgling pygmy-owls. In northwest Tucson, two incidences of likely cat predation have been reported (AGFD unpubl. data). Given the heavy representation of small rodents, birds, and reptiles noted by Barratt's study and the similar cross section of pygmy-owl prey recorded by Abbate *et al.* (1999), we are concerned that house cats may actually compete for prey with the pygmy-owl. The substantial overlap in prey preference may secondarily expose the pygmy-owl to increased risk of predation (i.e both animals are seeking the same prey), particularly in those moments when the pygmy-owl has seized a prey item larger than itself on the ground.

The applicant has specifically established CC&R Conservation Element 4 in regards to domestic animals. This CC&R states that 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 outside of these enclosed areas shall be leashed. Domestic cats shall be restricted to the inside of the homes or leashed. We have determined that this will appreciably minimize the risk of pygmy-owl mortality from house cats, though it will not eliminate it.

The proposed project will have indirect effects on surficial hydrology within and downstream of the project area. Residential development will increase the impervious area within the project area, thus altering the timing and magnitude of rainfall runoff. An on-site stormwater management plan has been developed, and is stated to be in compliance with applicable local regulations that include specific requirements for stormwater detention/retention to control the peak discharge. On-site detention will be used to collect and release runoff commensurate with current local drainage ordinances. Implementation of the stormwater management plan is expected to maintain the peak of the hydrograph within downstream drainages to a level

commensurate with existing natural levels. Implementation of this plan may prolong the duration of the hydrograph at the discharge point, increasing available water to these natural arroyo systems and potentially increasing the biomass of vegetation associated with these downstream areas. The changed surficial hydrology on the interfluve areas within the project area, however, can be expected to have an incremental effect on the sediment dynamics of the fluvial system. While the shape of the hydrograph may not be fundamentally altered, any retention of runoff on-site will likely retain sediment. Further, the construction of homes, yards, streets, and other anthropomorphic features are likely to incrementally lessen the supply of sediment to adjacent channels. Lastly, the potential increased biomass within the channels may reduce their capacity to conduct floods, thus increasing the potential for lateral erosion. The subsequent placement of bank protection to arrest this potential erosion could confound any gains in vegetation. While the effects of these hydrologic and fluvial changes on the pygmy-owl are difficult to measure, they are of increasing concern to us because they may contribute to landscape-scale, adverse changes to fluvial and interfluve areas on the Tortolita Fan.

An increased incidence of environmental contaminants is an indirect effect of the proposed action. The use of pesticides, in particular, could affect pygmy-owls indirectly by reducing prey species (e.g., insects, reptiles, birds) within their home ranges and directly if not used in a controlled and targeted manner. The application of pesticides will be limited to the developed areas of the project site and prohibited in the Conservation Property, helping to reduce, but not eliminate, effects in these areas.

The effects that non-directional and high-intensity lighting have on pygmy-owls are unknown. In residential areas, lighting is expected to increase substantially; however, it is not quantified in the BA. Of particular concern is high-intensity lighting in close proximity to pygmy-owl nests, activity centers, and movement corridors. Increased exposure to predation of adult pygmy-owls and fledglings may occur from great horned owls and other predators where bright lights are used near pygmy-owl sites. If low-intensity and directional lighting is used to reduce the exposure of pygmy-owls to predation in these areas, adverse effects would be substantially reduced or eliminated.

The proposed action could also cause short-term noise disturbance associated with construction and long-term noise disturbance and increased human activity. In the event a pygmy-owl were present, it is possible that such noise disturbance would affect the pygmy-owl directly by altering behavior and indirectly through potential increases in predation, effects on prey species, etc. However, these effects have not been quantified during research on pygmy-owls. The project proponent will implement the development constraints discussed in this document related to activities in proximity to pygmy-owls on and adjacent to the project. This should reduce the effects on pygmy-owls from noise and disturbance related to construction activities associated with this project.

Vegetation disturbance and activities that cause noise disturbances will be extremely limited within the Conservation Property per the conservation measures set forth in the project description and this opinion (e.g., ORV, jeep tours, organized events, pesticides, bright lights, and other activities). Because these activities are restricted within Conservation Property corridors, the corridors should provide connectivity and cover for pygmy-owls and allow for movement through the project site, reducing the effects of this project on pygmy-owl

movements. See also Reasonable and Prudent Measure 2: Terms and Conditions 2.1 through 2.3.

Interrelated and Interdependent Actions

Interrelated activities are part of the proposed action that depend on the action for their justification, and interdependent activities have no independent utility apart from the action. Direct and Indirect effects are discussed in the section above.

The proposed Tangerine Hills subdivision will make incremental contributions to increased traffic. The roadway impact fees collected from the development will be used to improve existing roads and construct new ones in the project's region. These future actions are interdependent effects of the proposed action. These effects, however, are difficult to measure at this scale and are, at present, useful primarily in determining the scope of the project's effects and the action area.

Proposed Critical Habitat

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service* (No. 03-35279) to complete the following analysis with respect to critical habitat.

The project area falls within, and the action area is represented by, the 73,958-acre Unit 3 of the proposed critical habitat for the pygmy-owl (U.S. Fish and Wildlife Service 2002). All of the primary constituent elements (PCEs) defined in the proposed rule designating critical habitat are found within the project boundaries. Constituent elements containing components essential for nesting, rearing of young, roosting, sheltering, and dispersal will be removed in a portion of this area. These elements include Sonoran desertscrub and xeroriparian vegetation containing saguaro cactus and large diameter trees, including ironwood, palo verde, mesquite, etc. These primary constituent elements will be eliminated on 13.22 acres within the project boundaries. This equals approximately 0.02% of Critical Habitat Unit 3. However, the actual percentage of critical habitat removed is somewhat higher since not all areas within the boundaries of critical habitat contain primary constituent elements (U.S. Fish and Wildlife Service 2002). Movement corridors will be maintained through the project site to allow for the movement of pygmy-owls through the area. The conservation measures described above and in the BA should maintain the function and viability of proposed critical habitat in Unit 3.

Summary

Based on the current status of the pygmy-owl in Arizona, survival and recovery of the pygmy-owl will likely require not only protection of all known sites, but also the conservation of other areas not currently known to have nesting pygmy-owls. This 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 have nesting pygmy-owls or are important for recovery. This project contains measures to ensure that connectivity between large blocks of habitat are maintained. At a finer scale, the protection of habitat within the vicinity of known pygmy-owl sites for

establishment of new sites and movement between them is also essential. The Northwest Tucson and Tortolita Fan SMAs account for a substantial proportion of the documented pygmy-owls and nests in Arizona. They also contain habitats not currently known to have nesting pygmy-owls, that are likely important for the expansion of the population within the action area. Measures implemented as a part of this project will help to maintain habitat components contributing to fine scale movements of pygmy-owls in the vicinity of known sites.

The development of the Tangerine Hills subdivision will permanently remove approximately 13.22 acres (residential development and off-site access road) of suitable nesting, foraging, sheltering habitat. Movement and pygmy-owl dispersal corridors will also be affected in these areas. Direct effects to nesting and dispersal habitat have been minimized and addressed through the conservation measures outlined in this opinion and the BA. Indirect effects associated with the development are anticipated but are also addressed in the conservation measures outlined in this opinion.

A maximum of 30.5% of the project site will have vegetation removed or disturbed, with 69.5% of the area maintained as natural open spaces. The removal of this amount of pygmy-owl habitat in the vicinity of rapidly urbanizing northwest Tucson will result in effects to pygmy-owls in Arizona. Because the project proponents have incorporated a large area of undisturbed open space within the development, because management activities on these lands will be conducive to the conservation of the pygmy-owl in accordance with measures contained in this opinion, and because of the extent of undisturbed or low-density disturbance present adjacent to the project boundaries, it is our opinion that the direct and indirect effects of this project on pygmy-owls and on pygmy-owl critical habitat are being addressed considering the best available science and the intent of recommendations made by the Recovery Team (FWS 2003) for minimizing effects on the Arizona pygmy-owl population.

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 draft 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 Act. As defined in the Environmental Baseline section, above, the action area includes 1,015 acres of project area and surrounding lands; a portion of one pygmy-owl home range; potential and known dispersal corridors intersected by Tangerine Road, El Camino de Mañana, Thornydale Road, Cortaro/Cortaro Farms Road, and Linda Vista Boulevard; and the two alluvial channels draining the project site to their confluence with the Santa Cruz River.

The action area thus overlaps or adjoins areas subject to ongoing residential and commercial development pressures, and State, local, and private actions are expected to continue with various levels of development immediately to the south and east and, to a lesser extent, northwest of the project site and elsewhere in the action area. Activities occurring within jurisdictional waters and wetlands of the U.S. require a section 404 permit under the CWA from the COE and, as a result, would be subject to future section 7 consultation and are not considered under cumulative effects. The Final BA for this project included partial information regarding cumulative effects. We also were provided with information regarding cumulative effects during consultation on the development of Section 36 in Township 11 North, Range 12 east, in Marana.

The data provided under the prior consultation included information and statistics concerning zoning and development levels within the portion of the action area proposed as critical habitat. We considered that information during our analysis of cumulative effects, and utilized those portions of that information that we deemed to be determinative.

In the past, any activity clearing five acres or more required a NPDES section 402 permit under the CWA from the EPA. However, the NPDES program was recently transferred to the State of Arizona Department of Environmental Quality and, as a result, projects requiring such a permit will no longer have a Federal nexus if the project does not require a permit from the ACOE. Many of these projects that were not formerly considered under cumulative effects because of their Federal nexus and section 7 process now need to be included in this analysis. Some of these projects may address effects on pygmy-owls through another process (Habitat Conservation Planning under section 10 of the ESA) and could be excluded from this cumulative effects analysis, but such participation is voluntary. Aside from HCPs already in development, it is difficult, if not impossible, to predict which parcels may choose to pursue an HCP. Therefore, the scope of the cumulative effects analysis for this project covers all activities not likely to require a 404 permit from the ACOE. It must also be noted that avoidance of jurisdictional waters may preclude the need obtain a 404 permit, thus removing a given project's Federal nexus.

The action area has been subject to significant development activities, and while development will likely continue at some level, there have been a number of recent lower-density developments proposed, such as Butterfly Mountain and Saguaro Canyon Ranch. In addition, some development projects have chosen to cluster development at higher densities, leaving larger blocks of undisturbed desert and wash vegetation (Dove Mountain and Sky Ranch). Both of these approaches reduce the level of cumulative effects on pygmy-owls. Some areas have been down-planned (recent plans recommend lower density development than previous plans), but build-out at these lower densities is dependent on a number of factors including market, existing zoning, and intentions of the landowner. Much of the private land in the area is zoned for low-density residential uses that would have reduced effects on the pygmy-owl. However, past development has often occurred on parcels with low-density zoning that was rezoned to a higher density. Based on projects with which we are familiar, this trend is likely to continue, but probably to a reduced extent.

The Baseline Conditions describe an action area that is already developed and fragmented, primarily in the area to the south of this project. As a result, any additional loss or fragmentation of pygmy-owl habitat may affect the species' ability to persist on the landscape. So while development trends, zoning, and planning are beginning to provide a scenario where cumulative effects may be reduced, any cumulative effects, particularly in the area south and east of the project site, may still have a considerable effect on the pygmy-owl. Many small, undeveloped parcels used primarily for single-family dwellings will not require a Federal permit or other Federal nexus and will continue to be built without section 7 consultation.

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, if developed, will further reduce the amount of suitable habitat, increase fragmentation, and degrade habitat conditions. Since 1999, we are aware of nine projects within the action area, totaling approximately 900 acres, that have received Federal permits, but removed suitable pygmy-owl habitat without undergoing section 7

consultation. These projects could be considered as having cumulative effects based on the lack of section 7 consultation.

As stated in the Environmental baseline section, the project area, action area, and surrounding region has supported one of the highest documented concentrations of pygmy-owls in the State. We are aware of a number of potential residential and commercial developments, schools, churches, etc. in the action area that may further reduce and fragment pygmy-owl habitat in this area. Some of these projects may not be reasonably certain to occur based on our section 7 guidelines, but the development history of this area and apparent trends indicate that there is a likelihood that they will.

We reiterate that analyses of trends in growth frame the scope of cumulative effects but do not necessarily define those actions that are reasonably certain to occur. There exist, however, certain incremental actions and approvals in the planning and zoning process that do contribute certainty to our analysis of cumulative effects. These actions include existing zoning, land use designations within jurisdictional comprehensive plans, transportation plans, population projections, rezoning requests, development plans, plat submittals, and grading and building permit application and approvals. It may be reasonably assumed that these actions, when considered in the context of recent trends, can give us a clear picture of the potential for cumulative effects that are reasonably certain to occur.

The general trend for the action area is for increasing residential development. The Town of Marana, which contains part of the action area, 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). More recently, from 2000 to 2002, total permits issued by Marana increases approximately 26% (PAG 2003). We have received, and continue to receive, notification of numerous new housing subdivisions and commercial developments in this region as well. 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). Not all of this growth occurs within the action area, nor are pygmy-owls affected by all growth. However, within Marana, growth increased 52% between 2000 and 2003, compared to only 8% for Pima County as a whole (PAG 2003). As described above, portions of the action area are and are highly likely to continue to experience effects from urbanization. New housing construction, and its associated commercial developments and capitol improvements, will continue to contribute to the loss and fragmentation of pygmy-owl habitat within the action area.

Within the action area, land ownership falls into two primary categories, private lands and State Trust lands. Much of the private land has already been developed and the remaining undeveloped private lands can be expected to be developed. The State Land Department has identified Trust lands along Tangerine Road, Thornydale Road, and Camino de Mañana as suitable for commercial and medium density residential development (includes uses as intense as apartments) (ASLD 2000), indicating that State Trust Lands are likely to contribute to impacts to pygmy-owls and their habitat within the action area. However, there is also the potential for these lands to contribute to the conservation of important pygmy-owl habitats.

Private lands within the action area have five jurisdictional approvals or designations that indicate continued development is reasonably certain to occur. We have searched the land use and zoning designation for Marana and Pima County for the action area. In light of documented trends and based on the existing zoning, submitted development plans or subdivision plats, transportation plans and development impact fee areas, we have determined that projects affecting pygmy-owls and pygmy-owl habitat, without a Federal nexus, are reasonably certain to occur at the following areas: Cortaro Road/Thornydale Road intersection, Tangerine Road/Thornydale Road intersection, Hardy Road/Thornydale Road intersection, Heritage Highlands development area, Tangerine Road/Camino de Oeste area, Camino de Mañana/Linda Vista area, and single-lot residential development throughout the action area. Proposed development is of both commercial and residential development categories.

These cumulative effects will contribute to habitat fragmentation because most occur adjacent to roadways and will increase the linear extent of unsuitable habitat across the action area. The areas where we anticipate cumulative effects to occur support known breeding home ranges for the pygmy-owl, as well as dispersal habitat and pathways. This will reduce available pygmy-owl breeding habitat, but will also reduce habitat connectivity and the opportunity of pygmy-owl movements throughout the action area. However, the majority of the outlined cumulative effects will occur in the southern and eastern portions of the action area, some distance from the proposed project. Because of the conservation measures outlined in the proposed action, we do not anticipate that the project will expand or exacerbate the identified cumulative effects.

Conclusion

After reviewing the current status of the pygmy-owl, the environmental baseline for the action area, the effects of the proposed residential development, and cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the pygmy-owl. The Tangerine Hills Subdivision project does occur within proposed critical habitat for the pygmy-owl. However, the application of conservation measures described below will help minimize the effects of the action, and it is our conference opinion that the proposed development is not likely to result in the destruction or adverse modification of proposed critical habitat.

The status of the pygmy-owl in Arizona is tenuous. The number of adult pygmy-owls documented in Arizona has never exceeded 50 since regular survey and monitoring work began in 1993. In both 2002 and 2003, the number of known pygmy-owl nests in the State was three and four respectively, down from the highest number, 13, documented in 2001. Although sample size is low and the monitoring period short, available data suggest that there may be a declining trend in population that has somewhat corresponded with recent drought conditions. However, in and around the action area, drought should not have such a marked effect due to artificial water sources, enhanced vegetation, and increased prey availability. However, numbers of known pygmy-owls within CHU 3 have declined from a high of 11 in 2000 to 3 in 2004, and only 2 as of this writing in 2005. Observations by researchers in Mexico may indicate a similar population decline just south of the U.S. Mexico border (A. Flesch, pers. comm).

The CHU 3, including the action area, has been subject to rapid growth and urbanization. Existing natural habitats have been lost and fragmented. Growth in the Town of Marana, the

primary jurisdiction within the action area, exceeded 400% during the past decade. Oro Valley, also within CHU 3, had 310% growth during that same time period. While some recent development projects have utilized lower housing densities or clustered development, many of the residential subdivisions being developed are high density (4 to 6 houses/acre). Many of the roads in the action area are slated for expansion or improvement, and at least one new highway interchange is under development. Some sites within CHU 3 have been designated for pygmy-owl conservation as a result of completed section 7 consultations.

With the EPA's transfer of the section 402 CWA NPDES program to the State of Arizona, the number of projects with a Federal nexus has been reduced within CHU 3. Single-family residence construction typically does not have a Federal nexus. Cumulative effects considered in our analysis include residential subdivisions, single-family residences, and commercial projects where zoning, development plans, subdivision plats, or impact fee assessment make them reasonably certain to occur, but no Federal nexus is anticipated. Areas where these cumulative effects are anticipated to occur include areas where pygmy-owl breeding home ranges and dispersal pathways have been documented. Cumulative effects are likely to continue to further fragment habitat.

The Applicant has included a number of conservation measures that will meaningfully reduce the effects of the proposed action on pygmy-owls and on proposed critical habitat by: (1) minimizing noise and vegetation disturbance if a pygmy-owl is detected on the project site prior to and/or after commencement of construction, reducing the extent of direct effects; (2) minimizing the indirect effects of this development (e.g., pet predation, pesticides, lighting, inappropriate activities within the conserved open space) on pygmy-owls; (3) limiting development to 30.5 percent of the site; and (4) maintaining habitat connectivity by leaving the washes in a natural state.

In summary, our conclusions are based on the record of this consultation including the initial and final BAs, correspondence and meetings with the project proponents, and the information outlined in this biological opinion. The pertinent points are summarized below:

1. The project site is not within a known territory of a pair or resident pygmy-owl, therefore the likelihood of lethal take is minimal.

2. Conservation measures will be implemented to minimize noise and vegetation disturbance if a pygmy-owl occupies the project site prior to and/or after commencement of construction, reducing the extent of direct effects.

3. Conservation measures will minimize the indirect effects of this development on pygmy-owls.

4. Habitat disturbance will not exceed 13.21 acres (11.59 acres, or 30.49% of the 38-acre project site plus an additional 1.62 acres of habitat off-site; 0.02% of Critical Habitat Unit 3) and the disturbance will occur in a configuration that will still allow the potential for nesting and movement, therefore effects to do not rise to the level of adverse modification of proposed critical habitat.

5. The effects of losing 13.19 acres of suitable habitat and the associated PCEs will be partially minimized through the protection of 26.41 of the 38-acres project site (69.5% of the Project Area). These protected lands will remain undisturbed and be managed in a manner that will protect suitable habitat for the pygmy-owl and contribute to its conservation.

6. The Conservation Property will maintain connectivity within the project site and to adjacent suitable habitat areas offsite, minimizing adjacent cumulative effects.

7. The Conservation Property will provide habitat suitable for breeding, sheltering, feeding, and movement, partially offsetting adjacent and regional cumulative effects.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act 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 defined (50 CFR §17.3) 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 (50 CFR §17.3) 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 sections 7(b)(4) and 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 Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the ACOE so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The ACOE has a continuing duty to regulate the activity covered by this incidental take statement. If the ACOE: (1) fails to assume and implement the terms and conditions; or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the applicant must report through the ACOE the progress of the action and its impact on the species to the FWS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

Amount or Extent of Take Anticipated

We do not anticipate the proposed action will incidentally take any pygmy-owls.

Reporting Requirements/Disposition of Dead or Injured Listed Animals

Upon finding a dead or injured threatened or endangered animal, initial notification must be made to the FWS's Division of Law Enforcement, 2450 West Broadway, Mesa, Arizona (480-

967-7900) 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 FWS 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 FWS 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 pygmy-owl. In furtherance of the purposes of the ESA, we recommend implementing the following discretionary actions:

- Conduct or fund studies using both monitoring and telemetry, to determine pygmy-owl habitat use patterns and relationships between owls and the human interface in northwest Tucson. Surveys involving simulated or recorded calls of pygmy-owls require an appropriate permit from the FWS. Contact AGFD in regard to state permitting requirements.

- Continue to actively participate in regional planning efforts, such as Pima County's Sonoran Desert Conservation Plan (SDCP) and the Town of Marana's HCP, and other conservation efforts for the pygmy-owl.

- Assist in the implementation of recovery tasks identified in the pygmy-owl Recovery Plan when approved by the FWS.

- Monitor the effectiveness of conservation measures associated with issuance of authorized permits.

REINITIATION-CLOSING STATEMENT

This concludes formal consultation with the ACOE on the proposed Tangerine Hills Residential Development Project in the Town of Marana, 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) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not

considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We have assigned log number 02-21-04-F-0105 to this consultation. Please refer to that number in future correspondence regarding this consultation. Any questions of comments should be directed to Jason Douglas (520) 670-6144, (x226) or Sherry Barrett (520) 670-6144, (x223) of my Tucson staff.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ
Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ (Attn: Bob Broscheid)
U.S. Army Corps of Engineers, Tucson, AZ (Attn: Marjorie Blaine)
WestLand Resources, Inc., Tucson, AZ (Attn: Jim Tress and Scott Hart)
C&C Construction, Tucson, AZ (Attn: Bud Cardinal)

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