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In Reply Refer To:  
AESO/SE  
2-21-99-F-007

June 11, 2002

Memorandum

To: Field Office Manager, Safford Field Office, Bureau of Land Management, Safford, AZ

From: Field Supervisor

Re: Biological Opinion for the Dos Pobres/San Juan Project

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the proposed Dos Pobres/San Juan Project, Graham County, Arizona, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). Formal consultation was initiated by the Bureau of Land Management (BLM) on May 27, 1999. Cooperating Federal agencies include the U.S. Army Corps of Engineers (Corps) and Environmental Protection Agency (EPA). The BLM has determined the proposed activity may affect the southwestern willow flycatcher (*Empidonax traillii extimus*), and may affect, but is not likely to adversely affect, the Gila topminnow (*Poeciliopsis occidentalis occidentalis*), razorback sucker (*Xyrauchen texanus*), spikedace (*Meda fulgida*), loach minnow (*Tiaroga cobitis*), and designated critical habitat for the razorback sucker, spikedace, and loach minnow. BLM had previously determined the proposed action may affect the Arizona hedgehog cactus (*Echinocereus triglochidiatis arizonicus*). Subsequent information (Baker 2001) has revealed that hedgehog cacti within the action area are not the listed entity. Therefore the proposed action will not affect the Arizona hedgehog cactus.

This BO is based on our review of the biological assessment for the Dos Pobres/San Juan Project (BA) (SWCA 1998), the addendum to the BA (SWCA 1999), the draft environmental impact statement (DEIS) (BLM 1998), the mitigation and monitoring plan (MMP) (Westland Resources 2002), various hydrologic studies and reports, field investigations, literature reviews, project meetings, other information exchanges, and information contained in our files. Literature cited is not a complete bibliography of all literature available on the project, subject species, or hydrology of the Safford Valley. A complete administrative record of this consultation is on file at this office.

As described in Appendix A, "CONCURRENCES" section herein, the Service concurs that the Dos Pobres/San Juan Project is not likely to adversely affect the Gila topminnow, razorback sucker, spikedace, loach minnow, and designated critical habitat for the razorback sucker, spikedace, and loach minnow.

## **CONSULTATION HISTORY**

The following history is a log of significant consultation events and does not include every minor project event such as routine electronic mail correspondence, facsimile transmissions, meetings, and telephone conferences and discussions.

October 19, 1998: Service receives BLM memorandum dated October 16 requesting initiation of formal section 7 consultation, in cooperation with the Corps, EPA, and Bureau of Indian Affairs, on the proposed Dos Pobres/San Juan Project under a determination of “may affect” for the razorback sucker and its critical habitat, southwestern willow flycatcher, Gila topminnow, and Arizona hedgehog cactus. Memo accompanied by BA.

November 3: Interagency project site visit and meeting held among Service, BLM, BIA, Phelps Dodge, Westland Resources, and SWCA personnel. Service informs participants of need for additional information to initiate formal consultation.

January 12, 1999: Interagency meeting held among Service, BLM, BIA, Phelps Dodge, Westland Resources, and SWCA personnel. Phelps Dodge requests Service provide written response to consultation request.

February 8: Service provides memorandum to BLM outlining additional information needed to complete formal consultation initiation package.

March 15: Meeting held among Service, Phelps Dodge, and Westland Resources personnel. Phelps Dodge indicates that BLM will respond to Service information request.

May 13: Service receives BLM memorandum dated May 12 submitting BLM’s response to BIA’s comments on the DEIS of December 17, 1998, and the Addendum to the BA. BLM determines the project may affect the Arizona hedgehog cactus and may affect, but is not likely to adversely affect, the southwestern willow flycatcher, Gila topminnow, razorback sucker, and critical habitat for the razorback sucker.

May 27: Service receives transmittal, dated May 19, from SWCA transmitting the following documents: Documentation of a Three-Dimensional Model of the Safford District, Near Safford, Arizona (Dames and Moore 1997a); Response to BLM Data Request regarding Phelps Dodge Safford District Groundwater Model (Dames and Moore 1997b); Hydrogeologic Report Phelps Dodge Dos Pobres/San Juan Project (Dames and Moore 1997c); Transmittal of the Technical Memorandum: Groundwater Model Results, Dos Pobres/San Juan Mine (Dames and Moore 1997d); and Revised Version of Compilation of Work Done on the Dos Pobres/San Juan Project (MacNish 1998).

June 22: Service submits memorandum to BLM confirming initiation of formal consultation on May 27, 1999.

September 13: Service receives Westland Resources memorandum dated September 10 relaying information regarding habitat structure and locations of southwestern willow flycatchers relative to mitigation activities conducted at the Pima mitigation site.

September 17: Service receives BLM memorandum dated September 16 stating that due to ongoing discussions relative to the BO and the need for additional time for its production and review, BLM agrees to receive a draft, rather than final, BO by October 9, 1999.

September 28: Meeting held among Service, BLM, Phelps Dodge, and Westland Resources personnel. Service recommends BLM request formal consultation for the southwestern willow flycatcher. Participants agree to conduct interagency site visit to the Pima mitigation site.

October 6: Service submits memorandum requesting 60-day extension of the consultation period.

October 14: Service, BLM, Phelps Dodge, and Westland Resources personnel participate in field visits to the Solomon and Pima mitigation sites.

November 1: Service receives BLM memorandum dated October 28 requesting formal consultation for the southwestern willow flycatcher under a “may affect” determination.

December 7: Service transmits to BLM, via electronic mail, draft reasonable and prudent measures and terms and conditions for the southwestern willow flycatcher.

December 30: Service receives BLM memorandum dated December 29 requesting extension of consultation and delay of release of the BO. Phelps Dodge submits, via electronic mail, their consent for extension.

February 8, 2000: Meeting held among Service, BLM, Phelps Dodge, and Westland Resources personnel. Participants agree to modify the proposed mitigation and monitoring plan so that terms and conditions would be unnecessary.

March 8: Service receives BLM memorandum dated March 7 determining that the proposed Dos Pobres/San Juan project would not destroy or adversely modify proposed critical habitat for the spikedace and loach minnow.

April 25: Service receives letter from Westland Resources dated April 24 transmitting the final version of the Dos Pobres/San Juan mitigation and monitoring plan.

August 15: Meeting held among Service, BLM, Phelps Dodge, Westland Resources, and SWCA personnel. Participants agree to conduct interagency site visit to the Pima mitigation site and to continue efforts to modify the proposed mitigation and monitoring plan.

October 19: Interagency field visit to Pima and Solomon mitigation sites attended by Service, BLM, Westland, and Phelps Dodge personnel. Refinements to proposed mitigation and monitoring plan discussed.

March 26, 2001: Service receives Westland's transmittal of the final cooperatively developed mitigation and monitoring plan.

April 2: BLM authorizes release of official draft BO via telephone message. Due to publication of the final critical habitat rule on April 25, 2000, consultation for spikedace, loach minnow, and critical habitat, to move forward under a determination of "may affect, is not likely to adversely affect."

June 15: Service transmits draft BO to BLM.

August 29: Service receives BLM memorandum of August 27, 2001, requesting interagency meeting prior to release of final BO.

September 5: Meeting held among Service, BLM, Phelps Dodge, and Westland personnel to discuss agency and applicant comments on draft BO. BLM informs Service that BIA is no longer a cooperating agency. BLM requests that the Service hold the final BO until receipt of additional project information.

April 19, 2002: Service receives BLM memorandum dated April 18, 2002, transmitting additional project information and requesting release of final BO. BLM determines the proposed action will have no effect on the proposed Chiricahua leopard frog (*Rana chiricahensis*).

## **DESCRIPTION OF PROPOSED ACTION**

Phelps Dodge has submitted a mining plan of operation (MPO) to BLM to use approximately 3,300 acres of BLM administered land to develop the Dos Pobres and San Juan copper ore bodies located in the Gila Mountains north of Safford, Graham County, Arizona. As an alternative to approval of the MPO, the BLM proposes to exchange approximately 17,000 acres of selected BLM administered lands for approximately 3,858 acres of land owned by Phelps Dodge. The land exchange has been identified as the preferred alternative. BLM, in cooperation with the Corps, EPA, and BIA, has prepared the DEIS for the proposed Dos Pobres/San Juan Project. Phelps Dodge and a habitat and water resources mitigation plan for project related impacts. For the purposes of consultation, the proposed action is comprised of three basic components: 1) the land exchange, including disposal of the selected lands and acquisition of the offered lands; 2) the development of the Dos Pobres and San Juan copper ore bodies; and 3) the implementation of the proposed mitigation and monitoring plan.

## **The Land Exchange**

The land exchange consists of public lands desired by Phelps Dodge (the selected lands) and private lands offered to the Federal government in exchange (the offered lands). BLM would dispose of about 17,000 acres of selected lands located north of Safford in Graham County in the Safford Mining District (see Figure 1-2 in BLM 1998, and Figure 1 in SWCA 1998). The selected lands also include approximately 12 acres north of the town of Sanchez containing an approximately 6,500-square-foot office building constructed by the AZCO Mining Company. Approximately 95 percent of the 884 mining claims filed for the selected lands are held by Phelps Dodge; the remaining 40 claims are held by the Melody Claims Group. The Melody Claims are included as part of the selected lands because Phelps Dodge is in the process of negotiating to buy these claims. Other patented claims, known as Horseshoe Claims, are excluded from the selected lands.

The base package of offered lands is composed of the following Phelps Dodge-owned properties: Amado, Curtis, Musnicki, Schock, Feulner, and Tavasci Marsh. An optional package of offered lands consists of the following Phelps Dodge-owned properties: Freeland, Butler-Borg, Norton, Clyne I, Clyne II, Davison, Lehner Ranch, and Lincoln Ranch. For maps or detailed descriptions of the offered lands, refer to BLM (1998) and SWCA (1998). If acquired, the offered lands would be subject to BLM management under the appropriate Resource Management Plan (RMP). Resource values associated with the offered lands package that would come into public ownership and Federal management include, but are not limited to, riparian and wetland biotic communities, wildlife habitats, threatened and endangered species habitats, cultural resources, recreation, and public access to special management areas.

BLM would acquire a total of 3,858 acres comprised of the five base package properties totaling 2,135 acres, and six of the optional properties totaling 1,723 acres. The proposed action also includes the exchange of surface water rights that are appurtenant to the selected and offered lands owned by BLM and Phelps Dodge, respectively. Exchanged lands would be subject to existing rights-of-way and easement agreements. When those expire, the new landowner could decide whether or not to renew or renegotiate the agreement. Prior to the exchange, current grazing leases on both the selected and offered lands would be terminated; however, BLM would likely offer the current leasee first right of refusal for those acquired properties. After the exchange occurs, the selected lands would be subject to the private actions of Phelps Dodge, and are not considered part of the proposed action. Those actions may include livestock grazing, residential development, commercial development, recreation, agriculture, and groundwater withdrawal. Those actions are described herein in the "Effects of the Action" because they are interrelated and interdependent to the proposed action, and thus the effects of these actions are among the effects of the proposed action.

## **Development of the Dos Pobres/San Juan Ore Bodies**

The following is a brief description of proposed development of the Dos Pobres and San Juan ore bodies. For a more detailed site plan of the project, including maps of facilities and locations

described herein, refer to BLM (1998) and SWCA (1998). Development of the ore body is considered part of the proposed action because a Clean Water Act section 404 permit is needed to authorize this activity.

Mining operation: The MPO for the Dos Pobres/San Juan Project provides for an integrated mining operation that includes the development of two open pit mines, a crushing and material handling system, a common Solution Extraction/Electrowinning (SX/EW) processing facility and shared infrastructure and support facilities. Development of the Dos Pobres and San Juan copper ore bodies would occur on 1,900 acres of selected lands and on an additional 1,400 acres of privately owned land. The project will produce approximately 2.9 billion pounds of salable copper over the project's estimated 16-year production life. Production will include mining of 626 million tons of oxide and sulfide leach ore and 385 million tons of lower grade and unmineralized material referred to as development rock. Total minable material amounts to 1.01 billion tons resulting in a 0.6:1.0 non-ore to ore ratio.

Three distinct periods of mining will occur during the 16-year life of the Project. The first four years includes mining leach material exclusively from the Dos Pobres orebody. A pre-production period of four months will be required to expose the orebody and place ore on the leach pad to provide the surface area required to support initial operations. Mining rate during this period will average approximately 222,000 tons per day (tpd). During years 5 to 13, mining operations at the Dos Pobres and San Juan deposits will be combined. During this time, the higher grade, higher stripping ratio leach ore from Dos Pobres will be mined in conjunction with the lower grade, lower stripping ratio leach ore from San Juan. By blending the leach ores from the two deposits, the overall mining rate will be held relatively constant at an average of approximately 246,000 tpd from years 5 through 8. During years 9 through 13, the mining rate will decline to approximately 164,000 tpd. The Dos Pobres oxide leach reserve will be depleted at the end of this period. The final period, years 14 through 16, will consist entirely of mining the San Juan deposit. Mining rates and copper cathode production will decline during this period. Average mining rates will be approximately 75,000 tpd. The San Juan reserves will be depleted at the end of this period.

Open pits: Two open pits will be developed. Surrounding the Dos Pobres pit will be an approximately 1,300-foot setback in which no leach pad or development rock stockpiles are planned. This setback has been designed to allow future mining of the deeper sulfide milling reserves that underlie the leachable ore at Dos Pobres. At completion of mining associated with leach operations, the Dos Pobres pit will be nearly circular with a diameter of approximately 4,200 feet and a depth of about 1,400 feet (2,600 feet above mean sea level [msl]). The pit design specifies a 50-foot bench height and 120-foot-wide haul roads with 10 percent gradient haulage ramps to develop the smoothed pit design and minable reserves. A 48° 100-foot wide double bench configuration will be used for all areas of the pit except in the Tertiary Gila Mountain Volcanics located on the upper southwestern area of the deposit, where a 48° single bench design will be incorporated.

Existing areas of disturbance within the project area at San Juan include the mine pit, leach pads, development rock stockpiles, and concrete foundations from facilities associated with former leach process operations. These areas also contain an impermeable composite liner system in the existing leach solution collection pond, six shallow reclaim wells in an interception trench up gradient of the stormwater collection pond, and stormwater diversion. At completion of mining efforts, the San Juan pit will be somewhat oval-shaped with a length and width of approximately 5,000 feet and 3,800 feet, respectively. The ultimate depth of the pit will be approximately 1,000 feet (3,150 feet above msl). The interamp angle for San Juan is based on a 48° 100-foot-wide, double bench configuration for all areas of the pit.

Leach ore and development rock will be mined from the proposed Dos Pobres and San Juan open pits using conventional drilling and blasting techniques. Blast holes will be drilled in a grid pattern to an average depth of 65 feet, loaded with ammonium nitrate and fuel oil and topped off with a sand and gravel mixture. When explosives are detonated, usually once a day during daylight hours, hard rock will be reduced to manageable size (called run-of-mine or ROM) for loading and hauling. Depending on its ore content, ROM leach ore will be either hauled directly to the leach pad or hauled to a crushing system. Development rock will be hauled to two unlined development rock stockpiles.

Crushing and material handling: A crushing plant will be located along the eastern side of the leach pad, between the Dos Pobres and San Juan pits. The truck loadout facility will be located at the southern end of the crushing and material handling facility.

Leach pad: A single, rectangular, approximately 922-acre leach pad will be located south of the Dos Pobres pit, between Cottonwood Wash on the east and Watson Wash on the west. The leach pad will be developed from south to north in 20 to 25-foot lifts. The pad will reach an ultimate height of approximately 450 feet and be constructed with setback benches to have a final overall slope of no greater than two horizontal to one vertical. The top surface of the pad will ultimately slope at approximately the same degree as the existing natural terrain.

Pregnant leach solution facilities: The leach solution collection/distribution system includes a pregnant leach solution (PLS) collection tank located immediately above the stormwater impoundment, two raffinate tanks at the SX/EW tankfarm, a raffinate booster tank located on the east side of the leach pad, the south and east headwalls, and various piping and conveyance systems.

Solution extraction and electrowinning facilities: The solution extraction (SX) and electrowinning (EW) processing facility will be located southwest of the leach pad and consist of three primary components: 1) the SX plant, 2) tank farm, and 3) EW tank house. The SX plant will be located near the EW tankhouse at a site west of the stormwater impoundment. The SX plant will receive PLS from the PLS collection tank and will extract copper from the PLS for further processing in the EW tankhouse.

The tankfarm will be located between the solution extraction and electrowinning facilities. It will contain two one-million gallon raffinate tanks, a single one-million gallon runoff collection tank, electrolyte and reagent storage and process tanks, and solution filtration systems. The tankfarm will be an open air facility, constructed in a concrete-lined containment area excavated and designed to contain stormwater runoff and excess process solutions from the SX/EW operations area. These solutions will be collected in the one-million gallon stainless steel runoff collection tank constructed within the containment area. To keep organic solutions separated from aqueous solutions, all the loaded organic tanks, storage tanks, and organic processing equipment will be located together in one contained area of the tankfarm. The containment area will be equipped with a sump and pump for recovering the solutions to the holding tanks.

Development rock stockpiles: Development rock will be hauled at ROM size to two unlined stockpiles that will not be leached. Development rock stockpiles will occupy approximately 861 acres total. These stockpiles will be situated to the west of the Dos Pobres pit and to the south of the San Juan pit. Stockpiles will be constructed in 50-foot lifts to approximately 400 feet above ground level.

Soil and growth medium stockpiles: Soil excavated during leach pad site preparation and suitable rock material excavated during mine pre-stripping will be stockpiled for use as growth media and capping material. Twelve soil and growth medium stock piles covering a total of roughly 123 acres will be created. They range in size from two to 51 acres. The stockpiles will be stabilized, as necessary, to prevent excessive losses from erosion and marked with signs identifying the material as soil. Other soil stockpiles may be developed if determined that sufficient soils exist in the footprints of the development rock stockpiles to economically justify excavation prior to lateral build-out of the development rock stockpiles. Stabilization of soil stockpiles would be accomplished by shaping slopes to minimize erosion and placing silt fence structures, as necessary, around the downgradient slope of the stockpiles. The side slopes will be shaped by a bulldozer traveling perpendicular to the slope, forming small berms to trap precipitation. Side-slopes and the tops of the soil stockpiles will then be seeded as an additional erosion control measure.

Support and ancillary facilities: The power system for the project will include construction of about seven miles of a primary 230 kilovolt (kV) transmission line from the existing 230 kV Hackberry line to a main substation that will be located on Phelps Dodge property west of Lone Star Road. At the main substation, power will be transformed to 69 kV and distributed via approximately 17 miles of overhead transmission line to the mine areas, stormwater impoundment, raffinate booster station, crushing/material handling system, and the SX/EW substation. A 69 kV powerline will be constructed around the pits to power two mine substations, a crusher substation, a maintenance area substation, a pumping substation, and the Site No. 2 substation. The mine substations will supply 7,200 volts (V) of power to electric shovels and drills. The crusher substation will supply 4,160 V power for the crushing and material handling system. The maintenance area substation will provide 4,160 V power to the truckshop and maintenance shops near San Juan. The pumping substation will supply 4,160 V

power for the raffinate pumps and stormwater impoundment dewatering pumps. The Site No. 2 substation will provide 4,160 V power to that area. A separate 69 kV powerline will be constructed from the main substation to the SX/EW substation where voltage will be reduced to 13.8 kV for distribution to the EW tankhouse and the SX plant. Transmission lines will be constructed using single pole structures for the 69 kV lines and H-frame double pole structures for the 230 kV line. All poles will be wooden and range in height from 45 to 65 feet, except for the 230 kV power line structures, which will range in height from 75 to 85 feet.

The Lone Star Compactible Soil Borrow Source (LSBS) will be located on Phelps Dodge land in Sec. 23, T6S, R26E. This site is approximately 4.5 mi southeast of the leach pad. Material from the LSBS will be used to construct the composite liner system for the leach pad and will be transported by truck to the leach pad along an approximately 110-foot-wide aggregate roadway. The LSBS borrow area will be approximately 50 acres. The compactible soil material to be mined is approximately 10 feet below the surface; total excavation depth will be approximately 50 feet. Overburden removed to access the soil material will be stockpiled west of the LSBS and will cover roughly 18 acres. The compactible soil in LSBS is primarily clay from an old lake-bed deposit. It is relatively homogeneous, with only occasional layers of fine sand or low plasticity clay and silt. The clay in this deposit is generally stiff and dry to lightly moist.

Administration, office, and shops: A service complex that includes a heavy duty truck shop, maintenance shop, fire truck and ambulance building, cable repair shop, recycling center, oil and lubricant storage, fuel station, and a truck wash facility will be built south of the San Juan Mine. Site No. 2, west of the proposed leach pad location, is an existing facility that contains general offices, a change room building, and a warehouse facility. This site will be refurbished. All administrative support functions for the project, such as operations management, mine planning, drafting, ore control, and safety will be conducted from the general offices. Mine operations and crew line-up will also be conducted from this site. The existing warehouse contains 11,000 square feet of storage space, which will be used for receiving, storing, and disbursing supplies and materials. In addition, Site No. 2 will be equipped with a service station for small vehicles.

Communications for the project will include hard wiring of a telephone cable in a loop configuration between the main security gate, Site No. 2, the truck shop complex, and the SX/EW plant. Radio communications require construction of a repeater transmitter tower on a hill located south of the San Juan Mine and three base stations for use at the administration building, mine office, and SX/EW facility. The repeater facility will be a steel lattice structure approximately 120-ft tall, with a 17 x 17 ft base, and will cover approximately one acre. The facility will include a 12 x 16 ft concrete building to house radio equipment.

Transportation, access, and security: New infrastructure requirements will include upgrading existing access roads, constructing employee parking facilities, and establishing additional security gates. Road crossings, and access and haul roads will be constructed with culverts or at grade. A fence will be constructed around the entire mine facility to provide for security and safety and to keep cattle off the property. This fence will tie into existing grazing allotment

boundary fences wherever possible. A main security gate will be installed on the Phelps Dodge Mine Road to control all traffic and access to the mines and SX/EW site. A secondary security gate will be installed on the San Juan Mine Road at the BLM property boundary, eliminating public access on this road. The main security gate will be equipped with automatic truck weigh scales to weigh incoming and outgoing truck traffic and record deliveries through bar coding. Employee parking will be provided at Site No. 2 and the SX/EW plant site. The Phelps Dodge Mine Road will be chip-sealed from its intersection with the Safford-Bryce Road to Site No. 2. Beyond this point, Phelps Dodge Mine Road and other access roads will be surfaced with aggregate. Current at-grade crossings of major drainages will be upgraded to box culvert crossings to allow all-weather access.

New traffic to and from the site is expected to occur in two distinct phases: the 15-month construction phase and the 16-year operational phase. During the construction phase, the total estimated mine-related traffic crossing all Gila River bridges (both directions) would peak at 1,700 vehicle trips per, an increase of approximately 36 percent of the existing estimated 4769 trips per day. During the operational phase, the total mine-related traffic crossing all Gila River bridges (both directions) would be 860 trips per day, an increase of approximately 6 percent of the 15,000 non-mining related trips over these bridges forecasted for the year 2011.

The proposed project will require delivery of chemicals used in operations (sulfuric acid, diluent, reagent, fuel) by tanker trucks, 90 percent of which will be acid trucks (projected at 94 trucks/day, with 133 trucks/day at peak production). The following safety precautions and procedures will be taken to reduce the chances of a hazardous spill into the Gila River: 1) the truck routes will avoid 8th Avenue Bridge, a narrow, substandard bridge with the highest vehicle traffic volume; 2) truck speeds when approaching and crossing bridges will be restricted to 35 miles per hour, 10 miles per hour below the county road speed limit; 3) trucking company managers randomly monitor truck speeds using radar guns and drivers are disciplined for exceedences; 4) new tanker design has been engineered to withstand both full pressure and full vacuum conditions to minimize potential for ruptures; 5) the pressure release valve design used on acid trucks exceeds the Department of Transportation's (DOT) recommended valve design by using a corrosion-resistant pressure release valve made from teflon-lined stainless steel; and 6) required DOT driver safety training and additional training is required by the trucking company.

Powder magazine and prill storage: Powder magazine and ammonium nitrate storage will be located in the vicinity of Site No. 1, south of the existing Site 1 stormwater diversion structure.

Aggregate materials: Aggregate materials will be used for a variety of purposes, including leach pad overliner material, road base fill material, riprap for stormwater diversion channels and road crossings, aggregate for concrete, and other uses. Two aggregate borrow sources totaling about 146 acres have been identified within the project area. One is located just south of the leach pad; the other at an existing aggregate borrow source along Watson Wash, west of the leach pad. Approximately 19 million tons of material will be excavated from aggregate borrow sources over the life of the project. Of the material excavated, 40 to 60 percent could be suitable for use as aggregate after screening. The remainder of the material will be stockpiled for use in reclamation activities.

Surface water management: The project will be constructed and operated as a “zero-discharge” facility designed for the 100-year/24-hour storm event, meaning process waters and stormwaters that come into contact with process facilities will be contained on-site rather than discharged. This will necessitate diverting stormwater around the project area to reduce run-on into the pits and ponding against stockpiles, and to prevent release of flows potentially impacted by the leaching or mining operations into surface waters. A series of detention and diversion dams are required as appurtenant structures. An integrated stormwater retention/detention management system will be used to control stormwater run-on and run-off from mine facilities. The system will use a lined stormwater impoundment below the leach pad and a series of retention and detention dams below, within, and above the footprint of the development rock stockpiles. In addition to developing a spill and pollution prevention plan to minimize the probability of releasing process solutions, Phelps Dodge must provide for the rapid detection and control of process solution seepage or accidental spill. The proposed project does not include plans for construction of a concentrator or tailings pond. Stormwater outflows from retention dams are not expected to be poor quality and would be required to comply with National Pollution Discharge Elimination System (NPDES) standards set forth in EPA’s permit issued under section 402 of the Clean Water Act (CWA). In the event of a 100 year/24 hour storm event, the permit will require monitoring and compliance with technology-based (total suspended solids) and water quality based (heavy metals, pH) permit effluent limitations (Shirin Tolle, EPA, personal communication, October 28, 1999).

Development of groundwater resources: Based upon the results of groundwater investigations, Phelps Dodge has determined that the aquifer located in the volcanics near Dos Pobres and San Juan will be developed to meet the project’s water requirements. This aquifer has historically provided approximately 1,400 gallons per minute (gpm). Investigations which have been underway since June of 1995 have indicated the presence of an aquifer capable of sustaining at least a 5,000 gpm flow rate. Water demand estimates for the project have been based upon historical mine, shop, and SX/EW make-up requirements at other Phelps Dodge operations in Arizona and New Mexico as well as additional information developed during a feasibility study. The average amount of water required for the project is forecast at 4,272 gpm and ranges from 1,270 to 4,982 gpm during the 16-year life of the project. On average, six percent of the leach solution flow rate will need replacement due to loss through evaporation and initial wetting of new leach ore.

The bedrock aquifer resource near Dos Pobres and San Juan will be developed. A total of five, 1,350 gpm vertical pumps will be established at wells constructed in the project area. Water will be pumped from wells to water storage tanks that will gravity feed to various project facilities. The main distribution tank (420,000 gallons) will be located near the mine fuel station; two head tanks (188,000 gallons each) will be located above Site No. 2; and a smaller tank (50,000 gallons) will be located at Site No. 1. The main distribution tank will supply water to the mines, the truck shop complex, and the crushing/material handling system. The head tanks at Site No. 2 will supply water to the SX/EW plant. An existing 95,000 gallon tank will supply water to the Administration Building, warehouse, and other facilities at Site No. 2.

### **Mitigation and monitoring plan**

The MMP (Westland Resources 2002) was developed to address impacts to jurisdictional waters of the United States as well as impacts to groundwater and surface water resources. Compliance with the MMP would be ensured by the Corps through their permitting authority under section 404 of the Clean Water Act. Portions of the MMP have already been carried out at the Pima site, as described below, and thus are part of the environmental baseline, rather than the proposed action. However, the MMP is described in full below to help the reader better understand all work accomplished and planned under the MMP.

Habitat MMP: The proposed project would directly impact 21.4 acres of jurisdictional waters through the discharge of dredged and/or fill material associated with mining activities. An additional 93.2 acres of jurisdictional waters would be indirectly affected by stormwater diversions and activities that reduce the area of the contributing watershed. The total area of jurisdictional waters to be affected by the project is 114.6 acres. To mitigate these impacts, Phelps Dodge has proposed the creation of 30 acres of riparian habitat, enhancement of 18 acres of existing riparian and wetland habitat, and preservation of 160 acres of riparian habitat. The MMP describes the three mitigation sites within the Safford Valley along the Gila River near Fort Thomas, Pima, and Solomon.

*Fort Thomas site:* The Fort Thomas mitigation site is part of an approximately 550-acre farm located northwest of the town of Fort Thomas, on the south bank of the Gila River. The river runs through the northernmost quarter-quarter section of the property. As part of the habitat mitigation program, 100 acres of riparian habitat, including the portion of the site traversed by the river, will be preserved for management of natural habitat values.

Mitigation implementation will consist of establishment of measures to protect targeted lands from future management/land use activities which could diminish riparian and wetland functions and values. These include fencing to restrict human and livestock access and restrictive covenants tied to the deed of each parcel to limit future use. Fencing design would be typical multi-strand barbed wire with smooth wire lower strands incorporated to provide wildlife egress and ingress. Barbed strands will control livestock that may be attracted to the area. Gates or step crossings will allow access for monitoring. Where fencing is not practicable, property boundary delineators and signage will be utilized. Figure 3 in the MMP illustrates the parcel identified for preservation and the perimeter of fencing to be constructed at the Fort Thomas mitigation site.

*Pima site:* The Pima mitigation site is part of an approximately 120-acre farm located northeast of the town of Pima, on the south bank of the Gila River. The easternmost portion of the northern quarter-quarter section of this parcel was damaged during the 1993 flood and is not currently in agricultural use. This portion of the property has become primarily riparian in nature and is dominated by tamarisk, willow, and cattail. Within this parcel, two mitigation strategies

will be utilized: restoration of a portion of a Sudan grass pasture to riparian habitat dominated by native vegetation and enhancement of existing wetland habitats, in part by the removal of exotic plant species. In all, 26 acres of riparian habitat will be created at this site and 18 acres will be improved through habitat enhancement.

Enhancement through salt cedar eradication at the Pima mitigation site was implemented in an area generally characterized by dense even-aged stands of sand bar willow (*Salix exigua*) averaging 9 to 10 feet in height (3 meters) interspersed with salt cedar, cottonwood (*Populus fremontii*), seep willow (*Baccharis glutinosa*), and large areas of sand and river cobble devoid of vegetation. Salt cedar removed from the site consisted of small (< 1.57 inches [4 cm] stem diameter), mostly single stemmed individuals spread unevenly throughout the willow stand at densities from 1-10 stems per 10.76 square feet (1 meter<sup>2</sup>). Salt cedar was generally less than 6.56 feet (2 meters) in height with very little foliage development, although a few plants had stem diameters from 2.76 to 4.72 inches (7 to 12 cm) and ranged from 8.2 to 13.12 feet (2.5 to 4 meters) in height. Salt cedar control activities were implemented on April 6, 1999, and all cut and initial herbicide treatments were completed by May 1. Stacked cuttings were removed from the site by hand from May 1 through May 4 during final cleanup efforts. Enhancement efforts were focused on the western, central, and northern portions of the 18-acre enhancement area. Efforts in the southeast portion of the mitigation area occurred in early April prior to the expected arrival of migrant or breeding southwestern willow flycatchers.

Salt cedar removal at the Pima site was accomplished through the cut-stump method. Plants were cut with pruning shears, loppers, and handsaws as close to the ground as possible to maximize the effect of herbicide treatment. Following cutting, stumps were treated with a 50 percent solution of Rodeo<sup>®</sup>, and aquatic herbicide. All cuttings were gathered, bundled, and hauled from the site for disposal at a local landfill. Eighty-five, seven-yard dump truck loads of tamarisk and other trash and debris were removed from the site. Evaluation of control measures indicated a 20 percent mortality of salt cedar plants with an additional 10 percent demonstrating aberrant or chlorotic growth. A follow up treatment was initiated in the southwestern portion of the site and the inner open areas adjacent to the river, on June 22, 1999. Foliar application of a two percent solution of Rodeo<sup>®</sup> in wet areas, and a solution of two percent Rodeo<sup>®</sup> and two percent Arsenal<sup>®</sup> in dry areas was made to the new growth on stumps. Supplemental efforts have achieved in excess of 90 percent control of salt cedar. Additional control of salt cedar at this site will be limited to seedlings and saplings less than four feet in height.

Restoration measures implemented at the Pima site consisted of planting approximately 140 Goodding willow (*Salix goodingii*) poles within a disturbed portion of the enhancement area. Willow poles were obtained from established trees along irrigation canals near Thatcher and ranged from 2 to 12 inches in diameter and 12 to 15 feet in height. After treatment with a butyrate root growth promotant, willow poles were placed in excavated holes so that at least one third of the plant was submerged in groundwater and excavations were then backfilled. Due to seasonal factors (poles flowering after planting) and fluctuations in irrigation return flow, the survival rate of initial plantings was low.

Additional work planned for the Pima site includes establishment of a mesquite bosque on a 26-acre pasture. The northeast corner of this parcel has an existing stand of fire damaged riparian vegetation. This portion of the site will be infilled with plantings between surviving vegetation. Mesquite was selected based on soil conditions and because this species will require less irrigation for establishment than other riparian species. Contract grown mesquite (*Prosopis velutina*), cottonwood, netleaf hackberry (*Celtis reticulata*), Mexican elderberry (*Sambucus neomexicana*), greythorn (*Zizyphus obtusifolia*), desert hackberry (*C. pallida*), and wolfberry (*Lycium pallidum*) will be cultivated and planted using the tall pot cultivation method. Prior to planting trees, the mitigation area will be tilled to establish seedbed conditions and then seeded with a base seed mix. Flood irrigation will be used for establishment of plantings. The perimeter of the mitigation areas will be fenced. Species composition, planting density, planting configuration, and the locations of mitigation efforts at the Pima site are described and depicted in the MMP.

The Pima enhancement area contains approximately four acres of habitat that will be actively managed for the establishment of potentially suitable habitat for the southwestern willow flycatcher (depicted as the Pima Active Management Area in Figure 6 of the MMP). The characteristics for establishing riparian habitat that could become suitable flycatcher habitat were defined specifically for this site through consultation with the Service. At the Pima enhancement site, success will be determined by establishing 400 living stems per acre as either volunteers or planted stems. These plants will be either native or non-native tree species that have already become established or may become established in the future in part through the active management efforts practiced by Phelps Dodge. It is the expectation that these 400 trees combined with management promoting recruitment, growth and development of additional trees will develop into suitable flycatcher habitat. A minimum of 0.84 acre of the four-acre area will achieve the targeted success criteria. The management actions implemented within the Active Management Area may include, but will not necessarily be limited to, supplemental planting, fencing, irrigation, construction of fire breaks, and other activities that may, from time to time be appropriate to achieve restoration objectives.

*Solomon site:* The Solomon mitigation site is part of an approximately 220-acre farm located northeast of the town of Solomon, primarily on the north bank of the Gila River (Figure 5 in the MMP). The Gila River generally runs along the southern boundary of the property. Currently, the farm has 175 acres of active agriculture. Within this parcel, two mitigation strategies will be implemented: restoration of disturbed lands to a riparian habitat dominated by native vegetation and preservation of existing riparian and wetland habitats. Specifically, 60 acres have been targeted for preservation and four acres have been identified as suitable for habitat restoration efforts.

Containerized native tree and shrub plantings (tall pot and one gallon nursery stock) and seeding will be utilized to establish riparian habitat within a portion of the Solomon site that has been previously disturbed during construction of a flood-control levee. Figure 9 in the MMP provides a planting plan of the proposed work that reflects input provided by the Service. Establishment

of 1.16 acres of potentially suitable habitat for the southwestern willow flycatcher will be part of the Solomon planting plan (the Solomon Active Management Area). Within this area, 440 plants per acre will be planted. The species mix planted within the 1.16-acre area targeted to create flycatcher habitat will reflect the structure and species composition found within flycatcher nesting habitat documented in the spring 2000 survey of the Pima Enhancement Mitigation site. The location and nature of plantings at this site will reflect site conditions found at the planting site at the time of actual implementation. Any modifications to the plan that may be necessary to reflect the site conditions at the actual time of planting will be required to achieve the objectives of this mitigation requirement. Planting will be irrigated until establishment of root systems. Once trees have developed a sufficient root system to exploit the underlying groundwater, irrigation will no longer be required to maintain the restored community and irrigation efforts will be terminated.

Mitigation through active management/preservation of existing habitats will also be employed at the Solomon site. Sixty acres of existing cottonwood/willow forest will be preserved through establishment of restrictive covenants on the deed of the lands. The perimeter of mitigation areas will be fenced.

*Habitat mitigation maintenance:* Maintenance of mitigation sites will consist of inspection and repair of perimeter fencing, irrigation of plantings, and upkeep of irrigation systems. Maintenance activities involving work that requires numerous people, vegetation disturbance, or potential noise will be scheduled to avoid, to the maximum extent practical, seasons when southwestern willow flycatchers are likely to be using the mitigation sites. Irrigation schedules will be based on specific field conditions (soil texture, run length), the availability of precipitation, and the rate at which plants are able to exploit groundwater. The overall irrigation strategy will be to provide sufficient moisture to allow plant establishment while weaning the plants off of supplemental water and encouraging them to develop sufficient root systems to exploit shallow underlying water tables.

*Habitat mitigation success criteria:* Success criteria are presented in Table 7 of the MMP. Restoration efforts at the Pima and Solomon sites will be considered successful when planted vegetation has been in place for a minimum of 10 years and when 80 percent of the containerized plantings are in a living, growing condition two years after cessation of the last irrigation event, whichever occurs last.

Mitigation within the Pima Active Management Area at the Pima enhancement site will be considered successful when 0.84 acre of the four acres of the Pima Active Management Area identified at the site have been established with a minimum of 400 living stems per acre. These stems can be established as either volunteers or via active planting programs. Plants that count towards the success criteria can be either native or non-native tree species that have already become established or may become established in the future in part through the active management efforts practiced by Phelps Dodge at this site. Within this 0.84-acre area, canopy height will average a minimum of 15 feet. Success criteria for the Solomon 1.16-acre Solomon

Active Management Area have been established in consultation with the Service. Within this area, success criteria are: 1) Four hundred (400) living native tree stems per acre, and 2) a canopy height that will average a minimum of 15 feet.

The acreage of potentially suitable flycatcher habitat that is established within the Active Management Areas at the Solomon and Pima Sites will be contiguous with existing potentially suitable or suitable flycatcher habitat so that, combined they will provide a minimum patch size of two acres at each location. Active Management/Preservation mitigation will be considered successful when the target land parcels have been placed under an appropriate conservation restriction and fencing and signage is constructed. In the event of any act of God or an event resulting from the negligence of others (fire, flood, or pestilence), Phelps Dodge will not be responsible for replacement or repair of impacted mitigation areas after success criteria have been achieved.

*Monitoring and reporting:* An initial monitoring report will be compiled after 404 permit issuance and as soon as mitigation sites have been created, enhanced, and preserved. All active (restored or enhanced) mitigation sites will be monitored and a report compiled annually. The annual mitigation report will include the following: 1) a summary of maintenance activities for each site, 2) photo-documentation, and 3) a summary of growth data collected from each site. Monitoring reports will be submitted to the Corps Regulatory Branch office in Phoenix, Arizona and the Service's Arizona Ecological Services Field Office.

Notification of successful completion of mitigation efforts may be made jointly or separately for each of the three mitigation sites and will be provided with the submittal of a Monitoring Report. Monitoring of the sites shall occur annually through year 10 after implementation of the MMP.

Photo documentation will be provided from permanent locations that will be identified and documented within the first monitoring report. Each mitigation site will have a minimum of five permanent photo points. Two of the minimum five photo points established at both the Pima and Solomon mitigation sites will occur within the flycatcher Active Management Areas. Matched photos from permanent photo points will be provided with the monitoring reports pursuant to the schedule outlined in the MMP.

Within restored and enhanced habitat areas that use supplemental irrigation during the establishment period, detailed records of the timing and duration of irrigation events will be maintained and summarized for mitigation monitoring reports. A minimum of 20 percent of all containerized and York pole plantings used at each mitigation site will be tracked during the establishment period. Each of the tagged plants will be measured after planting, at the end of the first growing season, at the end of each subsequent growing season that irrigation is applied, and for two years following the last irrigation event. Trees will be monitored to insure that a statistically significant increase in tree size (for the sampled population as measured by canopy diameter and height) occurs while irrigation takes place. Upon cessation of supplemental watering, a statistically significant increase in tree size may not occur and monitoring efforts are intended to identify potential die back or reduction in size that would indicate that the trees have not been sufficiently established.

Additional monitoring data may be collected to characterize plant community structure and changes in species composition with time. Methods that will be employed to achieve this effort will include calculation of vertical habitat structure and species composition using the vegetation volume method and small plot sampling to quantify herbaceous cover. These data will be collected as a supplement to the demographic data of planted trees that will form the basis for determination of success.

Additionally, stem density will be measured within the portions of the Pima Mitigation Site that were subject to habitat enhancement activities to determine the percentage of native versus non-native tree species. The collection of this data will be for informational purposes only and is not tied to any specific success criteria. This sampling effort will occur during the regularly scheduled monitoring efforts described above. Stem densities will be determined utilizing the point centered quarter sampling technique. Data collected at each point will include species type and stem diameter to enable calculation of the relative dominance of each species based upon calculated measures of stem basal area within the stand. All sampling efforts will be non-destructive and not require the removal or collection of vegetation for the determination of stand characteristics. Further, this effort will occur outside of the breeding and nesting season for the flycatcher.

*Flycatcher surveying at Pima site:* Flycatcher surveys will be conducted annually for five years, beginning in the spring of 2000. The first two years of surveys have been completed and results are provided as Appendix A in the MMP. Phelps Dodge will be responsible for surveys conducted during the 2002 and 2004 survey seasons and the Service will be responsible to conduct surveys during the 2003 survey season. The Service obligation to conduct surveys will be contingent on fund and staff availability. Phelps Dodge has agreed to grant access to the Service and its designated representatives for the purpose of conducting surveys described in this section. The Service will provide a minimum of two working days notice to the Phelps Dodge Safford office prior to conducting survey and the results of survey efforts will be provided to Phelps Dodge in a timely fashion. All flycatcher surveys will follow the protocol established in Sogge *et al.* (1997) and the recent Service revision (Service 2000a).

*Contingency measures:* Success or failure to achieve the mitigation objectives identified for the mitigation sites will be addressed in annual monitoring reports. These reports will identify the degree of success achieved, the likely causes for any failure and, if necessary, the proposed measures that will be implemented to achieve success. Should implementation of contingency measures become necessary, Phelps Dodge will schedule a meeting to establish a schedule for development and implementation of contingency measures. Correction of the foreseeable causes for not achieving the success criteria outlined in previous sections are not likely to require utilization of alternative mitigation locations. Should any problems arise that require implementation of contingency measures on other than the proposed mitigation sites, Phelps Dodge will coordinate with the Corps and other resource agencies.

*Habitat MMP implementation schedule:* Mitigation and monitoring will be initiated concurrently with project development. Within one year following project development, mitigation sites will be fenced and restrictive covenants placed upon the appropriate portions of the mitigation parcels. Contracts for plant materials required for restoration measures will be written and a contractor retained for this work. Additionally, during the first year, initial monitoring efforts will be implemented. This will include establishment of photo points and gathering any additional baseline information required to support mitigation implementation. Within two years following project development date, irrigation system repairs and modifications will be implemented, contracted plant materials will be planted at the designated sites, and monitoring of these plantings will begin. A graphic summary of the mitigation and monitoring schedule is presented in the MMP.

Water resources MMP:

BLM has prepared a groundwater model to evaluate the potential impact of the proposed project on groundwater and surface water resources within the action area, particularly the Gila River. The groundwater model is described in the Environmental Baseline section below. As a result of this model, Phelps Dodge, BLM, and the Corps have established the specific mitigation goal of achieving a 113 acre-feet benefit to the Gila River by the end of April of each calendar year. Mitigation for Gila River impacts will be accomplished through the Groundwater Model, Monitor, and Mitigate Program, designed to determine the efficacy of the groundwater modeling effort and the adequacy of compensatory mitigation provided for water resources; and through alternate year fallowing of selected agricultural lands, which will result in a net reduction in water demands upon the river system. Additionally, monitoring and mitigation steps will be implemented to minimize predicted impacts to the Watson Wash Well.

*Groundwater Model, Monitor, and Mitigate Program:* The most permeable aquifer between the mine and the Gila River is the Lower Basin Fill. If the model's present configuration either over- or under-represents flow moving from the mine area toward the river, the signal (a growing disparity between model projected and measured water levels in wells) will be most apparent in this aquifer. The monitoring wells located within this portion of the aquifer will be used to evaluate the accuracy of the model-projected impacts. If the changes in water levels in these wells vary significantly from predicted changes, model calibration will be adjusted to bring the projected levels and gradients within those bounds. After recalibration, the mining impact projection would be rerun to determine if any modification of the implemented mitigation measures is necessary. The MMP contains a detailed description of monitoring well construction, well calibration, data acquisition, equipment calibration, measuring points, documentation, water level measurement, and data analysis.

In the event a recalibration of the model is required, the recalibration process would include:

- 1) Documentation of all changes made during recalibration, and an evaluation of the recalibrated model based on graphs comparing model-projected water levels with observed water levels in all well groups for the period from start of mine pumping to the most recent annual measurement.
- 2) A revised model projection run starting at the onset of mine pumping and continuing 500 years in the future (or until steady state conditions are encountered, whichever comes first).
- 3) A technical adequacy review by the third party qualified hydrologist of all recalibration documentation and the recalibrated model projection. A report of the third party hydrologist's findings will be submitted to the Corps and Service.

*Alternate Year Fallowing Program:* To mitigate the potential impacts on flows in the Gila River, Phelps Dodge will fallow certain farmland that it owns in the Safford Valley. The effect of the fallowing program will be to leave water in the river that would otherwise have been consumed by crops. Although the full predicted impacts of pumping are not expected to occur for over 1,500 years, the mitigation will be implemented within one year of project startup.

Since the river is fully appropriated, it might be possible for others to use water resulting from fallowed land. To avoid this, the fallowing program will focus on foregoing the use of natural flow water rights during months in which water is flowing past diversion points in the river into San Carlos Reservoir, typically the months of January through April of each year. Water foregone during these months is expected to be left in the river and not used by other water rights holders. In addition, fallowed lands will not use groundwater from wells that would otherwise have been pumped during the dry months in which natural flow is not available.

Under the fallowing program, 114 acres of land will be fallowed every year (based on consumptive use data for selected agricultural crops presented in the MMP). To accomplish this in a manner consistent with existing agricultural practice in the valley and with applicable water law, two, 114-acre fields - one on "Alternate Year Fallow Site 1" and the other on "Alternate Year Fallow Site 2" (Figure 11 in the MMP), will be used. "Alternate Year Fallow Site 1" fields will be fallowed in even years and "Alternate Year Fallow Site 2" fields fallowed in odd years. In this manner, beneficial use of the surface water right associated with each farm can be demonstrated every other year, preserving the Decreed Water Right and, therefore, the benefit to the river from the Alternate Year Fallowing Program.

The fallowing program will be implemented by means of deed restrictions, which Phelps Dodge will record against each of the farms. The deed restrictions will require that 114 acres of land be fallowed every other year in perpetuity. Lands that are fallowed in a particular year will not be irrigated with either surface water or groundwater for the entire year. Deed restrictions requiring alternate year fallowing will be recorded prior to the time groundwater pumping for the project begins and will be enforceable through the Corps' regulatory authority and the conditions of the Section 404 permit issued for this project. The deed restrictions would be removed in the event the project does not go forward.

*Watson Wash Hot Well Monitoring Program:* Discharge from the Watson Wash Hot Well is conducted by a two-inch PVC pipe. The discharge rate from the PVC pipe is estimated at about 0.264 gallons (1 liter) per second or 16 gpm. There is no provision for shutting the flow off at the present time, and it is not known if all the discharge from the well passes through the PVC pipe. The well is located on BLM lands and has supported a population of introduced Gila topminnow. The model projection run suggests that the maximum effect occurs at 1,200 years, and the pressure head in this well would be reduced about 0.72 feet, due to the mine pumping. Because the pressure head in this well is not known at the present time, it cannot be determined whether or not this small reduction in pressure head would have a noticeable effect on the flow of water. If the model projection is accurate, lowering the level of the discharge pipe from the well by 0.72 feet would restore the present flow rate. If the discharge pipe is lowered before the pressure head in the aquifer is diminished by mine pumping, the rate of discharge would increase.

Phelps Dodge recommendation for this site is to use a stopper plug for the two-inch PVC discharge, fitted with a water pressure meter, to permit periodic (annual) measurement of shut-in pressure. Annual measurements of pressure head would be sufficient to determine any effects of mine pumpage. Any reduction in pressure in the artesian zone supplying this well will reduce the amount of water reaching the Gila River. BLM is currently evaluating various management alternatives for the Watson Wash Hot Well. These alternatives include consideration of recreational development or closure of the artesian well.

*Water Resources Mitigation and Monitoring Reporting:* Annual monitoring reports documenting the Model, Monitor, and Mitigate program will be prepared throughout the life of the Dos Pobres-San Juan Project. These reports will include copies of all well data collected during the reporting year, data analysis completed, and the results of any model recalibration efforts. Additionally, the reports will provide documentation of the alternate year following program. Water Resources Mitigation monitoring reports will be submitted to the Phoenix office of the Corps and the Service.

## **SCOPE AND DEFINITION OF THE ACTION AREA**

The action area is defined as all areas affected directly or indirectly by the Federal action and not merely the immediate area involved the action. The Service believes that the foreseeable land uses on the selected lands would be attributable to the proposed land exchange. However, the effects of future Federal actions in this larger action area are not evaluated in this BO as they would be subject to separate consultations. The Corps has indicated that future development of the Lone Star and Dos Pobres Sulfide ore bodies on the selected lands would require a permit under Section 404 of the CWA, and thus would be subject to review under section 7 of the ESA through the Corps' regulatory authority (SWCA 1999). Additionally, BLM has indicated that future Federal management activities on the offered lands would be subject to separate section 7 consultations under the applicable RMP (SWCA 1999; personal communication with Scott Evans, BLM). Therefore, the scope of the action for this consultation includes: land disturbance,

increased vehicular traffic, and effects to surface and ground water resources, including the Gila River, Bonita Creek, and Watson Wash caused by the development of the Dos Pobres and San Juan ore bodies; other potential future state and private actions not involving Federal agencies on the selected lands as described above; and the hydrologic and vegetation changes and manipulations associated with the MMP. The action area includes all areas affected by these activities.

## **BIOLOGICAL OPINION**

### **SOUTHWESTERN WILLOW FLYCATCHER**

#### **Status of the species**

The southwestern willow flycatcher is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 5.75 inches in length. It has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish belly. Two white wingbars are visible (juveniles have buffy wingbars). The eye ring is faint or absent. The upper mandible is dark, and the lower is light yellow grading to black at the tip. The song is a sneezy fitz-bew or a fit-a-bew, and the call is a repeated whitt.

The southwestern willow flycatcher is one of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993). It is a neotropical migrant that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historic breeding range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

The southwestern willow flycatcher was listed as endangered, without critical habitat on February 27, 1995 (Service 1995). Critical habitat was later designated on July 22, 1997 (Service 1997a). A correction notice was published in the Federal Register on August 20, 1997 to clarify the lateral extent of the designation (Service 1997b). On May 11, 2001, the Tenth Circuit of Appeals set aside critical habitat for the southwestern willow flycatcher.

Declining southwestern willow flycatcher numbers have been attributed to loss, modification, and fragmentation of riparian breeding habitat, loss of wintering habitat, and brood parasitism by the brown-headed cowbird (Sogge *et al.* 1997, McCarthy *et al.* 1998). Habitat loss and degradation are caused by a variety of factors, including urban, recreational, and agricultural development, water diversion and groundwater pumping, channelization, dams, and livestock grazing. Fire is an increasing threat to willow flycatcher habitat (Paxton *et al.* 1996), especially in monotypic saltcedar vegetation (DeLoach 1991) and where water diversions and/or groundwater pumping desiccates riparian vegetation (Sogge *et al.* 1997). Willow flycatcher

nests are parasitized by brown-headed cowbirds (*Molothrus ater*) which lay their eggs in the host's nest. Feeding sites for cowbirds are enhanced by the presence of livestock and range improvements such as waters and corrals; agriculture; urban areas; golf courses; bird feeders; and trash areas. These feeding areas, when in close proximity to flycatcher breeding habitat, especially when coupled with habitat fragmentation, facilitate cowbird parasitism of flycatcher nests (Hanna 1928, Mayfield 1977a and b, Tibbitts *et al.* 1994).

Habitat: The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to around 8,000 feet in Arizona and southwestern Colorado. Historic egg/nest collections and species' descriptions throughout its range, describe the southwestern willow flycatcher's widespread use of willow (*Salix* spp.) for nesting (Phillips 1948, Phillips *et al.* 1964, Hubbard 1987, Unitt 1987, T. Huels *in litt.* 1993, San Diego Natural History Museum 1995). Currently, southwestern willow flycatchers primarily use Geyer willow, Goodding's willow, boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolius*) and live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include: buttonbush (*Cephalanthus* sp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica* spp.). Based on the diversity of plant species composition and complexity of habitat structure, four basic habitat types can be described for the southwestern willow flycatcher: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge *et al.* 1997).

Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of flycatcher territories and nests; flycatchers sometimes nest in areas where nesting substrates were in standing water (Maynard 1995, Sferra *et al.* 1995, 1997). However, hydrologic conditions at a particular site can vary remarkably in the arid Southwest within a season and among years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e., May and part of June). However, the total absence of water or visibly saturated soil has been documented at several sites where the river channel has been modified (e.g. creation of pilot channels), where modification of subsurface flows has occurred (e.g. agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer *et al.* 1996).

Tamarisk is an important component of the flycatchers's nesting and foraging habitat in Arizona. In 2000, 270 of the 303 known nests built were placed in a tamarisk tree (Paradzick *et al.* 2001). In 2001, 323 nests were built in tamarisk, 79 in willow, and 2 in cottonwood (Smith *et al.* 2002).

Breeding Biology: Throughout its range the southwestern willow flycatcher arrives on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Maynard 1995, Sferra *et al.* 1995, 1997). Nesting begins in late May and early June and young fledge from late June through mid-August (Willard 1912, Ligon 1961, Brown 1988a,b, Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995). Southwestern willow flycatchers typically lay three to

four eggs per clutch (range = 2 to 5). Eggs are laid at one-day intervals and are incubated by the female for approximately 12 days (Bent 1960, Walkinshaw 1966, McCabe 1991). Young fledge approximately 12 to 13 days after hatching (King 1955, Harrison 1979). Typically one brood is raised per year, but birds have been documented raising two broods during one season and renesting after a failure (Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Whitfield 1994, Whitfield and Strong 1995). The entire breeding cycle, from egg laying to fledging, is approximately 28 days.

Southwestern willow flycatcher nests are fairly small (3.2 inches tall and 3.2 inches wide) and its placement in a shrub or tree is highly variable (2.0 to 59.1 feet off the ground). Nests are open cup structures, and are typically placed in the fork of a branch. Nests have been found against the trunk of a shrub or tree (in monotypic saltcedar and mixed native broadleaf/saltcedar habitats) and on limbs as far away from the trunk as 10.8 feet (Spencer *et al.* 1996). Flycatchers using predominantly native cottonwood/willow riparian habitats nest low to the ground (5.9 to 6.9 feet on average), whereas birds using mixed native/exotic and monotypic exotic riparian habitats nest higher (14.1 to 24.3 feet on average). Birds nesting in habitat dominated by box elder nest the highest (to almost 60 feet).

The southwestern willow flycatcher is an insectivore, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands. The bird typically perches on a branch and makes short direct flights, or sallies to capture flying insects. Drost *et al.* (1998) found that the major prey items of the southwestern willow flycatcher (in Arizona and Colorado), consisted of true flies (Diptera); ants, bees, and wasps (Hymenoptera); and true bugs (Hemiptera). Other insect prey taxa included leafhoppers (Homoptera: Cicadellidae); dragonflies and damselflies (Odonata); and caterpillars (Lepidoptera larvae). Non-insect prey included spiders (Araneae), sowbugs (Isopoda), and fragments of plant material.

Brown-headed cowbird parasitism of southwestern willow flycatcher broods has been documented throughout its range (Brown 1988a,b, Whitfield 1990, Muiznieks *et al.* 1994, Whitfield 1994, Hull and Parker 1995, Maynard 1995, Sferra *et al.* 1995, Sogge 1995b). Where studied, high rates of cowbird parasitism have coincided with southwestern willow flycatcher population declines (Whitfield 1994, Sogge 1995a,c, Whitfield and Strong 1995) or, at a minimum, resulted in reduced or complete nesting failure at a site for a particular year (Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995, Sferra *et al.* 1995, Sogge 1995a,c, Whitfield and Strong 1995). Cowbird eggs hatch earlier than those of many passerine hosts, thus giving cowbird nestlings a competitive advantage (Bent 1960, McGeen 1972, Mayfield 1977a,b, Brittingham and Temple 1983). Flycatchers can attempt to renest, but it often results in reduced clutch sizes, delayed fledging, and reduced nest success (Whitfield 1994). Whitfield and Strong (1995) found that flycatcher nestlings fledged after July 20th had a significantly lower return rate and cowbird parasitism was often the cause of delayed fledging.

Territory size: Southwestern willow flycatcher territory size likely fluctuates with population density, habitat quality, and nesting stage. Estimated territory sizes are 0.59 to 3.21 acres for monogamous males and 2.72 to 5.68 acres for polygynous males at the Kern River (Whitfield

and Enos 1996), 0.15 to 0.49 acres for birds in a 1.48 to 2.22 acre patch on the Colorado River (Sogge 1995c), and 0.49 to 1.24 acres in a 3.71 acre patch on the Verde River (Sogge 1995a). Territories are established within a larger patch of appropriate habitat sufficient to contain several nesting pairs of flycatchers. These birds appear to be semi-colonial nesters.

Rangewide distribution and abundance: Unitt (1987) documented the loss of more than 70 southwestern willow flycatcher breeding locations rangewide (peripheral and core drainages within its range) estimating the rangewide population at 500 to 1000 pairs. In 1999, there were 182 known southwestern willow flycatcher breeding sites in California, Nevada, Arizona, Utah, New Mexico, and Colorado (all sites from 1993 to 1999 where a resident flycatcher has been detected) holding approximately 915 territories. Sampling errors may bias population estimates positively or negatively (e.g., incomplete survey effort, double-counting males/females, composite tabulation methodology, natural population fluctuation, and random events) and it is likely that the total breeding population of southwestern willow flycatchers fluctuates. Numbers have increased over the last few years, however they are consistent with the 1987 estimate that 500-1000 pairs probably exist. About 50 percent of the 915 territories found throughout the subspecies range were located at three locations (U-Bar Ranch - NM, Roosevelt Lake - AZ, San Pedro/Gila confluence - AZ).

The distribution of breeding groups is highly fragmented, with groups often separated by considerable distances (e.g. in Arizona, approximately 55 miles straight-line distance between breeding flycatchers at Roosevelt Lake, Gila Co., and the next closest breeding groups known on either the San Pedro River, Pinal Co. or Verde River, Yavapai Co.). To date, survey results reveal a consistent pattern rangewide--the southwestern willow flycatcher population is comprised of extremely small, widely-separated breeding groups including unmated individuals.

Arizona distribution and abundance: The largest concentrations of willow flycatchers in Arizona in 2000 were near the confluence of the Gila and San Pedro rivers (219 flycatchers, 119 territories); at the inflows of Roosevelt Lake (207 flycatchers, 115 territories); Gila River, Safford area (30 flycatchers, 15 territories); Topock Marsh on the Lower Colorado River (25 flycatchers, 15 territories); Verde River at Camp Verde (9 flycatchers, 5 territories); Alpine/Greer on the San Francisco River/Little Colorado River (7 flycatchers, 5 territories); Alamo Lake on the Bill Williams River (includes lower Santa Maria and Big Sandy river sites) (44 flycatchers, 24 territories); Big Sandy River, Wikieup (23 flycatchers, 16 territories) and Lower Grand Canyon on the Colorado River (14 flycatchers, 8 territories) (Paradzick *et al.* 2001).

Unitt (1987) concluded that "...probably the steepest decline in the population level of *E. t. extimus* has occurred in Arizona..." Historic records for Arizona indicate the former range of the southwestern willow flycatcher included portions of all major river systems (Colorado, Salt, Verde, Gila, Santa Cruz, and San Pedro) and major tributaries, such as the Little Colorado River and headwaters, and White River.

In 2001, 635 resident flycatchers were detected within 346 territories at 42 sites along 11 drainages statewide (Smith *et al.* 2002). The lowest elevation where territorial pairs were detected was Topock Marsh on the Lower Colorado River (459 feet) and the highest elevation was at the Greer River Reservoir (8203 feet).

Just after listing in 1996, 145 territories were known to exist in AZ. In 2001, 346 territories were detected. However, the majority of this increase has occurred at Roosevelt Lake and at San Pedro/Gila River confluence. Survey effort was a larger factor in detecting more birds at San Pedro/Gila confluence, but the Roosevelt population has grown as habitat has developed in conservation pool of the reservoir. While numbers have increased, distribution has not changed dramatically.

Reproductive Success: In 2001, a total of 426 nesting attempts were documented in Arizona at 40 sites (Smith *et al.* 2002). Of the 329 attempts that were monitored, 191 fledged young, 114 failed, and 24 had unknown outcomes. Causes of nest failure included predation (n=82), nest abandonment (n=10), brood parasitism (n=6), infertile clutches (n=12), weather (n=2), and other causes (n=1). Cowbirds may have contributed to other abandoned nests, but no direct evidence was detected.

Intensive nest monitoring efforts in California, Arizona, and New Mexico have shown that cowbird parasitism and/or predation can often result in failure of the nest; reduced fecundity in subsequent nesting attempts; delayed fledging; and reduced survivorship of late-fledged young. Cowbirds have been documented at more than 90 percent of sites surveyed (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Camp Pendleton 1994, Muiznieks *et al.* 1994, Sogge and Tibbitts 1994, T. Ireland 1994 *in litt.*, Whitfield 1994, C. Tomlinson 1995 *in litt.*, Griffith and Griffith 1995, Holmgren and Collins 1995, Kus 1995, Maynard 1995, McDonald *et al.* 1995, Sferra *et al.* 1995, Sogge 1995a,b, San Diego Natural History Museum 1995, Stransky 1995, Whitfield and Strong 1995, Griffith and Griffith 1996, Skaggs 1996, Spencer *et al.* 1996, Whitfield and Enos 1996, Sferra *et al.* 1997, McCarthy *et al.* 1998). The probability of a southwestern willow flycatcher successfully fledging its own young from a cowbird parasitized nest is low (i.e. <5 percent). Also, nest loss due to predation appears consistent from year to year and across sites, generally in the range of 30 to 50 percent. Documented predators of southwestern willow flycatcher nests identified to date include common king snake (*Lampropeltis getulus*), gopher snake (*Pituophis melanoleucus affinis*), and Cooper's hawk (*Accipiter cooperii*) (Paxton *et al.* 1997, McCarthy *et al.* 1998, Paradzick *et al.* 2000).

Cowbird trapping has been demonstrated to be an effective management strategy for increasing reproductive success for the southwestern willow flycatcher as well as for other endangered passerines (e.g., least Bell's vireo [*Vireo bellii pusillus*], black-capped vireo [*V. atricapillus*], golden-cheeked warbler [*Dendroica chrysoparia*]). It may also benefit juvenile survivorship by increasing the probability that parents fledge birds early in the season. Expansion of cowbird management programs may have the potential to not only increase reproductive output and juvenile survivorship at source populations, but also to potentially convert small, sink populations into breeding groups that contribute to population growth and expansion.

## **Environmental Baseline**

The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process.

Status of the species in action area: The southwestern willow flycatcher is present along the Gila River south of the project area, and suitable habitat exists along Bonita Creek. Two flycatcher territories were recorded at the Sanchez Road crossing (Solomon Bridge) of the Gila River approximately 1.5 miles south of the project area in 1995 (Spencer *et al.* 1996). In 1996, two to three flycatchers were found approximately one mile west of Solomon Bridge and two others and a nest were located approximately one mile northeast of Thatcher (SWCA 1998). Four territories were present in the area approximately one mile west of Solomon Bridge in 1996 (Sferra *et al.* 1997). In 1997, a single bird was detected approximately three miles west of Solomon Bridge, 18-20 birds and three to four nests were found about three miles downstream of the Thatcher Bridge, 6-10 birds and one nest were found about three miles downstream of the Thatcher Bridge; and 6-8 birds were found about one-quarter mile east of the Pima Bridge (SWCA 1998). In 1998, five flycatchers were detected at the Ft. Thomas mitigation site, two were detected at the Pima/Thatcher mitigation site, and two were detected at the Solomon mitigation site. Subsequent surveys at the Pima Site detected 15 flycatcher territories in 2000 and 36 territories in 2001. Details and maps of survey results are provided in SWCA (1998, 1999) and Westland Resources (2002).

Habitat mitigation plan: Salt cedar eradication at the Pima mitigation site occurred prior to May 1, 1999. All cutting was conducted prior to the southwestern willow flycatcher's breeding season (May through August) and the species was not believed to be present at the site during eradication efforts. Flycatchers were detected at the Pima mitigation site during all three survey periods conducted in 1998. The Service, therefore, considers the habitat to be occupied. Based on our review of available information, the habitat enhancement area included habitats near and likely encompassing flycatcher detection locations. Eradication efforts included the removal of salt cedar understory within contiguous habitat patches suitable for nesting, foraging, and courting by flycatchers. Exactly how close to flycatcher nests that eradication occurred is difficult to determine as surveys conducted in 1998 did not locate nests. Due to the limited number of biologist-hours spent during those surveys, the potential for existing nests to have gone undetected is significant. Also, due to the proximity of eradication efforts to known flycatcher detections we believe salt cedar eradication adversely affected southwestern willow flycatchers.

The removal of understory can affect riparian obligate breeding birds, such as the flycatcher, in several manners. Vegetation thinning reduces stand density, structural complexity, available cover, and habitat suitability for flycatchers. When flycatchers are utilizing the habitat patch,

this can contribute to disrupted foraging patterns, shifted nest site selection, physiological stress, vulnerability to predation, susceptibility to brood parasitism, and nest abandonment, resulting in reduced fecundity, recruitment, and survival.

The removal of the salt cedar understory represents a temporal setback in succession and temporarily reduces structural heterogeneity and overall suitability of habitat for the flycatcher. The site where flycatchers were detected was composed of an overstory of dense willow poles/trees interspersed with an understory of exotic salt cedar. This habitat is typical of multi-storied willow flycatcher habitat described by Sogge *et al.* (1997). Clearing the saltcedar understory removed a portion of the foliated subcanopy layer sought by nesting flycatchers. Without detailed knowledge of the flycatcher's exact nesting and foraging locations, the Service believes that altering the structural diversity of the habitat patch temporarily reduced the suitability of the area for foraging, courting, and nesting by flycatchers.

In general the Service recognizes the desirability of eradicating salt cedar and revegetating with native riparian vegetation along southwestern streams and rivers. However, we are continually concerned that many areas currently occupied by salt cedar may not necessarily be suitable environments for establishment, regeneration, and survival by cottonwood and willow. As a result, we only support restoration programs when site specific analyses indicate that microhabitat conditions such as depth to water table, soil texture, soil salinity, flood frequency, and flood intensity would be appropriate to support and maintain the life history requirements of native riparian vegetation, including factors such as seed bed formation, seed dispersal, germination, seedling establishment, recruitment, and survival. In addition, due to the highly endangered status of the southwestern willow flycatcher and its propensity to nest in salt cedar thickets, we must urge those entities involved in restoration projects to recognize that although the net environmental effects of salt cedar eradication may be considered desirable, and perhaps beneficial, adverse effects to the flycatcher could still be realized. Due to the high variability and dynamic nature of riparian ecosystems and the flycatcher's status, we believe that salt cedar eradication projects must be evaluated individually and structured accordingly to reduce or eliminate the potential for adverse effects to, or take of, the southwestern willow flycatcher.

Groundwater model: In conjunction with BLM's consulting hydrologist Dr. MacNish, University of Arizona, Dames & Moore (1997a,b,c, and d) prepared a groundwater model to evaluate the potential impact of the proposed project on groundwater and surface water resources within the action area. The purpose of the model was to predict what impact there may be on water resources from development of the proposed open pit mines and groundwater production wells. Of particular interest was the potential impact to surface flows in the Gila River, approximately eight miles south of the proposed production well field.

The present 2001 calibration of the model projects a peak annual impact of 52 acre-feet per year (af/yr) on the Gila River. Accounting for a predicted 21 af/yr of groundwater discharge into pit lakes results in a total predicted peak impact on the river of 73 af/yr (Westland Resources 2002).

Surface water impacts from the capture and diversion of stormwater runoff is estimated to average 94 af/yr. Fifty-four af/yr of this amount is from capture of incidental sheet flow and 40 af/yr is from capture of channel flow. The effect on the river from average annual reductions in ephemeral tributary runoff, average annual reductions in non-tributary sheet flow runoff, and predicted maximum groundwater impacts total approximately 165 af/yr. Additionally, indirect effect to water resources resulting from population growth in the Safford Valley associated with the project is estimated to be 76 af/yr (SWCA 1999).

The model projection shows an unmeasurable impact on Bonita Creek (Westland Resources 2002). Monitoring continues to assess the accuracy of model predictions. The groundwater model predicts a possible 0.72-foot reduction in wellhead pressure at the Watson Wash Hot Well located southwest of the project area by year 1,200 of the model run (Westland Resources 2002). The Butte Fault appears to isolate springs in the vicinity of the project area (Cottonwood, Bryce, etc.) from the Graben where groundwater will be pumped, and the springs appear to be fed by locally recharged perched aquifers not connected to the regional groundwater system.

There are a number of springs located north of the Gila River near Bylas that emerge as seeps in drainages exiting elevated terraces and along the faces of sloping terraces themselves. Cold Springs and the springs near Bylas are located approximately 13 and 26 miles from the mine, respectively. The source of the water feeding these springs is suspected to be primarily local recharge along the Gila Mountain front.

Other past and present actions: The Gila River in the Safford Valley has undergone significant change over the last 100 years. Human activities have resulted in the lowering of groundwater levels, decreases in surface flows, changes to floodplain and channel dynamics, and changes in the extent and composition of riparian vegetation. The river channel has changed from narrow, deep, and meandering to wide, shallow and braided. Burkham (1972) reported that the average channel width in the 1880's was 150 to 300 feet. Olmstead (1919) reported that a United States township survey in Graham County showed the average width of the river channel in 1875 to be 138 feet, whereas in 1919 the channel width averaged 1,935 feet. More recently, Graf *et al.* (1983) noted that the channel in the Safford Valley appeared to be in transition from a braided to a meandering stream. Changes to channel morphology have been and continue to be a function of watershed conditions, flood events, clearing of lands within the floodplain for agricultural and other uses, direct modification of the stream channel, and the extent and stability of floodplain vegetation.

Increases in human population and agricultural activity have resulted in increased groundwater pumping and reduced surface flows in the Gila Valley during the last 60 years (Lilburn and Associates 1984). In the Safford Valley, groundwater use increased from 20,000 acre-feet/year in the last half of the 1930s to 116,000 acre-feet/year during the last half of the 1960's resulting in a lowering of the water table of up to 25 feet (Lilburn and Associates 1984). Surface water flows have also declined steadily since 1925 as a result of diversions for agriculture (Graf *et al.* 1983). These activities have restricted floodplain development and the maintenance of native riparian vegetation communities.

The areal extent of riparian habitat and species composition have changed substantially over the last 100 years. Flooding events, clearing for agricultural and other land uses, modifications to the floodplain for flood control, and the invasion of the exotic salt cedar have reduced the functional capacity of riparian habitats to dampen flood damage and provide wildlife habitat. Between 1881 and 1905 the Gila River in the Safford Valley was a meandering stream lined by cottonwood, willow, and mesquite (Graf *et al.* 1923). Ground photos of the Gila River in the Safford Valley in the 1880's indicate the riverbottom was dominated by 'fairly dense cover of cottonwoods and willows, with undergrowth beneath these trees ... very dense and ... almost impenetrable in places' (Graf *et al.* 1983). Salt cedar was not present in the photos, and was documented on the Gila River in the Phoenix area in the 1890s and first observed in the Safford Valley sometime between 1910 and 1920. Graf *et al.* (1983) also noted that by 1930 salt cedar had become the dominant bottomland vegetation on the upper Gila River. Riparian vegetation reached its maximum areal extent between 1944 and 1945 and has fluctuated considerably since that time with dynamic flooding events, agricultural clearing and phreatophyte control. One factor that has remained constant, however, is the predominance of salt cedar within existing riparian habitats.

In March of 1998, the southwestern willow flycatcher was included in the Biological Opinion on the Phoenix District portion of the eastern Arizona grazing environmental impact statement, issued to BLM. The Service concluded that project implementation was neither likely to jeopardize the continued existence of the species nor likely to adversely modify critical habitat. No incidental take was anticipated and conservation measures were recommended to provide management direction for the species.

In September of 1997, the southwestern willow flycatcher was included in the Programmatic Biological Opinion for the Safford and Tucson Field Office's livestock grazing program, southeastern Arizona, issued to BLM. The Service concluded that the proposed livestock grazing program was neither likely to jeopardize the continued existence of the species nor likely to adversely modify critical habitat. Although it was anticipated that cowbird parasitism could result in incidental take of an entire nestling cohort within the project area, the Service concluded that such take could be minimized or eliminated through implementation of the proposed mitigation, reasonable and prudent measures, and terms and conditions.

In October of 1995, the southwestern willow flycatcher was included in a biological opinion for construction of a new Solomon bridge over the Gila River at the Sanchez Road crossing in Graham County, Arizona, issued to the Federal Highways Administration. The Service concluded that the proposed action would not jeopardize the continued existence of the species. Reasonable and prudent measures, and terms and conditions were issued to minimize the anticipated temporary loss of reproduction from two southwestern willow flycatcher territories.

### **Effects of the action**

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with

that action, that will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

Groundwater pumping: The current calibration of the hydrologic model prepared for the proposed project coupled with the proposed fallowing program, supports the notion that projected impacts to surface flow in the Gila River and Bonita Creek would be insignificant and fully mitigated. The model, monitor, mitigate program will detect and remedy any unforeseen future hydrologic impacts to the Gila River and Bonita Creek that may affect the southwestern willow flycatcher or suitable habitat. Because the proposed safety precautions and procedures designed to reduce the chances of a hazardous materials spill by tanker trucks into the Gila River would be implemented, the probability of a spill large enough to affect the Gila River or riparian vegetation is extremely small and discountable.

Stormwater runoff: The project's stormwater management plan is sufficient to render the possible release of stormwater runoff or process solutions in excess of NPDES standards extremely remote and discountable. Even if exceedance of water quality standards become evident, we feel confident they would be evaluated separately for potential effects to the flycatcher through EPA's permitting process. Although two southwestern willow flycatcher territories were present near Solomon bridge in 1995, nests detected during recent surveys conducted between the Solomon and Pima bridges were located at considerable distances from the bridge crossings. Therefore, we expect the effects of increased vehicular traffic over the Gila River on breeding behavior of flycatchers to be insignificant.

Mitigation and monitoring plan:

While there are temporal setbacks to the suitability of the habitat patch at the Pima mitigation site for flycatchers, the proposed MMP is expected to result in net beneficial environmental effects. To ameliorate the adverse effects associated with the salt cedar eradication, and to eliminate the potential for take, Phelps Dodge agreed to incorporate specific measures into the MMP to benefit flycatchers. These measures are detailed in the PROJECT DESCRIPTION. The Corps has agreed to make the measures as a condition of their section 404 permit. Additionally, portions of the properties, identified and fenced for the MMP, will be set aside by Phelps Dodge in perpetuity. In the event of a transfer of title, the mitigation sites will have an appropriate conservation mechanism in place that would limit land use to the purposes outlined in the MMP. These restrictions would eliminate cattle grazing, livestock pasturage, and vegetation clearing activities.

Grazing: Phelps Dodge has indicated that if the exchange is authorized, it would renegotiate grazing leases with the current allottees for portions of the selected lands not involved in the proposed Dos Pobres/San Juan Project. Phelps Dodge plans to remove grazing from selected and

private lands used in the MPO. Though no significant change in grazing is expected, the change in land ownership will result in a loss of BLM oversight once lands become private. Maximum stocking rates would not be greater than existing rates due to low forage. Existing ground cover is minimal over most of the property and is highest on steep hillsides.

Residential development: Phelps Dodge has no plans for residential development on any of the selected lands. Such plans would significantly impact the future ability of Phelps Dodge to develop the Lone Star or the Dos Pobres Sulfide projects, the identified foreseeable uses of these lands.

Commercial development: Commercial development of the selected lands is considered highly unlikely because the nearest sizeable human population is at least eight miles away. Large or small scale commercial development would be unlikely.

Recreational development: Some recreational development, such as off-road vehicle (ORV) use, would no longer be subject to a Federal permit. If such activities occurred, they would be unlikely to occur on a large scale.

Agricultural development: Agricultural development is not feasible on the selected lands on a significant scale. Soil is poor and rocky, the land is generally too steep, the cost of pumping water for irrigation is not profitable, and the land's value as support lands for mining is much greater than its potential agricultural value.

Groundwater pumping: According to SWCA (1999), acquisition of the selected lands would not appreciably increase Phelps Dodge's potential for groundwater pumping. These activities would no longer be subject to BLM review on the selected lands.

### **Cumulative effects**

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

Specific future State and/or private actions (non-Federal actions) in the project area have not been identified although we anticipate ongoing activities in the Safford Valley, as described in the Environmental Baseline, as well as groundwater pumping, farming, and introduction and persistence of non-native species to continue to affect the Gila River and the flycatcher's habitats.

### **Conclusion**

After reviewing the current status of the species, environmental baseline for the action area, effects of the land exchange, ore body development, mitigation plan, and cumulative effects, it is

the Service's biological opinion that the Dos Pobres/San Juan Project, as proposed, is not likely to jeopardize the continued existence of the southwestern willow flycatcher. No critical habitat is present in the action area, therefore none will be affected. Our conclusion of no jeopardy is based on the following:

- 1) The model, monitor, mitigate program would be adequate to detect and remedy any unforeseen future hydrologic impacts to the Gila River and Bonita Creek that may affect the southwestern willow flycatcher or suitable habitat.
- 2) The probability of a hazardous spill large enough to affect the flycatcher or its habitat on the Gila River is extremely small and discountable.
- 3) The project's stormwater management plan is sufficient to render the possible release of stormwater runoff or process solutions in excess of NPDES standards extremely remote and discountable. Exceedance of water quality standards would be evaluated separately for potential effects to the flycatcher.
- 4) Although transitory adverse effects may have occurred as a result of salt cedar eradication, the Pima mitigation site should remain suitable for the flycatcher and may actually be enhanced through implementation of the MMP. Additionally, cooperatively crafted conservation measures have been incorporated into the project for the flycatcher.

### **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 further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of the Incidental Take Statement.

#### **Amount or extent of take**

The Service does not anticipate the proposed action will incidentally take southwestern willow flycatcher. Implementation of cooperatively crafted conservation measures, incorporated into the MMP, is expected to minimize project effects to the level where incidental take is not reasonably certain to occur.

### **Disposition of Dead or Injured Listed Species**

Upon locating a dead, injured, or sick listed species initial notification must be made to the Service's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: 480/835-8289) 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 if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes to the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. For the Dos Pobres/San Juan Project we recommend that:

- 1) In coordination with the Service and Arizona Game and Fish Department (AGFD), Phelps Dodge and the Corps should conduct at least two years of nest monitoring at the Pima mitigation site in accordance with the southwestern willow flycatcher nest monitoring protocol (AGFD 1999).
- 2) In cooperation with the Service and AGFD, Phelps Dodge and the Corps should conduct at least two years of cowbird trapping at the Pima mitigation site if nest monitoring indicates that cowbird parasitism is resulting in southwestern willow flycatcher nest failure.
- 3) All cooperating Federal agencies and Phelps Dodge should participate with the Service in the implementation of the southwestern willow flycatcher recovery plan, when completed.
- 4) Phelps Dodge and BLM should work cooperatively to ensure that powerlines constructed for the proposed project are designed to minimize potential electrocution of raptors, such as the bald eagle (*Haliaeetus leucocephalus*). We refer Phelps Dodge and BLM to Avian Power Line Interaction Committee (1996) for potential designs and ideas.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendation.

**REINITIATION NOTICE**

This concludes formal consultation for southwestern willow flycatcher for the proposed Dos Pobres/San Juan Project. As provided in 50 CFR Part 402.16, where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law), reinitiation of consultation is required if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the action is subsequently modified in a manner that causes an effect to listed species or critical habitat in a manner not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

After completion of the land exchange, BLM, the lead agency in this consultation, will no longer retain sufficient discretionary authority to reinitiate consultation on the selected lands. However, the Service anticipates sufficient discretionary Federal agency involvement or control over future actions would be retained by the Corps and/or EPA, cooperators in this consultation, through their respective authorities provided under sections 404 and 402 of the CWA.

In future communication regarding this consultation, please refer to consultation number 2-21-99-F-007. If we may be of further assistance, please contact Mike Martinez at (602) 242-0210 or Sherry Barrett at (520) 670-4617.

/s/ David L. Harlow

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)  
Supervisor, Fishery Resources Office, Fish and Wildlife Service, Pinetop, AZ  
Project Manager, Army Corps of Engineers, Tucson, AZ  
Regional Administrator, Environmental Protection Agency, San Francisco, CA  
Area Manager, Bureau of Indian Affairs, Phoenix, AZ

Supervisor, Project Evaluation Program, Arizona Game and Fish Department, Phoenix, AZ  
Director, Arizona Game and Fish Department, Phoenix, AZ

## APPENDIX A - CONCURRENCES

The proposed project may affect the loach minnow, spikedace, razorback sucker, their critical habitats, and the Gila topminnow for the following reasons: project-related groundwater pumping could impact the aquatic ecosystems of the Gila River, Bonita Creek, and Watson Wash; project-related traffic over Gila River bridges may increase noise, disturbance, or potential for hazardous materials spills; and stormwater discharges from the mining operation may introduce contaminants into the Gila River.

### **Gila topminnow**

The Gila topminnow was listed as endangered in 1967 without critical habitat (Service 1967). The Gila topminnow has gone from being one of the most abundant fishes of the Gila River basin (Hubbs and Miller 1941) to one that exists at not more than nine natural sites (Bagley et al. 1991). Of the 300+ reintroductions conducted by the AGFD and others, 21 remain extant (Brown and Abarca 1992). Near the project area, an introduced population has been documented in recent years at Watson Wash, north of Thatcher, Graham Co. Watson Wash is a small stream associated with an artesian well near the Gila River, less than one mile from the project area. In May 1997, Gila topminnows and introduced guppies (*Poecilia reticulata*) were both abundant in this spring (SWCA 1998). Despite contamination of its habitat with exotic fishes and pollutants, Gila topminnow at Watson Wash continue to persist. Past site visits have revealed large numbers of topminnow readily visible along the water course (BLM 1996), although recently few have been observed. Outside of the immediate action area, a population of Gila topminnow exists in Cold Springs, Graham County.

### **Razorback sucker**

Historically, the razorback sucker was found in the Gila River as far upstream as Fort Thomas, but was extirpated by the late 1970's. Razorback suckers were reintroduced into the Gila River and its tributaries between 1981 and 1989 (Hendrickson 1993, BLM 1996); however, there is no evidence that introductions have established a self-sustaining population. No razorbacks were found among the approximately 1664 fish captured during depletion surveys of a plunge pool below the Eagle Creek diversion dam conducted in 1996 by SWCA (1997). However, BLM (1996) reported a large razorback sucker found in Bonita Creek, northeast of the project area, in 1991. It is likely that small numbers of razorback suckers survive in the Gila River and Bonita Creek. On the Gila River, critical habitat is designated for the razorback sucker on the river and its 100-year floodplain from the Arizona-New Mexico border to Coolidge Dam. With the exception of upper Bonita Creek, razorback sucker habitat near the project area, especially the Gila River, supports several species of nonnative fish. These fish prey on and/or compete with razorback suckers, limiting the potential for self-sustaining populations (Minckley et al. 1991, Service 1993).

### **Loach Minnow**

Loach minnow was listed as threatened on October 28, 1986 (Service 1986a). Critical habitat was designated on April 25, 2000 (Service 2000b) and includes portions of the Verde, Black, middle Gila, San Pedro, San Francisco, Tularosa, Blue, and upper Gila Rivers and Eagle, Bonita, Tonto, and Aravaipa Creeks and several tributaries of those streams. In the action area, Bonita Creek is designated critical habitat. Historic range of loach minnow included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila rivers (Minckley 1973, Sublette *et al.* 1990). Habitat destruction plus competition and predation by nonnative species have reduced the range of the species by about 85 percent (Miller 1961; Williams *et al.* 1985; Marsh *et al.* 1989). Loach minnow remains in limited portions of the upper Gila, San Francisco, Blue, Black, Tularosa, and White rivers and Aravaipa, Turkey, Deer, Eagle, Campbell Blue, Dry Blue, Pace, Frieborn, Negrito, Whitewater, and Coyote creeks in Arizona and New Mexico (Barber and Minckley 1966, Silvey and Thompson 1978, Propst *et al.* 1985, Propst *et al.* 1988, Marsh *et al.* 1990, Bagley *et al.* 1995, USBLM 1995, Bagley *et al.* 1996, Miller 1998). The loach minnow is declining rangewide. Although it is currently listed as threatened, the Service has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending, however, work on it is precluded due to work on other higher priority listing actions (Service 1994c).

### **Spikedace**

Spikedace was listed as threatened on July 1, 1986 (Service 1986b). Critical habitat was designated on April 25, 2000 (Service 2000b). Critical habitat includes portions of the Verde, middle Gila, San Pedro, San Francisco, Blue, and upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks and several tributaries of those streams. In the action area, Bonita Creek is designated critical habitat. Spikedace historically occurred throughout the mid-elevations of the Gila River drainage, but is currently known only from the Verde, middle Gila, and upper Gila rivers, and Aravaipa and Eagle creeks (Barber and Minckley 1966, Minckley 1973, Anderson 1978, Marsh *et al.* 1990, Sublette *et al.* 1990, Jakle 1992, Knowles 1994, Rinne 1999). Habitat destruction along with competition and predation from introduced nonnative species are the primary causes of the species decline (Miller 1961, Williams *et al.* 1985, Douglas *et al.* 1994). The spikedace is declining rangewide. Although it is currently listed as threatened, the Service has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending, however, work on it is precluded due to work on other higher priority listing actions (Service 1994c).

### **Conclusion**

The Service concurs with BLM's determination that the Dos Pobres/San Juan Project may affect, but is not likely to adversely affect the Gila topminnow, razorback sucker, spikedace, loach minnow and designated critical habitat for the razorback sucker, spikedace, and loach minnow, based on the following:

- 1) The current calibration of the hydrologic model prepared for the proposed project coupled with the proposed fallowing program, described above, supports the notion that projected impacts to surface flow in the Gila River, Bonita Creek, and Watson Wash would be insignificant and fully mitigated. The hydrologic model has undergone rigorous peer review by various professional hydrologists and, overall, their conclusions indicate that the current model is a reasonably accurate simulation of water levels and representation of potential hydrologic impacts (BLM 1998, 1999a,b; SWCA 1998, 1999; MacNish 1998; Stetson Engineers 1999).
- 2) The model, monitoring, mitigate program, described above, would detect and remedy any unforeseen future hydrologic impacts to the Gila River, Bonita Creek, and Watson Wash that may affect listed species. Compliance with the project's MMP would be ensured by the Corps through their permitting authority under section 404 of the Clean Water Act. This would be sufficient to address any future threatened and endangered species issues through the section 7 consultation reinitiation process related to the functioning of the MMP.
- 3) If necessary, the lowering of the discharge pipe at Watson Wash will be conducted prior to the realization of a reduction in flow pressure, so as to avoid the incidental take of Gila topminnow.
- 4) The Service will be provided copies of all status reports related to the functioning of the proposed mitigation and monitoring programs.
- 5) Safety precautions and procedures, described above, which are designed to reduce the chances of a hazardous materials spill by tanker trucks into the Gila River will be implemented. Based on those precautions, we believe the probability of a spill large enough to adversely affect the aquatic ecosystem of the Gila River to be insignificant and discountable.
- 6) The project's stormwater management plan, described above, meets current standards and we believe it sufficient to render the possible release of stormwater runoff or process solutions in excess of NPDES limitations insignificant and discountable. Exceedance of the turbidity limit, or other constituents, is not covered under this consultation. In the event that exceedances of water quality standards become evident, they would be evaluated separately for potential effects to listed species or critical habitat under EPA's section 402 permitting process through either a separate consultation or a reinitiation.

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