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In Reply Refer to:
AESO/SE
02EAAZ00-2017-F-0482
2-21-99-F-007

September 12, 2017

Ms. Sallie Diebolt, Chief
Arizona Branch, Regulatory Division
Los Angeles District, Army Corps of Engineers
3636 North Central Avenue, Suite 900
Phoenix, Arizona 85012-1939

RE: Final Biological Opinion on the Lone Star Ore Body Development Project
(File Number SPL-2014-00065-MWL)

Dear Ms. Diebolt:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (ESA). Your request was dated May 25, 2017. At issue are impacts that may result from the proposed Lone Star Ore Body Development Project located in Graham County, Arizona. You concluded that the proposed action may affect and is likely to adversely affect the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) (SWFL) and its critical habitat, and the threatened western yellow-billed cuckoo (*Coccyzus americanus*) (WYBC) and its proposed critical habitat. Because critical habitat is proposed for the WYBC, this document represents a conference opinion that may be converted to a biological opinion if WYBC critical habitat is designated.

In your letter, supported by the geologic and hydrologic analyses contained in the October 2016 *Biological Assessment, Lone Star Ore Body Development Project* (BA; WestLand 2016a), you also determined the proposed project would have no effect on the endangered desert pupfish (*Cyprinodon macularius*), the endangered Gila chub (*Gila intermedia*), the endangered Gila topminnow (*Poeciliopsis occidentalis occidentalis*), the endangered loach minnow (*Tiaroga cobitis*) or its critical habitat, the endangered razorback sucker (*Xyrauchen texanus*) or its critical habitat, and the endangered spikedace (*Meda fulgida*) or its critical habitat.

This biological opinion and conference opinion is based on information contained in: (1) the October 2016 BA (WestLand 2016a); (2) the October 2016 Clean Water Act Section 404 *Mitigation Planning and Implementation Application of Lessons Learned to Lone Star Conceptual Mitigation Plan* (WestLand 2016b); (3), the October 2016 *Rotational Fallowing and 3M Programs Technical Memorandum* (WestLand 2016c); (4) the June 16, 2017, *Supplemental Conservation Measures and Estimation of Impacts to Southwestern Willow Flycatcher: Lone Star Ore Body Development Project* memorandum

(Conservation Measure Supplement); (5) our February 6, 2015, [Biological Opinion on the] *Upper Gila River Vegetation Management Project* and September 19, 2016, *Reinitiation of Consultation for the Upper Gila River Vegetation Management Project* [GWP BO; File Numbers 02EAAZZ00-2015-F-0151 (FWS 2015a) and 02EAAZZ00-2015-F-0151-R1 (FWS 2016), respectively]; and (6) telephone conversations, electronic communications, and other sources of information. Literature cited in this biological and conference opinion is not a complete bibliography of all literature available on the species of concern, vegetation management activities including nonnative vegetation removal and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

The FWS and the National Marine Fisheries Service (NMFS) published a Final Rule on February 11, 2016 (81 FR 7214), revising the definition for destruction or adverse modification of critical habitat in the Act's implementing regulations at 50 CFR 402.02. Specifically, we finalized the following regulatory definition: "Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features."

Furthermore, FWS and NMFS published a Final Rule on May 11, 2015 (80 FR 26832- 26845), amending the incidental take statement provisions of the implementing regulations for section 7 of the Act (50 CFR 402.02 and 402.14) to: (1) to refine the basis for development of incidental take statements for programmatic actions; and (2) address the use of surrogates to express the amount or extent of anticipated incidental take. With respect to the use of surrogate measures of incidental take, we amended 402.14(i)(1)(i) of the regulations to clarify that surrogates may be used to express the amount or extent of anticipated take, provided the biological opinion or the incidental take statement: (1) Describes the causal link between the surrogate and take of the listed species; (2) describes why it is not practical to express the amount of anticipated take or to monitor take related impacts in terms of individuals of the listed species; and (3) sets a clear standard for determining when the amount or extent of the taking has been exceeded.

Lastly, in reaching our findings that there is a reasonable certainty that the SWFL and WYBC will be incidentally taken, we considered the following:

- Section 9 of the Act and our implementing regulations in the Code of Federal Regulations (CFR) at 50 CFR part 17 prohibit the ``take'' of fish or wildlife species listed as endangered or threatened.
- Take of listed fish or wildlife is defined under the Act as ``to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct''.
- The term ``harass'' is defined in the regulations as ``an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering'' (50 CFR 17.3).
- The term ``harm'' is defined in the regulations as ``an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, and sheltering'' (50 CFR 17.3).
- "Incidental take" refers to takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant" (50 CFR 402.02).

CONSULTATION HISTORY

June 15, 2016: We participated in a technical assistance meeting with Freeport-McMoRan Safford Inc. (FMSI) and WestLand Resources, Inc. (WestLand) to discuss the project, ESA permitting approaches, and project timeline.

January 9, 2017: We received a Biological Assessment (BA) from the U.S. Army Corps of Engineers (USACE) with request for informal consultation.

March 22, 2017: We participated in a technical assistance meeting with FMSI and WestLand to discuss the project, the determinations in the Biological Assessment, the supporting documentation prepared by WestLand, and the Conceptual Mitigation Plan submitted to the USACE.

May 25, 2017: We received an electronic mail message from the USACE changing their effects determination the SWFL to may affect, likely to adversely affect for the species and its designated critical habitat, and their effects determination for the WYBC to may affect, likely to adversely affect for the species and its proposed critical habitat.

June 13-15, 2017: We discussed, via telephone, WestLand's authorship of the draft for the proposed Lone Star Ore Body Development Project, to be structured on the February 6, 2015, Final Biological Opinion on the Upper Gila River Vegetation Management Project (File Number 02EAAZZ00-2015-F-0151) and the subsequent September 19, 2016, Reinitiation of Consultation for the Upper Gila River Vegetation, Management Project (File Number 02EAAZZ00-2015-F-0151-R1). Discussions included WestLand's development of a SWFL density per unit area methodology based on bird survey data for parcels associated with the Upper Gila River Vegetation Management Project.

June 16, 2017: We received both Westland's proposed Draft Biological Opinion for the proposed action and the June 16, 2017 Conservation Measure Supplement (see Appendix B).

August 15, 2017: We transmitted a Draft BO to you.

August 22, 2017: We received your electronic mail message stating that neither the Corps nor FMSI had any comments with respect to the August 15, 2017, Draft BO.

BIOLOGICAL AND CONFERENCE OPINION

Description of the Proposed Action

Freeport-McMoRan Safford Inc. has proposed the development of the Lone Star ore body mineral resources on 6,196 acres of privately held lands within the existing, 36,050-acre Safford Mine facility, and proximate to their existing Dos Pobres and San Juan open-pit copper mining operations (Figure 1; all figures appear in Appendix A). Development of the Lone Star ore body mineral resources will require several common components of an open-pit copper mine including development rock stockpiles, a heap leach pad, conveyance route infrastructure, a compactible soil borrow source, related stormwater management facilities, and other appurtenant features, in addition to the open pit itself. The construction and operation of these components requires the discharge of fill to surface drainage features that the USACE has preliminarily determined (SPL-2014-00065-MWL) may be jurisdictional waters of the United States. FMSI has made application for a Department of the Army Clean Water Act (CWA) Section 404 permit to discharge fill into waters of the United States, and the USACE has prepared a Final

Environmental Impact Statement as part of its National Environmental Policy Act (NEPA) review of the permit application.

Compensatory mitigation activities are required to offset unavoidable impacts to waters of the United States resulting from the development of the project, in accordance with the USACE and the U.S. Environmental Protection Agency's (EPA) *Final Rule for Compensatory Mitigation for Losses of Aquatic Resources* (33 CFR Part 332 and 40 CFR Part 230; the 2008 Mitigation Rule). waters of the United States. A Conceptual Mitigation Plan (WestLand 2016d) has been prepared for the project to facilitate compliance with the 2008 Mitigation Rule, and outlines mitigation activities proposed along the Gila River at a property referred to as the Emery Site. The Emery Site is adjacent to the Gila River approximately 25 river miles downgradient of the project, and is within the same watershed sub-basin (WestLand 2016d) as the project. Located along the Gila River (Figure 1), the 158-acre Emery Site is associated with a perennial aquatic resource, has the potential to support high-value mesoriparian and hydroriparian habitats, and provides regional conservation benefit. Proposed mitigation actions at the Emery Site include restoration of a former agricultural field to a riparian area within the active floodplain of the Gila River, removal of tamarisk and riparian enhancement (both within Area B), and the creation of buffer areas to protect the mitigation areas from fire (Area C) (see Conservation Measure Supplement in Appendix B). We also note that the Conservation Measure Supplement proposes to implement all activities within riparian vegetation outside of the combined duration of the breeding seasons for SWFL and WYBC, which is from April 15 through September 30.

The action area is defined as those areas influenced by direct and indirect effects of the proposed action (FWS 1998a). The project action area includes the area affected by both the actions authorized by the USACE Section 404 permit, as well as all interrelated and interdependent actions at the Emery Site. As such, the action area (Figure 2) includes: (1) all areas subject to direct surface disturbance from the heap leach pad, the development rock stockpiles, the haul road, and stormwater management facilities that impact potentially jurisdictional waters of the United States, 2) compensatory mitigation activities to be undertaken on the Emery Site (see Appendix B), (3) the area of potential indirect effects resulting from the reduction of stormwater runoff to the Gila River, and (4) the area of potential indirect effects from the modeled reduction in groundwater contribution to flows in the identified reaches of Bonita Creek and the Gila River.

Activities analyzed include those potentially subject to authorization by the USACE Section 404 permit, as well as all interrelated and interdependent actions identified above. These activities will occur over an estimated period of twenty-five years, beginning at the time of 404 permit issuance.

Potential impacts to listed species or their designated or proposed critical habitat are limited to those direct impacts required by the CWA compensatory mitigation to be implemented at the Emery Site as a condition of the CWA Section 404 Permit issued by the USACE. The direct surface disturbance from development of mining facilities authorized by the Section 404 will not result in direct impacts to listed species or their designated or proposed critical habitat. Potential indirect impacts associated with onsite stormwater management facilities and potential long-term impacts to groundwater resources from development of the project have been offset by the Rotational Fallowing Program, and adverse effects to listed species or designated or proposed critical habitat are not expected from those activities.

Emery Site Mitigation

The 158-acre Emery Site is comprised of property solely owned by FMSI and located in portions of Section 20 and 21, Township 4 South, Range 23 East, in Graham County, Arizona. The Emery Site is on

the Gila River, northwest of Fort Thomas and Safford. Located along the Gila River, the Emery Site has the potential to support high-value mesoriparian and hydroriparian habitats, and provides regional conservation benefit. The primary goal of the mitigation activities at the Emery Site is the restoration of natural fluvial processes and native riparian vegetation communities through the removal of structural barriers to overbank flow, the restoration of a more natural floodplain morphology, the control of invasive species, and the planting of native riparian tree and shrub species. Mitigation efforts at the Emery Site complement the restoration and enhancement activities undertaken as part of the Upper Gila Watershed Riparian Restoration Project (see also the GWP BO and its reinitiation) and provide regional mitigation benefit within the Gila River mainstem. Rehabilitation of the natural vegetation community and protection of the riverine functions of the Gila River at the Emery Site are the important objectives of the mitigation efforts.

Proposed mitigation actions at the Emery Site (Figure 3) include restoration of a former agricultural field as mesquite-dominated mesoriparian habitat within the active floodplain of the Gila River, removal of tamarisk and restoration of mesoriparian and hydroriparian habitats dominated by mesquite, cottonwood and other native riparian species, and the creation of buffer areas to protect the mitigation areas from fire. Detailed descriptions of the mitigation areas and activities are provided in Table 1. The replacement of tamarisk with native cottonwood, willow, and mesquite will create habitat suitable for native wildlife, including the endangered SWFL and threatened WYBC, and maintain these functions during the anticipated die-off of non-native tamarisk when the tamarisk leaf beetle (*Diorhabda* sp.) arrives along this reach of the Gila River. The Emery Site is adjacent to other existing USACE- and FWS-approved vegetation management projects (FWS 2015a) and is within a few miles of other conservation properties that have been established by the Salt River Project (SRP 2002) and FMSI.

USACE mitigation obligations will be satisfied through 1) the recording of site protection instruments in the form of Restrictive Covenants covering all areas of the Emery Site, 2) the construction and maintenance of fences to deter unauthorized human access and prevent domestic livestock from grazing in the Emery Site, 3) the implementation of earthwork to restore access for the Gila River to Area A as part of its floodplain, 4) the performance of invasive tamarisk control and removal in Area B, 5) the planting and seeding of Areas A and B to restore the native character of existing mesoriparian and hydroriparian vegetation communities, 6) provision for the resources necessary to insure the long-term management, monitoring, and maintenance of the mitigation site consistent with 33 CFR 332.7-8, and 7) the identification of the party responsible for completion of the obligations set forth in the Final Mitigation Plan.

Table 1. Description of Mitigation Areas within the Emery Site

Mitigation Area and Proposed Treatment	Acreage	Description
Emery Site – Area A: Field to Riparian Restoration	50.00	Area A of the Emery Site includes approximately 50 acres, adjacent to both the Gila River and Area B. Most of Area A is composed of levelled areas that may have been farmed at some time in the past, although the northwestern portion of the area is currently vegetated by patches of tamarisk and a few cottonwoods. Understory vegetation that includes forbs and shrubs is patchy throughout Area A. Mitigation activities at Area A include the grading and re-contouring of the area to remove numerous manmade alterations, including berms, channels, and other erosion control features, which currently separate Area A from the active floodplain and channel of

Mitigation Area and Proposed Treatment	Acreage	Description
		the Gila River. Other mitigation activities include control of weedy plant species, planting and seeding of native mesquite trees, seeding for other native plant species, and minimal grading within the area to restore natural contours. These activities will restore the functional values of the site as a riparian area and as available active floodplain and possible overbank channel for the Gila River.
Emery Site – Area B: Tamarisk Control and Riparian Enhancement	47.00	Area B of the Emery Site encompasses approximately 47 acres of riparian corridor adjacent to Area A and a perennial reach of the Gila River. The riparian vegetation of Area B is almost exclusively exotic tamarisk. There is a concern that, if the expected colonization of the tamarisk leaf beetle occurs along this reach of the Gila River, the tamarisk within this site will be killed or substantially reduced over a very short period of time, resulting in the loss of the non-native riparian habitat that currently supports yellow-billed cuckoo and Southwestern willow flycatcher. Mitigation activities at Area B consist of the removal of tamarisk and the planting and seeding of native species including cottonwood, willow, and mesquite. The replacement of tamarisk with native cottonwood, willow, and mesquite will create habitat suitable for native wildlife, including the endangered Southwestern willow flycatcher and threatened yellow-billed cuckoo, and maintain these functions during the anticipated die-off of non-native tamarisk when the tamarisk leaf beetle arrives along this reach of the Gila River.
Emery Site – Area C: Buffer Preservation	55.00	Area C of the Emery Site consists of approximately 55 acres of lands. These lands surround Area B of the Emery Site and provide further protection for the enhancement activities undertaken in Area B. Although Area C may provide future mitigation opportunities adjacent to those enhancement activities undertaken in Area B, no further mitigation strategies are proposed for Area C at this time.

Emery Site Mitigation Work Plan

Specific details of the mitigation efforts, site performance, and management criteria are provided in the following sections.

Site-Wide Mitigation Actions

Site Protection Instrument

Restoration activities at the Emery Site will commence with the recordation of a site protection instrument with the Graham County Recorder's Office. The document(s) will include a legal description for the Emery Site and will incorporate the conditions of the mitigation obligations developed in the Final Mitigation Plan by reference. The site protection instrument(s) shall identify a scope of compatible and incompatible uses of the Emery Site, and prohibit those land uses which are not compatible with the functions and values of the mitigation site.

Fencing/Grazing Exclusion

A fence will be constructed along the length of the southern (landward) boundary of the Emery Site. The approximately 9,200 linear feet of perimeter fencing will be tied into other existing fences or the thick stands of vegetation upgradient and downgradient of the Emery Site boundary to exclude domestic

livestock. The fence will be constructed according to the Arizona Game and Fish Department's (AGFD) Standard Wildlife Fence Specifications.

Area A Mitigation Actions

Earthwork

Earth moving equipment will be used to remove portions of the numerous manmade alterations, including berms, channels, and other erosion control features, separating Area A from the currently constrained active floodplain of the Gila River. The equipment will grade a wide swale from the upgradient to downgradient end of Area A within the Emery Site. Larger flood events have already begun to inundate this portion of Area A, and this design will accommodate approximately 25 acres for planting and seeding with a minimum amount of surface disturbance. Groundwater elevations across the Emery Site are being monitored to develop the species planting pallet for Area A. The grading will serve to lower the ground surface within the swale relative to that groundwater elevation. The plantings proposed as restoration will be more heavily concentrated within the swale. The slope of the swale from upgradient to downgradient is less than 0.1% and, based on existing topography, should be engaged by the river as part of more modest flood events and drain less rapidly without exposing the plantings to severe scouring flows. The slopes and bottom of the swale will be seeded with a species mix that reflects the existing plant community of the surrounding uplands, as described under the planting and seeding plan.

Planting and Seeding Plan

The primary goal of the planting and seeding plan for the Emery Site is to establish a native vegetation community capable of maintaining and supporting itself in perpetuity with little to no maintenance and no artificial irrigation. The main components of the planting plan for Area A include the planting of containerized trees, the seeding of re-established riparian floodplain, and the control of undesirable species. Following the earthwork, containerized tree plantings will be installed within Area A and placed most densely in the created swale. Based upon the measured depth to groundwater, these plantings will be comprised of a suitable mix of cottonwood, willow, and mesquite. The shallower the water table, the more hydric the plant palette. Lists of species recommended for planting based on depth to groundwater have been developed by others for the Upper Gila Watershed Riparian Restoration Project. Given the current understanding of the depth to groundwater across Area A of the Emery Site, only the extreme lowest areas of elevation might be suitable for planting hydroriparian species such as cottonwood or willow. Following containerized tree plantings, a suitable seed mix of native riparian trees, shrubs, grasses, and forbs will be applied to the area using a suitable application technique that would not adversely impact tree plantings. The entire seeded area may be mulched, if mulch is available from the tamarisk control efforts in Area B to help maintain higher levels of soil moisture as well as reduce soil temperatures and seed loss by predation.

Area B Mitigation Actions

Invasive Species Control and Removal

Invasive species control within Area B of the Emery Site will consist of the removal and control of saltcedar from the existing vegetation communities within Area B. FMSI will implement a program of control and removal of saltcedar for 47 acres within Area B of the Emery Site. The "cut-stump/herbicide" method of tamarisk control, in which the trees are cut near ground level and the cutting immediately followed by application of an herbicide mixture to the cut stump, will be used for initial control of this species. Concentrated herbicides approved for use in riparian habitats will be applied to the cut stumps.

It is anticipated that mulching equipment mounted to heavy equipment will be used to clear and mulch the trunks and branches of the tamarisk trees in Area B. Stump removal is not anticipated at this time, as this causes greater ground disturbance and has the potential to lead to excessive sedimentation during flow events. Prior to removal of tamarisk using heavy machinery, existing native vegetation resources to be protected during the control efforts will be identified. Individual cottonwoods and willows have been found interspersed within the dense tamarisk during previous control efforts, and these species and will be avoided by machinery during removal.

Most herbicides applied to short stumps (less than one inch) immediately after cutting have been shown to be nearly 100 percent effective. During the initial implementation period, multiple follow-up treatments of tamarisk re-sprouts are anticipated. Some regrowth from roots and stems, as well as new seedling establishment, is expected. The schedule for the first year of control and removal includes three treatments: first the "cut-stump" treatment, followed by two subsequent treatments of sprouts and regrowth with herbicide within the year. A maintenance program will be implemented to assure that saltcedar within the treated areas of the Emery Site remains at densities low enough for native plant species to maintain competitive advantage. Resprouts of saltcedar observed during maintenance visits will be pulled from the ground by hand or cut and the stump treated with an appropriate herbicide as described above.

Planting and Seeding Plan

The primary goal of the planting and seeding plan for the Emery Site is to establish a native vegetation community capable of maintaining and supporting itself in perpetuity with little to no maintenance and no artificial irrigation. The main components of the planting plan for Area B include the removal and control of invasive species, the planting of containerized trees, and the seeding of the area of tamarisk removal. Following the initial tamarisk control efforts described, containerized tree plantings will be installed within Area B to replace the removed tamarisk. Based upon the measured depth to groundwater, these plantings will be comprised of a suitable mix of cottonwood, willow, and mesquite. The shallower the water table, the more hydric the plant palette. Given the current understanding of the depth to groundwater across Area B of the Emery Site, areas of lower elevation within Area B, such as relic channels, might be suitable for planting hydroriparian species such as cottonwood or willow. Species mix is expected to vary more across this area than for Area A. Most of the more elevated portions of Area B further from the groundwater table will be managed to establish mesquite-dominated riparian habitat. Planting of sacaton grass (*Sporobolus wrightii*) is also proposed to provide soil stabilization, native cover during establishment of other species, and enhanced seed retention and germination after flood events.

Following containerized tree plantings, a suitable seed mix of native riparian trees, shrubs, grasses, and forbs will be applied to the area using a suitable application technique that will not adversely impact tree plantings. The entire seeded area may be mulched, if mulch is available from the tamarisk control efforts, to help maintain higher levels of soil moisture as well as reduce soil temperatures and seed loss by predation.

Area C Mitigation Actions

The mitigation actions being undertaken within Area C of the Emery Site consist mainly of the preservation of Area C. Portions of Area C away from the active low-flow channel may be cleared of vegetation to act as a natural firebreak, to allow access to protect other habitats within the Emery Site in the event of fire, or as part of potential future mitigation efforts. The vegetation within Area C adjacent to

the active low-flow channel of the Gila River will be left intact for species utilizing the habitat at the river's edge.

Emery Site Maintenance and Monitoring Work Plans

Site-Wide Maintenance and Monitoring

Property Inspections

A key element of the management program is regularly scheduled inspections to identify maintenance needs and ensure that no uses prohibited by the restrictive covenants are occurring within the Emery Site. Minor maintenance activities may be carried out during these visits; however, any need for more intensive maintenance activities will be identified for follow-up action. Any information collected on the need for maintenance or maintenance activities occurring during the general inspection will be documented on a standard form(s) and included in the regular reports to the USACE.

Fencing Repair and Maintenance

The approximately 9,200 linear feet of fencing for the Emery Site will be installed, maintained and replaced as needed by FMSI. Maintenance tasks can include, but are not limited to, small-scale revegetation of wildcat roads and trails, repairing breaks in a fence, replacing damaged sections of a fence, constructing and repairing vehicle gates/walk-throughs for either vehicles or pedestrians, removal of common household trash that has been illegally discarded, clearing of vegetation that threatens the integrity of a fence, removal of trespass livestock, and correcting of any unforeseen problem to the extent funding is available. Maintenance activities completed will be documented on a standard form(s) and documented in the regular monitoring report.

Area A Maintenance and Monitoring

Unless additional activities are determined to be necessary as part of potential adaptive management of Area A, maintenance and monitoring of this area of the Emery Site is limited strictly to monitoring of the plantings and germination of applied seeds. It is currently anticipated that the established goal of native tree and large shrub densities within Area A equal to or exceeding an average of 100 stems per acre, without requirement for supplemental water, will be achieved in a five-year period from implementation of the Final Mitigation Plan. Permanent monitoring plots will be established within Area A to monitor changes in cover and stem density of native and non-native species. A suitable cover measurement will be identified to track the stem density of native and non-native species over the course of the monitoring. Adaptive management of the plantings and seed in Area A will not be necessary as long as the absolute cover of exotic species remains at ≤10 percent, as outlined in the USACE SPD Unified Performance Standards (USACE 2014).

Area B Maintenance and Monitoring

Maintenance and Monitoring of Invasive Species Control

Following the initial removal and control of tamarisk, subsequent control would consist of the treatment of sprouts and regrowth. Effectiveness of the previous control treatments would also be monitored during these field visits. The success of saltcedar control will be noted during monitoring and included in the regular reports to the USACE. The timing and frequency of additional treatments under the control

program would be determined by the effectiveness of the treatments observed during monitoring. A suitable density and stem basal diameter measurement will be identified to track the stem density and basal diameter of native and non-native species over the course of the monitoring. The goal of the saltcedar control program is to maintain the target species at ≤10 percent of the total observed basal area. Results of the monitoring will be documented in a report included as part of the regular report.

Planting and Seeding Plan

As with Area A, it is currently anticipated that the established goal of native tree and large shrub densities within Area B equal to or exceeding an average of 150 stems per acre, without requirement for supplemental water, will be achieved in a five-year period from implementation of the Final Mitigation Plan. If the goals are not achieved by that date, the establishment period will be extended until the success criteria and goals have been achieved, or new goals have been established in consultation with the Corps. Permanent monitoring plots will be established within Area B to monitor changes in cover and stem density of native and non-native species. A suitable cover measurement will be identified to track the stem density of native and non-native species over the course of the monitoring. Adaptive management of the plantings and seed in Area B will not be necessary as long as the absolute cover of exotic species remains at ≤10 percent, as outlined in the USACE SPD Unified Performance Standards (USACE 2014).

Area C Maintenance and Monitoring
Unless additional actions are determined to be necessary as part of potential adaptive management of Area C, or subsequent mitigation activities undertaken by FMSI in Area C, no maintenance or monitoring of this area of the Emery Site is anticipated.

Rotational Fallowing Program

The development of the existing Safford Mine, originally termed the Dos Pobres/San Juan (DP/SJ) Project after the ore bodies proposed for development, was subject to Bureau of Land Management (BLM) NEPA review (1793 [AZ-040] AZA-31133; BLM 2003) and USACE NEPA review and permitting (964-0202-MB). The original hydrologic and hydrogeologic modeling for the DP/SJ Project predicted a reduction in stormwater runoff and groundwater flow to the Gila River, resulting from mine development and operation. Mitigation for these impacts was developed through the use of the Alternate Year Fallowing (AYF) Program, now referred to as the Rotational Fallowing Program. The Rotational Fallowing Program is a component of the Model, Monitor, and Mitigate (3M) Program, established to ensure that impacts to groundwater from development of the existing Safford Mine do not exceed predicted modeled impacts and that those impacts are offset by the Rotational Fallowing Program. Detailed descriptions of the function and operation of these programs with regards to the mitigation for the existing Safford Mine are included in a technical memorandum (WestLand 2016c) provided as a supplement to the Biological Assessment.

The maximum calculated average annual reduction in stormwater runoff and groundwater flow to the Gila River from the existing Safford Mine was approximately 149 acre-feet. This value includes a maximum calculated reduction in potential stormwater runoff of 94 acre-feet and a maximum model-predicted reduction in groundwater flow of approximately 55 acre-feet. The Rotational Fallowing Program mitigated the modeled impacts to Gila River flows by annually fallowing a minimum of 200 acres of decreed agricultural fields on a rotating basis. Based on the consumptive use of the crops typically grown on the fallowed fields, the Rotational Fallowing Program provides a benefit of 480 acre-feet of water annually to the flows in the Gila River. This benefit exceeds the maximum modeled impacts from the

existing Safford Mine by approximately 331 acre feet annually. The Rotational Fallowing Program is in its tenth year of implementation. Based on the general timing of when the crops on those fallowed fields would have otherwise been irrigated the Rotational Fallowing Program provides the benefit to the Gila River during periods of low flow. The Rotational Fallowing Program is a condition of the CWA Section 404 Permit for the existing Safford Mine (964-0202-MB) and its operation in perpetuity is written into the Restrictive Covenant placed over the fallowed fields included in the program (WestLand 2016c).

The previously predicted reductions in stormwater runoff and groundwater flow to the Gila River have been revised to include the effects of the construction and operation of the Lone Star Ore Body Development Project (WestLand 2016c). Based upon the development of a smaller mine footprint, the existing Safford Mine features and stormwater controls intercept and retain less stormwater runoff than forecasted originally; approximately 71 acre-feet, less than the 94 acre-feet annually originally predicted during the review of the DP/SJ Project (WestLand 2016c). The proposed project features and non-discharge areas in the Lone Star project area would prevent an estimated additional 118 acre-feet of annual stormwater runoff from discharging to the Gila River, for a total estimated annual average reduction of stormwater runoff to the Gila River of 189 acre-feet (WestLand 2016c). Update of the groundwater model used in the 3M Program and revision to include the proposed Lone Star pit and groundwater pumping for the project results in a maximum, model-predicted reduction in groundwater flow to the Gila River of approximately 100 acre-feet annually (WestLand 2016c). This modeled reduction includes both the existing Safford Mine operations and the proposed project, and is associated with the pit lakes and groundwater pumping.

Based on these calculations, the combined predicted reduction in stormwater runoff and groundwater flow to the Gila River peaks at approximately 289 acre-feet annually (WestLand 2016c). This maximum impact is not predicted to occur until approximately 107 years after the development of the Lone Star Ore Body Development Project.

The Rotational Fallowing Program provides an estimated 480-acre-foot benefit to the Gila River downstream of the lands involved in the fallowing program and exceeds the predicted impacts of the existing Safford Mine and the proposed Lone Star Project by 191 acre-feet per year.

Conservation Measures

The following measures will be implemented as a part of the project action to avoid and minimize impacts to wildlife and other environmental resources:

1. Fence construction, tamarisk removal, and earthwork with heavy equipment will only occur between October 1 and April 14, with the following exceptions that may be conducted at any time of the year: monitoring activities; monitoring equipment installation using hand tools; pre-vegetation management surveys; tamarisk re-sprout treatment and revegetation in areas burned by wildfire; vegetation management site visits and access on foot; and planting of container stock and cuttings to coincide with bi-modal rains.

2. Native vegetation will be avoided to the extent practical.

3. Mulched tamarisk material (i.e., wood chips) will be left on-site to help retain soil moisture and to further hinder recruitment of nonnative weeds.

4. Stockpiling of construction materials such as portable equipment, vehicles, and supplies, including

chemicals, will be restricted to designated staging areas.

5. All refueling and maintenance of vehicles and other construction equipment will be restricted to designated work areas and will be at least 100 ft from any down-gradient aquatic habitat unless otherwise isolated from habitat. Proper spill prevention and cleanup equipment will be maintained in all refueling areas.

6. Application of herbicide will be closely supervised and the project will obtain and comply with the conditions of a Pesticide General Permit from ADEQ.

7. Per the FWS (2007) Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service, herbicides and pesticides will not be mixed or stored near aquatic habitats. Excess herbicides and pesticide and empty herbicide and pesticide containers will not be allowed to remain near waterbodies and will be discarded at authorized landfills or other appropriate sites. Application equipment will be well-maintained and checked periodically for leaks, worn parts, and calibration.

8. Per the FWS (2007) Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service, herbicides will not be applied when weather forecasts indicate rainfall is likely to occur within 48 hours after treatment, and spray applications will not occur when wind speeds exceed 10 miles per hour.

9. When working within 20 feet of the Gila River and other aquatic habitats, triclopyr herbicide will only be applied to cut tamarisk stumps, tamarisk re-sprouts by hand "painting." Backpack sprayers will not be used be used within 20 feet of the Gila River.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Southwestern willow flycatcher

Description

The SWFL is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 5.75 inches. The song is a sneezy "fitz-bew" or a "fit-a-bew", the call is a repeated "whit." It 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 historical breeding range of the SWFL included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

Listing and critical habitat

The SWFL was listed as endangered, without critical habitat on February 27, 1995 (FWS 1995). Critical habitat was later designated on July 22, 1997 (FWS 1997a). A correction notice was published in the Federal Register on August 20, 1997 to clarify the lateral extent of the designation (FWS 1997b).

On May 11, 2001, the 10th circuit court of appeals set aside designated critical habitat in those states under the 10th circuit's jurisdiction (New Mexico). The FWS decided to set aside critical habitat designated for the SWFL in all other states (California and Arizona) until it could re-assess the economic analysis.

On October 19, 2005, the FWS re-designated critical habitat for the SWFL (FWS 2005). A total of 737 river miles across southern California, Arizona, New Mexico, southern Nevada, and southern Utah were included in the final designation. The lateral extent of critical habitat includes areas within the 100-year floodplain.

On August 15, 2011, the FWS proposed a revision to the critical habitat designation, identifying stream segments in each of the 29 Management Units where there are recovery goals (FWS 2011). These segments totaled 2,090 stream miles. Similar to the 2005 rule, the lateral extent of critical habitat includes only the riparian areas within the 100-year floodplain. About 790 stream miles were identified as areas we will consider for exclusion from the final designation under section 4(b)(2) of the Act.

On January 3, 2013, the FWS completed its SWFL critical habitat revision by designating approximately 1,227 stream miles as critical habitat. These areas are designated as stream segments, with the lateral extent including the riparian areas and streams that occur within the 100-year floodplain or flood-prone areas encompassing a total area of approximately 208,973 acres. About 948 stream miles of proposed critical habitat were excluded from the final revised designation.

A final recovery plan for the SWFL was signed by the FWS Region 2 Director and released to the public in March, 2003 (FWS 2002). The Plan describes the reasons for endangerment, current status of the SWFL, addresses important recovery actions, includes detailed issue papers on management issues, and provides recovery goals. Recovery is based on reaching numerical and habitat related goals for each specific Management Unit established throughout the subspecies range and establishing long-term conservation plans (FWS 2002).

The five-year review for the SWFL was completed in August 2014 by the Arizona Ecological Services Field Office and is posted on the Field Office's web site (http://www.fws.gov/southwest/es/arizona/Southwes.htm).

Reasons for endangerment

Reasons for decline have been attributed to primarily loss, modification, and fragmentation of riparian breeding habitat, along with a host of other factors including loss of wintering habitat and brood parasitism by the brown-headed cowbird (Sogge *et al.* 1997, McCarthey *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 excessive livestock grazing. Fire is an increasing threat to SWFL 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). SWFL nests can be 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. When these feeding areas are in close proximity to SWFL breeding habitat, especially coupled with habitat fragmentation, cowbird parasitism of SWFL nests may increase (Hanna 1928, Mayfield 1977a,b, Tibbitts *et al.* 1994).

Habitat

The SWFL breeds in dense riparian habitats from sea level in California to approximately 8,500 feet in Arizona and southwestern Colorado. Historical egg/nest collections and species' descriptions throughout its range describe the SWFL's widespread use of willow (*Salix* spp.) for nesting (Phillips 1948, Phillips *et al.* 1964, Hubbard 1987, Unitt 1987, San Diego Natural History Museum 1995). Currently, SWFLs primarily use Geyer willow (*Salix geyeriana*), coyote willow (*Salix exigua*), Goodding's willow (*Salix gooddingii*), boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolio*), 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 SWFL: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge *et al.* 1997).

The SWFL's habitat is dynamic and can change rapidly: nesting habitat can grow out of suitability; saltcedar habitat can develop from seeds to suitability in about four to five years; heavy runoff can remove/reduce habitat suitability in a day; or river channels, floodplain width, location, and vegetation density may change over time. The SWFL's use of habitat in different successional stages may also be dynamic. For example, over-mature or young habitat not suitable for nest placement can be occupied and used for foraging and shelter by migrating, breeding, dispersing, or non-territorial SWFLs (McLeod *et al.* 2005, Cardinal and Paxton 2005). SWFL habitat can quickly change and vary in suitability, location, use, and occupancy over time (Finch and Stoleson 2000).

Tamarisk is an important component of the SWFL's nesting and foraging habitat in the central part of the SWFL's breeding range in Arizona, southern Nevada and Utah, and western New Mexico. In 2001 in Arizona, 323 of the 404 (80 percent) known SWFL nests (in 346 territories) were built in tamarisk trees (Smith *et al.* 2002). Tamarisk had been believed by some to be a habitat type of lesser quality for the SWFL, however comparisons of reproductive performance (FWS 2002), prey populations (Durst 2004) and physiological conditions (Owen and Sogge 2002) of SWFLs breeding in native and exotic vegetation has revealed no difference (Sogge *et al.* 2005).

The introduced tamarisk leaf beetle was first detected affecting tamarisk within the range of the SWFL in 2008 along the Virgin River in St. George, Utah. Initially, this insect was not believed to be able to move into or survive within the southwestern United States in the breeding range of the SWFL. Along this Virgin River site in 2009, 13 of 15 SWFL nests failed following vegetation defoliation (Paxton *et al.* 2010). As of 2012, the beetle has been found in southern Nevada/Utah and northern Arizona/New Mexico within the SWFL's breeding range. It was detected along the Colorado River below Hoover Dam in 2012. Because tamarisk is a component of about 50 percent of all known SWFL territories (Durst *et al.* 2008), continued spread of the beetle has the potential to significantly alter the distribution, abundance, and quality of SWFL nesting habitat and impact breeding attempts.

Breeding biology

Throughout its range the SWFL 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). SWFLs typically lay three to four eggs per clutch (range = 1 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.

SWFL nests are fairly small (3.2 inches tall and 3.2 inches wide) and its placement in a shrub or tree is highly variable (1.6 to 60 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). Typical nest placement is in the fork of small-diameter (e.g., 0.4 in), vertical or nearly vertical branches (FWS 2002). Occasionally, nests are placed in down-curving branches. Nest height varies considerably, from 1.6 to 60 feet, and may be related to height of nest plant, overall canopy height, and/or the height of the vegetation strata that contain small twigs and live growth (FWS 2002). Typically, nests are relatively low, 6.5 to 23 feet above ground (FWS 2002). Nests built in habitat dominated by box elders are placed highest in the tree (upwards of 60 feet) (FWS 2002).

The SWFL 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 SWFL (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 SWFL 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 SWFL 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). SWFLs 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 SWFL nestlings fledged after July 20th had a significantly lower return rate and cowbird parasitism was often the cause of delayed fledging.

Territory and home range size

SWFL territory size likely fluctuates with population density, habitat quality, and nesting stage. Estimated territory sizes recorded at the Kern River were 0.59 to 3.21 acres for monogamous males and 2.72 to 5.68 acres for polygynous males (Whitfield and Enos 1996). Within a 2.22 acre patch on Colorado River, estimated territory sizes were 0.15 to 0.49 acres (Sogge 1995c), and in a 3.71 acre patch on the Verde River, 0.49 to 1.24 acres (Sogge 1995a). Territories are established within a larger patch of appropriate habitat sufficient to contain several nesting pairs of SWFLs.

Cardinal and Paxton (2005) found that the home ranges of telemetered SWFLs at Roosevelt Lake, Arizona, varied from 0.37 to 890 acres. Bird movements just prior to and following nesting were the greatest, while movements while incubating and with nestlings were the most limited. Movements following fledging of young indicated possible pre-migration staging and the targeting of local increases in insect prey populations. Birds were found using a variety of riparian habitat in a variety of conditions (open, young mature, exotic, mixed, etc.) and the distances moved indicate that birds can occupy a larger area and used more different types of habitat than previously believed (Cardinal and Paxton 2005).

Movements

The site and patch fidelity, dispersal, and movement behavior of adult, nestling, breeding, non-breeding, and migratory SWFLs are just beginning to be understood (Kenwood and Paxton 2001, Koronkiewicz and Sogge 2001). From 1997 through 2000, 66 to 78 percent of SWFLs known to have survived from one breeding season to the next returned to the same breeding site; conversely, 22 to 34 percent of returning birds moved to different sites (Luff *et al*. 2000). A large percentage (75%) of known surviving 2000 adults returned in 2001 to their same breeding site (Kenwood and Paxton 2001). Just considering Roosevelt Lake in its entirety, all but three surviving birds (n=28) banded at Roosevelt Lake returned to Roosevelt Lake (Kenwood and Paxton 2001). Although most SWFLs return to former breeding sites, SWFLs can regularly move among sites within and between years (Kenwood and Paxton 2001). Within-drainage movements are more common than between-drainage movements (Kenwood and Paxton 2001). Year-to-year movements of birds have been detected between the San Pedro/Gila river confluence and Roosevelt Lake, the Verde River near Camp Verde and Roosevelt Lake, and the Little Colorado River near Greer and Roosevelt Lake (Kenwood and Paxton 2001). Typical distances moved range from 1.2 to 18 miles. However, long-distance movements of up to 137 miles have been observed on the lower Colorado River and Virgin River (McKernan and Braden 2001). Breeding groups of SWFLs act as a meta-population (Busch *et al.* 2000).

Table 2. Estimated rangewide population for the SWFL based on 1993 to 2007 survey data for Arizona, California, Colorado, New Mexico, Nevada, Utah, and Texas[1].

State	Number of sites with WIFL territories 1993-07[2]	Percentage of sites with WIFL territories 1993-07	Number of territories[3]	Percentage of total territories
Arizona	124	43.1 %	459	35.3 %
California	96	33.3 %	172	13.2 %
Colorado	11	3.8 %	66	5.1 %
Nevada	13	4.5 %	76	5.9 %
New Mexico	41	14.2 %	519	40.0 %
Utah	3	1.0 %	7	0.5%

Texas	?	?	?	?
Total	288	100 %	1,299	100 %

[1]Durst *et al.* 2008.
[2]Site boundaries are not defined uniformly throughout the bird's range.
[3] Total territory numbers recorded are based upon the most recent years survey information from that site between 1993 and 2007.

Rangewide distribution and abundance

There are currently 288 known SWFL breeding sites in California, Nevada, Arizona, Utah, New Mexico, and Colorado (all sites from 1993 to 2007 where a territorial SWFL has been detected) holding an estimated 1,299 territories (Durst *et al.* 2008). It is difficult to arrive at a grand total of SWFL territories since not all sites are surveyed annually. Numbers have increased since the bird was listed and some habitat remains unsurveyed; however, after nearly a decade of intense surveys, the existing numbers are just past the upper end of Unitt's (1987) estimate of 20 years ago (500-1000 pairs). About 50 percent of the 1,299 estimated territories (Table 2) throughout the subspecies range are located at four general locations (Cliff/Gila Valley – New Mexico, Roosevelt Lake - Arizona, San Pedro River/Gila River confluence – Arizona, Middle Rio Grande, New Mexico).

Arizona distribution and abundance

While numbers have significantly increased in Arizona (145 to 459 territories from 1996 to 2007) (English *et al.* 2006, Durst *et al.* 2008), overall distribution of SWFLs throughout the state has not changed much. Currently, population stability in Arizona is believed to be largely dependent on the presence of three population centers (Roosevelt Lake, San Pedro/Gila River confluence, upper Gila River). Therefore, the result of catastrophic events or losses of significant populations either in size or location could greatly change the status and survival of the bird. Conversely, expansion into new habitats or discovery of other populations would improve the known stability and status of the SWFL.

Fire

The evidence suggests that fire was not a primary disturbance factor in southwestern riparian areas near larger streams (FWS 2002). Yet, in recent time, fire size and frequency has increased on the lower Colorado, Gila, Bill Williams, and Rio Grande rivers. The increase has been attributed to increasing dry, fine fuels as a result of the cessation of flood flows and human caused ignition sources. The spread of the highly flammable plant, tamarisk, and drying of river areas due to river flow regulation, water diversion, lowering of groundwater tables, and other land practices is largely responsible for these fuels. A catastrophic fire in June of 1996, destroyed approximately a half mile of occupied tamarisk SWFL nesting habitat on the San Pedro River in Pinal County. That fire resulted in the forced dispersal or loss of up to eight pairs of SWFLs (Paxton *et al.* 1996). Smaller fires have occurred along the upper most portion of the San Pedro River closer to the Mexico Border and another large fire occurred on the lower San Pedro River at the Nature Conservancy's San Pedro Preserve between Winkelman and Dudleyville in 2004. Recreationists cause over 95 percent of the fires on the lower Colorado River (FWS 2002). In California, Brothers (1984) attributed increased fire along the Owens River to more use of the riparian zones by campers and fishermen in the past 30 years.

Critical habitat

The primary constituent elements of designated critical habitat are based on riparian plant species, structure and quality of habitat and insects for prey.

1. Primary Constituent Element 1— *Riparian vegetation.* Riparian habitat along a dynamic river or lakeside, in a natural or manmade successional environment (for nesting, foraging, migration, dispersal, and shelter) that is comprised of trees and shrubs (that can include Gooddings willow, coyote willow, Geyer's willow, arroyo willow, red willow, yewleaf willow, pacific willow, boxelder, tamarisk, Russian olive, buttonbush, cottonwood, stinging nettle, alder, velvet ash, poison hemlock, blackberry, seep willow, oak, rose, sycamore, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut) and some combination of:
    (a) Dense riparian vegetation with thickets of trees and shrubs that can range in height from about about 6 to 98 ft. Lower-stature thickets (6 to 13 ft tall) are found at higher elevation riparian forests and tall-stature thickets are found at middle and lower-elevation riparian forests;
    (b) Areas of dense riparian foliage at least from the ground level up to approximately 13 ft above ground or dense foliage only at the shrub or tree level as a low, dense canopy;
    (c) Sites for nesting that contain a dense (about 50 percent to 100 percent) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground);
    (d) Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.25 ac or as large as 7,175 ac.
2. Primary Constituent Element 2—*Insect prey populations.* A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include: flying ants, wasps, and bees (*Hymenoptera*); dragonflies (*Odonata*); flies (*Diptera*); true bugs (*Hemiptera*); beetles (*Coleoptera*); butterflies, moths, and caterpillars (*Lepidoptera*); and spittlebugs (*Homoptera*).

The physical and biological features of SWFL critical habitat are the principal biological or physical elements essential to SWFL conservation which may require special management considerations or protection (FWS 2013a). We primarily identified the features and functions of rivers that generate SWFL habitat and its food such as low gradient/broad floodplains, water, saturated soil, hydrologic regimes, elevated groundwater, and fine sediments, etc. (FWS 2013a).

Past Consultations

Since listing in 1995, at least 228 Federal agency actions have undergone (or are currently under) formal section 7 consultation throughout the SWFL's range. This list of consultations is maintained in our office. We concluded in our biological opinion for the Southwestern Regional Land Resource Management Plan (LRMP) (FWS 2005a, #2-22-03-F-366) that ongoing upland grazing associated with Management Area 6J (Code 1423) of Tonto Creek on the Tonto National Forest would cause a sub-lethal response (-2) to the SWFL. The conclusion in the LRMP that continued grazing can facilitate decreased bank stabilization, increased run-off, increased sedimentation, increased erosion, and reduced capacity of soils to hold water. These factors would reduce the occurrence, longevity, and quality of the habitat-based Primary Constituent Elements of SWFL critical habitat. The LRMP was completed prior to the USFS adopting a policy of rangeland adaptive management in Chapter 90 of FSH 2209.13. Since SWFL critical habitat was finalized in 2005, at least 33 formal opinions have been completed in Arizona (within and outside designated critical habitat). While many opinions were issued for the previous critical habitat designation, the stream reaches and constituent elements have changed.

Activities continue to adversely affect the distribution and extent of all stages of SWFL habitat throughout its range (development, urbanization, grazing, recreation, native and non-native habitat removal, dam operations, river crossings, ground and surface water extraction, etc.). Introduced tamarisk eating leaf beetles were not anticipated to persist within the range of the southwestern willow SWFL. However, they were detected within the breeding habitat (and designated critical habitat) of the SWFL in 2008 along the Virgin River near the Town of St. George, Utah. In 2009, beetles were also known to have been detected defoliating habitat within the range of SWFL habitat in southern Nevada, and along the Colorado River in the Grand Canyon and near Shiprock in Arizona. Stochastic events also continue to change the distribution, quality, and extent of SWFL habitat.

Conservation measures associated with some consultations and Habitat Conservation Plans have helped to acquire lands specifically for SWFLs on the San Pedro, Verde, and Gila rivers in AZ and the Kern River in CA. Additionally, along the lower Colorado River, the U.S. Bureau of Reclamation is currently attempting to establish riparian vegetation to expand and improve the distribution and abundance of nesting SWFLs. A variety of Tribal Management Plans in CA, AZ, and NM have been established to guide conservation of the SWFLs. Additionally, during the development of the critical habitat rule, management plans were developed for some private lands along the Owens River in CA and Gila River in NM. These are a portion of the conservation actions that have been established across the subspecies' range.

YELLOW-BILLED CUCKOO

The Western Distinct Population Segment (DPS) of the yellow-billed cuckoo was listed as a threatened species on October 3, 2014 (FWS 2014a). Critical habitat was proposed on August 15, 2014 (FWS 2014b).

Physical Characteristics

Adult yellow-billed WYBCs have moderate to heavy bills, somewhat elongated bodies and a narrow yellow ring of colored bare skin around the eye. The plumage is grayish-brown above and white below, with reddish primary flight feathers. The tail feathers are boldly patterned with black and white below. They are a medium-sized bird about 12 inches in length, and about 2 ounces in weight. Males and females differ slightly; the males have a slightly smaller body size, smaller bill, and the white portions of the tail tend to form distinct oval spots. In females the white spots are less distinct and tend to be connected (Hughes 1999).

Morphologically, the yellow-billed cuckoos throughout the western continental United States and Mexico are generally larger, with significantly longer wings, longer tails, and longer and deeper bills (Franzreb and Laymon 1993). Birds with these characteristics occupy the Western DPS and we refer to them as the "western yellow-billed cuckoo." Only the Western DPS was listed as a threatened species (FWS 2014a). WYBCs in the west arrive on the breeding grounds 4 to 8 weeks later than eastern yellow-billed cuckoos at similar latitude (Franzreb and Laymon 1993, Hughes 1999).

Distribution

The WYBC is a member of the avian family Cuculidae and is a Neotropical migrant bird that winters in South America and breeds in North America. The breeding range of the entire species formerly included most of North America from southeastern and western Canada (southern Ontario and Quebec and

southwestern British Colombia) to the Greater Antilles and northern Mexico (AOU 1957, AOU 1983, AOU 1998).

Based on historical accounts, the WYBC was formerly widespread and locally common in California and Arizona, more narrowly distributed but locally common in New Mexico, Oregon, and Washington and uncommon along the western front of the Rocky Mountains north to British Columbia (AOU 1998, Hughes 1999). The species may be extirpated from British Colombia, Washington, and Oregon (Hughes 1999). The WYBC is now very rare in scattered drainages in western Colorado, Idaho, Nevada, and Utah, with single, nonbreeding birds most likely to occur (FWS 2001). The largest remaining breeding areas are in southern and central California, Arizona, along the Rio Grande in New Mexico, and in northwestern Mexico (FWS 2013b).

The current breeding population is low, with estimates of approximately 350 to 495 pairs north of the Mexican border and another 330 to 530 pairs in Mexico for a total of 680 to 1,025 breeding pairs (FWS 2013b).

WYBCs spend the winter in South America, east of the Andes, primarily south of the Amazon Basin in southern Brazil, Paraguay, Uruguay, eastern Bolivia, and northern Argentina (Ehrlich *et al.* 1992, AOU 1998, Johnson *et al*. 2008b). The species as a whole winters in woody vegetation bordering fresh water in the lowlands to 4,921 ft, including dense scrub, deciduous broadleaf forest, gallery forest, secondary forest, subhumid and scrub forest, and arid and semiarid forest edges (Hughes 1999). Wintering habitat of the WYBC is poorly known.

Migration

Little is known about migratory habitat for the WYBC. WYBCs may be found in a variety of vegetation types during migration, including coastal scrub, secondary growth woodland, hedgerows, humid lowland forests, and forest edges from sea level to 8,125 ft (2,500 m) (Hughes 1999). Additionally, during migration they may be found in smaller riparian patches than those in which they typically nest. This variety of vegetation types suggests that the habitat needs of the WYBC during migration are not as restricted as their habitat needs when nesting and tending young.

Habitat and Life History

Food

WYBCs forage primarily by gleaning insects from vegetation, but they may also capture flying insects or small vertebrates such as frogs and lizards (Hughes 1999). They specialize on relatively large invertebrate prey, including caterpillars (*Lepidoptera* sp.), katydids (*Tettigoniidae* sp.), cicadas (*Cicadidae* sp.), and grasshoppers (*Caelifera* sp.) (Laymon *et al.* 1997). Minor prey includes beetles (*Coleoptera* sp.), dragonflies (*Odonata* sp.), praying mantis (*Mantidae* sp.), flies (*Diptera* sp.), spiders (*Araneae* sp.), butterflies (*Lepidoptera* sp.), caddis flies (*Trichoptera* sp.), crickets (*Gryllidae* sp.), wild berries, and bird eggs and young (Laymon *et al.* 1997, Hughes 1999). Prey species composition varies geographically. Their breeding season may be timed to coincide with outbreaks of insect species, particularly tent caterpillars (Hughes 1999, FWS 2001a) or cicadas (Johnson *et al.* 2007, Halterman 2009). In Arizona, fledging occurred at the peak emergence of cicadas (Rosenberg *et al.* 1982).

In the arid West, these conditions are usually found in cottonwood-willow and mesquite riparian associations along water courses and in madrean Evergreen woodlands in the foothills and mountains of southeastern Arizona and southwestern New Mexico (Cornell Lab of Ornithology 2012; Westland Resources 2013a, 2013b; American Birding Association 2014). The arrival of birds and the timing of nesting are geared to take advantage of any short-term abundance of prey. In years of high insect abundance, WYBCs lay larger clutches (3-5 eggs rather than two), a larger percentage of eggs produce fledged young, and they breed multiple times (2-3 nesting attempts rather than one) (Laymon *et al.* 1997).

WYBC food availability is largely influenced by the health, density, and species of vegetation. Desiccated riparian sites produce fewer suitable insects than healthy moist sites.

Breeding Habitat

WYBCs breed in dense riparian woodlands, primarily of cottonwood (*Populus fremontii*), willow (*Salix* spp.), and mesquite (*Prosopis* spp.), along riparian corridors in otherwise arid areas (Laymon and Halterman 1989, Hughes 1999). Dense undergrowth may be an important factor in selection of nest sites. Occupied habitat in Arizona may also contain box elder (*Acer negundo*), Arizona alder (*Alnus oblongifolia*), Arizona walnut (*Juglans major*), Arizona sycamore (*Platanus wrightii*), oak (*Quercus* spp.), netleaf hackberry (*Celtis reticulata*), velvet ash (*Fraxinus velutina*), Mexican elderberry (*Sambuccus mexicanus*), tamarisk (*Tamarix* spp.; also called salt cedar), and seepwillow (*Baccharis glutinosa*)(Corman and Magill 2000). Surveys conducted by the Arizona Breeding Bird Atlas (Corman and Wise-Gervais 2005) reported 68 percent of the WYBC observations were in lowland riparian woodlands, often containing a variable combination of Fremont cottonwood, willow, velvet ash, Arizona walnut, mesquite, and tamarisk (Corman and Wise-Gervais 2005). Narrow bands of riparian woodland can contribute to the overall extent of suitable habitat. Adjacent habitat on terraces or in the upland (such as mesquite) can enhance the value of these narrow bands of riparian woodland.

Cuckoos can breed in habitat other than riparian. Cuckoos are found in Madrean evergreen woodland habitat in southeastern Arizona in mountain drainages with mixed oak assemblages, often interspersed with riparian species (Brown 1994; Cornell Lab of Ornithology 2017; Westland Resources 2013a, 2013b; American Birding Association 2014, Corman and Magill 2000). These mixed oak assemblages contain trees typical of drier drainages like hackberry, sycamore, walnut, mesquite, desert willow, and juniper. Recent surveys have documented cuckoos in many drainages on and near the Coronado National Forest (Tucson Audubon in prep.; Westland Resources 2013a, 2013b). Additional survey and nesting information in Madrean evergreen woodland is needed. Throughout the WYBC range, a large majority of nests are placed in willow trees, but alder (*Alnus* spp.), cottonwood, mesquite, walnut (*Juglans* spp.), box elder, sycamore, netleaf hackberry (*Celtis laevigata* var. *reticulata*), soapberry (*Sapindus saponaria*), and tamarisk are also used (Laymon 1980, Hughes 1999, Corman and Magill 2000 , Corman and Wise-Gervais 2005, Holmes et al. 2008). Tamarisk is also a riparian species that may be associated with breeding under limited conditions; WYBC will sometimes build their nests and forage in tamarisk, but there is usually a native riparian tree component within the occupied habitat (Gaines and Laymon 1984, Johnson et al. 2008a).

WYBCs reach their breeding range later than most other migratory breeders, often in June (Rosenberg et al. 1982). They construct an unkempt stick nest on a horizontal limb in a tree or large shrub. Nest height ranges from 4 ft to (rarely) 100 ft, but most are typically below 30 ft (Hughes 1999). The incubation period for the WYBC is 9 to 11 days, and young leave the nest at 7 to 9 days old. Although other species of cuckoos are often or always brood parasites of other birds, WYBCs do so only infrequently, possibly in response to high food resources that allow rapid egg production (Fleischer et al. 1985). Nesting usually

occurs between late June and late July, but can begin as early as late May and continue until late September (Hughes 1999).

The WYBC primarily breeds in riparian habitat along low-gradient (surface slope less than 3%) rivers and streams, and in open riverine valleys that provide wide floodplain conditions (greater than 325 ft). In the southwest, it can also breed in high gradient drainages, and narrower and drier reaches of riparian or Madrean Evergreen woodland habitat. Within the boundaries of the distinct population segment (DPS)(see Figure 2 at 78 FR 61631,) these riparian areas are located from southern British Columbia, Canada, to southern Sinaloa, Mexico, and may occur from sea level to 7,000 ft (or slightly higher in western Colorado, Utah, and Wyoming) in elevation. The moist conditions that support riparian plant communities that provide WYBC habitat typically exist in lower elevation, broad floodplains, as well as where rivers and streams enter impoundments. In southeastern Arizona, however, WYBCs were often found nesting along intermittent drainages with dense stands of velvet mesquite and netleaf hackberry (Corman and Wise-Gervais 2005, AGFD 2011). WYBCs are also found in higher mountain drainages where Arizona sycamore, Arizona alder, or mixed oak assemblages are the dominant riparian species (Cornell Lab of Ornithology 2012; Westland Resources 2013a, 2013b; American Birding Association 2014). Dense understory foliage appears to be an important factor in nest site selection, while cottonwood trees are an important foraging habitat in areas where the species has been studied in California (FWS 2001). In the extreme southern portion of their summer range in the States of Sonora (southern quarter) and Sinaloa, Mexico, WYBCs also nest in upland thorn scrub and dry deciduous habitats away from the riparian zone (Russell and Monson 1988), though their densities are lower in these habitats than they are in adjacent riparian areas. At the landscape level, the available information suggests the WYBC requires large tracts of willow-cottonwood or mesquite forest or woodland for their nesting season habitat. Habitat can be relatively dense, contiguous stands, irregularly shaped mosaics of dense vegetation with open areas, or narrow and linear.

Canopy cover directly above the nest is generally dense and averages 89 percent and is denser at the South Fork Kern River (93 percent) and Bill Williams River (94 percent) than at the San Pedro River (82 percent). Canopy closure in a plot around the nest averages 71 percent and was higher at the Bill Williams River (80 percent) than at the South Fork Kern River (74 percent) or San Pedro River (64 percent) (Laymon et al. 1997, Halterman 2003, Halterman 2004, Halterman 2005, Halterman 2006).

The optimal size of habitat patches for the species are generally greater than 200 ac and have dense canopy closure and high foliage volume of willows and cottonwoods (Laymon and Halterman 1989) and thus provide adequate space for foraging and nesting. Tamarisk, a nonnative tree species, may be a component of the habitat, especially in Arizona and New Mexico. Sites with a monoculture of tamarisk are usually unsuitable habitat for the species. The association of breeding with large tracts of suitable riparian habitat is likely related to home range size. Individual home ranges during the breeding season average over 100 ac, and home ranges up to 500 ac have been recorded (Laymon and Halterman 1987, Halterman 2009, Sechrist et al. 2009, McNeil et al. 2011, McNeil et al. 2012).

In addition to the dense nesting grove, WYBCs need adequate foraging areas near the nest. Foraging areas can be less dense or patchy with lower levels of canopy cover and may be a mix of shrubs, ground cover, and scattered trees (FWS, unpubl. data). Optimal breeding habitat contains groves with dense canopy closure and well-foliaged branches for nest building with nearby foraging areas consisting of a mixture of cottonwoods, willows, or mesquite with a high volume of healthy foliage (FWS 2013b).

Riparian habitat is dynamic, and species may move from one area to another over time. WYBCs may nest at more than one location in a year. Some individuals also roam widely (several hundred miles), apparently assessing food resources before selecting a nest site (Sechrist et al. 2012).

During movements between nesting attempts WYBCs are found at riparian sites with small groves or strips of trees, sometimes less than 10 ac in extent (Laymon and Halterman 1989). These stopover and foraging sites can be similar to breeding sites, but are smaller, narrower, and lack understory vegetation when compared to nesting sites.

Water and Humidity

Habitat for the WYBC is largely associated with perennial rivers and streams that support the expanse of vegetation characteristics needed by breeding WYBCs. The range and variation of stream flow frequency, magnitude, duration, and timing that will establish and maintain WYBC habitat can occur in different types of regulated and unregulated flows depending on the interaction of the water and the physical characteristics of the landscape (Poff et al. 1997; FWS 2002, 2013b).

Hydrologic conditions at WYBC breeding sites can vary widely between years. At some locations during low rainfall years, water or saturated soil is not available. At other locations, particularly at reservoir inlets, riparian vegetation can be inundated for extended periods in some years and be totally dry in other years. This is particularly true of reservoirs like Lake Isabella in California, Roosevelt and Horseshoe Reservoirs in Arizona, and Elephant Butte Reservoir in New Mexico, all of which have relatively large WYBC populations. This year-to-year change in hydrology can affect food availability and habitat suitability for WYBCs. In some areas, managed hydrologic cycles above or below dams can create temporary WYBC habitat, but may not be able to support it for an extended time, or may support varying amounts of habitat at different points of the cycle and in different years. Water management operations create varied situations that allow different plant species to thrive when water is released below a dam, held in a reservoir, or removed from a lakebed, and consequently, varying amounts of WYBC habitat are available from month to month and year to year as a result of dam operations. During wet years, habitat within a lake and below a dam can be flooded for extended periods and stressed or killed. During dry years, habitat can be desiccated and stressed or killed because of lack of water (Poff et al. 1997, Greco 1999, National Academy of Sciences 2002; FWS 2002, 2013b).

Humid conditions created by surface and subsurface moisture appear to be important habitat parameters for WYBC. The species has been observed as being restricted to nesting in moist riparian habitat in the arid West because of humidity requirements for successful hatching and rearing of young (Hamilton and Hamilton 1965, Gaines and Laymon 1984, Rosenberg et al. 1991). WYBCs have evolved larger eggs and thicker eggshells, which would help them cope with potential higher egg water loss in the hotter, dryer conditions (Hamilton and Hamilton 1965, Ar et al. 1974, Rahn and Ar 1974). A study on the South Fork Kern River showed that lower temperatures and higher humidity were found at nest sites when compared to areas along the riparian forest edge or outside the forest (Launer *et al.* 1990). Recent research on the lower Colorado River has confirmed that WYBC nest sites had significantly higher daytime relative humidity (6–13% higher) and significantly lower daytime temperatures (2–4° F lower) than average forested sites (McNeil *et al.* 2011, McNeil *et al.* 2012).

Subsurface hydrologic conditions are equally important to surface water conditions in determining riparian vegetation patterns. Depth to groundwater plays an important part in the distribution of riparian vegetation and WYBC habitat. Where groundwater levels are elevated so riparian forest trees can access

the water, habitat for nesting, foraging, and migrating WYBCs can develop and thrive. Goodding's willows (*Salix gooddingii*) and Fremont cottonwoods do not regenerate if the groundwater levels fall below 6 ft (Shafroth *et al.* 2000). Goodding's willows cannot survive if groundwater levels drop below 10 ft, and Fremont cottonwoods cannot survive if groundwater drops below 16 ft (Stromberg *et al.* 1996). Abundant and healthy riparian vegetation decreases and habitat becomes stressed and less productive when groundwater levels are lowered (Stromberg *et al.* 1996).

Conditions for Germination and Regeneration of Riparian Zone Trees

The abundance and distribution of fine sediment deposited on floodplains is critical for the development, abundance, distribution, maintenance, and germination of trees in the riparian zone that become WYBC habitat. These sediments become seedbeds for germination and growth of the riparian vegetation upon which WYBCs depend. These sediments must be accompanied by sufficient surface moisture for seed germination and sufficient ground water levels for survival of seedlings and saplings (Stromberg 2001). The lack of hydrologic processes, which deposit such sediments, may lead riparian forested areas to senesce and become degraded and unable to support the varied vegetative structure required for WYBC nesting and foraging.

Arizona

At present, it appears that the State's population could be as low as 170 pairs of WYBCs, and probably does not exceed 250 pairs. The population of the WYBC in Arizona is the largest in the United States (FWS 2013b).

The WYBC was historically widespread and locally common in Arizona (Phillips *et al.* 1964, Groschupf 1987). Although Arizona probably contains the largest remaining WYBC population among states west of the Rocky Mountains, the population has reportedly declined significantly in distribution and abundance over the past 80 years (Corman and Wise-Gervais 2005). During Arizona Breeding Bird Atlas surveys, nesting birds were found to be concentrated in western, central, and southeastern Arizona. According to Corman and Wise-Gervais (2005), WYBCs were found along most of the 25 drainages where they were reported historically but they are now much more local in distribution. It is believed that the San Pedro River likely sustains the largest single remaining population of WYBCs (Brand *et al.* 2009).

In a survey in 1999 that covered 265 mi (426 km) of river and creek bottoms (a subset of statewide WYBC habitat), 172 WYBC pairs and 81 single birds were located in Arizona (Corman and Magill 2000). WYBC populations greater than 10 pairs are found at 12 locations in Arizona: Bill Williams River, Colorado River, Gila River, Upper Cienega Creek, Hassayampa River, San Pedro River, Santa Maria River, Verde River, Sonoita Creek, Santa Cruz River, Altar Valley, and Agua Fria River. Sites with smaller populations are found at the Roosevelt Lake complex, Upper Tonto Creek, Pinto Creek, Sycamore Creek in Pajarito Mountains, Oak Creek, Lower Cienega Creek, Babocomari River, Pinal Creek, Bonita Creek, San Bernardino NWR, Hooker Hot Springs, Big Sandy River, and many smaller drainages. However, many drainages have not been thoroughly surveyed and it is likely that some additional WYBC locations will be discovered. These include, but are not limited to the mountain ranges of southeastern Arizona, Eagle Creek, and along the Gila, San Francisco, and Blue Rivers. WYBC sightings reported by birders between 15 June and 31 August, 1998 to 2014, in more than one year in southeastern Arizona mountain ranges include Box, Walker, Madera, and Montosa canyons in the Santa Rita Mountains; Carr Canyon, Ash Canyon, Garden Canyon, Ramsey Canyon, and Miller Canyon in the Huachuca Mountains; Scotia Canyon and Sycamore Canyon in the Atascosa/Pajarito Mountains; French

Joe Canyon in the Whetstone Mountains; Kitt Peak on Baboquivari Mountain; Harshaw Canyon and Paymaster Spring in the Patagonia Mountains; and a few locations in the Chiricahua Mountains (Cornell Laboratory of Ornithology 2012). WYBC are breeding in at least some of these locations, with nests confirmed at Sycamore Canyon, Box Canyon, and Kitt Peak (American Birding Association 2014; Sebesta pers comm 2014; AGFD, unpublished data).

Arizona Sites with at Least 10 Years of Survey Data

Bill Williams River — In the mid-1970s, an estimated 57 pairs of WYBCs bred in the riparian forest of the Bill Williams River delta (Gaines and Laymon 1984). Following the sustained high water levels of 1983 to 1984 and 1986, which inundated and killed most of the cottonwoods and willows along the Colorado River, WYBC numbers also declined on the Bill Williams River delta where similar habitat mortality occurred (Rosenberg *et al.* 1991). In 1987, 17 pairs of WYBCs were located at this site and a total of 25 to 30 pairs estimated to be present (Laymon and Halterman 1987a). Surveys were conducted regularly at this site from 1993 to 2002. The breeding population fluctuated from a low of 6 to 9 pairs in 1999 to a high of 28 to 39 pairs in 2001 (Halterman 2003). In 2010, 12 to 31 pairs were estimated, and the most recent survey in 2011 estimated 9 to 23 pairs (McNeil *et al.* 2010, McNeil *et al.* 2012). Bill Williams River NWR is considered the largest, highest quality stand of suitable habitat for the WYBC along the lower Colorado River (Johnson *et al.* 2008a). Data from this site show an important, but fluctuating, breeding population that has not recovered to 1977 levels.

Lower Colorado River — The lower Colorado River on the California-Arizona border supported an estimated 180 WYBC pairs in 1976 to 1977 (Gaines and Laymon 1984), a number that had declined an estimated 80 to 90 percent by 1986 (Laymon and Halterman 1987). In 2010, based on intensive surveys, 8 to 18 pairs were estimated, and a survey in 2011 estimated 9 to 23 pairs on the Arizona side of the Colorado River, excluding the Bill Williams River (McNeil *et al.* 2010, McNeil *et al.* 2012). Recent population estimates are well below the breeding population in 1977, even though more area was surveyed.

Upper San Pedro River — The San Pedro River supports one of the largest remaining populations of WYBCs in the western U.S. (Brand *et al.* 2009). Krueper (1993) provides data on the density of WYBCs and other obligate riparian songbirds in the San Pedro Riparian National Conservation Area between 1986 through 1991, during which grazing was retired in 1987, and understory vegetation increased significantly.

Sonoita Creek — A 4-mi (6-km) segment of Sonoita Creek was surveyed seven years between 1976 and 1986 (Groschupf 1987). WYBC pairs were not estimated, but lows of 5 and 6 individuals were found in 1976 and 1986, respectively, and highs of 24 to 28 individuals were found between 1977 and 1979. The site was surveyed again in 1998 and 1999, with 11 to 12 pairs and 8 to 9 single WYBCs located (Corman and Magill 2000). In 2005, 17 individuals were found while conducting bird surveys for Important Bird Area designation (Arizona Audubon 2012, http://iba.audubon.org/iba). This population, while fluctuating, does not appear to have decreased in size from 1976 to 2005.

Verde River—Surveys conducted in 2004 and 2005 at 37 sites within the Verde River watershed were done at historical sites (16) where WYBCs were previously detected in 1998 to 1999 and at random sites (21) with riparian forest that appeared to be suitable nesting habitat (Holmes *et al.* 2008). In the 2 years, 59 percent of sites had detections; 75 percent of historical sites and 48 percent of random sites (Holmes *et al.* 2008). Holmes *et al.* (2008) confirmed nesting at five sites and found evidence of probable breeding at

nine additional sites. The maximum number of detections during any one survey period was 23 in 2004 and 31 in 2005.

Threats

The WYBC is threatened by two of the five threat factors evaluated (A and E).

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Within the three States with the highest historical number of WYBC pairs, past riparian habitat losses are estimated to be about 90 to 95 percent in Arizona, 90 percent in New Mexico, and 90 to 99 percent in California (Ohmart 1994, U.S. Department of Interior 1994, Noss *et al.* 1995, Greco 2008).

The primary threat to the WYBC is loss or fragmentation of high-quality riparian habitat suitable for nesting (Corman and Wise-Gervais 2005). Habitat loss and degradation from several interrelated factors include alteration of flows in rivers and streams, encroachment into the floodplain from agricultural and other development activities, stream channelization and stabilization, diversion of surface and ground water for agricultural and municipal purposes, livestock grazing, wildfire, establishment of nonnative vegetation, drought, and prey scarcity due to pesticides (Ehrlich *et al.* 1992, Wiggins 2005, FWS 2013b). Drought and prey scarcity (especially the loss of sphinx moth caterpillars to pesticides in the West) appear to play a role in yellow-billed cuckoo declines even where suitable nesting habitat remains (Ehrlich *et al.* 1992). These factors also contribute to fragmentation and promote conversion to nonnative plant species and increased incidence of wildfire (Krueper 1993; FWS 2001, 2013b). A potential factor contributing to declines across the species' range in North America is the loss of forested habitat on its wintering grounds in South America where little is known of its ecology or distribution (Ehrlich *et al.* 1992). The threats affecting WYBC habitat are ongoing. Such a loss of riparian habitat leads not only to a direct reduction in WYBC numbers but also leaves a highly fragmented landscape, which can reduce breeding success through increased predation rates and barriers to dispersal by juvenile and adult WYBCs (FWS 2013b).

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Factor E threats, including habitat rarity and small, isolated populations of the WYBC, cause the remaining populations in western North America to be increasingly susceptible to further declines through lack of immigration, chance weather events, fluctuating availability of prey populations, pesticides, collisions with tall vertical structures during migration, spread of the introduced tamarisk leaf beetle (*Diorhabda* spp.) as a biocontrol agent in the Southwest, and climate change. The ongoing threat of small overall population size leads to an increased chance of local extirpations through random events (Thompson 1961, McGill 1975, Wilcove *et al.* 1986).

Habitat for the WYBC has been modified and curtailed, resulting in only remnants of formerly large tracts of native riparian forests, many of which are no longer occupied by WYBCs. Despite recent efforts to protect existing, and restore additional, riparian habitat in the Sacramento, Kern, and Colorado Rivers, and other rivers in the range of the WYBC, these efforts offset only a small fraction of historical habitat that has been lost. Therefore, we expect the threat resulting from the combined effects associated with small and widely separated habitat patches to continue to affect a large portion of the range of the WYBC. This threat is particularly persistent where small habitat patches are in proximity to human-altered landscapes, such as near agricultural fields that dominate the landscape in many areas where the WYBC occurs. As a result, the potential exists for pesticides to directly affect (poisoning individual WYBCs) and indirectly affect (reducing the prey base) a large portion of the species. These effects could ultimately

result in lower population abundance and curtailment of its occupied range. Mortality from collisions with tall structures is also an ongoing, but largely unquantified effect. We recognize that climate change is a critical issue with potentially severe wide-ranging effects on the species and its habitat. The available scientific literature suggests that the effects of climate change will likely exacerbate multiple existing threats to the WYBC and its habitat.

Proposed Critical Habitat

The primary constituent elements of proposed critical habitat are based on riparian plant species, structure and quality of habitat and an adequate prey base.

1. Primary Constituent Element 1— *Riparian woodlands.* Riparian woodlands with mixed willow-cottonwood vegetation, mesquite-thorn forest vegetation, or a combination of these that contain habitat for nesting and foraging in contiguous or nearly contiguous patches that are generally greater than 325 ft in width and 200 ac or more in extent. These habitat patches contain one or more nesting groves, which are generally willow-dominated, have above average canopy closure (greater than 70 percent), and have a cooler, more humid environment than the surround riparian and upland habitats.
2. Primary Constituent Element 2—*Adequate prey base.* Presence of a prey base consisting of large insect fauna (for example, cicadas, caterpillars, katydids, grasshoppers, large beetles, dragonflies) and frogs for adults and young in breeding areas during the nesting season and in post-breeding dispersal areas.
3. Primary Constituent Element 3—*Dynamic riverine processes.* River systems that are dynamic and provide hydrologic processes that encourage sediment movement and deposits that allow seedling germination and promote plant growth, maintenance, health, and vigor (e.g. lower gradient streams and broad floodplains, elevated subsurface groundwater table, and perennial rivers and streams). This allows habitat to regenerate at regular intervals, leading to riparian vegetation with variously aged patches from young to old.

The physical and biological features of WYBC proposed critical habitat are the principal biological or physical elements essential to WYBCs conservation which may require special management considerations or protection (FWS 2014b). The proposed critical habitat rule identifies the following physical or biological features of WYBC habitat to include (FWS 2014b):

1. Rivers and streams of lower gradient and more open valleys with a broad floodplain.
2. Presence of abundant, large insect fauna (for example, cicadas, caterpillars, katydids, grasshoppers, large beetles, and dragonflies) and frogs during nesting season.
3. Flowing rivers and streams, elevated subsurface groundwater tables, and high humidity.
4. Flowing perennial rivers and streams and deposited fine sediments.
5. Riparian trees including willow, cottonwood, alder (*Alnus* sp.), walnut (*Juglans* sp.), sycamore (*Platanus* sp.), boxelder (*Acer* sp.), ash (*Fraxinus* sp.), mesquite, and tamarisk that provide cover and shelter for foraging and dispersing WYBCs.
6. Blocks of riparian habitat greater than 200 ac in extent and greater than 325 ft in width, with one or more densely foliaged, willow-dominated nesting sites and cottonwood-dominated foraging sites.

ENVIRONMENTAL BASELINE

The action area for the proposed action includes all areas directly and indirectly affected by the proposed action, including effects of actions that are interdependent and interrelated to the proposed action. The

action area includes all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Description of the Action Area

The action area (Figure 2) includes: (1) all areas subject to direct surface disturbance from the project configuration and within the USACE scope of analysis for the CWA Section 404 permit, (2) compensatory mitigation activities undertaken on the Emery Site (see Appendix B), (3) the area of potential indirect effects resulting from the reduction of stormwater runoff to the Gila River, and (4) the area of potential indirect effects from the modeled reduction in groundwater contribution to flows in the identified reaches of Bonita Creek and the Gila River.

The Lone Star Ore Body Development Project occurs entirely within FMSI Property. Elevations within the FMSI Property range from approximately 3,010 feet above mean sea level (amsl) to approximately 6,095 feet amsl. The topography consists primarily of the gently sloping bajada between the rocky slopes of the southern edge of the Gila Mountains and the alluvial floodplain of the Gila River. The sediments that form this bajada are principally derived from the basalt, andesite, and rhyolite bedrock of the Gila Mountains. The drainages within the FMSI Property are all ephemeral, dendritic in form on the higher slopes, but gradually becoming braided as the slope gradient decreases. There are no perennial waters of the United States within the FMSI Property. The primary drainages, from east to west, are Wilson Wash, Peterson Wash, Cottonwood Wash, Talley Wash, Watson Wash, and Coyote Wash. All of these drainages ultimately report to the Gila River.

The reach of Bonita Creek in the action area consists of an approximately 14.8-mile stretch between the southern boundary of the San Carlos Apache Nation and the confluence of Bonita Creek and the Gila River and is entirely within the Gila Box National Riparian Conservation Area. Elevations along this reach of Bonita Creek range from approximately 3,970 feet amsl at the San Carlos Apache Nation boundary to approximately 3,140 feet amsl at the confluence with the Gila River. Perennial flow begins at about 4,270 feet elevation (18 miles upstream from the mouth), although intermittency is common downstream (FWS 2007a). The reach of Bonita Creek within the action area is constricted within a steep canyon, with nearly verticals walls that can reach to 180 feet or more in height (FWS 2007a). A U.S. Geological Survey (USGS) gage station (USGS 09447800) is located within this reach approximately 6 miles above Bonita Creek's confluence with the Gila River. The Bureau of Reclamation has built a fish barrier on Bonita Creek approximately 1.3 miles upstream of Bonita Creek's confluence with the Gila River.

The reach of the Gila River in the action area is an approximately 80-mile stretch between the confluence with Bonita Creek and the confluence with Goodwin Wash, west of Safford which includes the Emery Site. Elevations along this reach range from approximately 3,140 feet amsl at the confluence with Bonita Creek to 2,647 feet amsl at the confluence of Goodwin Wash and the Gila River. The river is a low-gradient, braided, meandering channel bordered by a broad floodplain. Flow within the river is typically perennial throughout the reach within the action area. Much of the broad floodplain of the Gila River through the Safford Valley was historically, and is currently, used for agriculture. The upper most portions of the Gila River within the action area are located within the Gila Box Riparian National Conservation Area. There are two USGS gages (USGS 09448500, 0945100) located near the up gradient end of this reach of the Gila River and at least one USGS gage (USGS 09466500) located just beyond the downgradient end on the San Carlos Apache Nation.

The FMSI Property within the action area is mapped primarily within two biotic communities as described by Brown (1994): the Arizona Upland subdivision of the Sonoran Desertscrub biotic community and the Semidesert Grassland biotic community. Native vegetation within the majority of the FMSI Property, and in the action area between the FMSI Property and the Gila River, is generally more characteristic of the Arizona Upland subdivision of the Sonoran Desertscrub biotic community.

Throughout most of the Action Area, this community is dominated by creosotebush (*Larrea tridentata*). The biotic communities generally progress from Sonoran Desertscrub to Semidesert Grassland through an ecotone of the two communities from southwest to northeast, following the general trend of rising elevation. The Semidesert Grassland biotic community, present only in the northeast corner of the FMSI Property, is dominated by snakeweed (*Gutierrezia sarothrae*) and grasses, with generally widely scattered shrubs and trees. The ecotone between the two biotic communities supports a mixture of species found in those communities. The only species of plant more common in the transition area than in either the Sonoran Desertscrub or Semidesert Grassland is jojoba (*Simmondsia chinensis*), which occurs in dense patches on some north- and west-facing hillsides in the foothills of the Gila Mountains.

Vegetation along the larger drainages within the FMSI Property and between the FMSI Property and the Gila River is xeroriparian, and is variously dominated by mesquite (*Prosopis juliflora*), catclaw acacia (*Senegalia greggii*), whitethorn acacia (*Vachellia constricta*), blue paloverde (*Parkinsonia florida*), and desert broom (*Baccharis sarothroides*). One drainage in the northeastern portion of the FMSI Property, Bear Spring Canyon, is dominated by scrub live oak (*Quercus turbinella*).

The reach of Bonita Creek within the action area is mapped within the Arizona Upland subdivision of the Sonoran Desertscrub biotic community as described by Brown (1994). Upland vegetation near this reach is generally consistent with this designation. Vegetation within the canyon containing Bonita Creek transitions from upland areas dominated by species, such as velvet mesquite (*Prosopis velutina*), catclaw acacia, paloverde, and burroweed (*Isocoma tenuisecta*) to a well-developed riparian plant community variously dominated by Fremont's cottonwood (*Populus fremontii*), Goodding's willow (*Salix gooddingii*), coyote willow (*Salix exigua*), Arizona sycamore (Platanus wrightii), Arizona walnut (J*uglans major*), horsetail (*Equisetum* spp.), cattail (*Typha* spp.), and sedges (*Carex* spp.) (FWS 2007a).

The majority of the floodplain of the Gila River within the action area has been given over to agricultural practices, and little riparian vegetation remains except immediately adjacent to the active channel. The remaining vegetation of the riparian corridor along the active channel is dominated by non-native tamarisk, with mesquite on some terraces and intermittent patches of other native riparian vegetation that include Fremont's cottonwood and Goodding's willow. The Emery Site is located near the downgradient end of this reach. Vegetation within the Emery Site is typical of the above description of the Gila River reach, and includes a dense stand of tamarisk, interspersed with a few Fremont's cottonwood and Goodding's willow, as well as a fallow agricultural field.

A. STATUS OF THE SPECIES AND CRITICAL HABITAT WITHIN THE ACTION AREA

Southwestern Willow Flycatcher

SWFL are known to be present along the reaches of the Gila River and Bonita Creek within the action area. Both reaches are located within the Upper Gila Management Unit for SWFL. Surveys following the 2007 breeding season detected 329 territories along three segments of the Gila River within the Upper Gila Management Unit in Arizona and New Mexico (Durst *et al.* 2008). A single SWFL was detected

along Bonita Creek in 2003 (BOR 2010). Survey conducted along Bonita Creek from 2004 to 2007 did not detect any individuals of this species (BOR 2010). SWFL are known to be present throughout the reach of the Gila River within the action area and within the Emery Site. FWS-protocol (Sogge et al. 2010) surveys for SWFL presence/absence were conducted within portions of Area B of the Emery Site from 2014 to 2016 (Johnson and Calvo 2015, Johnson 2016).

The data readily available on recent flycatcher territories along the Gila River in the general vicinity of the Emery Site is largely limited to surveys conducted by USGS between 2014 and 2016 (Stillwater Sciences 2014, Johnson 2016). These data provide information on not only where SWFL were detected and not detected, but also nest locations along several reaches of the Gila River downstream of Safford, AZ. As such, these data provide valuable insight into where SWFL territories are expected to be established in relation to the river channel.

When analyzed broadly, a clear pattern emerges from these data; SWFL detections and territories are largely limited to areas within approximately 50 m (164 ft) of the main channel of the Gila River or secondary channels that contain surface water (Stillwater Sciences 2014, Johnson 2016). Similarly, nest locations identified by Johnson (2016) were mostly adjacent to the main Gila River channel. When surveyors did survey riparian vegetation away from the channel they did not detect SWFL territories (see Appendix 1 of Johnson 2016). In fact, researchers explicitly do not survey areas away from the main channel because SWFL territories are not expected to be establish away from the main channel (Johnson 2017). Moreover, surveys along the Gila River and other riparian areas away from the main channel have not resulted in SWFL territories (Johnson 2017).

The surveys were conducted as part of the Gila Watershed Partnership's (GWP) Upper Gila River Vegetation Management Project (FWS 2015a). These surveys were focused on GWP's vegetation management site, Site R8, located within the larger Emery Site (Figure 4). Assessments completed on behalf of GWP identified approximately 4.5 acres of the total 9.3 acre site as suitable SWFL habitat (Orr *et al*. 2014).**Table 3** provides detailed SWFL survey data from the three years of survey at the R8 site.

Table 3. SWFL nests and territories located at GWPs R8 Site within Area B of the Emery Site

SWFL Territories	SWFL Nests	Re-nest Attempts
2014 = 6	2014 = 2	2014 = 0
2015 = 4	2015 = 2	2015 = 0
2016 = 5	2016 = 4	2016 = 1

Sources of disturbance were assessed by Johnson and Calvo (2015), who found that roads and cattle were located at R8, and that cattle evidence (i.e. trails and scat) and cattle presence were common at the site (Johnson and Calvo 2015). Recreational activity was also observed at all sites either from people fishing, hunting, or the use ATVs (Johnson and Calvo 2015).

Brood parasitism is relatively low on this section of the Gila River compared to other SWFL populations in the southwest (Johnson and Calvo 2015), but was observed near the Emery Site. During SWFL surveys and nest searching, brown-headed cowbirds have been incidentally observed near the Emery Site (Johnson and Calvo 2015).

Designated critical habitat for SWFL occurs along the Gila River from the upper end of Earven Flat in Arizona, above the Town of Safford, through the Safford Valley to the San Carlos Apache tribal boundary in Gila, Graham, and Pinal Counties, Arizona. Designated critical habitat for the SWFL includes all of Area B and portions of Area A within the Emery Site.

Western yellow-billed cuckoo

WYBC are not known to be present within the areas subject to direct surface disturbance from the mine-related elements of the project. Numerous surveys have been conducted documenting the presence of WYBC along Bonita Creek and the Gila River within the action area (WestLand 2015). The species was detected during surveys of the Gila River and Bonita Creek in 1998 and 1999 (Corman and Magill 2000) and more recent surveys of the Gila River in 2005, 2006, and 2007 (Stillwater Sciences 2014). Surveys at GWPs R8 Site within Area B of the Emery Site did not detect WYBC in 2015 (Johnson and Calvo 2015). One WYBC was detected at R8 during surveys in 2016 (Johnson *et al.* 2016). Johnson and Calvo (2015) describe Site R8 as dominated by tamarisk with very little native vegetation (i.e. cottonwood/willow).

Previous to 2014, the only observations of WYBC along the Gila River reach within the action area since 2005 have been at the Fort Thomas Preserve, which is owned and managed by Salt River Project (SRP) and the Bureau of Reclamation (Reclamation). The Fort Thomas Preserve is approximately 6 miles from the Emery Site. Suitable breeding habitat in the Fort Thomas Preserve consists of multi-layered riparian vegetation patches of various sizes that are linked by stream channels or irrigation drainages. Habitat ranges from mixed-native (51–75% native tree species) to nonnative-dominated (>75% nonnative tree species). Surveys in mixed native and nonnative habitat on the southern portion of the Fort Thomas Preserve yield significantly more WYBC detections than have tamarisk–dominated survey routes to the north. Surveys in 2007 recorded 76 detections, a dramatic increase from those reported in 2005 (two detections) and 2006 (three detections) (Johnson *et al.* 2006a, b). Possible explanations include natural population fluctuations, an increase in survey effort, survey effort shifting focus to higher quality habitat, or a combination of factors. Population numbers in the eastern United States are highly variable depending on food availability (Eaton 1988) and western populations may fluctuate similarly. In 2007, breeding pairs were concentrated on the southern portion of the preserve in native-dominated gallery forests. In 2009, 66 WYBC detections were recorded for the Fort Thomas Preserve study area over four separate protocol surveys. Twenty incidental detections were also recorded. Results of the surveys and observations indicated that five to seven pairs were present in the study area. In 2012, only 22 detections were recorded in the Fort Thomas Preserve surveys, with data suggesting that only five to six pairs were present in the study area.

The proposed critical habitat unit for WYBC occurs along the Gila River in the action area and begins approximately 12 mi upstream of Safford and continues 66 miles downstream to the San Carlos Reservoir. Proposed critical habitat for the WYBC includes all of Area B and portions of Area A within the Emery Site.

B. FACTORS AFFECTING SPECIES ENVIRONMENT WITHIN THE ACTION AREA

The majority of the Safford Valley floor is privately owned, and cotton farming has been the dominant land-use activity since the mid-20th century. While much of the area is sparsely developed, the largest urban center (and County Seat) is in Safford, which supports a growing population of around 10,000 people according to the 2010 U.S. Census. Much of the upland areas are held by BLM. In recent years, several parcels overlapping the river corridor have been purchased by Freeport McMoRan Copper & Gold

(FMI; formerly Phelps Dodge Corporation) to serve as mitigation sites. The SRP also manages a group of mitigation parcels near Fort Thomas called the Fort Thomas Preserve.

Hydrology

These flows are punctuated by flashy runoff events during winter and spring storms and summer monsoons. Daily flows in a given water year average about 400 cubic feet per second (cfs) in the upper Gila River valley (from gages near Solomon and at Calva), but decrease along its length, likely due to human water-uses (e.g., diversions, wells) and riparian vegetation water use. Mean daily flows in the valley are typically less than about 1,000 cfs for 90 percent of the time (as recorded at both gages), and less than 100 cfs and 10 cfs for 10 percent of the time near the upstream and downstream ends of the valley (as recorded near Solomon and at Calva), respectively. The month of March typically experiences the highest mean monthly flows over a given water year, and August experiences the highest flows from Summer through Fall. Annual peak flows in the Safford Valley can be characterized as "flashy": they are massive in comparison with the mean daily flows (e.g., 453 cfs versus 132,000 cfs), but usually span only a few hours to days. These flashy discharge dynamics, which are common to large, dryland riverine systems, periodically result in dramatic geomorphic change. The amount of surface flow and the location of the river channel in the action area are also be strongly influenced by several in-channel irrigation diversions, bridge crossings, and agricultural levees.

Seasonal agricultural run-off directly influences vegetation development along the Gila River within the action area and an abundance of very dense riparian and wetland vegetation can be found associated with these discharge points.

Vegetation

The most common vegetation type in the action area is tamarisk-dominated shrubland, which is found under a relatively wide range of conditions. The abundance of tamarisk ranges throughout the action area, to areas where it is nearly the only woody species present, to other stands where there are greater mixtures of tamarisk, cottonwood, Goodding's willow, and other native riparian shrubs. Vegetation density can range widely, from nearly continuous to only 10 percent tamarisk cover, and canopy heights are typically no more than 16 feet. Dense stands of tamarisk near flowing and standing water or very moist soils are the primary nesting habitat of SWFL in the action area. The herbaceous layer in tamarisk-dominated shrublands is low in floristic diversity, comprised mostly of a sparse cover of nonnative bermuda grass (*Cynodon dactylon*) or johnsongrass (*Sorghum halepense*). Tamarisk can tolerate a wide variety of soil conditions, flood and scour frequencies, increased groundwater depths, and are found from stream banks to more mesic upland areas. Tamarisk is highly flammable and has fueled a number of fires in the action area. In areas burned by the Clay Fire in March 2013 near Fort Thomas, nearly all of the tamarisk biomass was burned away, but just a year later all burnt tamarisk trees were observed to be re-sprouting vigorously from the base.

There are also stands of cottonwood-Goodding's willow woodland in the action area, typically along the outer margin of the riparian corridor and the banks of abandoned and/or high flow channels, which form a dense, high canopy 15–30 ft tall. In the action area along the Gila River, most cottonwood and Goodding's willow trees are mature or decadent appearing to have been established soon after the 1993 and 1995 flood events, and there appears to be very little to no recent natural recruitment of either species. Tamarisk, and less often mesquite, still dominates the sub-canopy in these stands. In general, the herbaceous layer is very sparse to absent and the ground layer has a moderate cover of downed wood and other organic litter. Cottonwood-Goodding's willow woodland typically occurs where substrates are silty

or sandy, and generally dry, and at elevations where they are frequently inundated by lower velocity floods but are not subject to intense scouring. Cottonwood-Goodding's willow woodlands are important habitat for WYBC.

Mixed riparian shrubland and narrowleaf willow-mulefat shrubland are found along the river banks in the action area. A combination of tamarisk, mulefat, and/or narrowleaf willow typically dominate the shrub layer, while bermudagrass, sacaton, and/or johnsongrass may occur at low cover in the herb layer. The tree layer is nearly always absent, although Goodding's willow can occasionally occur at low cover. Typically 30–40 percent of the area is unvegetated sand or silt. These vegetation types occur along the active channel, as well as side channels, on silty, typically moist substrates, where they are frequently inundated, in more or less continuous narrow, sparse strips (see the riverbanks in photo insert at right). In many instances, these vegetation types appear to be limited in extent as a result of shading from adjacent and taller-stature tamarisk-dominated shrublands.

The occurrence of specific riparian plant species exotic (tamarisk), native (willow and cottonwood), or mixtures of the both within the action areas is largely a product of the underlying landscape conditions of the river (USGS 2010, FWS 2002). In other words, tamarisk flourishes largely because anthropogenic stressors degrade conditions favorable to establishment of native trees and improve conditions favorable for tamarisk (Stromberg *et al.* 2005). The distribution and abundance of tamarisk is symptomatic of the more difficult and broader issue of land and water management and should be considered within the context of the underlying physical and biological processes that shape the ecosystem (Stromberg *et al.* 2005). Upstream water use combined with surface water diversions and groundwater pumping surrounding the action area in the Safford Valley are likely significant factors that create favorable conditions for tamarisk, while adversely affecting conditions where native plants can thrive. Additionally, agricultural return-flow during the spring and summer months, when tamarisk is becoming established, creates further advantageous conditions for tamarisk (FWS 2014c).

Review of Previous 50-acre Vegetation Management/Restoration by GWP

Monitoring plots were established at GWP Site R18 on the north and south banks, as this was the most completely treated site before the April 15th cut-off date. Thus, it experienced a full growing season, which allowed for both natural recruitment, and re-sprouting of the treated tamarisk stumps. The plots that were treated on the north bank of R18 (Class 3 tamarisk) averaged 1,355 tamarisk stumps per acre. The plots that were treated on the south bank of R18 (Class 3 tamarisk) averaged 4,065 tamarisk stumps per acre. From those stumps on the north bank, an average of 1,537 re-sprouts were observed coming back from the stump and/or recruiting. From those stumps on the south bank, an average of 4,162 re-sprouts were observed coming back from the stump and/or recruiting. Therefore, the tamarisk treatment protocol was adapted to stress the need to "low-stump" the tamarisk, such that the herbicide is able to absorb into the root crown which should improve effectiveness.

Passive re-establishment of native plant species was more rapid than anticipated at the initial vegetation management sites. A first effort at documenting this re-establishment of native species involved mapping "recruitment events". "Recruitment event" is defined as the establishment of greater than 100 stems of native riparian obligate tree species that are taller than 6 feet, in an area less than 0.25 acres. According to these metrics, two such events have occurred on the north bank of R18. A *Populus fremontii* recruitment event occurred when 146 cottonwood trees, ranging between 6 and 12 feet tall, established on a 0.33 acre area (equivalent to 111 trees per 0.25 acres). A *Salix exigua* recruitment event occurred when 126 coyote willow trees, ranging between 6 and 8 feet tall, established on a 0.01 acre area (equivalent to 3,150 trees per 0.25 acres).

As of December 2015, a high rate of planting success for the container stock introduced from the GWP Native Plant Nursery has been observed, but much less success of the pole plantings that were placed in early March of 2015. The container stock may have had higher success due to the planting zones and the strategic timing of the plantings to coincide with rain events. The lower success of the pole planting may have been due to the use of the water auger not allowing for the accurate determination of whether the poles were being planted in the water table, and possibly because many of the trees from which we were harvesting poles had begun to come out of dormancy when we were trying to plant (and thus were focusing energy on producing foliage as opposed to root growth).

The preliminary monitoring results from this past year suggest there is uncertainty whether the project is on a trajectory to achieve its project goals and objectives. Natural recruitment may assist in establishing dense stands of native riparian tree species 9-19 feet tall, which will be supplemented by the proposed project through introducing additional species that may not naturally recruit as well (*Salix gooddingii*, *Sporobolus airoides*, *Prosopis velutina*, *Lycium torreyi*, *etc*.). However, many tamarisk plants re-sprouted at the treated sites compared to those that were removed. We have no information yet about the configuration, density, or persistence of plants and plant species in the near future or distant future, or to what extent breeding SWFL may use these management sites. Between natural processes (floods, drought) and the vegetation management proposed, there is still uncertainty to what extent these efforts will provide short-term or long-term benefits for SWFLs,Western yellow-billed cuckoos and their designated and proposed critical habitats.

Tamarisk Leaf Beetle

Hatten (2016) applied satellite modeling to predict the amount and distribution of potential SWFL breeding habitat across the southwestern United States and evaluated potential impacts by the leaf beetle along the upper Gila River (including the action area). Their findings predicted a 53.1 percent loss of predicted flycatcher habitat for a 44 stream mile reach of the upper Gila River from the confluence with Bonita Creek downstream to Goodwin Wash (4.35 stream miles downstream of Fort Thomas) (Hatten 2016).

EFFECTS OF THE ACTION

Effects of the action refer 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 the action that will be added to the environmental baseline. 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. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Southwestern Willow Flycatcher

The effects of groundwater pumping and retention of stormwater runoff within the footprints of the Safford Mine and the proposed Lone Star Ore Body Development Project are more than offset by the benefits of the Rotational Fallowing Program, with a 191-acre-foot net benefit at the peak anticipated impact 107 years after the development of the project. Adverse impacts to riparian habitats suitable for SWFL are not anticipated from ground water pumping, stormwater management, or pit effects from development of the project.

Mitigation activities at the Emery Site are being implemented to offset unavoidable impacts to waters of the United States that would occur after issuance of the CWA Section 404 Permit by the USACE (see the Conservation Measure Supplement in Appendix B). Short-term adverse indirect effects to the SWFL and its critical habitat are expected to occur as a result of mitigation activities at the Emery Site.

The proposed removal of tamarisk to restore a native-dominated riparian habitat within 47 acres of the Emery Site will impact habitat suitable for SWFL. These impacts are expected to be short term in nature, and as native riparian habitat develops in the areas of tamarisk control, beneficial effects to SWFL are anticipated.

The proposed conservation measures are anticipated to be effective in reducing the adverse effects of the proposed action. Scheduling vegetation removal activities during the October 1 to April 14 work period will avoid direct effects during the nesting season, while SWFLs are on their wintering grounds in Central America or northern South America. Therefore, no direct impacts to SWFLs, their nesting attempts, eggs or young are expected to occur. Avoiding habitat removal within the immediate area surrounding known SWFL nest areas and minimizing clearing access routes within occupied or highly suitable habitat, will minimize, but not eliminate indirect SWFL impacts.

Riparian habitat in the Southwest is naturally rare and patchy, occurring as widely separated ribbons of forest in a primarily arid landscape. In Arizona, for example, riparian habitat comprises less than 0.5 percent of the landscape (Strong and Bock 1990). Wide-ranging or highly mobile species that rely on naturally patchy habitats, such as the SWFL, persist at regional scales as meta-populations, or local breeding groups that are linked together and maintained over time through immigration and emigration (Pulliam and Dunning 1994, FWS 2002). SWFLs, as neo-tropical migrants, have high site fidelity to the location of breeding patches, returning to the same areas to breed annually (FWS 2002). It is anticipated that the individuals that established nest territories in any given year would return the next year. Persistence of local breeding groups is a function of the group's size (numbers of individuals) and the ability of individuals to disperse from one breeding location to another.

Tamarisk removal and selective clipping of willow and cottonwood cuttings for propagation may temporarily and indirectly affect SWFL habitat through the short-term loss of nesting and/or foraging habitat, between the time of tamarisk removal and sufficient growth of native vegetation. Decreased cover due to clearing of tamarisk may increase rates of nest predation and brood parasitism by cowbirds, reducing the suitability of nesting habitat. Creating gaps in tamarisk-dominated vegetation in buffers along the river may increase temperatures and lower relative humidity in the habitat patches, reducing the success of egg hatching, productivity of insects and therefore the overall suitability of nesting and foraging habitat. The replacement of habitat structure lost by removing tamarisk by native vegetation is expected to take approximately five years in more mesic portions of the Emery Site. The short-term effects to nesting SWFLs and the number of territories by the removal of habitat within the action area will be minimized by the re-establishment of native woody plant species. The Emery Site has a greater likelihood of being able to grow native species due to appropriate soil and groundwater conditions.

Removal of tamarisk will occur within a maximum 47-acre area where migrant willow flycatchers may occur. The removal of riparian habitat remains a relatively small fraction of the overall amount of riparian habitat across the action area. Because migrant SWFLs are able to take advantage of a much broader quality of riparian habitat for shelter, cover, and food and will use areas briefly as they move onto other locations, we do not anticipate significant impacts to occur to migrating SWFLs from this habitat removal over the life of the project. Therefore the overall small amount of Gila River habitat temporally affected by this project is not expected to substantially influence the overall quality of migration habitat or adversely affect migrating SWFL behavior. We expect they

will utilize unaffected available habitat and take advantage of the new habitat that becomes established through planting or natural recruitment.

The amount of vegetation required by nesting flycatchers varies depending on the habitat quality. Salt River Project, when using the Arizona Game and Fish Department and U.S. Geological Survey's (Hatten and

Paradzick 2003) flycatcher habitat model, estimated that about 11 acres of vegetation overall is needed to support a single territory (FWS 2003). Within that broader acreage of vegetation, flycatchers defend territories of various sizes ranging from 0.15 to 5.68 acres, with territories more typically ranging from 0.5 – 1.2 acres in size. Stillwater Science (2014) estimated the average SWFL nest territory size at 2.2 acres. However, a more site-specific estimate could be used based upon the 291.9 acres surveyed within the action area by GWP and the 95 territories detected, which equals about 3.1 acres per territory. Surveys within the action area also allow for assessment of the spatial distribution of SWFL along the Gila River. Based on available survey data from the action area, we expect few SWFL territories to be established away from the main channel from the Gila River (WestLand 2017). We believe that up to 8 SWFL territories will be impacted by the proposed restoration efforts (see the Conservation Measure Supplement in Appendix B for a more-detailed description of the methodology with which the number of territories was calculated).

Given the nest site fidelity of SWFL, there is the likelihood that removal of tamarisk at identified nesting locations will adversely affect future breeding opportunities during the anticipated five-year native vegetation recovery window.

SWFL habitat modeling based on remote sensing and GIS data found that breeding site occupancy is influenced by vegetation characteristics surrounding a territory (FWS 2002). This same model was used to conclude that an 11.1-acre "neighborhood" was a reasonable estimate of habitat needed by adult and juvenile SWFLs for refuge and foraging near nests and territories (SRP 2002). Therefore, the removal of 47 acres of tamarisk-dominated riparian habitat from the Emery Site is anticipated to remove vegetation from within SWFL territories, important habitat surrounding territory boundaries, and likely undetected areas used for nest placement. Based on SWFL breeding habitat suitability modeling (Orr *et al.* 2014), after tamarisk removal, there will still remain a substantial amount of suitable nesting habitat in the action area approximately equivalent to 1,484 nest territories SWFL to naturally disperse to (FWS 2016).

The PCEs of SWFL critical habitat, as described in the status of the species section, are those habitat elements that provide sufficient riparian habitat for breeding, non-breeding, territorial, dispersing and migrating SWFLs and to SWFLs throughout their range, and provide those habitat components essential for conservation of the subspecies. Short-term effects on PCEs are expected during the habitat vegetation management process, between the time of removal of tamarisk and the growth of sufficient structure of native vegetation. The project is expected to have short-term adverse effects on the PCEs of designated critical habitat, but in the longer term is intended to improve these PCEs and the overall quality of SWFL habitat.

The project is likely to cause temporary adverse effects to SWFLs and their critical habitat. Up to 47 acres of suitable SWFL habitat and up to 8 territories will be temporarily affected by selective tamarisk removal activities. We can anticipate that throughout the implementation of the project, this total amount of suitable habitat will shift in quality. However, this anticipated temporary effect to the SWFL and its habitat needs, should be viewed in comparison to what would be expected if this habitat vegetation management project were not undertaken. In the absence of this project, habitat loss or alteration over much of these acres is

expected to occur due to the expected arrival of the tamarisk leaf beetle. This likely outcome would lead to the alteration of SWFL habitat and could impact the productivity of these territories. By completing this

project in advance of the beetle's arrival, while abundant territories occur upstream and downstream of these management sites, the intent is to create more native dominated habitat which would be expected to reduce the impact of the leaf beetle. In contrast, waiting to implement this project following impacts from the beetle, when SWFL populations may be depressed, isolated, and with fewer individuals could increase the probability of local extinction (Pulliam and Dunning 1994, FWS 2002). However, because this is a dynamic system with significant stressors (groundwater extraction, surface water diversion, cattle grazing, etc.), prone to devastating floods, the primary benefit of this project is expected to be short-term in nature and minimized once the next large flood event occurs. We anticipate the vegetation community and riparian plant species that will return following the floods will largely be reliant on the surrounding natural existing conditions (groundwater, watershed, soil, etc.) and the stressors that affect them (FWS 2013, p. 351-355).

Western Yellow-billed Cuckoo

We present occupancy and habitat use data from the most recent WYBC surveys, above.

Vegetation management in the area may temporally change the habitat conditions at the vegetation management sites. Creating gaps in vegetation may increase temperatures and lower relative humidity in the habitat patches, reducing the success of egg hatching, productivity of insects and therefore the overall suitability of nesting and foraging habitat. The selective clipping of willow and cottonwood cuttings for propagation could also affect WYBC habitat. Clippings will be made either from areas within the vegetation management site or outside of WYBC habitat, in irrigation ditches that contain stringers of vegetation.

The long-term effects to WYBC by the removal of habitat within the action area will be minimized by the re-establishment of native woody plant species. Project site selection identified that these management sites have a greater likelihood of being able to grow native species due to appropriate soil and groundwater conditions. As a result of this portion of the Gila River being unregulated, the impacts of this project are limited by the length of time until the next large flood event that removes and alters vegetation through this area.

Removal of tamarisk at the Emery Site will occur on a maximum of 47 acres of suitable WYBC habitat. WYBC require large blocks of riparian habitat for breeding. Home ranges are large, vary in size depending on seasonal food abundance, and overlap greatly both between members of a pair and between neighboring pairs. Individual home ranges during the breeding season average over 100 acres, and home ranges up to 697 acres have been recorded (Laymon and Halterman 1987, pp. 31–32; Halterman 2009, p. 93; Sechrist et al. 2009, p. 55; McNeil et al. 2010, p. 75; McNeil et al. 2011, p. 37; McNeil et al. 2012, p. 69; McNeil et al. 2013a, pp. 133–134; McNeil et al. 2013b, pp. 49–52). In a study on the Rio Grande in New Mexico, Sechrist et al. (2009, p. 55) estimated a large variation in home range size, ranging from 12 to 697 acres, and averaging 202 acres using the Minimum Convex Polygon method. In a study on the upper San Pedro River in Arizona, Halterman (2009, pp. 67, 93) also estimated a large variation in home range size, ranging from 2.5 to 556 acres, and averaging 126 acres using the Minimum Convex Polygon method.

At the landscape level, the amount of cottonwood–willow-dominated vegetation cover and the width of riparian habitat influences WYBC distribution and abundance (Gaines and Laymon 1984).

Previous surveys in the Action Area have only detected WYBC where riparian habitat is dominated by native riparian trees with tamarisk in the understory (FWS 2016). Habitats within the 47-acres of the Emery Mitigation site are dominated by tamarisk with limited native tree species within the overstory.

The vegetation management has the potential to affect WYBCs. While lacking the typical species composition expected to support WYBC, the removal of 47 acres of tamarisk could impact one WYBC home range.

An unintended consequence of removal of tamarisk within the vegetation management sites may be a decline in health or mortality of the remaining native habitat that is no longer protected by surrounding foliar cover and soil-binding roots. Sudden exposure to wind, erosion, and more extreme temperature can result in windthrow and desiccation. Although treatment areas that are less dense, or patchy with a mix of shrubs, ground cover, and tamarisk, may not be used for nesting, they may be used for foraging and removal will reduce the prey availability, at least in the short term.

Lastly, the proposed conservation measures are anticipated to be effective in virtually eliminating the potential for direct adverse effects of the proposed action, most notably scheduling noisy or ground-disturbing vegetation removal activities between October 1 to April 14 while WYBC are on their wintering grounds. Therefore, no direct impacts to WYBC, their nesting attempts, eggs, or young are expected to occur.

The PCEs of proposed WYBC critical habitat defined as described in the status of the species section are those habitat elements that provide sufficient riparian habitat for breeding, non-breeding, territorial, dispersing and migrating WYBC and to WYBC throughout their range, and provide those habitat components essential for conservation of the subspecies. Short-term effects on PCEs are expected during the habitat vegetation management process, between the time of removal of tamarisk and the growth of sufficient structure of native vegetation. Decreased cover due to clearing of tamarisk may increase rates of nest predation, reducing the suitability of nesting habitat. Creating gaps in vegetation may increase temperatures and lower relative humidity in the habitat patches, reducing the productivity of insects and therefore the suitability of foraging habitat. Overall, however, the vegetation management is expected to improve native habitat along the Gila River, and because tamarisk removal is a focus, an additional net gain of suitable WYBC habitat within the 47 acres of tamarisk to be removed and in the restoration of the fallowed farm field could be expected**.**

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.

The current land use in the action area consists of privately-owned residences and agricultural lands. Agricultural production is primarily irrigated cotton and grazing for livestock. Agricultural fields are irrigated primarily using water diverted from the river at six hardened (permanent) and earthen (seasonal push-up) dams, with supplemental water pumped from shallow alluvial aquifers.

Table 4 summarizes the ongoing and future actions that are reasonably certain to occur in the project vicinity that could result in cumulative effects on the species analyzed in this biological opinion, alone or in combination with the proposed action.

Table 4. Potentially cumulative actions in the project vicinity.

Action	Location	Description	Status	Summary of potential effects
SRP's and Reclmation's Fort Thomas Preserve	Gila River near Fort Thomas (between R11 and R14)	Conservation and annual monitoring of riparian vegetation (1,259 acres) as off-site mitigation for SRP's water supply management activities (SRP 2013)	Ongoing, to be continued indefinitely	Beneficial effects on native riparian vegetation and riparian- obligate species habitat
FMI's Safford Valley Environmental Vegetation management Sites	Gila River between Solomon and Fort Thomas	Fallowing of agricultural lands and conservation, vegetation management, and monitoring of riparian vegetation on the Gila River as mitigation for Safford Mine water use impacts	Ongoing, to be continued indefinitely	Beneficial effects on native riparian vegetation and riparian- obligate species habitat
Gila Basin Irrigation Commission and Storage Project, Southwest New Mexico Regional Water Supply Plan, and Hidalgo County Off-Stream Project	Upper Gila River near Cliff, Silver City, and Virden in Grant and Hildago Counties, NM, approximately 70 miles upstream of Pima, AZ	Development of three new surface-water diversion projects along the upper Gila River in New Mexico (BOR 2014)	Construction pending state and federal approvals expected this year	Diversion of surface water from the upper Gila River in New Mexico, thereby potentially reducing baseflows in the project vicinity
Future Upper Gila Restoration	Duncan Valley and additional sites in Safford Valley	Tamarisk removal and revegetation of native riparian plants	Ongoing, with expansion planned as additional landowner permission and funding are acquired	Short-term effects on SWFL, WYBC, and critical habitat, but long-term improvement in quality

CONCLUSION

Southwestern Willow Flycatcher

After reviewing the current status of the SWFL, the environmental baseline for the action area, and the effects of the proposed vegetation management activities in the action area, it is our biological opinion that the action, as proposed, is neither likely to jeopardize the continued existence of the SWFL, nor likely to destroy or adversely modify critical habitat for the species. Our conclusion is based on the following:

- Implementation of the action at the Emery Site B will be conducted outside of the SWFL breeding season, thus minimizing direct and indirect effects to migrating, nesting, and dispersing birds.

However, breeding SWFL in 8 territories are still expected to experience temporary displacement, reduced productivity, and increased predation/parasitism from the proposed project, though quantifying these effects would be difficult.

- Southwestern willow flycatchers are known to breed within riparian vegetation along the Gila River upstream and downstream of the Emery Site in appreciable numbers, preventing the temporary impacts from this project from causing any population level impacts. For example, near Fort Thomas downstream of the action area over 100 territories were known to occur (SRP 2013). Similarly, in the Cliff-Gila Valley in western New Mexico territory numbers have ranged widely from near 100 to near 200 territories (FWS 2002). Both areas have established long-term conservation associated specific to the SWFL. As a result of the abundant numbers of SWFL territories along the upper Gila River, the short-term temporary loss of 8 territories from altering 47 acres of Emery Site Area B s not expected to affect the persistence of SWFL along the entire upper Gila River. In the more immediate short-term, the project is intended to provide greater stability from the arrival of the leaf beetle until the next large flood event. Further, the establishment of riparian vegetation in 50 acres of fallowed agricultural lands in Emery Site A and restoration of protection of 55 acres in Emery Site Area C, situated adjacent to the Gila River, as a buffer to restoration activities in Area B, will further minimize the potential for harm and harassment of SWFL.
- Additionally, the goals of the project at the Emery Site are for all protected, enhanced, and restored riparian vegetation to be better protected from the impacts of leaf beetles. Also, because this section of the Gila River is prone to periodic devastating floods that remove large amounts of riparian vegetation, the overall impact of the project will likely be temporary in nature.
- We anticipate the temporary effects to PCEs 1 (riparian vegetation) and 2 (insect prey populations) on up to 47 acres of Site B situated inland (behind the Site C buffer) along a 0.48-mile stream mile reach of critical habitat to be minor compared to overall amount of critical habitat designated within the Upper Gila Management Unit. The affected stream mileage is approximately 1.01 percent) of the 47.5 mile designated stream length of the Gila River in the Upper Gila Management Unit and 0.02 percent of the 208,973 acres of critical habitat rangewide. The effects described above are temporary and so small in scale that they will not destroy or adversely modify SWFL critical habitat nor prevent the affected site, the Upper Gila Management Unit, and the rangewide critical habitat designation from contributing to the recovery of SWFL.

Western Yellow-billed cuckoo

After reviewing the current status of the WYBC, the environmental baseline for the action area, and the effects of the proposed vegetation management activities in the action area, it is our biological opinion that the action, as proposed, is neither likely to jeopardize the continued existence of the WYBC, nor, in conference, likely to destroy or adversely modify proposed critical habitat for the species. Our conclusion is based on the following:

- Implementation of the action at the Emery Site B will be conducted outside of the WYBC breeding season, thus minimizing direct and indirect effects to migrating, nesting, and dispersing birds.
- WYBCs are known to breed within riparian vegetation along the Gila River, upstream and downstream of the Emery Site, and 26 birds were detected within adjacent parcels during SWFL surveys. The effects of the proposed action are temporary and are not expected to cause any population level impacts. The proposed project is not expected to affect the persistence of WYBCs along the upper Gila River because WYBC are present upstream and downstream on the Gila River, and the 47 acres of treatment within Site B is less than the 100- to 500-acre home range size for WYBC. In the more immediate short-term, the project is intended to provide greater stability from the

arrival of the leaf beetle until the next large flood event. Further, the establishment of riparian vegetation in 50 acres of fallowed agricultural lands in Emery Site A and restoration of protection of 55 acres in Emery Site Area C, situated adjacent to the Gila River, as a buffer to restoration activities in Area B, will further minimize the potential for harm and harassment of WYBC.

- We anticipate short-term effects to proposed PCEs 1 and 2 of up to 47 acres, or approximately 0.23 percent, of the 20,726 acres of riparian habitat along the Gila River in the Gila River proposed Critical Habitat Unit 36 and 0.01 percent of the 546,335 acres of proposed critical habitat rangewide. Thus, while there is a measurable impact, the overall effect, considering the status of the WYBC and amount of acreage in the proposed critical habitat unit, does not approach a level of significance to impact the function of proposed critical habitat or affect its role in recovery of the taxon. Additionally, the effects will be temporary in nature and within five years it is anticipated that a native riparian community will be established within the affected acres.

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including all Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations 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 (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal 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 this Incidental Take Statement.

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

AMOUNT OR EXTENT OF TAKE

Amount or Extent of Take – Southwestern Willow Flycatcher

The FWS anticipates incidental take of SWFL as a result of this proposed action. Although SWFL are migratory and spend only part of the year nesting in the action area, the area is still considered occupied because of their high site fidelity that causes them to return to the same areas to nest (Conservation

Measure Supplement in Appendix B and FWS 2002). Breeding SWFL have been detected at the vegetation management sites and have been utilizing the vegetation planned for renovation.

It is difficult to determine with any accuracy exactly how many flycatcher territories may be affected by the proposed action. Vegetation patch size and shape that SWFLs use for nesting can vary from 0.25 ac to 175 ac (FWS 2002). Mean reported size of breeding patches was 21.2 ac (FWS 2002). Mean patch size of breeding sites supporting 10 or more SWFL territories was 62.2 ac (FWS 2002). Based upon the number of SWFL territories reported in each patch, it required an average 2.7 ac for each territory in a patch (FWS 2002). To clarify, these are generalizations across the subspecies range, and because breeding patches include areas that are not actively defended as territories, these numbers do not equate to average territory size (FWS 2002). Additionally, SWFL habitat modeling identified an 11 acre "neighborhood" of vegetation surrounding territories as important toward creating conditions to attract nesting SWFL (FWS 2002, SRP 2002).

These variations in the size of breeding patches used by SWFL and the number of nesting SWFL within a patch of habitat makes it nearly impossible to accurately predict how many pairs of SWFL will be nesting at these locations, the exact fate of the birds displaced by the proposed action, or the effects to birds occurring in neighboring, unaffected habitat. The dynamic aspect of habitat conditions and annual fluctuations in breeding bird numbers causes additional challenges. As a result, we cannot quantify exactly how many breeding SWFL will be taken at the project location and therefore will use habitat as a surrogate.

The riparian vegetation within the action area is a valid surrogate for incidental take because, as discussed in the effects analysis above, the habitat exists within a river reach known to be occupied by SWFL. Removal of the vegetation is anticipated to adversely affect flycatchers, thus establishing a causal link between the effects of the proposed action, the surrogate measure of take (habitat), and the indeterminable number of SWFL that will be incidentally taken.

The SWFL habitat within the Emery Site is expected to be removed, altered, or disturbed, but vegetation is also expected to persist from buffered conservation measures and be re-established by replanting. The specific location of habitat alteration activities throughout the project and pace of the project is unknown. As a result, it is anticipated the SWFL and their breeding habitat will be affected (reduced territories and productivity, increased predation) by the project until planted habitat is re-established in suitable condition. We expect that, barring a natural disturbance event, like a flood, it will take up to five years for habitat to be re-established in suitable condition.

Therefore, due to the removal and alteration of SWFL nesting habitat and erratic pace of implementing the project, we anticipate that the project will result in harm or harassment of all breeding SWFLs in the 158-acre Emery Site, and within the 47-acre Site B in particular. Within the Emery Site, we have estimated that up to 8 SWFL territories would be affected. Removal, alteration, and fragmentation of SWFL nesting habitat within management sites will harm and harass SWFLs by forcing SWFLs to relocate to areas of unknown status and condition, likely either preventing reproduction or resulting in reduced productivity. Southwestern willow flycatchers attempting to nest within Site B are expected to be harmed by reduced productivity from altered nesting habitat and/or increased levels of predation and

brood parasitism. Displaced SWFL attempting to nest elsewhere in the Emery Site are anticipated to encounter and potentially compete with birds already nesting in those areas.

Incidental take will be considered to have been exceeded if, seven years after clearing of tamarisk, replanted riparian vegetation has not been successfully reestablished within the Emery Site. Successfully reestablished riparian vegetation will be considered averaging 150 stems per acre within the tamarisk removal vegetation portion of Site B and the restoration of fallowed agricultural lands in Site A. Pursuant to 50 CFR 402.16, reinitiation of consultation would be required to the extent USACE retains discretion over the proposed action.

Amount or Extent of Take – Western Yellow-billed Cuckoo

We anticipate that the proposed action will result in incidental take of WYBCs in the form of harm through temporary loss of suitable and occupied habitat from removal of tamarisk. Although WYBC are migratory and spend only part of the year in the action area, the area is still considered occupied because WYBCs are detected throughout the action area and on nearby properties during the breeding season (Johnson and Calvo 2015). Because WYBCs have large home ranges averaging from 50 to greater than 100 acres (Laymon and Halterman 1987, pp. 31–32; Halterman 2009, p. 93; Sechrist et al. 2009, p. 55; McNeil et al. 2010, p. 75; McNeil et al. 2011, p. 37; McNeil et al. 2012, p. 69; McNeil et al. 2013a, pp. 133–134; McNeil et al. 2013b, pp. 49–52) and are known to be present in the action area and are known to be breeding on nearby properties, the Emery Site may be within a home range or multiple home ranges of nesting WYBCs. The 47-acre to-be-cleared portion of the Emery Site is less than the overall home range used by a WYBC pair, but provides insect production, temperature amelioration, and hiding cover.

We recognize that providing a numerical estimate of incidental take is the preferred method of measuring take. However, we must use habitat as a surrogate for the amount or extent of take because the number of WYBCs in a given area cannot be determined with existing information and techniques. Counting WYBCs is difficult because males and females look and sound alike, they have large overlapping home ranges, they are behaviorally secretive, they have short breeding cycles, and they can move to different locations within and between breeding seasons (Halterman *et al*. 2016). These factors can lead to either underestimating or overestimating the number of WYBCs. Protocol surveys (Halterman *et al*. 2016) are designed only to determine presence/absence in a given reach rather than an accurate count of individual birds. Moreover, while the 47 acres in Site B may represent less than one 50- to 100-acre WYBC home range, there is also the potential that the site is within the home ranges of multiple WYBC territories, and displacement of WYBC may affect WYBC within the entire 158-acre Emery Site. Additional surveys and methods, including banding and possibly monitoring telemetered birds, would need to be employed to obtain an accurate count of individual birds and pairs throughout the breeding season. Such efforts are impractical for a discrete project such as the proposed action and would result in additional harm and harassment.

The riparian vegetation within the action area is a valid surrogate for incidental take because, as discussed in the effects analysis above, the habitat exists within a river reach known to be occupied by SWFL. Removal of the vegetation is anticipated to adversely affect flycatchers, thus establishing a causal link between the effects of the proposed action, the surrogate measure of take (habitat), and the indeterminable number of WYBC that will be incidentally taken.

It is reasonable to assume that the abundance of WYBCs is correlated with the extent of suitable riparian habitat. We therefore quantified the adverse effects of the proposed action as the number of acres of

habitat that we anticipate will be degraded due to tamarisk removal. We anticipate that 158 acres of suitable WYBC habitat will be temporarily affected removed by proposed activities at the Emery Site. We also anticipate that the affected vegetation will be re-established by replanting. As a result, it is anticipated the WYBC and its breeding habitat will be affected (reduced territories and productivity, increased predation) by the project until planted habitat is re-established in suitable condition. We expect that, barring a natural disturbance event, like a flood, it will take five years or more for habitat to be re-established in suitable condition.

Therefore, due to the temporary removal and alteration of WYBC nesting habitat we anticipate that the project will result in harm or harassment of WYBCs utilizing up to 158 acres of the Emery Site. Removal of WYBC habitat within Emery Site B will harm and harass WYBC by reducing the quality and amount of suitable habitat, likely resulting in reduced productivity, and/or it will displace birds to adjacent areas. WYBCs attempting to nest within or near affected areas are expected to be harmed by reduced productivity from altered suitable habitat within their home range(s) and/or increased levels of predation. Displaced WYBC attempting to nest elsewhere in the Emery Site are anticipated to encounter and potentially compete with birds already nesting in those areas.

Incidental take will be considered to have been exceeded if, after seven years, replanted riparian vegetation has not been successfully reestablished at 150 stems per acre within Emery Sites A and B.

Pursuant to 50 CFR 402.16, reinitiation of consultation would be required to the extent USACE retains discretion over the proposed action.

EFFECT OF THE TAKE

In this biological opinion, the FWS has determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the USACE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

Southwestern willow flycatcher

The following reasonable and prudent measure and terms and conditions are necessary and appropriate to minimize take of SWFL:

Monitor the effects of the proposed action and report the findings to this office.

1.1 The USACE shall ensure that the permittee monitors the riparian plantings in accordance with the approved permit conditions.

A. The USACE shall ensure the project area and other areas that could be affected by the proposed action are monitored to ascertain take of individuals of the species or loss of its habitat that causes harm or harassment to the species.

B. The USACE shall submit annual monitoring reports to the Arizona Ecological Services Field Office by December 31st beginning in the first full calendar year after USACE issuance of the CWA Section 404 permit for the Lone Star Project and ending after demonstration of desired stem densities. These reports shall briefly document for the previous calendar year the effectiveness of the terms and conditions and locations of listed species observed, and, if any are found dead, suspected cause of mortality. The reports shall also summarize tasks accomplished under the proposed minimization measures and terms and conditions. The reports shall make recommendations for modifying or refining these terms and conditions to enhance listed species protection or reduce needless hardship on the USACE and its permittees.

Western yellow-billed cuckoo

The following reasonable and prudent measure and terms and conditions are necessary and appropriate to minimize take of WYBC:

Monitor the effects of the proposed action and report the findings to this office.

1.1. The USACE shall ensure that the permittee monitors the riparian plantings in accordance with the approved contract for the grant and conducts WYBC surveys.

A. The USACE shall ensure the project area and other areas that could be affected by the proposed action are monitored to ascertain take of individuals of the species or loss of its habitat that causes harm or harassment to the species.

B. In the event a WYBC nest is found, tamarisk removal shall not occur within a minimum of 200 ft of an active nest.

C. The USACE shall submit annual monitoring reports to the Arizona Ecological Services Field Office by December 31st beginning the first full calendar year after USACE issuance of the CWA Section 404 permit for the Lone Star Project and ending after demonstration of desired stem densities.. These reports shall briefly document for the previous calendar year the effectiveness of the terms and conditions and locations of listed species observed, and, if any are found dead, suspected cause of mortality. The reports shall also summarize tasks accomplished under the proposed minimization measures and terms and conditions. The reports shall make recommendations for modifying or refining these terms and conditions to enhance listed species protection or reduce needless hardship on the USACE and its permittees.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened 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.

Southwestern Willow Flycatcher

We recommend FMSI continue to work with other local landowners and GWP along the Gila River and implement strategies described in the Flycatcher Recovery Plan. Specifically, we recommend the development and implementation of management plans that reduce threats and address the physical elements and processes of rivers in order to improve the distribution, abundance, and persistence of riparian habitat. Management plans should focus on removing threats more than engineering elaborate cures, mitigation, or contrived vegetation management. Where feasible and effective, conserve and restore natural processes and elements by removing stressors or, secondarily, modifying the stressors for natural recovery. Reestablish physical integrity of rivers, then proceed to biological integrity of SWFL habitat. Physical integrity for rivers implies vegetation management and maintenance of their primary functions of water and sediment dynamics. The vegetation communities needed for SWFL habitat require specific hydrologic and geomorphic conditions, primarily floods, elevated groundwater levels, sediments, and persistent water.

Yellow-billed cuckoo

We recommend FMSI continue to work with other local landowners and GWP to conserve and restore natural processes and elements in the Gila River Watershed by removing stressors or, secondarily, modify the stressors by naturalizing flow regimes, modifying grazing regimes, and/or removing barriers between channels and floodplains, to allow for natural recovery. Specifically, we recommend the development and implementation of management plans that reduce threats and address the physical elements and processes of rivers in order to improve the distribution and abundance of riparian habitat. Management plans should focus on removing threats rather than engineering elaborate cures, mitigation, or contrived vegetation management. The hydrologic and geomorphic river function should be reestablished first to allow for development and persistence of WYBC habitat. The vegetation communities needed for WYBC habitat in this area require specific hydrologic and geomorphic conditions: primarily floods, elevated groundwater levels, sediments, and persistent water.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations. Follow-up monitoring and reporting will be crucial in assessing a) the success and cost/effectiveness of this project in producing habitat superior to that which currently exists and b) whether or not these methods should be considered for future vegetation management projects.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 4901 Paseo del Norte NE, Suite D, Albuquerque, NM 87113; 505-248-7889) 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.

Certain project activities may also affect species that are protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. sec. 703-712) and/or bald and golden eagles protected under the Bald and Golden Eagle Protection Act (BGEPA). The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the FWS. BGEPA prohibits anyone, without a permit issued by the FWS, from taking (including disturbing) eagles, and including their parts, nests, or eggs. If you believe migratory birds will be affected by the project, we recommend you contact our Migratory Bird Permit Office, P.O. Box709, Albuquerque, NM 87103, (505) 248-7882, or permitsR2mb@fws.gov. For more information regarding the MBTA, please visit the following websites: http://www.fws.gov/migratorybirds and http://www.fws.gov/migratorybirds/mbpermits.html.

For information on protections for bald eagles under the BGEPA, please refer to the FWS's National Bald Eagle Management Guidelines (72 FR 31156) and regulatory definition of the term "disturb" (72 FR 31132) that were published in the Federal Register on June 5, 2007. Existing take authorizations for bald eagles issued under the Act became covered under the BGEPA via a final rule published in the Federal Register on May 20, 2008 (73 FR 29075). Our office is also available to provide technical assistance to help you with compliance.

REINITIATION NOTICE

This concludes both the formal and conference opinion for the Lone Star Ore Body Development Project as outlined by the USACE. You may ask the FWS to confirm the conference opinion (yellow-billed cuckoo proposed critical habitat) as a biological opinion issued through formal consultation if the proposed species is listed or critical habitat is designated. The request must be in writing. If the FWS reviews the proposed action and finds there have been no significant changes in the action as planned or in the information used during the conference, the FWS will confirm the conference opinion as the biological opinion for the project and no further section 7 consultation will be necessary.

As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

In keeping with our trust responsibilities to American Indian Tribes, we encourage you to coordinate with the Bureau of Indian Affairs in the implementation of this consultation and, by copy of this biological opinion, are notifying affected Tribes of its completion (Ak Chin Indian Community, White Mountain Apache Tribe, Fort McDowell Yavapai Nation, Fort McDowell, Salt River Pima-Maricopa Indian Community, San Carlos Apache Tribe, Gila River Indian Community, Tohono O'odham Nation, and

Pascua Yaqui Tribe). We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department.

The FWS appreciates the U.S. Army Corps of Engineers efforts to identify and minimize effects to listed species from this project. For further information please contact Jason Douglas (520) 670-6150 (x231) or Scott Richardson at (x224). Please refer to the consultation number, 02EAAZ00-2017-F-0482, in future correspondence concerning this project.

Sincerely,

Steven L. Spangle
Field Supervisor

Enclosures (2)
Appendix A
Appendix B

cc: (hard copies)
Field Supervisor, Fish and Wildlife Service, Phoenix, Arizona (2 copies)
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ

cc: (electronic copies)
Michael Langley, Senior Regulatory Project Manager, U.S. Army Corps of Engineers, Phoenix, AZ
Greg Beatty, Fish and Wildlife Biologist, Fish and Wildlife Service, Phoenix, AZ
Susan Sferra, Fish and Wildlife Biologist, Fish and Wildlife Service, Tucson, AZ
Chairman, Ak Chin Indian Community, Maricopa, AZ
Chairman, White Mountain Apache Tribe, Whiteriver, AZ
Chairman, Fort McDowell Yavapai Nation, Fort McDowell, AZ
Chairman, Salt River Pima-Maricopa Indian Community, Scottsdale, AZ
Chairman, San Carlos Apache Tribe, San Carlos, AZ
Chairman, Gila River Indian Community, Sacaton, AZ
Chairman, Tohono O'odham Nation, Sells, AZ
Chairman, Pascua Yaqui Tribe, Tucson, AZ
Environmental Specialist, Environmental Services, Western Regional Office, Bureau of Indian Affairs, Phoenix, AZ
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ (pep@azgfd.gov)
Raul Vega, Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ

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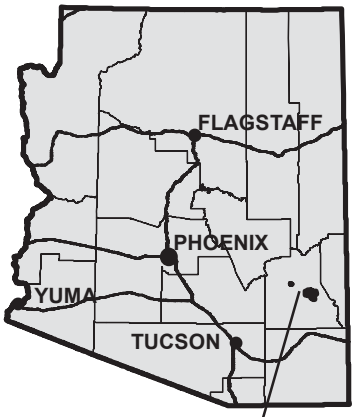
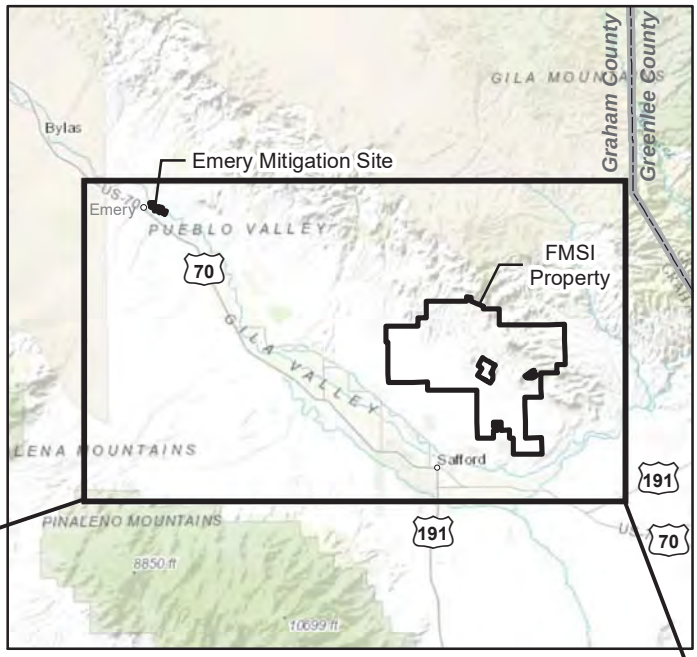
ARIZONA

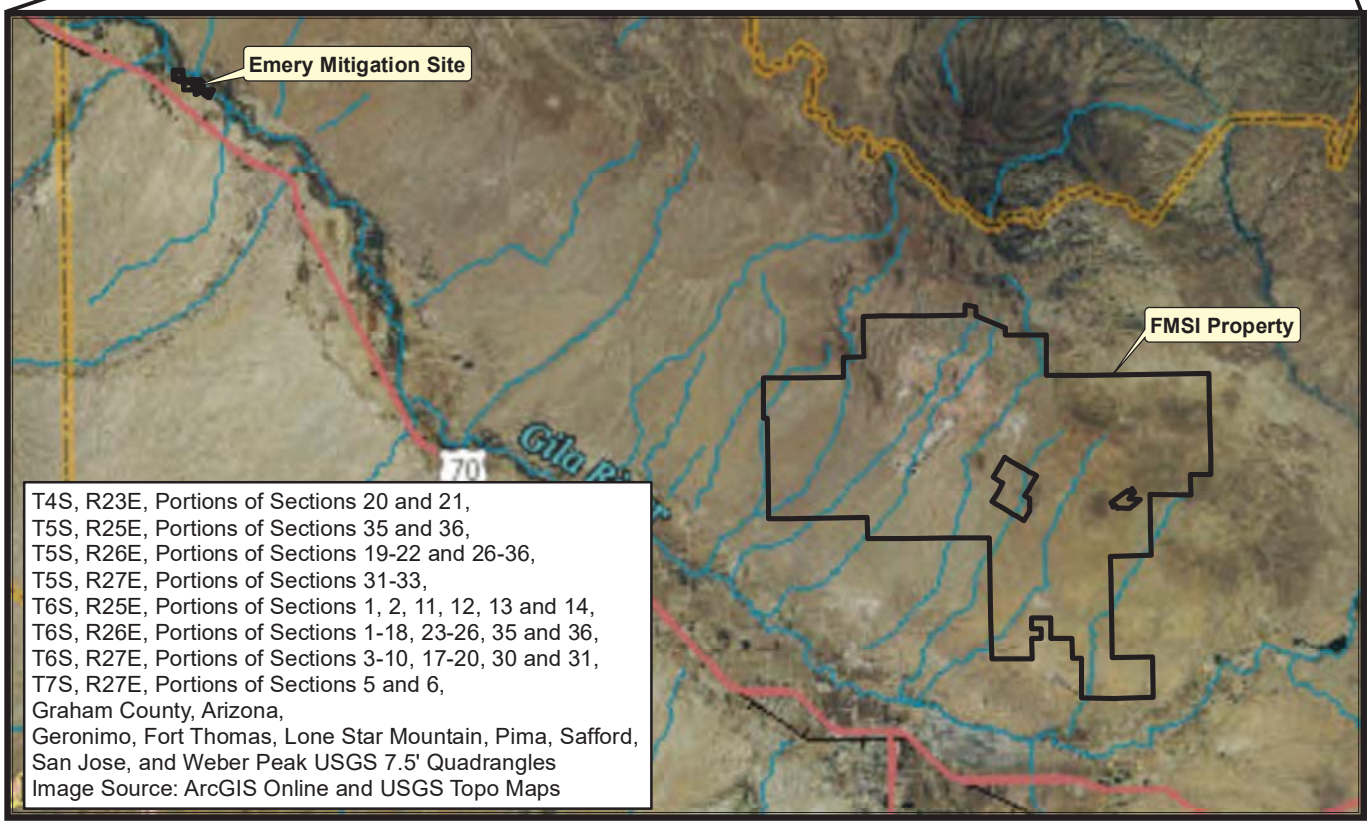


PROJECT LOCATION

GRAHAM COUNTY



Approximate Scale 1 Inch = 12 Miles



LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

Vicinity Map

Figure 1

WestLand Resources

N

0 2.5 5 Miles

0 5 10 Kilometers

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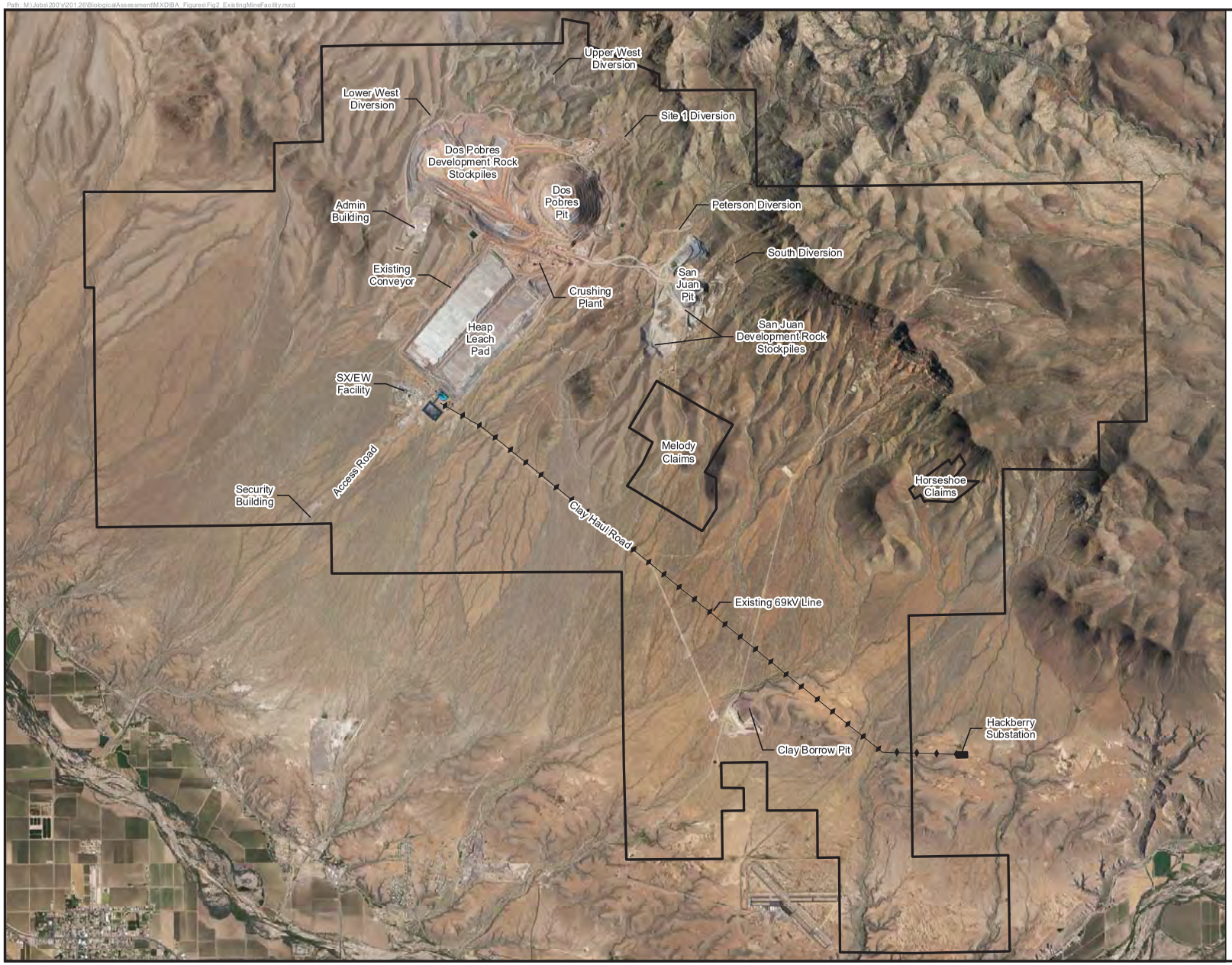

Legend

FMSI Property

N

0 2,600 5,200 Feet

0 1,300 2,600 Meters

T5S, R25E, Portions of Sections 35 and 36,
T5S, R26E, Portions of Sections 19-22 and 26-36,
T5S, R27E, Portions of Sections 31-33,
T6S, R25E, Portions of Sections 1, 2, 11, 12, 13 and 14,
T6S, R26E, Portions of Sections 1-18, 23-26, 35 and 36,
T6S, R27E, Portions of Sections 3-10, 17-20, 30 and 31,
T7S, R27E, Portions of Sections 5 and 6,
Graham County, Arizona,
Image Source: NAIP 2015

WestLand Resources

LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

EXISTING MINE FACILITY

Figure 2

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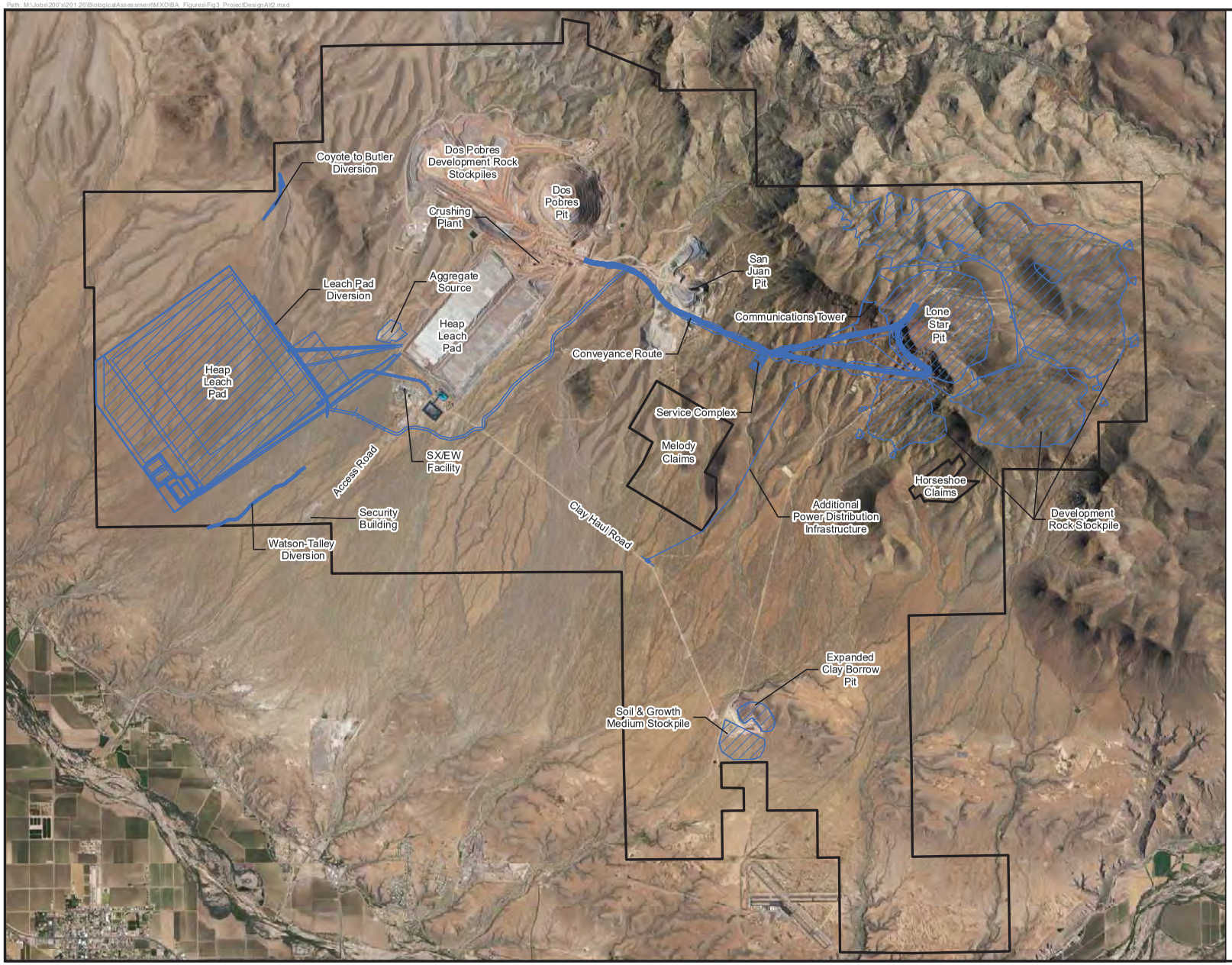
Date: 8/18/2016 User: towens



Legend

Proposed Project Features (FMSI)

Safford Mine Property

N

0 2,600 5,200 Feet

0 1,300 2,600 Meters

T05S, R25E, Portion of Sections 35 & 36,
T05S, R26E, Portion of Sections 19-22, 26-36,
T05S, R27E, Portion of Sections 31-33,
T06S, R25E, Portion of Sections 1, 2, 11, 12, 13 & 14,
T06S, R26E, Portion of Sections 1-18, 23-26, 35 & 36,
T06S, R27E, Portion of Sections 3-10, 17-20, 30 & 31,
T07S, R27E, Portion of Sections 5 & 6,
Graham County, Arizona,
Lone Star Mountain, Pima, Safford, San Jose,
& Weber Peak USGS 7.5' Quadrangles
Image Source: NAIP 2015

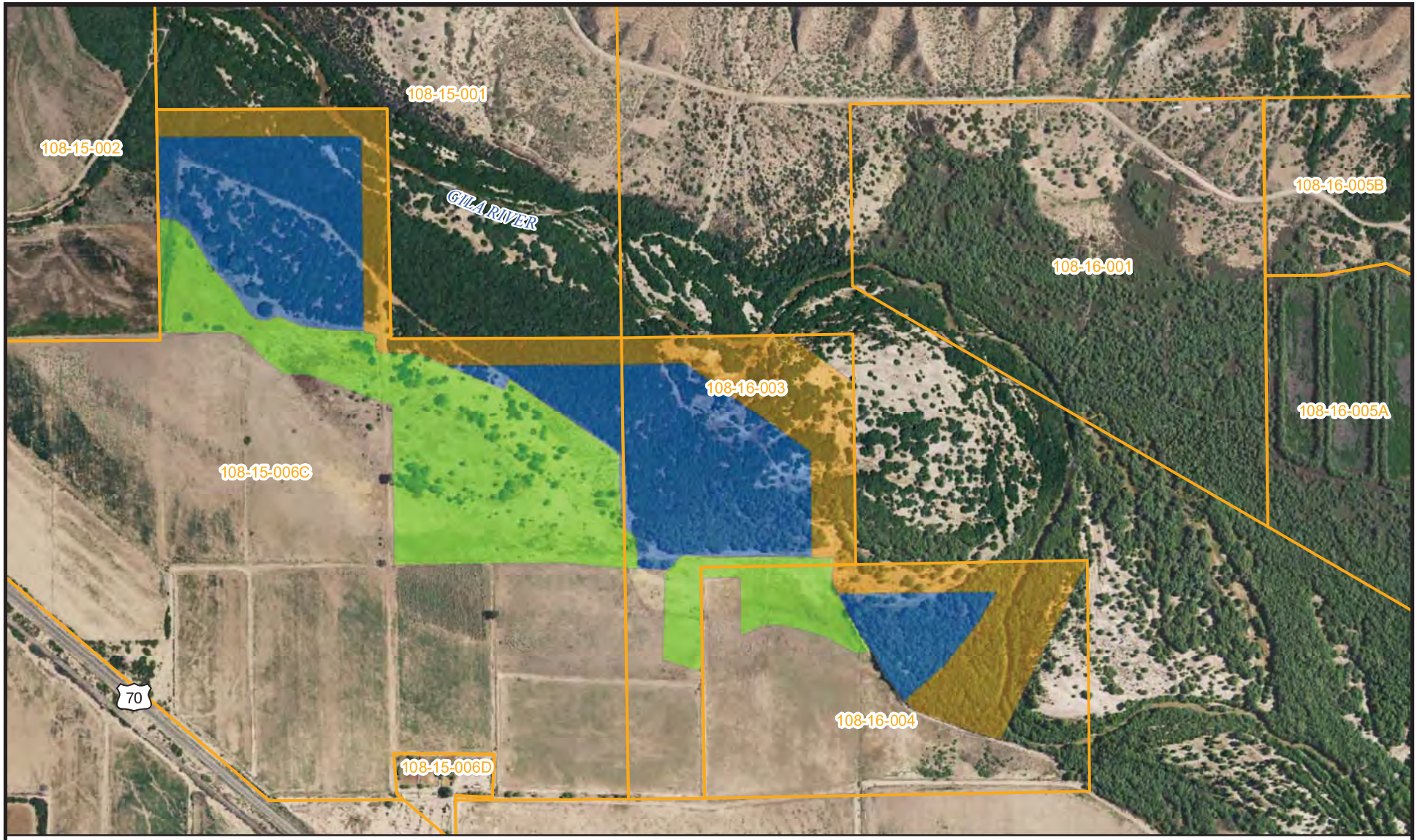
WestLand Resources

LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

DRAFT EIS ALTERNATIVE 2

Figure 3



T4S, R23E, Portions of Sections 20 and 21,
Graham County, Arizona,
Geronimo and Fort Thomas USGS 7.5' Quadrangles
Image Source: NAIP 2015

WestLand Resources

0 400 800 Feet
0 200 400 Meters

N

Legend

- Parcel (Graham County, 2014)

Emery Mitigation Site:

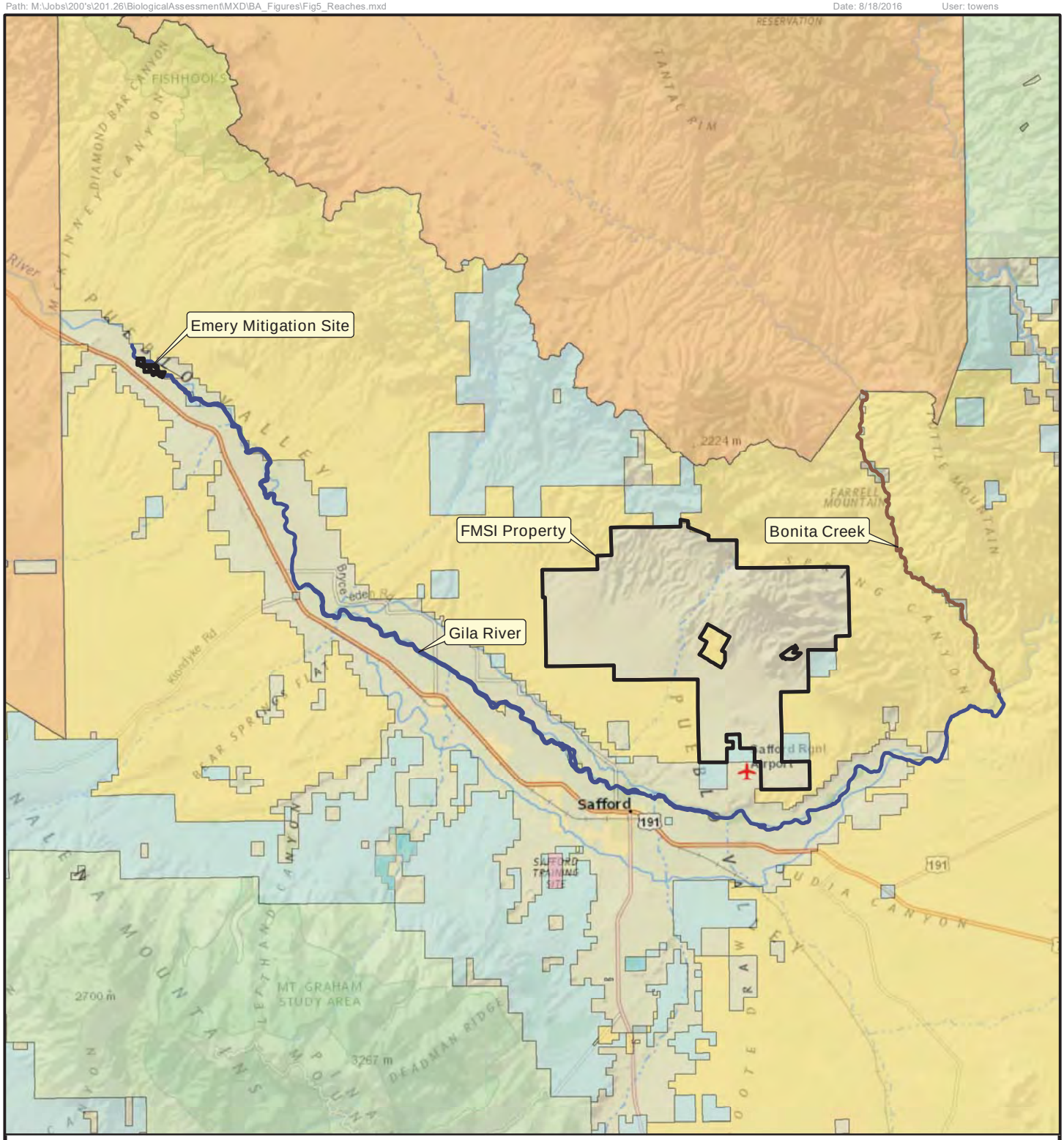
- Area A: Field to Riparian Restoration
- Area B: Tamarisk Control and Riparian Enhancement
- Area C: Buffer Preservation

LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

EMERY MITIGATION SITE

Figure 4



Legend

Image Source: ArcGIS Online, National Geographic Map

Surface Management (BLM 2014):

- Bureau of Land Management (BLM)
- Indian Lands
- Local or State Parks
- Military
- Private Land (No Color)
- State Trust Land
- State Wildlife Area
- US Forest Service (USFS)

WestLand Resources

0 2.5 5 Miles

0 5 10 Kilometers

N

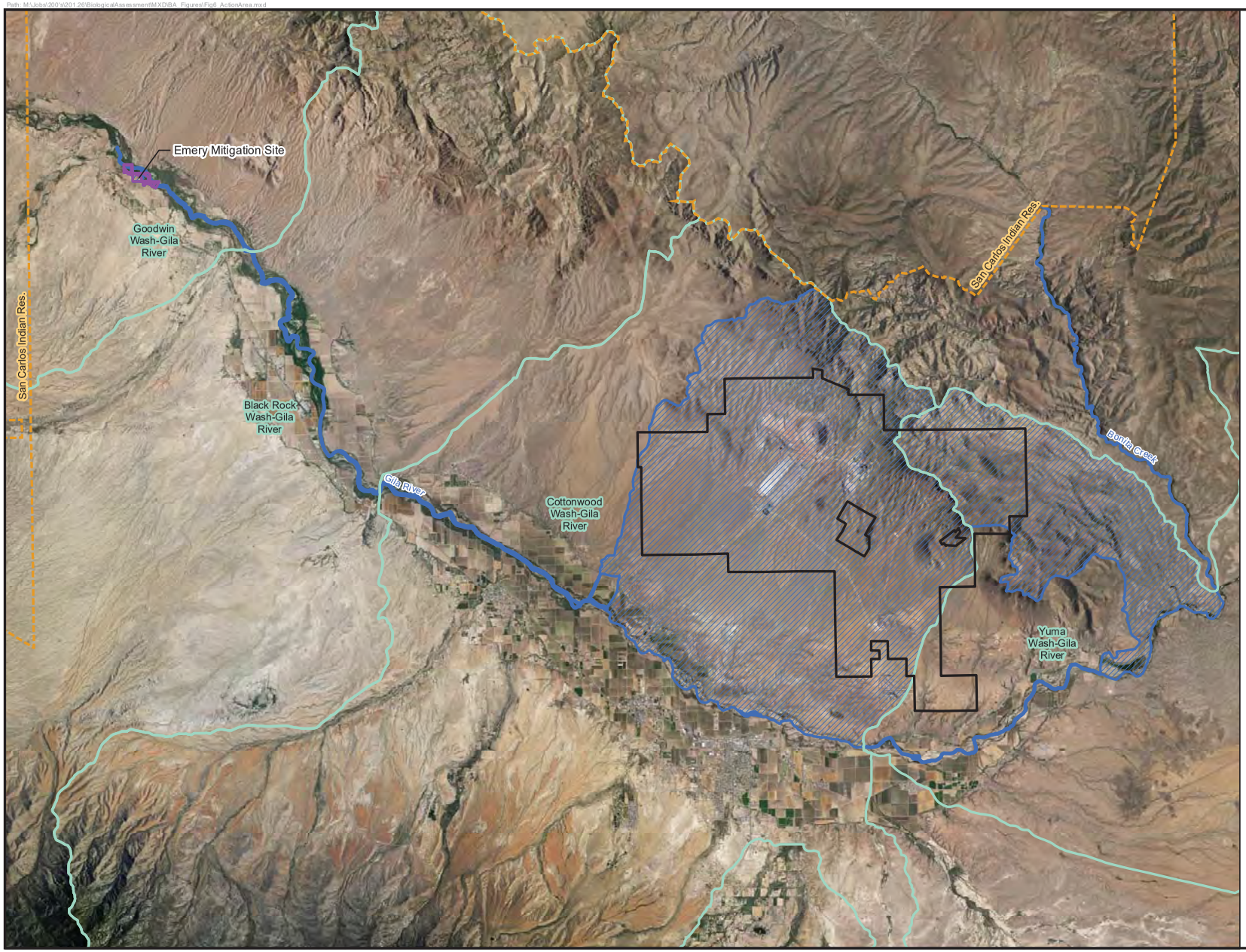
LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

GILA RIVER AND BONITA CREEK REACHES

Figure 5

Path: M:\Jobs\200's\201.26\BiologicalAssessment\MXD\BA_Figures\Fig6_ActionArea.mxd Date: 8/18/2016 User: towens



Legend

- Action Area
- Emery Mitigation Site
- FMSI Property
- HUC 10 Watershed (NHD, Acquired 2016)
- San Carlos Indian Reservation Boundary (BLM 2014)

Image Source: NAIP 2015

N

0 1.5 3 Miles

0 3 6 Kilometers

WestLand Resources

LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

ACTION AREA

Figure 6

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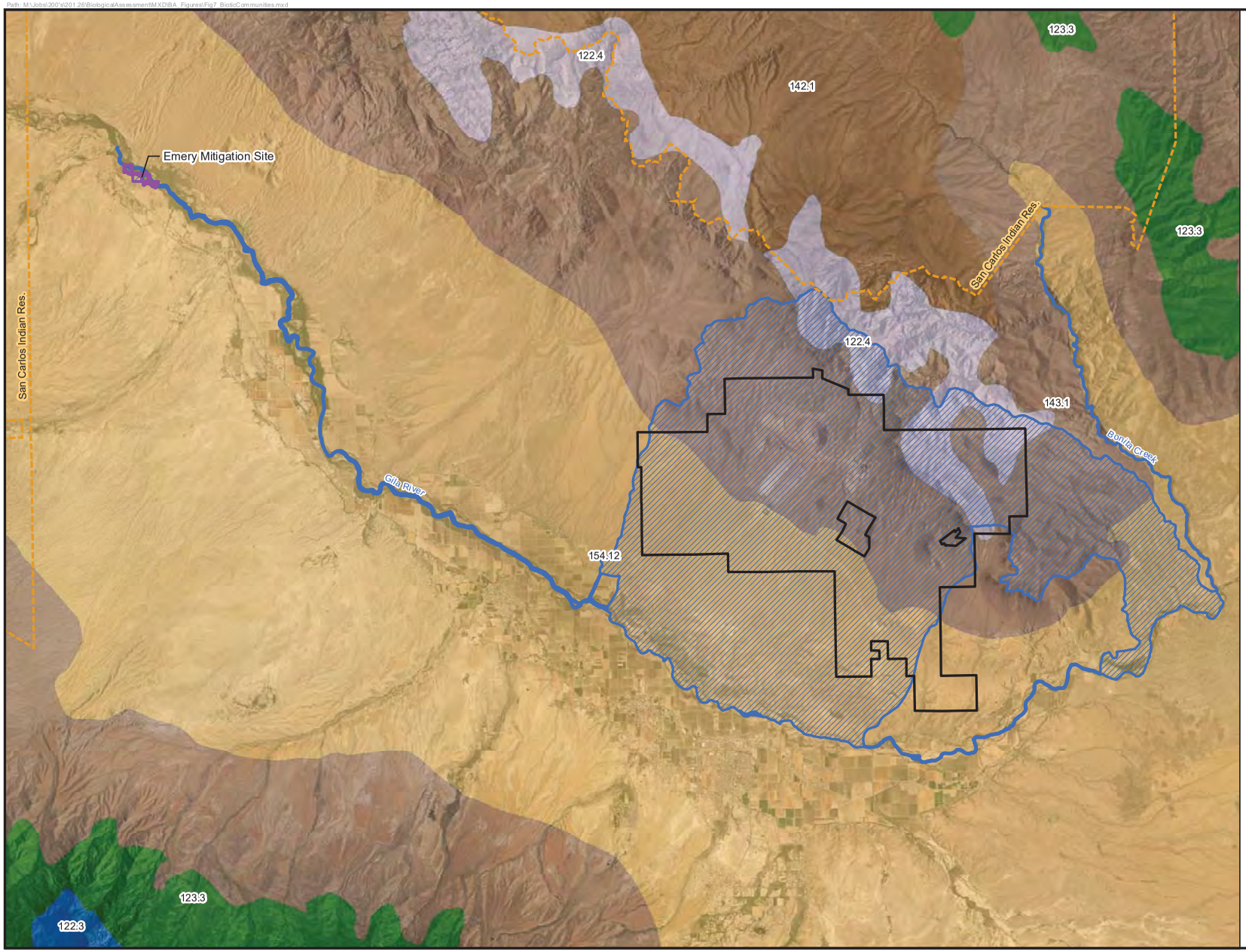


Legend

- Emery Mitigation Site
- FMSI Property
- Listed Species Analysis
- San Carlos Indian Reservation Boundary (BLM 2014)

Brown and Lowe's Biotic Communities of the Southwest (1980), developed by The Nature Conservancey in Arizona (2004) :

- 122.3 Petran Montane Conifer Forest
- 122.4 Great Basin Conifer Woodland
- 123.3 Madrean Evergreen Woodland
- 142.1 Plains and Great Basin Grassland
- 143.1 Semidesert Grassland
- 154.12 Arizona Upland Subdivision - Sonoran Desertscrub

Image Source: NAIP 2015

N

0 1.5 3 Miles

0 3 6 Kilometers

WestLand Resources

LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

BIOTIC COMMUNITIES

Figure 7

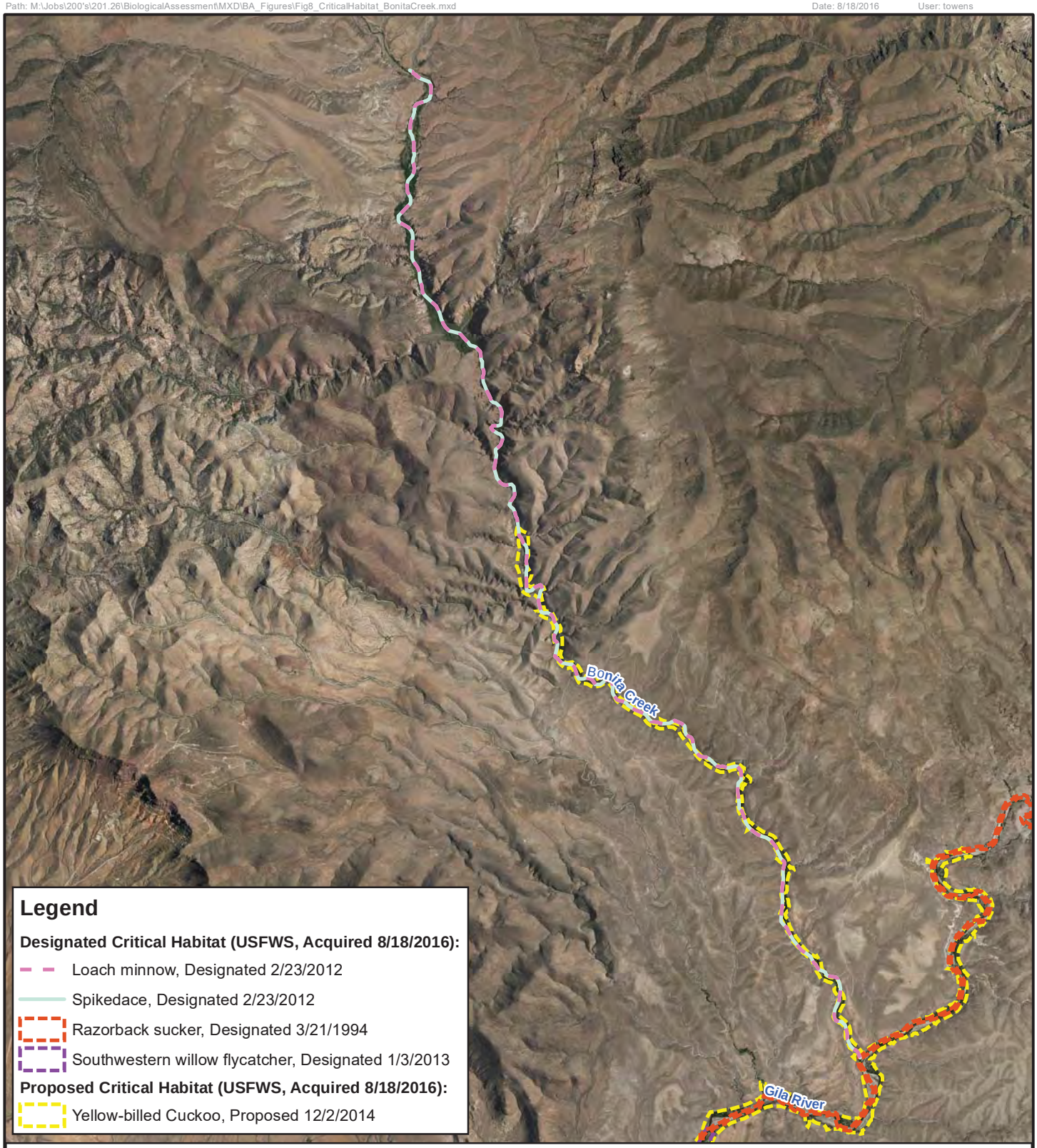


Image Source: NAIP 2015

Note: USFWS Critical Habitat layer is based on the Federal Register description and does not necessarily match the current aerial imagery.

WestLand Resources

0 4,000 8,000 Feet

0 2,000 4,000 Meters

N

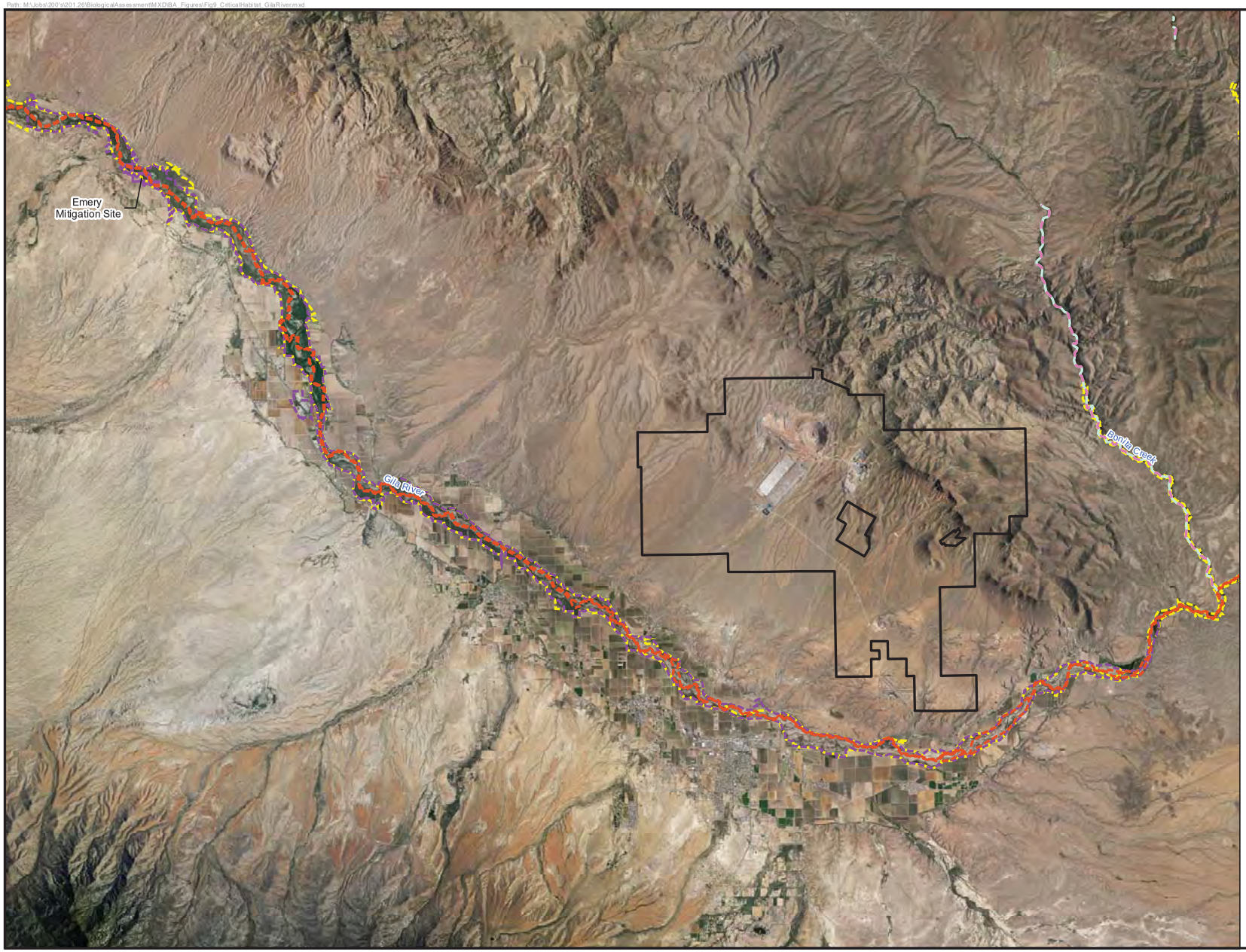
LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

CRITICAL HABITAT ALONG BONITA CREEK WITHIN THE ACTION AREA

Figure 8

Path: M:\Jobs\200's\201.26\BiologicalAssessment\MXD\BA_Figures\Fig9_CriticalHabitat_GilaRiver.mxd Date: 8/18/2016 User: towens



Legend

- Emery Mitigation Site
- FMSI Property

Designated Critical Habitat (USFWS, Acquired 8/18/2016):

- Loach minnow, Designated 2/23/2012
- Spikedace, Designated 2/23/2012
- Razorback sucker, Designated 3/21/1994
- Southwestern willow flycatcher, Designated 1/3/2013

Proposed Critical Habitat (USFWS, Acquired 8/18/2016):

- Yellow-billed Cuckoo, Proposed 12/2/2014

Image Source: NAIP 2015

Note: USFWS Critical Habitat layer is based on the Federal Register description and does not necessarily match the current aerial imagery.

N

0 1.5 3 Miles

0 3 6 Kilometers

WestLand Resources

LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

CRITICAL HABITAT ALONG THE GILA RIVER WITHIN THE ACTION AREA

Figure 9

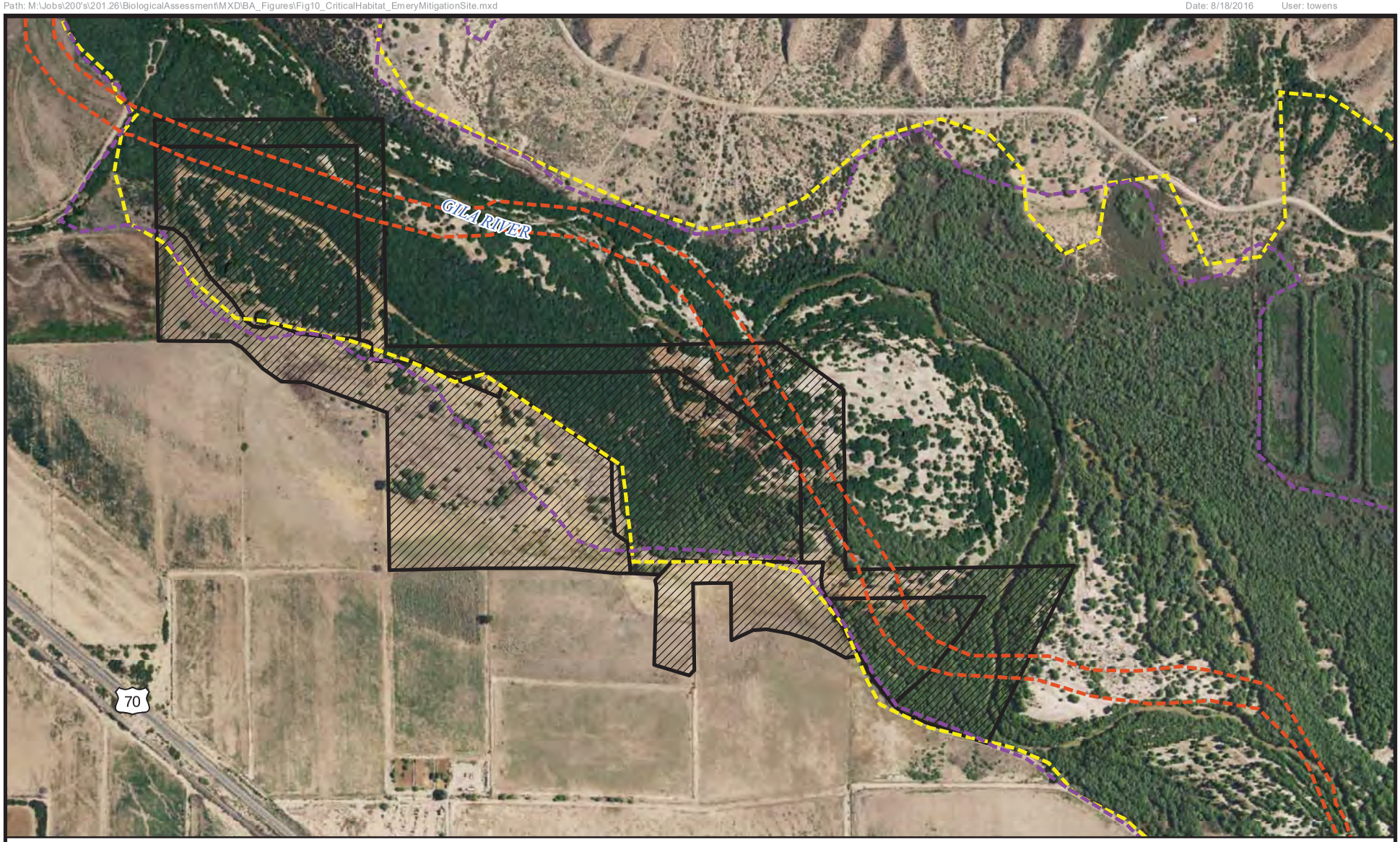


Image Source: NAIP 2015

Note: USFWS Critical Habitat layer is based on the Federal Register description and does not necessarily match the current aerial imagery

WestLand Resources

0 400 800 Feet

0 200 400 Meters

N

Legend

Emery Mitigation Site

Designated Critical Habitat (USFWS, Acquired 8/18/2016):

Razorback sucker, Designated 3/21/1994

Southwestern willow flycatcher, Designated 1/3/2013

Proposed Critical Habitat (USFWS, Acquired 8/18/2016):

Yellow-billed Cuckoo, Proposed 12/2/2014

LONE STAR ORE BODY DEVELOPMENT PROJECT

Biological Assessment

CRITICAL HABITAT ALONG THE GILA RIVER AT THE EMERY MITIGATION SITE

Figure 10

SUPPLEMENTAL CONSERVATION MEASURES AND ESTIMATION OF IMPACTS TO SOUTHWESTERN WILLOW FLYCATCHER: LONE STAR ORE BODY DEVELOPMENT PROJECT

Prepared by: WestLand Resources, Inc.

Date: June 16, 2017

Project No.: 201.26

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Figure 2. Gila River 50 Meter Buffer within Emery Site

1. INTRODUCTION

This document describes additional applicant proposed conservation measures for the Lone Star Ore Body Development Project (the Project) to be incorporated as part of the Proposed Action and provides the approach taken to estimate the number of southwestern willow flycatcher (SWFL; *Empidonax traillii extimus*) that may be temporarily impacted by mitigation actions implemented by Freeport-McMoRan Safford Inc. (FMSI) along the Gila River as part of the Project. As described in the Biological Assessment for the Project, FMSI has proposed conservation actions at the Emery Site along the Gila River downstream of Safford. This site is the only location where SWFL habitat may be directly impacted by the Project. The mitigation activities entail removal of tamarisk and replanting of native species to, in part, support the persistence of SWFL habitat along the Gila River.

2. SUPPLEMENTAL CONSERVATION MEASURES

FMSI proposes that the following conservation measures related to the Emery Mitigation site be incorporated into the Proposed Action. These measures will help benefit the establishment of native vegetation and minimize the risk to listed species and their habitat.

1. Fence construction, tamarisk removal, and earthwork with heavy equipment will only occur between October 1 and April 14, with the following exceptions that may be conducted at any time of the year: monitoring activities; monitoring equipment installation using hand tools; pre-vegetation management surveys; tamarisk re-sprout treatment and revegetation in areas burned by wildfire; vegetation management site visits and access on foot; and planting of container stock and cuttings to coincide with bi-modal rains.
2. Native vegetation will be avoided to the extent practical.
3. Mulched tamarisk material (i.e., wood chips) will be left on-site to help retain soil moisture and to further hinder recruitment of nonnative weeds.
4. Stockpiling of construction materials such as portable equipment, vehicles, and supplies, including chemicals, will be restricted to designated staging areas.
5. All refueling and maintenance of vehicles and other construction equipment will be restricted to designated work areas and will be at least 100 ft from any down-gradient aquatic habitat unless otherwise isolated from habitat. Proper spill prevention and cleanup equipment will be maintained in all refueling areas.
6. Application of herbicide will be closely supervised and the project will obtain and comply with the conditions of a Pesticide General Permit from ADEQ.
7. Per the USFWS (2007) Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service, herbicides and pesticides will not be mixed or stored near aquatic habitats. Excess pesticide and herbicide and empty pesticide and herbicide containers will not be allowed to remain near waterbodies and will be discarded at authorized landfills or other appropriate sites. Application equipment will be well-maintained and checked periodically for leaks, worn parts, and calibration.

8. Per the USFWS (2007) Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service, herbicides will not be applied when weather forecasts indicate rainfall is likely to occur within 48 hours after treatment, and spray applications will not occur when wind speeds exceed 10 miles per hour.
9. When working within 20 feet of the Gila River and other aquatic habitats, triclopyr herbicide will only be applied to cut tamarisk stumps, tamarisk re-sprouts by hand "painting." Backpack sprayers will not be used be used within 20 feet of the Gila River.

3. SWFL IMPACT ANALYSIS

The activities that are anticipated to result in impacts to habitat for SWFL and yellow-billed cuckoo (YBC; *Coccyzus americanus*) are associated with the implementation of conservation actions at the proposed Emery Site (**Figure 1**). These activities include restoration of a former agricultural field as mesquite dominated mesoriparian habitat within the active floodplain of the Gila River, removal of tamarisk and restoration of mesoriparian and hydroriparian habitats to habitats dominated by mesquite, cottonwood and other native riparian habitats, and the creation of buffer areas to protect the mitigation areas from fire. Detailed descriptions of the mitigation areas and activities are provided in **Table 1**. The replacement of tamarisk with native cottonwood, willow, and mesquite will create habitat suitable for native wildlife, including the endangered SWFL and threatened western YBC, and maintain these functions during the anticipated die-off of non-native tamarisk when the tamarisk leaf beetle (*Diorhabda* sp.) arrives along this reach of the Gila River.

Table 1. Description of Mitigation Areas within the Emery Site

Mitigation Area and Proposed Treatment	Acreage	Description
Emery Site – Area A: Field to Riparian Restoration	50.00	Area A of the Emery Site includes approximately 50 acres, adjacent to both the Gila River and Area B. Most of Area A is composed of levelled areas that may have been farmed at some time in the past, although the northwestern portion of the area is currently vegetated by patches of tamarisk and a few cottonwoods. Understory vegetation that includes forbs and shrubs is patchy throughout Area A. Mitigation activities at Area A include the grading and re-contouring of the area to remove numerous manmade alterations, including berms, channels, and other erosion control features, which currently separate Area A from the active floodplain and channel of the Gila River. Other mitigation activities include control of weedy plant species, planting and seeding of native mesquite trees, seeding for other native plant species, and minimal grading within the area to restore natural contours. These activities will restore the functional values of the site as a riparian area and as available active floodplain and possible overbank channel for the Gila River.

Table 1. Description of Mitigation Areas within the Emery Site

Mitigation Area and Proposed Treatment	Acreage	Description
Emery Site – Area B: Tamarisk Control and Riparian Enhancement	47.00	Area B of the Emery Site encompasses approximately 47 acres of riparian corridor adjacent to Area A and a perennial reach of the Gila River. The riparian vegetation of Area B is almost exclusively exotic tamarisk. There is a concern that, if the expected colonization of the tamarisk leaf beetle occurs along this reach of the Gila River, the tamarisk within this site will be killed or substantially reduced over a very short period of time, resulting in the loss of the non-native riparian habitat that currently supports yellow-billed cuckoo and Southwestern willow flycatcher. Mitigation activities at Area B consist of the removal of tamarisk and the planting and seeding of native species including cottonwood, willow, and mesquite. The replacement of tamarisk with native cottonwood, willow, and mesquite will create habitat suitable for native wildlife, including the endangered Southwestern willow flycatcher and threatened yellow-billed cuckoo, and maintain these functions during the anticipated die-off of non-native tamarisk when the tamarisk leaf beetle arrives along this reach of the Gila River.
Emery Site – Area C: Buffer Preservation	55.00	Area C of the Emery Site consists of approximately 55 acres of lands. These lands surround Area B of the Emery Site and provide further protection for the enhancement activities undertaken in Area B. Although Area C may provide future mitigation opportunities adjacent to those enhancement activities undertaken in Area B, no further mitigation strategies are proposed for Area C at this time.

As proposed, mitigation activities will take place outside of the breeding season for SWFL and YBC. Because of the large territory size for YBC (USFWS 2015, 2016), we anticipate that these activities will affect one YBC territory. Below we demonstrate the estimation of the number of SWFL territories that may be affected by these activities using available survey data.

Prior restoration projects along the Gila River that could affect SWFL and their habitat have relied upon survey data within the area that restoration activities will take place (USFWS 2015, 2016; Johnson 2016). These areas were located along the main Gila River channel adjacent to surface water. The majority of restoration activities at the Emery Site, however, will take place away from the main channel of the Gila River (see **Figure 1**). Because SWFL are expected to establish territories preferentially along the river channel (Johnson2017), the analyses of anticipated take from USFWS (2015, 2016) are not directly transferrable to the expected effects to SWFL for the Project without further analysis. We describe this analysis below.

The data readily available on recent flycatcher territories along the Gila River in the general vicinity of the Emery Site is largely limited to surveys conducted by U.S. Geological Survey (USGS) between 2014 and 2016 (Stillwater Sciences 2014, Johnson 2016). These data provide information on not only

where willow flycatchers were detected and not detected, but also nest locations along several reaches of the Gila River downstream of Safford, AZ. As such, these data provide valuable insight into where SWFL territories are expected to be established in relation to the river channel.

When analyzed broadly, a clear pattern emerges from these data; SWFL detections and territories are largely limited to areas within approximately 50 m (164 ft) of the main channel of the Gila River or secondary channels that contain surface water (Stillwater Sciences 2014, Johnson 2016). Similarly, nest locations identified by Johnson (2016) were mostly adjacent to the main Gila River channel. When surveyors did survey riparian vegetation away from the channel they did not detect SWFL territories (see Appendix 1 of Johnson 2016). In fact, researchers explicitly do not survey areas away from the main channel because SWFL territories are not expected to be establish away from the main channel (Johnson 2017). Moreover, surveys along the Gila River and other riparian areas away from the main channel have not resulted in SWFL territories (Johnson 2017).

Based on these data, we expect few SWFL territories to be established away from the main channel from the Gila River. As such a calculation of territories to be affected that is based on the number of territories per acre of riparian habitat, as was completed by USFWS (2015, 2016) for areas to be affected adjacent to the main channel of the Gila River, is not appropriate for this analysis.

Because the vast majority of SWFL territories observed along the Gila River in the vicinity of the Emery Site have been within 50 m (164 ft) of the main channel of the Gila River, we calculated the number of expected territories to be affected by mitigation activities to be limited to those areas associated with tamarisk control (**Figure 1**) that are close to the Gila River.

The steps of the analysis undertaken to estimate the number of SWFL territories affected by the Project are provided below (**Table 2** provides the data used for these calculations):

Table 2. Data and calculations used for estimation of SWFL territories expected to be adversely impacted by mitigation activities at the Emery Site

Site Number from USGS (2016)	Length of Gila River channel within Site (m) calculated from Table 1 of USGS (2016)	Territories Observed in 2016 from Table 1 of USGS (2016)	Territories (km)
R4	1.58	44	27.85
R8	0.67	4	5.97
R9	1.8	6	3.33
R14	0.96	10	10.42
R18	1.92	7	3.65
Average Territories/km Using all Sites			10.24
Length of 50 m Buffer along Gila River within Emery Site			0.77
Estimated Territories within Emery Site Using Average Territories			7.89
Estimated Territories within Emery Site Using R8 (survey data immediately adjacent to Emery Site)			4.60

Note that the length of R9 was digitized by WestLand from Appendix 1 of USFS (2016).

1. Using data provided by Johnson (2016) for surveys conducted along the Gila River in 2016, we calculated the average number of SWFL territories per kilometer of the main channel of the Gila River (using data provided for sites R4, R8, R9, R14, and R18 by Johnson [2016]).
2. To estimate the number of territories that might be affected by mitigation activities at the Emery Site, we buffered the main channel of the Gila River by 50 m (164 ft).
3. We then calculated the length of this buffer that falls with the Emery Site (**Figure 2**).
4. We used the average number of SWFL territories per kilometer calculated above for all sites where data were provided by Johnson (2016) and for R8 only, the site immediately adjacent to the Emery Site, to estimate the expected SWFL territories that would be established along the main Gila River channel adjacent to the Emery Site. Because tamarisk control will occur within or adjacent to these potential territories, effects to habitat within these territories are expected.

Based on the calculation described above, an estimated 4-8 SWFL territories will be temporarily affected by mitigation activities. Note that the use of the length of the 50 m (164 ft) buffer instead of the main channel of the Gila River to calculate the estimated number of territories affected results in a conservative estimate of the number of territories. This analysis also assumes that all SWFL territories along the reach of the Gila River adjacent to the Emery Site are located immediately adjacent to areas that will be affected by vegetation clearing rather than distributed evenly within a 50 m (164 ft) area on river left and river right of the main channel of the Gila River. As such, this estimate of the number of territories expected to be affected by mitigation activities is conservative and likely overestimated that number of territories that are expected to be affected.

4. REFERENCES

Johnson, M. 2016. Gila River, AZ Southwestern Willow Flycatcher and Yellow-billed Cuckoo Surveys and Nest Monitoring for Proposed Restoration Sites, 2016. Northern Arizona University. 55 pp.

_____. 2017. Southwestern Willow Flycatcher and Yellow-billed Cuckoo Surveys. Presentation and Question & Answer Period, Gila Watershed Partnership Month Meeting. June 14, 2017.

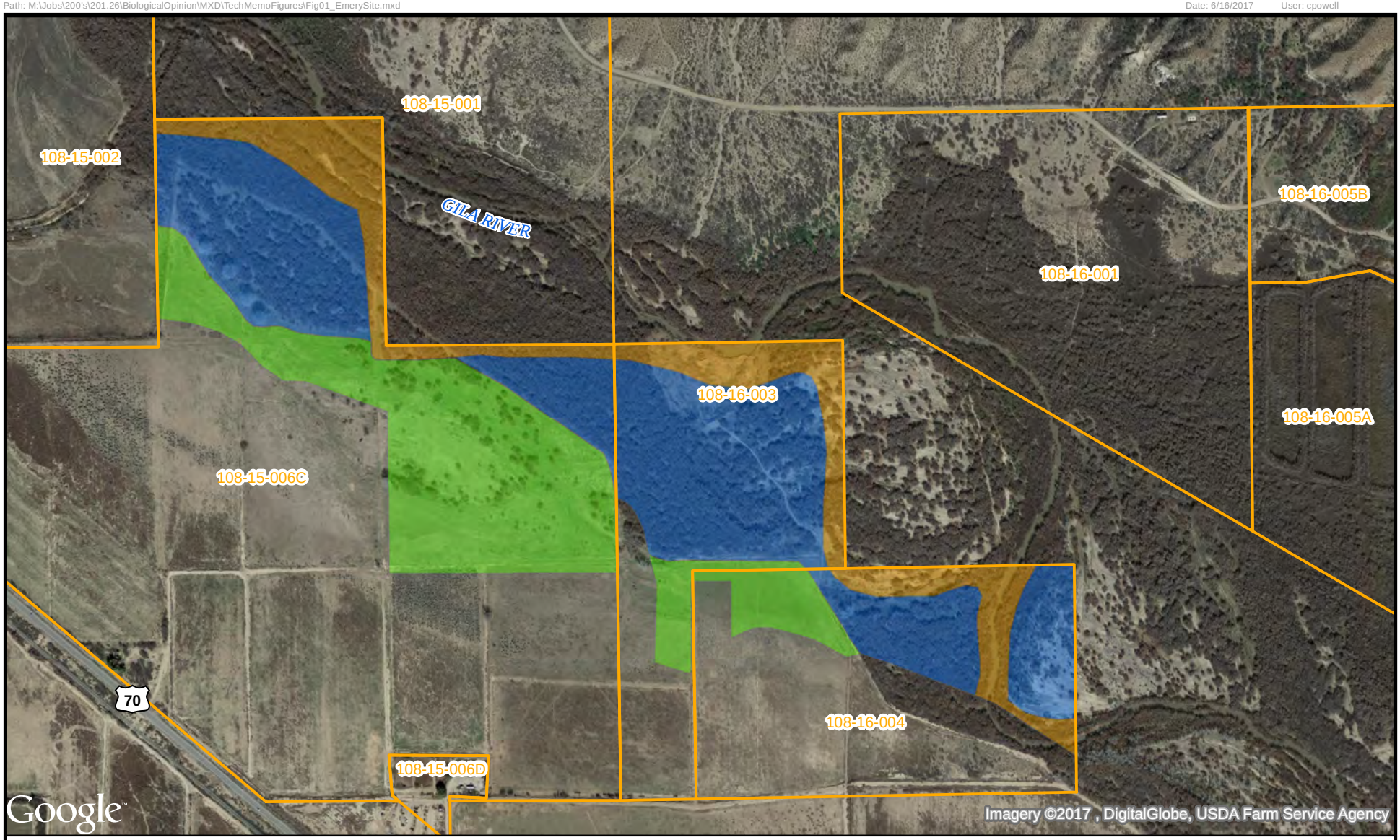
Stillwater Sciences. 2014. Biological Assessment for the Upper Gila River Restoration Project. 59 pp.

U.S. Fish and Wildlife Services (USFWS). 2007. Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service. April.

_____. 2015. Biological Opinion, Upper Gila River Vegetation Management Project. 73 pp.

_____. 2016. Biological Opinion, Reinitiation of Consultation for the Upper Gila River Vegetation Management Project. September. 78 pp.

FIGURES



T4S, R23E, Portions of Sections 20 and 21,
Graham County, Arizona,
Geronimo and Fort Thomas USGS 7.5' Quadrangles
Image Source: Google Earth, 1/28/2016

WestLand Resources

N

0 400 800 Feet

0 200 400 Meters

Legend

Parcel (Graham County, 2014)

Emery Site:

Area A: Field to Riparian Restoration

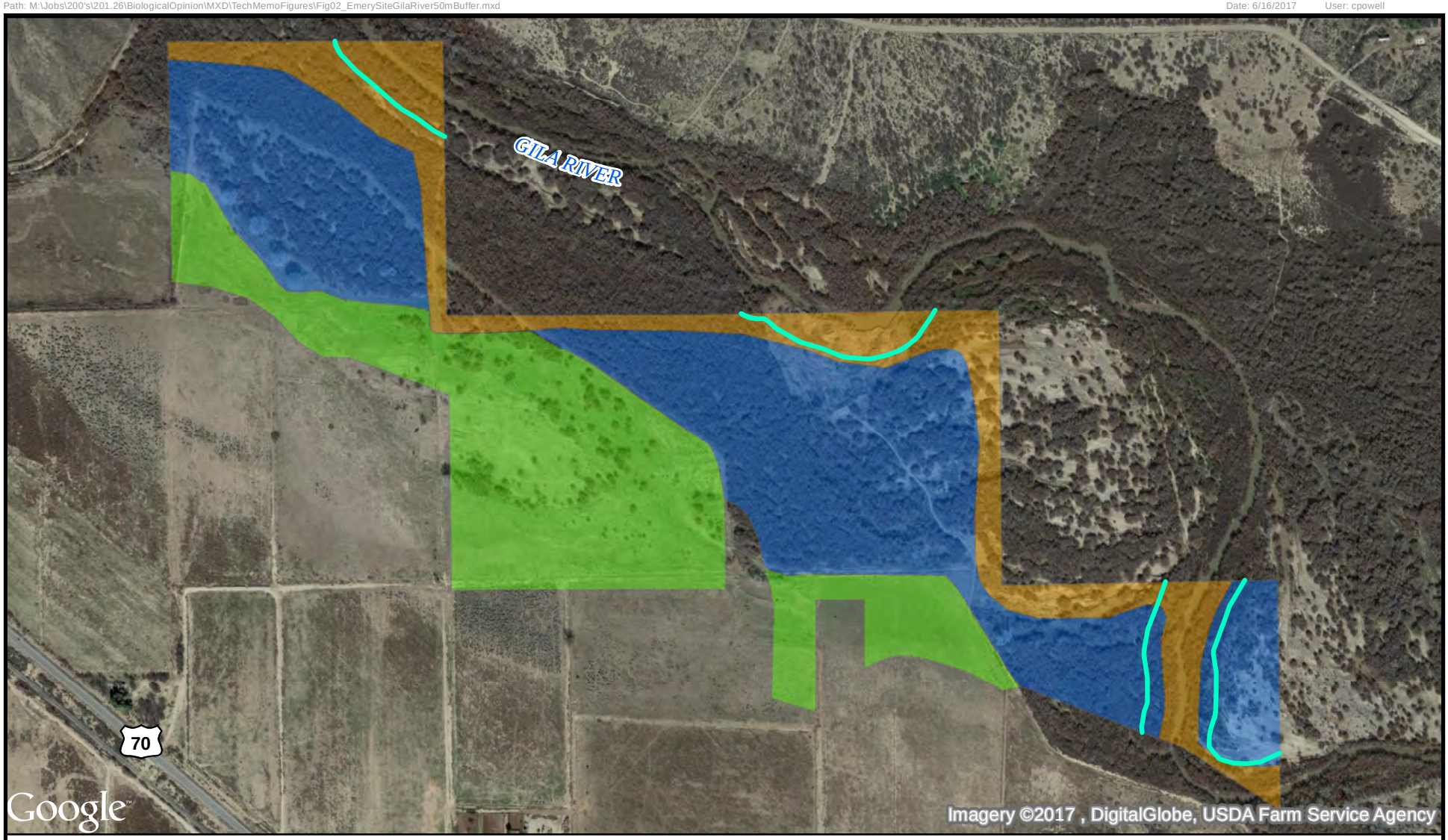
Area B: Tamarisk Control and Riparian Enhancement

Area C: Buffer Preservation

SUPPLEMENTAL CONSERVATION MEASURES AND ESTIMATION OF IMPACTS TO SOUTHWESTERN WILLOW FLYCATCHER: LONE STAR ORE BODY DEVELOPMENT PROJECT

EMERY MITIGATION SITE

Figure 1



T4S, R23E, Portions of Sections 20 and 21,
Graham County, Arizona,
Geronimo and Fort Thomas USGS 7.5' Quadrangles
Image Source: Google Earth, 1/28/2016

WestLand Resources

N

0 400 800 Feet

0 200 400 Met

Legend

Gilla River 50 Meter Buffer

Emery Site:

Area A: Field to Riparian Restoration

Area B: Tamarisk Control and Riparian Enhancement

Area C: Buffer Preservation

SUPPLEMENTAL CONSERVATION MEASURES AND ESTIMATION OF IMPACTS TO SOUTHWESTERN WILLOW FLYCATCHER: LONE STAR ORE BODY DEVELOPMENT PROJECT

50M BUFFER ALONG THE GILA RIVER ADJACENT TO EMERY MITIGATION SITE

Figure 2