



United States Department of Agriculture

Forest
Service

Southwestern
Region

July 2016



Second Supplemental Information Report

Rosemont Copper Project



Contents

Introduction and Background	1
Summary of New Information Received or Changed Conditions.....	2
Documents Considered.....	2
Documents Not Representing New Information or Changed Conditions	4
Documents Regarding Section 404 Mitigation/Conservation Measures	4
WestLand Resources February 16 Davidson Canyon Memorandum	4
Analysis of New Information	5
Geology, Minerals, and Paleontology	5
Soils and Revegetation.....	5
Air Quality and Climate Change	5
Summary of Applicable New Information and/or Changed Conditions	5
Assessment of 2015–2016 Wildfires	5
Baseline Conditions Considering New Information and Changed Conditions	5
Summary of FEIS Analysis Methodology and Impact Conclusions.....	5
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact	
Conclusions.....	5
Summary of Findings.....	6
Groundwater Quantity.....	6
Summary of Applicable New Information and/or Changed Conditions	6
Integrated Hydro Systems Groundwater Modeling Review	6
Baseline Conditions Considering New Information and Changed Conditions	6
Summary of FEIS Analysis Methodology and Impact Conclusions.....	6
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact	
Conclusions.....	6
Summary of Findings.....	8
Groundwater Quality.....	8
Surface Water Quantity.....	8
Summary of Applicable New Information and/or Changed Conditions	8
January 2014 Ashby Memorandum on Water Rights Transfer.....	8
December 2015 Pima County Memorandum and April 2016 Highbay Response	9
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review	
Memorandum.....	9
Baseline Conditions Considering New Information and Changed Conditions	10
January 2014 Ashby Memorandum on Water Rights Transfer.....	10
December 2015 Pima County Memorandum and April 2016 Highbay Response	10
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review	
Memorandum.....	10
Summary of FEIS Analysis Methodology and Impact Conclusions.....	10
January 2014 Ashby Memorandum on Water Rights Transfer.....	10
December 2015 Pima County Memorandum and April 2016 Highbay Response	11
Percentage of Contribution from Barrel Canyon	11
Relationship between Stormflow and Recharge in Davidson Canyon	11
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review	
Memorandum.....	12

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact	
Conclusions.....	13
January 2014 Ashby Memorandum on Water Rights Transfer.....	13
December 2015 Pima County Memorandum and April 2016 Hudbay Response.....	13
Percentage of Contribution from Barrel Canyon.....	13
Relationship between Stormflow and Recharge in Davidson Canyon.....	14
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review	
Memorandum.....	15
Summary of Findings.....	15
January 2014 Ashby Memorandum on Water Rights Transfer.....	15
December 2015 Pima County Memorandum and April 2016 Hudbay Response.....	15
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review	
Memorandum.....	15
Surface Water Quality	16
Summary of Applicable New Information and/or Changed Conditions	16
Assessment of 2015–2016 Wildfires	16
Baseline Conditions Considering New Information and Changed Conditions	16
Assessment of 2015–2016 Wildfires	16
Summary of FEIS Analysis Methodology and Impact Conclusions.....	16
Assessment of 2015–2016 Wildfires	16
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact	
Conclusions.....	16
Assessment of 2015–2016 Wildfires	16
Summary of Findings.....	16
Assessment of 2015–2016 Wildfires	16
Seeps, Springs, and Riparian Areas.....	17
Summary of Applicable New Information and/or Changed Conditions	17
Assessment of 2015–2016 Wildfires	17
January 2014 Ashby Memorandum on Water Rights Transfer.....	17
December 2015 Pima County Memorandum and April 2016 Hudbay Response.....	17
Integrated Hydro Systems Groundwater Modeling Review	17
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review	
Memorandum.....	17
Baseline Conditions Considering New Information and Changed Conditions	17
Assessment of 2015–2016 Wildfires	17
January 2014 Ashby Memorandum on Water Rights Transfer.....	17
December 2015 Pima County Memorandum and April 2016 Hudbay Response.....	17
Integrated Hydro Systems Groundwater Modeling Review	17
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review	
Memorandum.....	17
Summary of FEIS Analysis Methodology and Impact Conclusions.....	17
Assessment of 2015–2016 Wildfires	17
January 2014 Ashby Memorandum on Water Rights Transfer.....	18
December 2015 Pima County Memorandum and April 2016 Hudbay Response.....	18
Integrated Hydro Systems Groundwater Modeling Review	18
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review	
Memorandum.....	18
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact	
Conclusions.....	19
Assessment of 2015–2016 Wildfires	19
January 2014 Ashby Memorandum on Water Rights Transfer.....	19
December 2015 Pima County Memorandum and April 2016 Hudbay Response.....	19
Integrated Hydro Systems Groundwater Modeling Review	19
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review	
Memorandum.....	19

Summary of Findings.....	20
Assessment of 2015–2016 Wildfires	20
January 2014 Ashby Memorandum on Water Rights Transfer.....	20
December 2015 Pima County Memorandum and April 2016 Huidbay Response.....	20
Integrated Hydro Systems Groundwater Modeling Review	20
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum.....	20
Biological Resources.....	21
Summary of Applicable New Information and/or Changed Conditions	21
April 2016 Amended Final BO.....	21
First and Second Addenda to Biological Evaluation	24
Assessment of 2015–2016 Wildfires	25
January 2014 Ashby Memorandum on Water Rights Transfer.....	25
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum.....	25
Locational Information for Sensitive Plant Species.....	25
Baseline Conditions Considering New Information and Changed Conditions	25
April 2016 Amended Final BO.....	25
First and Second Addenda to Biological Evaluation	26
Assessment of 2015–2016 Wildfires	26
January 2014 Ashby Memorandum on Water Rights Transfer.....	26
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum.....	26
Locational Information for Sensitive Plant Species.....	26
Summary of FEIS Analysis Methodology and Impact Conclusions.....	26
April 2016 Amended Final BO; First and Second Addenda to Biological Evaluation.....	26
Assessment of 2015–2016 Wildfires	26
January 2014 Ashby Memorandum on Water Rights Transfer.....	27
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum.....	27
Locational Information for Sensitive Plant Species.....	28
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions.....	28
April 2016 Amended Final BO.....	28
First and Second Addenda to Biological Evaluation	30
Assessment of 2015–2016 Wildfires	44
January 2014 Ashby Memorandum on Water Rights Transfer.....	44
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum.....	44
Locational Information for Sensitive Plant Species.....	45
Summary of Findings.....	45
April 2016 Amended Final BO.....	45
First and Second Addenda to Biological Evaluation	46
Assessment of 2015–2016 Wildfires	46
January 2014 Ashby Memorandum on Water Rights Transfer.....	46
July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum.....	47
Locational Information for Sensitive Plant Species.....	47
Landownership and Boundary Management	47
Livestock Grazing.....	47
Dark Skies	47
Visual Resources.....	47
Summary of Applicable New Information and/or Changed Conditions	47

Assessment of 2015–2016 Wildfires	47
Baseline Conditions Considering New Information and Changed Conditions	47
Assessment of 2015–2016 Wildfires	47
Summary of FEIS Analysis Methodology and Impact Conclusions	48
Assessment of 2015–2016 Wildfires	48
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact	
Conclusions.....	48
Assessment of 2015–2016 Wildfires	48
Summary of Findings.....	48
Assessment of 2015–2016 Wildfires	48
Recreation and Wilderness.....	48
Summary of Applicable New Information and/or Changed Conditions	48
Assessment of 2015–2016 Wildfires	48
Baseline Conditions Considering New Information and Changed Conditions	48
Assessment of 2015–2016 Wildfires	48
Summary of FEIS Analysis Methodology and Impact Conclusions	48
Assessment of 2015–2016 Wildfires	48
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact	
Conclusions.....	48
Assessment of 2015–2016 Wildfires	48
Summary of Findings.....	49
Assessment of 2015–2016 Wildfires	49
Hazardous Materials.....	49
Fuels and Fire Management.....	49
Summary of Applicable New Information and/or Changed Conditions	49
Assessment of 2015–2016 Wildfires	49
Baseline Conditions Considering New Information and Changed Conditions	49
Assessment of 2015–2016 Wildfires	49
Summary of FEIS Analysis Methodology and Impact Conclusions	49
Assessment of 2015–2016 Wildfires	49
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact	
Conclusions.....	49
Assessment of 2015–2016 Wildfires	49
Summary of Findings.....	49
Assessment of 2015–2016 Wildfires	49
Transportation/Access.....	50
Noise.....	50
Public Health and Safety.....	50
Summary of Applicable New Information and/or Changed Conditions	50
Buffalo Solder Electronic Testing Range	50
Baseline Conditions Considering New Information and Changed Conditions	50
Buffalo Solder Electronic Testing Range	50
Summary of FEIS Analysis Methodology and Impact Conclusions	50
Buffalo Solder Electronic Testing Range	50
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact	
Conclusions.....	50
Buffalo Solder Electronic Testing Range	50
Summary of Findings.....	51
Buffalo Solder Electronic Testing Range	51
Cultural Resources.....	51
Summary of Applicable New Information and/or Changed Conditions	51
Assessment of 2015–2016 Wildfires	51

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum.....	51
Baseline Conditions Considering New Information and Changed Conditions	51
Assessment of 2015–2016 Wildfires	51
Summary of FEIS Analysis Methodology and Impact Conclusions.....	51
Assessment of 2015–2016 Wildfires	51
Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions.....	51
Assessment of 2015–2016 Wildfires	51
Summary of Findings.....	52
Assessment of 2015–2016 Wildfires	52
Socioeconomics and Environmental Justice.....	52
Participants in Review.....	53
Forest Service.....	53
SWCA Environmental Consultants	53
Conclusions and Determination	55
Literature Cited	57

Tables

Table 1. Comparison of effects determinations between October 2013 BO and April 2016 BO	28
Table 2. Comparison of effects determinations between BE and BE addenda.....	30

Introduction and Background

In December 2013, a final environmental impact statement (FEIS¹) and draft record of decision (draft ROD) were published by the Coronado National Forest (Coronado) for the Rosemont Copper Project. The draft ROD described the Selected Action (Alternative 4 – Barrel Alternative, as described in the FEIS) and the rationale for its selection.

The Administrative Review Objection Period was held from January 1 through February 14, 2014. After determining that 101 objectors were eligible, the Regional Office proceeded to review and respond to these objections. This review was extended due to the content and complexity of the objections, but also because of information coming from the U.S. Fish and Wildlife Service (USFWS) regarding the sighting of a protected species (ocelot) within the analysis area. Additionally, as explained in the Regional Forester's objection response letter, a number of objectors introduced what they presented to be "new information" not previously considered (U.S. Forest Service (Forest Service) 2014).

In May 2014, the Coronado decided to reinitiate formal consultation under the Endangered Species Act (ESA), based in part on the sightings of ocelot within the project area. As part of these discussions, the Coronado made an effort to enhance the existing analysis completed for the USFWS in the previous biological assessment (BA) and in several supplemental BAs (SBAs). Both the Coronado and USFWS were striving to improve the accuracy or reduce the uncertainty of the analysis associated with the October 2013 biological opinion (BO) that was prepared for the FEIS, and specifically uncertainty related to impacts within the Las Cienegas National Conservation Area (NCA) in riparian areas along Empire Gulch and Cienega Creek. A number of agencies were invited to participate in meetings and a renewed effort to exchange information, in order to better document baseline conditions and refine the hydrologic analyses related to riparian areas. This exchange brought forward numerous documents, field data, and analyses not previously provided to the Coronado, which constituted new information under National Environmental Policy Act (NEPA) regulations.

In light of the new information, the Coronado conducted a review to determine the adequacy of the EIS. In accordance with Forest Service Handbook (FSH) 1909.15, chapter 10, section 18.1, "If new information or changed circumstances relating to the environmental impacts of a proposed action come to the attention of the responsible official after a decision has been made and prior to completion of the approved program or project, the responsible official must review the information carefully to determine its importance" (Forest Service 2012). The responsible official would then determine whether a "correction, supplement, or revision to an environmental document is necessary." This review was accomplished with the publication of a supplemental information report (SIR) in May 2015 (Forest Service 2015).

The Forest Supervisor concluded in the May 2015 SIR that "the new information or changed circumstances are within the scope and range of effects considered in the original analysis. Therefore, no significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts were found that would require a supplement or revision of the Rosemont Copper Project EIS" (Forest Service 2015).

¹ Available at: <http://www.rosemonteis.us/final-eis>. Further mention of the FEIS in this report will not be accompanied by a formal citation.

An Amended Final BO was issued by the USFWS on April 28, 2016 (USFWS 2016), concluding the reinitiation of consultation under Section 7 of the ESA. Since publication of the May 2015 SIR, additional information has been provided to the Coronado, including the Amended Final BO. This Second SIR documents the interdisciplinary team's review of new information and comparison of impacts with the original analysis presented in the Rosemont Copper Project FEIS.

Summary of New Information Received or Changed Conditions

Documents Considered

The following new information or changed conditions were considered for inclusion in this Second SIR:

- The issuance of the Amended Final BO, dated April 28, 2016, which includes revised analysis, additional information, and additional conservation measures. The Amended Final BO is included in the project record (USFWS 2016; Project Record #049435). This information is analyzed in the biological resources section of this Second SIR.
- The preparation of two addenda to the Forest Service biological evaluation (BE) for the project. The first BE addendum is dated December 13, 2013 (Forest Service 2013; Project Record #047330). The second BE addendum is dated May 26, 2016 (SWCA 2016; Project Record #049523). This information is analyzed in the biological resources section of this Second SIR.
- A summary of wildfire activity during 2015 and 2016. These wildfires and their expected effects are summarized in a process memorandum in the project record (Chute 2016; Project Record #049527). This information is analyzed in the following resource sections in this Second SIR: air quality; surface water quality; seeps, springs, and riparian areas; biological resources; visual resources; recreation and wilderness; fuels and fire management; and cultural resources.
- A summary of an investigation of potential effects the project could have on the Fort Huachuca Sentinel Landscape and the Buffalo Soldier Electronic Testing Range in southern Arizona. This investigation is summarized in a process memorandum in the project record (Garrett 2016b; Project Record #049463). This information is analyzed in the public health and safety section of this Second SIR.
- Two reports commissioned by the U.S. Environmental Protection Agency (EPA) assessing aspects of the mitigation proposed under the Clean Water Act (CWA) Section 404 permit. In addition, Hudbay Minerals commissioned a review and critique of the 2015 Kondolf and Ashby report from Water and Earth Technologies (WET) and submitted it to the Coronado for consideration:
 - Ashby, J. 2014. Technical Memorandum – Arizona Water Rights Analysis Support (Order Number EP-G149-00202), January 31. (Project Record #011917). This information is analyzed in the following resource sections in this Second SIR: surface water quantity; seeps, springs, and riparian areas; and biological resources.
 - Kondolf, M., and J. Ashby. 2015. Technical Memorandum – Conceptual Design for Sonoita Creek, AZ, Technical Review Support (Order Number EP-G149-00241), July 27. (Project Record #049528). This information is analyzed in the following resource sections in this Second SIR: surface water quantity; seeps, springs, and riparian areas; biological resources; and cultural resources.
 - Water and Earth Technologies (WET), Inc. 2016. Response to Technical Memorandum dated July 27, 2015 by Dr. Mathias Kondolf and James Ashby, June 29 (Project Record #

049552 and 049553). This information is analyzed in the following resource sections in this Second SIR: surface water quantity; seeps, springs, and riparian areas; biological resources; and cultural resources.

- Four reports submitted by WestLand Resources, Inc. (WestLand Resources), or Hudbay Minerals to USFWS during the preparation of the April 2016 Amended Final BO, containing clarification of aspects of conservation measures. As assessed in the following section, these reports do not represent new information or changed conditions and are not analyzed for any resource sections:
 - Hudbay Minerals. 2016a. Letter re: Proposed Conservation Measures. February 11. (Project Record #049372)
 - WestLand Resources. 2016a. Letter to USFWS re: Summary of Rosemont Copper Company's Sonoita Creek Ranch Restoration Project. February 18. (Project Record #049313)
 - Hudbay Minerals. 2016b. Letter re: Clarification of Conservation Measures. February 24. (Project Record #049374)
 - Hudbay Minerals. 2016c. Letter re: Clarification of Conservation Property Commitments. March 18. (Project Record #049375)
- A memorandum submitted by WestLand Resources to USFWS during the preparation of the BO, with clarification of habitat characteristics in Davidson Canyon. As assessed in the following section, this report does not represent new information or changed conditions and is not analyzed for any resource sections:
 - WestLand Resources. 2016b. Riparian Vegetation along Portions of Davidson Canyon Wash and Cienega Creek; Rosemont Copper Project. February 16. (Project Record #049433)
- A report prepared by Dr. Robert Prucha with Integrated Hydro Systems, LLC (Integrated Hydro Systems), reviewing the groundwater modeling conducted for the project. This report was commissioned by the Center for Biological Diversity. A detailed review of this report is included in the project record (Garrett 2016a; Project Record #049526). This information is analyzed in the following resource sections of this Second SIR: groundwater quantity; and seeps, springs, and riparian areas.
 - Integrated Hydro Systems. 2016. Review of Potential Impacts of the Proposed Rosemont Mine, Southeast of Tucson, Arizona on Las Cienegas National Conservation Area (LCNCA) Hydrologic System. May 6. (Project Record #049486)
- A report concerning surface water/groundwater interaction in lower Davidson Canyon, prepared by Pima County and submitted to the Coronado. In addition, Hudbay Minerals contracted three consultants to prepare a critique of the Pima County report and submitted it to the EPA and Coronado. This information is analyzed in the following resource sections of this Second SIR: surface water quantity; and seeps, springs, and riparian areas.
 - Powell, B., J. Fonseca, and F. Postillion. 2015. Memorandum – New Analysis of Stormflow and Groundwater Data from Davidson Canyon: Evidence for Influence of Stormwater Recharge of Groundwater. December 13. (Project Record #049368)
 - WestLand Resources, Water and Earth Technologies and NEIRBO Hydrogeology. 2016. Response to Powell et al. (2015), “*New Analysis of Stormflow and Groundwater Data from Davidson Canyon: Evidence for Influence of Stormwater Recharge of Groundwater.*” April 19. (Project Record #04937 and #049524)

- Hudbay Minerals and their consultant, WestLand Resources, have provided locational information for sensitive plant species identified during pre-disturbance site surveys. This information is analyzed in the biological resources section of this Second SIR.

Documents Not Representing New Information or Changed Conditions

Documents Regarding Section 404 Mitigation/Conservation Measures

A series of four documents was submitted during the Section 7 consultation process in February and March 2016, intended to clarify aspects of mitigation measures and provide further information regarding various mitigation measures proposed under the CWA Section 404 permit process, specifically at Sonoita Creek Ranch, Fullerton Ranch, the Helvetia Ranch Annex North parcels, and the Davidson Canyon parcels (Hudbay Minerals 2016a–2016c; WestLand Resources 2016a).

The mitigation measures proposed under the CWA Section 404 permit process are also included in the April 2016 Amended Final BO as Conservation Measures. One purpose of the documents submitted to the USFWS was to confirm that conservation of these lands will occur whether or not they are accepted for mitigation credit under the CWA Section 404 permit. These mitigation parcels were identified in the FEIS as pertinent to the following resources:

- Sonoita Creek Ranch: surface water quality; seeps, springs, and riparian areas; biological resources; and cultural resources
- Fullerton Ranch: biological resources; and cultural resources
- Helvetia Ranch Annex North parcels: biological resources; and cultural resources
- Davidson Canyon parcels: surface water quantity; surface water quality; seeps, springs, and riparian areas; biological resources; recreation and wilderness; and cultural resources

The Coronado reviewed the most recent version of the “Habitat Mitigation and Monitoring Plan” (HMMP) (September 2014) for the CWA Section 404 permit in the May 2015 SIR. The four documents listed above are reiterations of the mitigation proposed in the September 2014 HMMP; there are no changes to acreage identified in these four documents and no changes to the expected restoration activities or management activities identified in these four documents. These four documents contain clarification on funding details, conservation easements, and management priorities specifically with respect to individual species, but do not constitute new information or changed conditions and therefore are not reviewed further in this Second SIR.

WestLand Resources February 16 Davidson Canyon Memorandum

This memorandum was submitted to the USFWS in order to clarify the extent of habitat suitable for western yellow-billed cuckoo in Barrel Canyon and Davidson Canyon, and along Cienega Creek (WestLand Resources 2016b). The memorandum restates information that originated in two previous documents:

- WestLand Resources. 2011. Offsite Riparian Habitat Analysis and Mapping. Project No. 1049.14. Prepared for Rosemont Copper Company. Tucson, Arizona: WestLand Resources, Inc. August 17.
- WestLand Resources. 2012. Trip Report for Cienega Creek Site Visit Conducted on October 26-28, 2011 and November 3, 2011. Project No. 1049.14. Prepared for Rosemont Copper Company. Tucson, Arizona: WestLand Resources, Inc. May 4.

Both of these documents were reviewed in the FEIS analysis and are cited in the FEIS. The February 16, 2016, memorandum does not constitute new information or changed conditions and is therefore not reviewed further in this Second SIR.

Analysis of New Information

Geology, Minerals, and Paleontology

No new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for geology, minerals, and paleontology.

Soils and Revegetation

No new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for soils and revegetation.

Air Quality and Climate Change

Summary of Applicable New Information and/or Changed Conditions

Assessment of 2015–2016 Wildfires

Five additional wildfires have occurred in the proximity of the Rosemont project area between May 2015 and April 2016 (Gunsite Pass, Oaktree, Ojo Blanco, Rosemont #1, and Rosemont #2). Information was gathered on these fires and they were assessed for impacts to resources (Chute 2016). Impacts from wildfires were addressed in the FEIS for a variety of resources, including air quality and climate change.

Baseline Conditions Considering New Information and Changed Conditions

During the period from 2015 to 2016, the five wildfires that occurred ranged in size from 0.1 acre to 2,023 acres. Wildfires occur in the analysis area annually, and the five wildfires that have occurred since release of the May 2015 SIR are a continuation of past and present actions described in the FEIS.

Summary of FEIS Analysis Methodology and Impact Conclusions

Wildfires occur in the analysis area annually, and were considered in the FEIS as part of the existing conditions with respect to air quality and climate change.

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

Additional wildfires have occurred between 2015 and 2016. Wildfires occur in the analysis area annually. While wildfires have air quality impacts, these would not contribute toward air quality impacts during mine operations. Any air quality impacts these fires may have caused have ceased, and will not overlap temporally or spatially with air quality impacts from the proposed mine. No changes in the overall impacts disclosed in the FEIS have resulted from these wildfires.

Summary of Findings

Additional wildfires have occurred in the area during 2015–2016 and have resulted in changes to baseline conditions. However, this new information would not result in any change to analysis methodology or conclusions of impacts presented in the FEIS for air quality and climate change.

Groundwater Quantity

Summary of Applicable New Information and/or Changed Conditions

Integrated Hydro Systems Groundwater Modeling Review

In May 2016, the Center for Biological Diversity commissioned a report prepared by Dr. Robert H. Prucha with Integrated Hydro Systems (Integrated Hydro Systems 2016). This report has been fully summarized and assessed in a process memorandum titled “Review of New Information – Integrated Hydro Systems Modeling Review” (Garrett 2016a).

The Integrated Hydro Systems report identifies the purpose of the report as follows:

“My review focuses on the evaluation of predicted future mining impacts on both the surface and subsurface hydrology within the Las Cienegas National Conservation Area (LCNCA) and also provides specific recommendations to fix and/or improve estimation of impacts. Because of the inherent uncertainty in these types of model-predicted future changes, my review also focuses on whether a complete and realistic range of potential impacts was determined, which sufficiently inform regulators who must then make critical decisions regarding permitting.” (p. 1)

The Integrated Hydro Systems report is critical of the groundwater modeling effort, with key findings regarding overall methodology, data collection and characterization within Las Cienegas NCA, model conceptualization, calibration, model code selection, and sensitivity/uncertainty analysis. The report makes recommendations for changes to the modeling approach as well as for additional data collection.

Baseline Conditions Considering New Information and Changed Conditions

The baseline conditions for groundwater quantity described in the FEIS remain valid, with no changes or modifications. The Integrated Hydro Systems report is focused on criticism of methodology, rather than baseline conditions described in the FEIS.

Summary of FEIS Analysis Methodology and Impact Conclusions

The groundwater modeling approach used in the FEIS is extensive and described both in the FEIS and the project record. Among other records, see project records #047366 for documentation of the water resources analysis process.

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

A full analysis by the Forest Service of the issues and concerns raised in the Integrated Hydro Systems report is contained in the project record (Garrett 2016a). In general, the Forest Service analysis found that:

- A small number of documents were reviewed by Integrated Hydro Systems, and those reviewed were not capable of providing an adequate review of the full groundwater modeling effort.
- The project record does not support the assertion in the Integrated Hydro Systems report that hydrologic data are lacking from within the Las Cienegas NCA. The analysis also found that additional data collection is not a requirement under the NEPA process; and that the use of hydrologic data within Las Cienegas NCA to predict impacts in the FEIS was not reviewed as part of the Integrated Hydro Systems critique.
- The Integrated Hydro Systems report concludes that inadequate conceptual frameworks were analyzed. The Forest Service analysis found that the project record documents a robust, collaborative, and iterative process for conceptualizing and constructing the groundwater models, and that the Forest Service provided for a variety of different conceptual frameworks by using multiple models for disclosure.
- The Integrated Hydro Systems report concludes that inadequate calibration was conducted on the groundwater models. The Forest Service analysis found that the project record documents a robust, collaborative, and iterative process for calibrating the groundwater models.
- The Integrated Hydro Systems report concludes that the groundwater models were not conducted to industry standards. The Forest Service analysis found that the project record documents that the groundwater models were constructed to industry standards.
- The Integrated Hydro Systems report supports the use of a Monte Carlo approach to assessing uncertainty. In 2015, the Forest Service specifically assessed the use of the sensitivity analysis in lieu of a Monte Carlo approach and determined that the approach used by the Forest Service was appropriate.
- The Forest Service analysis identified that the Forest Service specifically constructed a process to ensure groundwater modeling was conducted in a manner such that the models would be robust, defensible, and not arbitrarily constructed by the proponent. Fundamental components of the Forest Service process included:
 - Identification of individual, objective, outside experts with specific modeling expertise in order to conduct a thorough peer review of the Rosemont modeling work and ensure that the modeling was performed to an industry standard, that the models were properly constructed and adequately calibrated, and that the models were sufficient for use in predicting impacts;
 - Iterative discussions between these outside experts, Rosemont modeling contractors, and Forest Service specialists in order to discuss and work through fundamental modeling issues and approaches;
 - The decision to use and disclose three separate groundwater models, each representing a different conception of the hydrologic framework and relying on different fundamental assumptions;
 - The decision to use the sensitivity analyses to disclose a range of potential results, rather than reliance on a single model result;
 - Collaborative “all-hands” panel meetings with Federal agency specialists, Rosemont contractors, Forest Service specialists, outside experts, other Federal agency specialists and managers (U.S. Geological Survey (USGS), EPA, USFWS, Bureau of Land Management (BLM)) and Coronado line officers in order to make fully informed decisions on the proper use of the model results;

- Use of an alternative method, above and beyond the groundwater models, in order to estimate impacts to streamflow, standing pools, wetlands, and riparian vegetation within Las Cienegas NCA; and
- With respect to outside opinions, similar concerns with the construction and application of the groundwater models were raised and addressed throughout the NEPA process. Both the FEIS and the project record reflect the changes that were made to the analysis in response to these concerns.

The Forest Service analysis also found that the issues raised in the Integrated Hydro Systems report did not represent new information, as these issues and concerns had been explicitly considered and addressed throughout the groundwater modeling process. The Forest Service analysis further found that the Forest Service on multiple occasions upheld the groundwater modeling process, including in response to an objection filed (in part) by the Center for Biological Diversity. The Forest Service analysis concludes that “the concerns raised in the Integrated Hydro Systems report are similar to concerns raised throughout the NEPA process and directly considered by the Regional Forester in the objection process. The groundwater modeling efforts undertaken by the Forest Service were found to be credible and adequate for analyzing and disclosing impacts to sensitive aquatic resources. No further action is recommended based on the contents of the Integrated Hydro Systems report submitted to the Coronado National Forest by the Center for Biological Diversity on May 6, 2016” (Garrett 2016a).

Summary of Findings

Based on the Forest Service analysis of the Integrated Hydro Systems report contained in the project record (Garrett 2016a), no new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for groundwater quantity.

Groundwater Quality

No new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for groundwater quality.

Surface Water Quantity

Summary of Applicable New Information and/or Changed Conditions

January 2014 Ashby Memorandum on Water Rights Transfer

The January 31, 2014, memorandum from James Ashby of PG Environmental focuses on the legal framework under which surface water rights can be transferred under Arizona state water law (Ashby 2014). This study was commissioned by the EPA for the purpose of assessing the likelihood for proposed mitigation under the CWA Section 404 permit to occur and to be effective. One aspect of the proposed mitigation calls for the severance and transfer of senior surface water rights on Cienega Creek from Rosemont Copper Company (Rosemont Copper) to various conservation entities to hold as in-stream flow rights (for instance Pima County or BLM). The memorandum notes that there is a substantial legal process that must be undertaken for water rights to be severed and transferred under Arizona state surface water law.

December 2015 Pima County Memorandum and April 2016 Hudbay Response

The December 13, 2015, memorandum from Pima County focuses on the analysis of new groundwater level and streamflow monitoring data collected between July and November 2015 in Davidson Canyon (Powell et al. 2015). Specifically, the memorandum analyzes:

- Automated water levels collected using a pressure transducer (four measurements per day) from the Davidson Canyon #2 monitoring well; period of record from July 16 to November 24, 2015.
- Streamflow measurements taken at the USGS stream gage in Barrel Canyon (#94845680) during this same period.
- Streamflow measurements taken at the Pima County ALERT gage located in Davidson Canyon, approximately 150 feet from the Davidson Canyon #2 monitoring well, during this same period.

The Pima County analysis focuses on three aspects of the collected data:

1. The proportion of runoff at Barrel Canyon compared with runoff in Davidson Canyon, in order to demonstrate the disproportionate amount of runoff contributed by the Barrel Canyon watershed.
2. The relationship between stormflow occurring in Davidson Canyon and changes in groundwater level.
3. The relationship between streamflow length in Davidson Canyon and changes in groundwater level.

The April 2016 response document from consultants of Hudbay Minerals (WestLand Resources, Water and Earth Technologies and NEIRBO Hydrogeology 2016.) reviews the December 2015 Pima County memorandum and draws the following conclusions:

“1) The comparison of surface water runoff in Barrel Canyon to that in lower Davidson Canyon is based on a flawed application of the surface water gauge data in both systems. In addition, the dataset is so limited that it renders the analysis nearly meaningless.

2) The relationship between stormwater runoff and the recharge of the shallow alluvial aquifer is well understood by the permitting agencies. The “demonstration” of the runoff-recharge relationship by Powell et al. (2015) neither refutes nor adds to the disclosure of effects in the Forest Service Final Environmental Impact Statement (FEIS; USFS 2013), or the decision by ADEQ to issue the CWA Section 401 water quality certification (ADEQ 2014a).

3) The statistical analysis is based on substantial flaws in both the methodology used and the interpretation of results, resulting in inappropriate conclusions about the relationship between depth to water and length of streamflow.” (p. 1)

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

This memorandum by Dr. Mathias Kondolf and James Ashby of PG Environmental was commissioned by the EPA to assess the potential viability of the mitigation proposed at Sonoita Creek Ranch (Kondolf and Ashby 2015). This report raises questions with respect to the conservation benefit of the proposed mitigation, specifically:

- Concerns with the hydrologic/hydraulic modeling conducted for the mitigation assessment.
- Concerns that the proposed constructed channels will likely not sustain flow.
- Concerns that the existing ecological functions of Sonoita Creek will be reduced by diverting flow from the main channel.
- Concerns with constructed channel design and maintenance, and the resulting ecological value.
- Concerns that there is no ecological benefit to controlling bank erosion at Sonoita Creek.

The June 2016 WET review/critique of the Kondolf and Ashby memorandum provides detailed responses to eight individual findings from the July 2015 memo, including the criticisms listed above. In general, the June 2016 WET memorandum provides additional analysis to respond to technical concerns and criticisms, or identifies items that changed with the final mitigation design, which was not reviewed by Kondolf and Ashby in July 2015.

Baseline Conditions Considering New Information and Changed Conditions

January 2014 Ashby Memorandum on Water Rights Transfer

This memorandum does not result in any changes to baseline conditions, but rather is focused on the applicability of mitigation.

December 2015 Pima County Memorandum and April 2016 Hudbay Response

The surface water quantity section of the FEIS discloses baseline stream flow conditions for several drainages, including those areas downstream of the mine site that could potentially be impacted by reduced stormwater runoff (Barrel, Davidson, Lower Cienega Creek) and those areas that potentially could be impacted by mine drawdown (Upper Cienega Creek). The May 2015 SIR further discusses more recent surface flow monitoring conducted in Barrel and Davidson Canyons by Rosemont Copper.

The Pima County memorandum references new storm flow monitoring data in Barrel and Davidson Canyons, including ALERT gages and data from the Barrel Canyon USGS stream gage. Similar data were used to construct baseline conditions in the FEIS, but for longer periods of record. The additional data from the new Pima County document add marginally to the record of surface flows in the area. These new data were reviewed; the baseline conditions used in the “Surface Water Quantity” analysis remain within the bounds identified in the FEIS, specifically the characterization of Barrel Canyon and most of Davidson Canyon as ephemeral. The new information provided by the memorandum is more pertinent to the assumptions used in the FEIS predictions of impacts, as discussed below.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

The July 2015 Kondolf and Ashby memorandum and the June 2016 WET review memorandum do not result in any changes to baseline conditions, but rather are focused on assumptions of the effectiveness of mitigation.

Summary of FEIS Analysis Methodology and Impact Conclusions

January 2014 Ashby Memorandum on Water Rights Transfer

As with all the mitigation in the FEIS, the effectiveness of mitigation is assessed separately from project-related impacts and cumulative effects. In each resource section in chapter 3 of the FEIS,

following the assessment of project-related direct and indirect impacts in the “Environmental Consequences” subsection, there is a “Mitigation Effectiveness” subsection. In this subsection all applicable mitigation for a given resource is listed and then assessed for its ability to offset or minimize environmental effects.

The potential water rights transfers on Cienega Creek are included as mitigation in the “Surface Water Quantity” section of Chapter 3. In the FEIS, the actions associated with this mitigation measure (FS-SSR-01) were considered to be a required mitigation due to potential inclusion in the CWA 404 permit, as well as inclusion as a conservation measure under ESA Section 7 consultation. The inclusion of these water rights transfers as acceptable for mitigation under the 404 permit has not yet been determined. Regardless, they are still considered to be required mitigation due to their inclusion as conservation measures in the Amended Final BO (April 2016).

The FEIS states the following conclusions regarding effectiveness of this mitigation measure:

“The purchase of senior surface water rights on Cienega Creek and conversion of these water rights into in-stream flow rights would be effective at providing legal protection to Cienega Creek that would help mitigate for any potential impacts to surface water. Cooperating agencies have raised concerns that the sever-and-transfer process that must be undertaken through the ADWR is not guaranteed to be successful and allows for challenges to any transfer of surface water rights. If the water rights transfer were not approved, this mitigation would not be protective of Cienega Creek.” (FEIS, p. 442)

December 2015 Pima County Memorandum and April 2016 Hudbay Response

With respect to the relationship between groundwater and surface water in Davidson Canyon, several assumptions in the FEIS are pertinent.

Percentage of Contribution from Barrel Canyon

This issue was raised by cooperating agencies during preparation of the FEIS and is discussed explicitly in the FEIS (p. 430). The assumption used in the FEIS is that the contribution of streamflow from Barrel Canyon to Davidson Canyon is proportional to the percentage of surface area that Barrel Canyon represents of the Davidson Canyon watershed. This proportion is used primarily to estimate the reductions in stormflow in Davidson Canyon (estimated at 4.3 percent postclosure for the Barrel Alternative). Cooperating agency comments indicated the likelihood that Barrel Canyon contributes a higher proportion of streamflow than suggested by surface area alone, due to the elevation and orographic effects. The FEIS concludes: “While it is acknowledged that Barrel Canyon receives higher precipitation due to its location, it is by no means the only part of the Davidson Canyon watershed that does, and the estimates provided are still valid approximations, albeit with some uncertainty.” (FEIS, p. 430)

Relationship between Stormflow and Recharge in Davidson Canyon

The potential for hydrologic changes in Davidson Canyon were analyzed in the FEIS in several ways: “Two potential impacts to groundwater discharge could occur: (1) from reductions in flow as a result of drawdown in the regional aquifer; and (2) from reductions in shallow groundwater moving through the alluvial stream sediments, which are recharged from surface storm flows” (FEIS, p. 354). The impacts to Davidson Canyon from both possibilities are analyzed in the “Seeps, Springs, and Riparian Areas” section of the FEIS (pp. 534–536 for potential impacts based on a shallow alluvial water source, and pp. 536–538 for potential impacts based on a regional water source).

Ultimately, the FEIS concludes that recharge in lower Davidson Canyon is more likely to be from a shallow alluvial source, with recharge occurring mostly from stormwater:

“In summary, the weight of the available evidence suggests that lower Davidson Canyon is not hydraulically connected to the regional aquifer that would be impacted by the pit dewatering. Changes in surface flow and, therefore, to the recharge to shallow alluvial aquifers are possible as a result of disturbance by the mine and removal of portions of the watershed upstream. The effect of reduction in surface flow is estimated and could reduce storm flows by 4.3 to 11.5 percent, depending on alternative, but this effect on recharge is likely to be overestimated, with the contribution being less owing to the distance downstream of the project area and substantial channel losses.” (FEIS, p. 536)

“This effect should be considered a maximum possible loss to shallow alluvial aquifers in lower Davidson Canyon, with actual losses likely to be much lower.” (FEIS, p. 536)

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

As noted previously, the effectiveness of mitigation is assessed separately from project-related impacts and cumulative effects. In each resource section in chapter 3 of the FEIS, following the assessment of project-related impacts in the “Environmental Consequences” subsection, there is a “Mitigation Effectiveness” subsection. In this subsection all applicable mitigation for a given resource is listed and then assessed for its ability to offset or minimize environmental effects.

Sonoita Creek Ranch is included as mitigation under “Surface Water Quantity.” In the FEIS, the actions associated with this mitigation measure (FS-BR-08) were considered to be a required mitigation due to potential inclusion in the CWA 404 permit, as well as inclusion as a conservation measure under ESA Section 7 consultation. The inclusion of the Sonoita Creek Ranch restoration activities as acceptable mitigation under the 404 permit has not yet determined. Regardless, they are still considered to be required mitigation due to their inclusion as conservation measures in the recent Amended Final BO (April 2016).

The FEIS states the following conclusions regarding effectiveness of this mitigation measure with respect to surface water quantity:

“In the event that restoration is required to mitigate impacts to waters of the U.S., Rosemont would utilize the existing infrastructure and the naturally occurring water from Monkey Spring (that currently irrigates the agricultural fields) to create riparian and/or wetland habitat within the 115-acre fields. Otherwise water available after the needs of the existing ponds would be discharged onto the floodplain terrace of Sonoita Creek, which is currently an agricultural field, in order to facilitate the passive restoration of riparian habitat.” (FEIS, p. 440)

“Recordation of a similar restrictive covenant associated with Sonoita Creek Ranch would be at least partially effective at mitigating impacts to surface waters but would be outside the area of analysis for surface waters. It should also be noted that sufficiency of the mitigation on the Davidson Canyon parcels or Sonoita Creek Ranch to offset impacts to jurisdictional WUS has yet to be determined by the USACE.” (FEIS, p. 442)

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

January 2014 Ashby Memorandum on Water Rights Transfer

The January 2014 memorandum concerning the water rights transfer states a conclusion that is similar to the one already included in the FEIS, namely that there is legal uncertainty associated with the water rights transfer that would affect the ability to mitigate impacts. This document does not represent new information with respect to the FEIS analysis.

December 2015 Pima County Memorandum and April 2016 Hudbay Response

Percentage of Contribution from Barrel Canyon

The data presented in the December 13, 2015, memorandum represent a snapshot in time between July and November 2015. In this time period, Pima County found that 470 acre-feet of stormwater passed the Davidson Canyon gage, and 186 acre-feet of stormwater passed the Barrel Canyon gage, suggesting that the contribution from Barrel Canyon is greater (39 percent) than suggested solely by area (28 percent).

The analysis from Pima County provides a relatively limited snapshot in time (5 months). Similar streamflow data over much longer periods of time were reviewed both in the FEIS (pp. 412–419), and in the May 2015 SIR (pp. 30–32). Comparison of the Pima County results with results from data sets with longer time spans suggests that the Pima County results are not indicative of the system as a whole, or only show one component of a more complex system over a short temporal period.

The following was noted in the May 2015 SIR:

“The additional information includes new surface flow monitoring stations in Barrel and Davidson Canyons. These stations provide detail on the current frequency of flows that occur in Barrel Canyon and Davidson Canyon. In Barrel Canyon, a total of 23 days of storm flow occurred in 2013; most of these were related to monsoon events between July and September, with several additional days of flow occurring in November. In Davidson Canyon, a total of 2 days of storm flow occurred in 2013 related to monsoon events.” (SIR, p. 30)

Additional indicators of the hydrologic relationship between Barrel Canyon and Davidson Canyon were also analyzed in the May 2015 SIR, notably differences in stormwater quality:

“The new stormwater quality also illustrates the infeasibility of estimating impacts on Davidson Canyon water quality due to runoff from the mine site. Stormwater quality clearly changes greatly in the intervening 12 miles between the mine site and lower Davidson Canyon. Just as runoff in Barrel Canyon is empirically demonstrated to be dissimilar to Davidson Canyon stormwater runoff, it is reasonable to assume that mine site runoff would be equally dissimilar to Davidson Canyon, and it would be inappropriate to directly compare mine runoff that far downstream.” (SIR, p. 134)

The conclusion presented by Pima County that Barrel Canyon contributes a higher proportion of streamflow to Davidson Canyon does not represent a reasonable changed condition, for the following reasons:

- This time period focuses solely on the monsoon season, and not hydrologic events occurring during winter months.
- Longer time periods, incorporating multiple seasons, were already analyzed and show potentially contradictory results. Data collected by Hudbay Minerals and analyzed in the May 2015 SIR suggest that potentially 91 percent of flows (21 out of 23) that register in Barrel

Canyon do not reach lower Davidson Canyon. This is supportive of the conclusions in the FEIS that substantial flow loss occurs in the 12 miles between the mine site and lower Davidson Canyon.

- Analysis of other information (stormwater quality) also suggests a hydrologic disconnect between Barrel Canyon runoff and Davidson Canyon runoff.
- There are substantial differences in the quality of the data between the Barrel Canyon USGS flow gage and the ALERT gage. The level of data validation conducted for the ALERT gages is not clear; the purpose of the ALERT gages is for flood warning and not necessarily to provide accurate quantification of flows. Periodic maintenance activities such as resurveying of channel geometry, revising Manning’s coefficients, and collecting instantaneous flow measurements to recalibrate the rating curve are part of USGS maintenance procedures but may not be conducted for ALERT gages. ALERT gaging data are likely useful to document timing and relative magnitude of flow events, but less useful for comparing actual flow values as was done in the Pima County memorandum. Without determining the potential error of the ALERT gage data, it would be premature to use the data in the manner provided.

Relationship between Stormflow and Recharge in Davidson Canyon

The Pima County findings suggest a demonstrable relationship exists between groundwater levels and streamflow in Davidson Canyon. They conclude:

“2) The shallow groundwater aquifer in Davidson Canyon, in which Davidson #2 Well is embedded, is highly responsive to pulses of surface water flow, whether it be baseflow or stormflow. This relationship was evident from the qualitative observations (Figs. 2-4) and quantitative analyses (Fig. 5). Yet, analysis of the impacts of the proposed Rosemont project on Davidson Canyon and Cienega Creek does not take into account this relationship.” (Pima County, p. 8)

“3) The new analysis of the relationship between depth to water and length of streamflow in Davidson Canyon, which used three new data points, reaffirms an earlier analysis by Powell et al. (2014) for a strong statistical relationship between these two variables. That is, as groundwater levels rise and fall, so too does the length of flow in Davidson Canyon increase and contract (Fig. 6).” (Pima County, p. 9)

Contrary to the statement in the preceding excerpt, the FEIS explicitly acknowledges the relationship between stormwater flow and recharge in the shallow alluvial aquifer and uses that as a basis for the impacts analysis. This aspect of the Pima County memorandum does not represent new information. Refer to the following FEIS sections specifically for where this assumption is used as a basis for impact analysis:

- Effect on Perennial Streamflow; Predicted Effect on Davidson Canyon Stream Flow; Potential Impacts Based on a Shallow Alluvial Source (FEIS, pp. 534–536)
- Indirect Effect on Riparian Vegetation; Predicted Effect on Riparian Vegetation in Davidson Canyon (Reaches 3 and 4); Expected Effects on Riparian Vegetation (FEIS, p. 544)
- Effect on Outstanding Arizona Waters; Davidson Canyon and Lower Cienega Creek (FEIS, pp. 547–554).

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

The FEIS acknowledges that the mitigation proposed under the CWA 404 permit would not necessarily happen, and identifies the remaining effectiveness if this does not happen and only a conservation easement is implemented. In addition, it is clearly noted that these lands are not within the same watershed and would not directly offset any impacts described in the FEIS. As such, the concerns raised in both the July 2015 Kondolf/Ashby memorandum and the June 2016 WET review memorandum do not represent new information with respect to the FEIS analysis.

Summary of Findings

January 2014 Ashby Memorandum on Water Rights Transfer

With respect to the January 2014 water rights memorandum, the uncertainty associated with the water rights transfer is already acknowledged in the FEIS, and therefore no new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for surface water quantity.

December 2015 Pima County Memorandum and April 2016 Hudbay Response

With respect to the proportion of streamflow contributed by Barrel Canyon to the Davidson Canyon drainage, the new information presented was reviewed in the context of other available hydrologic information used in the NEPA analysis. The relationship demonstrated by Pima County may be valid for the short time period analyzed; however, it is not sufficient to change the assumptions used in the FEIS or the analyses that stem from this assumption. This conclusion is based on the fact that only the monsoon season was analyzed and not the full hydrologic year, that similar data from a longer period of record were included in the May 2015 SIR and show contradictory conclusions, that additional water quality data also raise questions about the connectivity between Barrel Canyon and lower Davidson Canyon stormwater flows, and that substantial uncertainty exists with the use of the ALERT gage data. The criticisms in methodology presented by Hudbay Minerals are noted by the Forest Service as further concerns with the memorandum, but did not influence this determination.

The Forest Service notes that as a concept the type of analyses undertaken by Pima County may ultimately prove useful for evaluating and potentially modifying the assumption of percent contribution from Barrel Canyon. Indeed, performing this type of analysis in order to validate hydrologic assumptions was one purpose for requiring monitoring of flows in Barrel Canyon and Davidson Canyon. At this time, the data and analysis presented by Pima County are not sufficient to revise assumptions; additional future analysis of more extensive data sets may show differing results and would be evaluated at that time.

With respect to the relationship between shallow alluvial groundwater levels and streamflow, this assumption is already incorporated into the FEIS analysis and therefore does not represent new information.

In summary, no new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for surface water quantity.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

With respect to the July 2015 Kondolf and Ashby memorandum, the uncertainty with respect to implementation of the Sonoita Creek Ranch conservation measures, the potential for the lands to only

be set aside for conservation and not restoration, and the location of Sonoita Creek Ranch within a different watershed than the impacts from the mine are already stated in the FEIS. As such, no new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for surface water quantity.

The Forest Service notes that the review included in this SIR does not provide any evaluation of the specific criticisms raised in the July 2015 Kondolf/Ashby memorandum, or the additional analysis and responses contained in the June 2016 WET review memorandum. Some of the Kondolf/Ashby criticisms may be valid, which if unchanged would lead to only partial success of planned restoration activities. In this case, only the set-aside of the lands for conservation would provide mitigation for impacts, as noted in the FEIS.

Surface Water Quality

Summary of Applicable New Information and/or Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

Baseline Conditions Considering New Information and Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

Summary of FEIS Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Wildfires occur in the analysis area annually, and were considered in the FEIS as part of the existing conditions with respect to surface water quality.

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Additional wildfires that occurred between 2015 and 2016. New fires do have an effect on watershed runoff characteristics, but in the context of the whole watershed, these fires are generally a small percentage of the drainage area. Past wildfires have been recovering over time, and these newer fires will also recover over time. No changes in the overall impacts disclosed in the FEIS have resulted from these wildfires.

Summary of Findings

Assessment of 2015–2016 Wildfires

Additional wildfires have occurred in the area in 2015 and 2016 and have resulted in changes to baseline conditions. However, this new information would not result in any change to analysis methodology or conclusions of impacts presented in the FEIS for surface water quality.

Seeps, Springs, and Riparian Areas

Summary of Applicable New Information and/or Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

January 2014 Ashby Memorandum on Water Rights Transfer

See the “Surface Water Quantity” section for the full discussion of this document.

December 2015 Pima County Memorandum and April 2016 Hudbay Response

See the “Surface Water Quantity” section for the full discussion of these documents.

Integrated Hydro Systems Groundwater Modeling Review

See the “Groundwater Quantity” section for the full discussion of this document.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

See the “Surface Water Quantity” section for the full discussion of this document.

Baseline Conditions Considering New Information and Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

January 2014 Ashby Memorandum on Water Rights Transfer

As noted in the “Surface Water Quantity” section, the data presented in the January 2014 water rights memorandum do not change baseline conditions presented in the FEIS, but rather are focused on the applicability of mitigation.

December 2015 Pima County Memorandum and April 2016 Hudbay Response

As noted in the “Surface Water Quantity” section, the data presented by Pima County do not substantially change baseline conditions presented in the FEIS.

Integrated Hydro Systems Groundwater Modeling Review

As noted in the “Groundwater Quantity” section, the Integrated Hydro Systems report does not address any changes to baseline conditions, but rather reflects a critique of methodology.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

As noted in the “Surface Water Quantity” section, the July 2015 Kondolf and Ashby memorandum and the June 2016 WET review memorandum do not result in any changes to baseline conditions, but rather are focused on assumptions of the effectiveness of mitigation.

Summary of FEIS Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Wildfires occur in the analysis area annually, and were considered in the FEIS as part of the existing conditions with respect to seeps, springs, and riparian areas.

January 2014 Ashby Memorandum on Water Rights Transfer

The “Seeps, Springs, and Riparian Areas” section of the FEIS states the following conclusions of mitigation effectiveness for the water rights transfer:

“The severance and transfer of water rights on Cienega Creek would not necessarily provide any new or “wet” water in either Lower or Upper Cienega Creek; however, by creating a senior instream flow right where none currently exists, this mitigation measure would provide significant legal protection against future water use that might take water from Cienega Creek, and it would remove legal obstacles to conducting restoration or management activities along Cienega Creek. Cooperating agencies have raised concerns that the sever-and-transfer process that must be undertaken through the ADWR is not guaranteed to be successful and allows for challenges to any transfer of surface water rights. If the water right transfer were not approved, this mitigation would not be protective of Cienega Creek. The exact effects of projects conducted under the conservation fund cannot be known at this time, but these projects would be presumed to be beneficial to riparian resources in some manner, as this is the purpose of the conservation funds. It should also be noted that sufficiency of the mitigation activities on Cienega Creek to offset impacts to jurisdictional WUS, either from transfer of water rights or implementation of conservation funds, has yet to be determined by the USACE.” (FEIS, p. 569)

December 2015 Pima County Memorandum and April 2016 Hudbay Response

As noted in the “Surface Water Quantity” section, several assumptions regarding streamflow in Barrel and Davidson Canyons are also pertinent to seeps, springs, and riparian areas downstream of the mine.

Integrated Hydro Systems Groundwater Modeling Review

As noted in the “Groundwater Quantity” section, the groundwater modeling methodology used in the FEIS is extensive and well documented in the FEIS and project record.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

As noted previously, the effectiveness of mitigation is assessed separately from project-related impacts and cumulative effects. In each resource section in chapter 3 of the FEIS, following the assessment of project-related impacts in the “Environmental Consequences” subsection, there is a “Mitigation Effectiveness” subsection. In this subsection, all applicable mitigation for a given resource is listed and then assessed for its ability to offset or minimize environmental effects.

Sonoita Creek Ranch is included as mitigation under “Surface Water Quantity.” In the FEIS, the actions associated with this mitigation measure (FS-BR-08) were considered to be a required mitigation due to potential inclusion in the CWA 404 permit, as well as inclusion as a conservation measure under ESA Section 7 consultation. The inclusion of the Sonoita Creek Ranch restoration activities as acceptable mitigation under the 404 permit has not yet determined. Regardless, they are still considered to be required mitigation due to their inclusion as conservation measures in the recent Amended Final BO (April 2016).

The FEIS states the following conclusions regarding effectiveness of this mitigation measure with respect to seeps, springs, and riparian areas:

“In the event that restoration is required to mitigate impacts to WUS, Rosemont Copper would use the existing infrastructure and the naturally occurring water from Monkey Spring

(that currently irrigates the agricultural fields) to create riparian and/or wetland habitat within the 115-acre fields. Otherwise water available after the needs of the existing ponds would be discharged onto the floodplain terrace of Sonoita Creek, which is currently an agricultural field, in order to facilitate the passive restoration of riparian habitat.” (FEIS, p. 568)

“The lands proposed for conservation at Sonoita Creek Ranch would be at least partially effective at mitigating riparian resources by preserving and possibly creating new riparian habitat; however, it should be noted that these lands are not located within the analysis area or within the Davidson Canyon/Cienega Creek watershed. It should also be noted that sufficiency of the mitigation on the Davidson Canyon parcels or Sonoita Creek Ranch to offset impacts to jurisdictional WUS has yet to be determined by the USACE.” (FEIS, p. 568)

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Additional wildfires occurred between 2015 and 2016. Wildfires occur in the analysis area annually. New fires do have an effect on watershed runoff characteristics and potentially downstream riparian areas, but in the context of the whole watershed, these fires are generally a small percentage of the drainage area. Past wildfires are recovering over time, and these newer fires will also recover over time. No changes in the overall impacts disclosed in the FEIS have resulted from these wildfires.

January 2014 Ashby Memorandum on Water Rights Transfer

The January 2014 memorandum concerning the water rights transfer states a similar conclusion to that which is already included in the FEIS, namely that there is legal uncertainty associated with the water rights transfer that would affect the ability to mitigate impacts. This document does not represent new information with respect to the FEIS analysis.

December 2015 Pima County Memorandum and April 2016 Hudbay Response

See the “Surface Water Quantity” section for a full discussion of consideration of the new information contained in the Pima County memorandum.

Integrated Hydro Systems Groundwater Modeling Review

See the “Groundwater Quantity” section for a full discussion of the conclusions regarding the Integrated Hydro Systems report; in general, the analysis of this report found that the issues raised in the Integrated Hydro Systems report did not represent new information, as these issues and concerns had been explicitly considered and addressed throughout the groundwater modeling process.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

The FEIS acknowledges that the mitigation proposed under the CWA 404 permit would not necessarily happen, and identifies the remaining effectiveness if this does not happen and only a conservation easement is implemented. In addition, it is clearly noted that these lands are not within the same watershed and would not directly offset any impacts described in the FEIS. As such, the concerns raised in both the July 2015 Kondolf/Ashby memorandum and the June 2016 WET review memorandum do not represent new information with respect to the FEIS analysis.

Summary of Findings

Assessment of 2015–2016 Wildfires

Additional wildfires have occurred in the area in 2015 and 2016 and have resulted in changes to baseline conditions. However, this new information would not result in any change to analysis methodology or conclusions of impacts presented in the FEIS for seeps, springs, and riparian areas.

January 2014 Ashby Memorandum on Water Rights Transfer

With respect to the January 2014 water rights memorandum, the uncertainty associated with the water rights transfer is already acknowledged in the FEIS, and therefore no new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for seeps, springs, and riparian areas.

December 2015 Pima County Memorandum and April 2016 Hudbay Response

With respect to the proportion of streamflow contributed by Barrel Canyon to the Davidson Canyon drainage, the new information presented was reviewed in the context of other available hydrologic information used in the NEPA analysis. The relationship demonstrated by Pima County may be valid for the short time period analyzed; however, it is not sufficient to change the assumptions used in the FEIS, or the analyses that stem from this assumption. This conclusion is based on the fact that only the monsoon season was analyzed and not the full hydrologic year, that similar data from a longer period of record were included in the May 2015 SIR and show contradictory conclusions, and that additional water quality data also raise questions about the connectivity between Barrel Canyon and lower Davidson Canyon stormwater flows. The criticisms in methodology presented by Hudbay Minerals are noted by the Forest Service as further concerns with the memorandum, but did not influence this determination.

As noted in the “Surface Water Quantity” section, with respect to the relationship between shallow alluvial groundwater levels and streamflow, this assumption has already been incorporated into the FEIS analysis and therefore does not represent new information.

With respect to the Pima County memorandum, no new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for seeps, springs, and riparian areas.

Integrated Hydro Systems Groundwater Modeling Review

Based on the analysis of the Integrated Hydro Systems report contained in the project record (Garrett 2016a), no new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for seeps, springs, and riparian areas.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

With respect to the July 2015 Kondolf and Ashby memorandum and the June 2016 WET review memorandum, the uncertainty with respect to implementation of the Sonoita Creek Ranch conservation measures, the potential for the lands to only be set aside for conservation and not restoration, and the location of Sonoita Creek Ranch within a different watershed than the impacts from the mine are already stated in the FEIS. As such, no new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis

methodology, or the conclusions of impacts presented in the FEIS for seeps, springs, and riparian areas.

Biological Resources

Summary of Applicable New Information and/or Changed Conditions

April 2016 Amended Final BO

On May 16, 2014, the USFWS provided the Coronado with its rationale for reinitiation of ESA Section 7 consultation identifying a number of reasons related to listed species. On May 23, 2014, the Coronado Forest Supervisor replied to the USFWS, indicating his intention to reinitiate Section 7 consultation. The Coronado worked with numerous agencies to engage their expertise to improve accuracy and/or reduce uncertainty in the analysis of impacts to species in an SBA. The SBA was submitted to the USFWS on May 26, 2015, and was accepted by USFWS as complete in June 2015. As stated in the May 26 cover letter, the SBA included:

- documentation of an ocelot in the action area;
- new information, including a refined aquatic analysis;
- listing of the northern Mexican gartersnake and the western yellow-billed cuckoo as threatened, with proposed critical habitat;
- the recently identified introduction of the desert pupfish into the action area;
- designation of critical habitat for jaguar; and
- the Mexican gray wolf subspecies, which was listed as endangered, gained its own listing separate from the gray wolf, and concurrently the regulations for the nonessential experimental population of the subspecies changed and the 10J reintroduction area for that subspecies changed to include the entire action area.

The USFWS issued an “Amended Final Reinitiated Biological and Conference Opinion for the Rosemont Copper Mine” (Amended Final BO) for the Rosemont Copper Project on April 28, 2016 (USFWS 2016).

In addition to the above items, during reinitiation of ESA Section 7 formal consultation, Rosemont Copper brought forth three new conservation measures to provide additional mitigation of impacts to threatened and endangered species. These three measures are incorporated into the April 2016 Amended Final BO, issued by USFWS. Consistent with the FEIS (FEIS, appendix B, p. B-3), mitigation and monitoring items required by the Amended Final BO are considered mandatory by the Forest Service, are required as a component of the ROD, and will be incorporated into the final mine plan of operations (MPO). For ease of reference, in the ROD these three new measures have been given unique identifiers similar to those used in appendix B of the FEIS. Descriptions of the measures follow.

Revised Conservation Measure 1 – Staff Funding (FS-BR-29)

Rosemont Copper will provide funding to the Forest Service for one full-time biologist position at a pay grade level of General Schedule (GS) 9 or higher. The full-time biologist position would support the Rosemont Copper Project on all biology-related issues and would be responsible for oversight of implementation and monitoring of all conservation measures, as well as terms and conditions appearing in the BO. Furthermore, this position will incorporate and fulfill the roles previously identified for the biological monitor in the October 30, 2013, BO and FEIS. Funding for this position

will continue until either such time as the Rosemont Copper Project is completed or until all conservation funds have been fully expended, whichever happens later. This conservation measure supplants the biological monitor position described in the “Description of the Proposed Conservation Measures” section in the October 30, 2013, final BO.

The conservation entities to be engaged in the distribution and use of funds tied to the conservation measures consist of those land and resource management agencies with special expertise or knowledge regarding the action area and adjoining areas in southeastern Arizona, as well as wildlife and other resources associated with these conservation measures.

Revised Conservation Measure 2 – Harmful Nonnative Species Management and Removal (FS-BR-30)

To benefit threatened and endangered aquatic species, as well as other native Arizona aquatic species potentially impacted by the Rosemont Copper Project, a harmful nonnative aquatic species management and removal program will be developed and implemented. This program will specifically address the threat of harmful nonnative aquatic vertebrate, invertebrate, and plant species invading the aquatic habitat on NFS lands preferentially in and around Cienega Creek and in the San Rafael–Santa Cruz River Watersheds in the Nogales and Sierra Vista Ranger Districts (but excluding the recreational sport fishery at Parker Canyon Lake). Acreage within these watersheds but outside Forest Service lands will also be considered for inclusion within this program, subject to obtaining consent of the appropriate landowner/management agency and the agreement of the USFWS and the Forest Service.

This conservation measure will augment a program that the Coronado is currently undertaking that will assemble existing data on efforts to control targeted harmful nonnative species, collect additional data, purchase equipment for the removal of harmful nonnative species, mitigate effects on threatened and endangered species as well as other native aquatic species, and develop a plan for continued control efforts within the Sierra Vista Ranger District.

The purpose of this conservation measure is to provide funding for a program with the following goal:

That subbasins within the Cienega Creek and neighboring San Rafael-Santa Cruz River Watersheds in the Nogales and Sierra Vista Ranger Districts, that are of value to the survival and continued recovery of the Gila chub, Gila topminnow, desert pupfish, Chiricahua leopard frog, northern Mexican gartersnake, Huachuca water umbel, and other native aquatic species, are secured and maintained as a whole or nearly whole native community.

Specific components of the harmful nonnative species management and removal program include:

1. Baseline surveys and the preparation of plans and priorities of the program.
2. Harmful nonnatives to be addressed in the program will include, but not be limited to, nonnative fish in the families Centrarchidae (sunfishes and black basses) and Ictaluridae (catfishes), American bullfrogs, any species of crayfish, other nonnative aquatic invertebrates, and nonnative plants invading aquatic habitat and adjoining riparian areas.
3. Baseline surveys will include all known suitable habitat that has legal access or for which legal access is given for Gila chub, Gila topminnow, desert pupfish, Chiricahua leopard frogs, and northern Mexican gartersnakes (and their native prey species (i.e., fish and amphibians)).

4. The plans shall include removal activities of harmful nonnative species using mechanical methods or any other methods, with associated revegetation or restoration where appropriate, which accomplish the repeated removal and control of harmful nonnative species as authorized by the Forest Service.
5. Data, plans, and priorities that arise from this funding will be managed through the Conservation Partners program, with the Forest Service ultimately being responsible for program direction and administration.
6. Funding for this measure will be apportioned as follows:
 - a. Ten (10) percent of the total funding will be provided to the Forest Service within 90 days of approval of the final MPO for use in planning and survey implementation.
 - b. The remainder of the fund will be provided within 30 days of project commissioning, which is defined by the declaration of commercial production for the facility.
 - c. The total amount of funding for these activities will be \$3,000,000.

The Forest Service and Conservation Partners will be responsible for appropriate reporting and financial management of the \$3,000,000 to ensure that the funds are spent in a way that meets the goals specified above.

Revised Conservation Measure 3 – Western Yellow-Billed Cuckoo and Southwestern Willow Flycatcher Habitat Enhancement and Monitoring, Surveying, and Conservation Property Management (FS-BR-31)

Western yellow-billed cuckoos (cuckoo) have been detected along Cienega Creek and Empire Gulch, in areas proposed as critical habitat, and in small numbers in xeroriparian habitat in drainages at the Rosemont Copper Project site. Additionally, small numbers of southwestern willow flycatchers have been detected along upper Cienega Creek and Empire Gulch, in areas that have been designated as critical habitat for the species.

Analysis of the Cienega Creek basin has shown a possibility that, under the range of potential groundwater impacts, habitat for the western yellow-billed cuckoo and southwestern willow flycatcher may be affected by the Rosemont Copper Project. Because of this, Rosemont Copper is interested in providing funding for a habitat improvement, preservation, and replacement program to benefit these species. This program also will provide substantial benefits to other native Arizona species that use riparian habitat.

Habitat replacement, improvement, and survey program

In addition to the elements of the program specified above, habitat replacement, improvement, and surveys funded by this conservation measure will include these specific components:

1. Baseline surveys, preparation of plans, priorities, and implementation of the plans for a southwestern willow flycatcher and western yellow-billed cuckoo habitat replacement, improvement, and survey program.
2. Specific projects will be identified in areas proximal to the Rosemont Copper Project, preferably on Forest Service lands (USFWS also intends that the sites are in areas not subject to drawdown effects). Rosemont Copper will also work with conservation entities as necessary in other appropriate areas.

3. Baseline surveys² for southwestern willow flycatcher and western yellow-billed cuckoo in the action area will include all known suitable habitat that has legal access or for which legal access is given. Proposed habitat monitoring methods will be measurable, repeatable, and capable of detecting changes in extent, density, species composition, canopy height, canopy closure, vertical foliar density, soil moisture, temperature, and humidity of habitat.
4. The program shall include enhancement activities that may include, but not be limited to, the following: planting and maintaining trees native to the local environment, elevating groundwater levels, reducing stressors that affect vegetation establishment and growth, installing rock erosion control structures that slow stream flow, excluding or removing livestock from certain riparian areas, and providing riparian area fencing to prevent damage from humans and livestock.
5. Data, plans, and priorities that arise from this funding will be managed through the Conservation Partners program, with the Forest Service ultimately being responsible for direction and administration.
6. Funding for this measure will be apportioned as follows:
 - Ten (10) percent of the total funding will be provided to the Forest Service within 90 days of approval of the final MPO for use in planning and survey implementation.
 - The remainder of the fund will be provided within 30 days of project commissioning, which is defined by the declaration of commercial production for the facility.
 - The total amount of funding for these activities will be \$1,250,000.

The Forest Service and Conservation Partners will be responsible for appropriate reporting and financial management of the \$1,250,000 to ensure that funds are spent in a way that meets the goals specified above.

First and Second Addenda to Biological Evaluation

Since publication of the BE, the Forest Service has prepared two addenda to the BE for the project (Forest Service 2013; SWCA Environmental Consultants (SWCA) 2016). The initial BE (SWCA 2013) was prepared to support the analyses and effects determinations contained in the FEIS.

The Forest Service must disclose effects on species on the Regional Forester’s sensitive species list. In the absence of a “no-effect” or “beneficial effect” determination, the effects analysis considers two factors: whether the effects cause the species to “trend toward listing [under the Endangered Species Act]”; and/or whether the effects would cause a loss of population viability. According to Forest Service guidance, “population viability” relates to the distribution of a species on lands managed by the Coronado—not rangewide—and is not interchangeable with other definitions for this or related terms (e.g., a population viability assessment is usually a rangewide exercise).

In addition to the threatened and endangered species analyzed in the BE, the BE specifically analyzes species from two lists maintained by Federal agencies of sensitive species: the Forest Service Region 3 Regional Forester’s Sensitive Species List, and the Arizona BLM Sensitive Species List. These lists

² Surveys must be conducted by individuals with the appropriate species-specific section 10(a)(1)(a) Recovery Permits employing protocols acceptable to the USFWS (i.e., Halterman et al. (2015) for yellow-billed cuckoos and Sogge et al. (2010) for southwestern willow flycatchers).

Halterman, M., M.J. Johnson, J.A. Holmes, and S.A. Laymon. 2015. *A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-Billed Cuckoo*. U.S. Fish and Wildlife Techniques and Methods. Sogge, M.K., D. Ahlers, and S.J. Sferra. 2010. *A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher*. U.S. Geological Survey Techniques and Methods 2A-10.

are updated periodically. The original BE (December 2013) used the 2007 version of the Forest Service list and the 2005 version of the BLM list. The first addendum to the BE (December 2013) was prepared to reflect an updated 2013 version of the Forest Service list. The second addendum to the BE (May 2016) was prepared to reflect an updated 2010 version of the BLM list, as well as the same changes that were analyzed in the April 2016 Amended Final BO. The second addendum to the BE also considered an updated population viability analysis for all species contained in the original BE.

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

January 2014 Ashby Memorandum on Water Rights Transfer

See the “Surface Water Quantity” section for the full discussion of this document.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

See the “Surface Water Quantity” section for the full discussion of this document.

Locational Information for Sensitive Plant Species

Hudbay Minerals/WestLand Resources have provided detailed locational information for individuals of sensitive plant species identified during pre-disturbance site surveys, which are required under mitigation measure FS-BR-18. Sensitive plant species with new locational information include beardless chinchweed and Arizona manihot.

Baseline Conditions Considering New Information and Changed Conditions

April 2016 Amended Final BO

The April 2016 Amended Final BO contains updated baseline conditions for many of the listed species, based on additional surveys and information made available after the October 2013 Final BO. Notable changes include the following:

- Baseline conditions for desert pupfish were addressed during consultation after release of information by BLM that indicated the reintroduction and presence of desert pupfish within the Las Cienegas NCA.
- Baseline conditions for northern Mexican gartersnake and western yellow-billed cuckoo were addressed during consultation after these species were listed as threatened.
- Baseline conditions for aquatic species (Gila chub, Gila topminnow, Chiricahua leopard frog, Huachuca water umbel) were updated to reflect the refined hydrological analysis. Note that the refined hydrological analysis was already addressed in the May 2015 SIR.
- Baseline conditions for Gila chub, Gila topminnow, southwestern willow flycatcher, jaguar, ocelot, and lesser long-nosed bat were updated with additional surveys, species occurrence information, or scientific studies. This additional information did not fundamentally change the geographic extent of species’ occurrence within the analysis area.
- Baseline conditions for Chiricahua leopard frog were updated with additional surveys and species occurrence information. This information did indicate some changes in distribution of individual populations within the analysis area, particularly die off in some stock ponds due to disease outbreak. However, this additional information did not fundamentally change the geographic extent of species’ occurrence within the analysis area.

- Baseline conditions for Huachuca water umbel and Pima pineapple cactus remained essentially unchanged since publication of the October 2013 Final BO.

First and Second Addenda to Biological Evaluation

The first and second addenda to the BE contain updated baseline conditions for many of the species. For threatened and endangered species, much of the new information incorporated is identical to that described above for the April 2016 Amended Final BO. For other species, the primary change to baseline conditions was the reconsideration in the second BE addendum of population viability for species based on loss of habitat.

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

January 2014 Ashby Memorandum on Water Rights Transfer

As noted in the “Surface Water Quantity” section, the data presented in the January 2014 water rights memorandum do not change baseline conditions presented in the FEIS.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

As noted in the “Surface Water Quantity” section, the July 2015 Kondolf and Ashby memorandum and the June 2016 WET review memorandum do not result in any changes to baseline conditions, but rather are focused on assumptions of the effectiveness of mitigation.

Locational Information for Sensitive Plant Species

At the time of publication of the FEIS, no individual locations of sensitive plant species known with the exception of Coleman’s crested coralroot, but portions of the site were considered suitable habitat. The identification of locations of individuals of sensitive plant species provides further clarification of where suitable habitat exists in the project area.

Summary of FEIS Analysis Methodology and Impact Conclusions

April 2016 Amended Final BO; First and Second Addenda to Biological Evaluation

The FEIS contains detailed analysis of potential impacts to species listed under the ESA, as well as other special-status species. Analyses of impacts to biological resources in the FEIS include:

- Analysis of impacts from dust, air quality, noise, vibration, and artificial night lighting.
- Analysis of impacts to biophysical features that could affect species, including adits and shafts, talus slopes, seeps and springs, stock tanks, vegetation communities, and vegetation type.
- Analysis of impacts to habitat blocks and wildlife movement corridors.
- Analysis of impacts from traffic.
- Analysis of impacts from loss of acreage of individual species’ habitat.

Assessment of 2015–2016 Wildfires

Wildfires occur in the analysis area annually, and were considered in the FEIS as part of the existing conditions with respect to biological resources.

January 2014 Ashby Memorandum on Water Rights Transfer

The “Biological Resources” section of the FEIS states the following conclusions of mitigation effectiveness for the water rights transfer:

“These measures would partially mitigate for potential impacts to jaguar, ocelot, Chiricahua leopard frog, Gila chub, Gila topminnow, Huachuca water umbel, western yellow-billed cuckoo, and southwestern willow flycatcher, as well as aquatic and riparian vegetation. Refer to the biological opinion in appendix F for further information.” (FEIS, p. 714)

“The proposed mine is a large project that would result in 5,431 to 6,197 acres (depending on which alternative is selected) of direct, long-term, or permanent impacts (habitat loss or alteration) and up to 146,163 acres of indirect, short- or long-term impacts to biological resources. While these mitigation measures can help offset some effects in the project area, significant impacts would remain. Rosemont Copper has worked with other agencies (e.g., Pima County, AGFD) to provide offsite mitigation to help offset some rangewide threats to some species. While these measures would partially compensate or offset for impacts of the mine, they would not effectively offset all impacts, and significant impacts to habitat and some species would remain.” (FEIS, p. 723)

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

As noted previously, the effectiveness of mitigation is assessed separately from project-related impacts and cumulative effects. In each resource section in chapter 3 of the FEIS, following the assessment of project-related impacts in the “Environmental Consequences” subsection, there is a “Mitigation Effectiveness” subsection. In this subsection all applicable mitigation for a given resource is listed and then assessed for its ability to offset or minimize environmental effects.

Sonoita Creek Ranch is included as mitigation under Surface Water Quantity. In the FEIS, the actions associated with this mitigation measure (FS-BR-08) were considered to be a required mitigation due to potential inclusion in the CWA 404 permit, as well as inclusion as a conservation measure under ESA Section 7 consultation. The inclusion of the Sonoita Creek Ranch restoration activities as acceptable mitigation under the 404 permit has not yet been determined. Regardless, the restoration activities are required mitigation due to their inclusion as conservation measures in the recent Amended Final BO (April 2016).

The FEIS states the following conclusions regarding effectiveness of this mitigation measure with respect to biological resources:

“In the event that restoration is required to mitigate impacts to waters of the U.S., Rosemont would utilize the existing infrastructure and the naturally occurring water from Monkey Spring (that currently irrigates the agricultural fields) to create riparian and/or wetland habitat within the 115-acre fields. Otherwise water available after the needs of the existing ponds would be discharged onto the floodplain terrace of Sonoita Creek, which is currently an agricultural field, in order to facilitate the passive restoration of riparian habitat. This mitigation could partially compensate for impacts to wildlife habitat and habitat connectivity, including jaguar, ocelot, Mexican spotted owl, lesser long-nosed bat, Gila chub, Gila topminnow, Chiricahua leopard frog, western yellow-billed cuckoo, and Huachuca water umbel.” (FEIS, p. 716)

“The proposed mine is a large project that would result in 5,431 to 6,197 acres (depending on which alternative is selected) of direct, long-term, or permanent impacts (habitat loss or

alteration) and up to 146,163 acres of indirect, short- or long-term impacts to biological resources. While these mitigation measures can help offset some effects in the project area, significant impacts would remain. Rosemont Copper has worked with other agencies (e.g., Pima County, AGFD) to provide offsite mitigation to help offset some rangewide threats to some species. While these measures would partially compensate or offset for impacts of the mine, they would not effectively offset all impacts, and significant impacts to habitat and some species would remain.” (FEIS, p. 723)

Locational Information for Sensitive Plant Species

For the FEIS analysis, suitable habitat for sensitive plant species was identified based on a Geographic Information System (GIS) spatial analysis that incorporated elevation range, slope aspect, and overall vegetation community. Details of the specific criteria used to define habitat were included in the “Biological Resources” section of Chapter 3 of the FEIS for each sensitive species. With the exception of Coleman’s coralroot, locations of individuals were not incorporated into the FEIS analysis.

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

April 2016 Amended Final BO

The April 2016 Amended Final BO evaluated the potential impacts to threatened and endangered species as well as any proposed or designated critical habitat. The conclusions of the Amended Final BO incorporated the most recent information with respect to baseline conditions for each species, the effects of the proposed action, and all conservation measures brought forward to mitigate impacts to species, including the three new conservation measures. A comparison of the conclusions for each species between the October 2013 Final BO and the April 2016 Amended Final BO is shown in table 1. New information and changed conditions considered in the April 2016 Amended Final BO did not result in any changes to the impact conclusions for any species.

Table 1. Comparison of effects determinations between October 2013 BO and April 2016 BO

Species/Habitat	Effects Determination from October 2013 Final BO	Effects Determination from April 2016 Amended Final BO
Gila chub (<i>Gila intermedia</i>) and designated critical habitat	The proposed action is not likely to jeopardize the continued existence of the Gila and is not likely to destroy or adversely modify Gila chub designated critical habitat nor affect its role in recovery of the species.	The proposed action is not likely to jeopardize the continued existence of the Gila chub and is not likely to destroy or adversely modify Gila chub designated critical habitat or to affect its role in recovery of the species.
Gila topminnow (<i>Poeciliopsis occidentalis occidentalis</i>)	The proposed action is not likely to jeopardize the continued existence of the Gila topminnow.	The proposed action is not likely to jeopardize the continued existence of the Gila topminnow.
Desert pupfish (<i>Cyprinodon macularius</i>)	Not included.	The proposed action is not likely to jeopardize the continued existence of the desert pupfish.

Species/Habitat	Effects Determination from October 2013 Final BO	Effects Determination from April 2016 Amended Final BO
Chiricahua leopard frog (<i>Lithobates chiricahuensis</i>) and designated critical habitat	The action, as proposed, is not likely to jeopardize the continued existence of the Chiricahua leopard frog or adversely modify its designated critical habitat.	The proposed action is not likely to jeopardize the continued existence of the Chiricahua leopard frog and is not likely to destroy or adversely modify designated critical habitat or significantly delay or preclude its role in recovery of the species.
Northern Mexican gartersnake (<i>Thamnophis eques megalops</i>) and proposed critical habitat	Not included.	The proposed project is not likely to jeopardize the continued existence of the northern Mexican gartersnake, and is not likely to adversely modify its proposed critical habitat.
Huachuca water umbel (<i>Lilaeopsis schaffneriana</i> spp. <i>recurva</i>)	The proposed project is not likely to jeopardize the continued existence of the species.	The proposed project is not likely to jeopardize the continued existence of the species.
Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>) and proposed critical habitat	Not included.	The project is not likely to jeopardize the continued existence of the yellow-billed cuckoo and is not likely to destroy or adversely modify yellow-billed cuckoo proposed critical habitat or affect its role in recovery of the species.
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>) and designated critical habitat	The proposed project is not likely to jeopardize the continued existence of the flycatcher, and is not likely to destroy or adversely modify designated flycatcher critical habitat.	The proposed project is not likely to jeopardize the continued existence of the flycatcher, and is not likely to destroy or adversely modify designated flycatcher critical habitat.
Jaguar (<i>Panthera onca</i>) and designated critical habitat	The proposed project is not likely to jeopardize the continued existence of the jaguar, and (conference opinion) the proposed action will not likely destroy or adversely modify proposed critical habitat.	The proposed project is not likely to jeopardize the continued existence of the jaguar and will not likely destroy or adversely modify designated critical habitat.
Ocelot (<i>Leopardus pardalis</i>)	The proposed project is not likely to jeopardize the continued existence of the ocelot.	The proposed project is not likely to jeopardize the continued existence of the ocelot.
Lesser long-nosed bat (<i>Leptonycteris curasoae yerbabuena</i>)	The proposed action is not likely to jeopardize the continued existence of the lesser long-nosed bat.	The proposed action is not likely to jeopardize the continued existence of the lesser long-nosed bat.
Pima pineapple cactus (<i>Coryphantha scheeri</i> var. <i>robustispina</i>)	The Rosemont Copper Project is not likely to jeopardize the continued existence of the Pima pineapple cactus.	The proposed project is not likely to jeopardize the continued existence of the Pima pineapple cactus.

Species/Habitat	Effects Determination from October 2013 Final BO	Effects Determination from April 2016 Amended Final BO
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	USFWS concurs with determination that the proposed action may affect, but will not likely adversely affect , the Mexican spotted owl.	USFWS concurs with determination that the proposed action may affect, but will not likely adversely affect , the Mexican spotted owl.
Mexican gray wolf (<i>Canis lupus baileyi</i>)	Not included.	Not addressed: USFWS communicated in March 2015 that consultation on the effects of the proposed action was not necessary for the non-essential, experimental population of Mexican gray wolf.

First and Second Addenda to Biological Evaluation

The first and second addenda to the BE evaluated the potential impacts to threatened and endangered species, proposed or designated critical habitat, and other species considered sensitive by either the Forest Service or BLM. A comparison of the conclusions for each species between the December 2013 BE, the first BE addendum (December 2013), and the second BE addendum (May 2016) is shown in table 2.

In total, 108 species are considered between the three documents. Of these:

- For 72 species, there was no change in effects determination between the BE/first BE addendum in December 2013 and the second BE addendum in May 2016.
- An additional 15 species were analyzed in the second BE addendum in May 2016 that were not analyzed in the BE/first BE addendum in December 2013. Analysis of all of these species resulted in an effects determination that the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
- There were 12 species no longer considered sensitive species by either Forest Service or BLM that were included in the BE/first BE addendum in December 2013, but dropped from the second BE addendum in May 2016.
- For nine species listed as threatened and endangered, the overall impact analysis did not change between the BE/first BE addendum in December 2013 and the second BE addendum in May 2016, although the language of the effects determination was changed to match Forest Service guidance.

Table 2. Comparison of effects determinations between BE and BE addenda

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Plants			
Pima Indian mallow (<i>Abutilon parishii</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Santa Cruz striped agave (<i>Agave parviflora</i> ssp. <i>parviflora</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Saiya (<i>Amoreuxia gonzalezii</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Lemmon milkweed (<i>Asclepias lemmonii</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Chihuahuan sedge (<i>Carex chihuahuensis</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Cochise sedge (<i>Carex ultra</i> (= <i>C. spissa</i> var. <i>ultra</i>))	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Metcalfé's tick-trefoil (<i>Desmodium metcalfei</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Arid throne fleabane (<i>Erigeron arisolius</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
San Pedro River wild buckwheat (<i>Eriogonum terrenatum</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Bartram stonecrop (<i>Graptopetalum bartramii</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Rutter's false goldenaster (<i>Heterotheca rutteri</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Coleman's crested coralroot (<i>Hexalectris colemanii</i>)	For all action alternatives, the proposed project may impact individuals and could result in a downward trend toward Federal listing as threatened or endangered but is not likely to result in a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals and could result in a downward trend toward Federal listing as threatened or endangered but is not likely to result in a loss of population viability.
Arizona coralroot (<i>Hexalectris spicata</i> var. <i>arizonica</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Lemon lily (<i>Lilium parryi</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Lemmon's lupine (<i>Lupinus lemmonii</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Arizona manihot (<i>Manihot davisiae</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Sycamore Canyon muhly (<i>Muhlenbergia elongata</i> (= <i>M. xerophila</i>))	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Southwestern muhly (<i>Muhlenbergia palmeri</i> (= <i>M. dubioides</i>))	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Beardless chinchweed (<i>Pectis imberbis</i>)	For all action alternatives, the proposed project may impact individuals and could result in a downward trend toward Federal listing as threatened or endangered but is not likely to result in a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals and could result in a downward trend toward Federal listing as threatened or endangered but is not likely to result in a loss of population viability.
Broadleaf ground cherry (<i>Physalis latiphysa</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Chiricahua Mountain brookweed (<i>Samolus vagans</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Nodding blue-eyed grass (<i>Sisyrinchium cernuum</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Lemmon's stevia (<i>Stevia lemmonii</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Sonoran noseburn (<i>Tragia laciniata</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Tumamoc globeberry (<i>Tumamoca macdougalii</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Huachuca water umbel (<i>Lilaeopsis schaffneriana</i> ssp. <i>recurva</i>)	For all action alternatives, the proposed project may affect and is likely to adversely affect the Huachuca water umbel.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Pima pineapple cactus (<i>Coryphantha scheeri</i> var. <i>robustispina</i>)	For all action alternatives, the proposed project may affect and is likely to adversely affect the Pima pineapple cactus.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Amphibians			
Western barking frog (<i>Craugastor augusti cactorum</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Great Plains narrow-mouthed toad (<i>Gastrophryne olivacea</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Lowland leopard frog (<i>Lithobates yavapaiensis</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Chiricahua leopard frog (<i>Lithobates chiricahuensis</i>)	For all action alternatives, the proposed project may affect and is likely to adversely affect the Chiricahua leopard frog and designated critical habitat for the Chiricahua leopard frog.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Invertebrates			
Sunrise skipper (<i>Adopaeoides prittwitzi</i>)	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Cestus skipper (<i>Atrytonopsis cestus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Santa Rita Mountains chlorochroan bug (<i>Chlorochroa rita</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
A cave obligate pseudoscorpion (<i>Tuberochernes ubicki</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Reptiles			
Giant spotted whiptail (<i>Aspidoscelis stictogramma</i> (=A. burti stictogrammus))	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Arizona ridgenose rattlesnake (<i>Crotalus willardi willardi</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Sonoran desert tortoise (<i>Gopherus morafkai</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Reticulate Gila monster (<i>Heloderma suspectum suspectum</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
Sonora mud turtle (<i>Kinosternon sonoriense sonoriense</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Mountain skink (<i>Plestiodon callicephalus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Slevin's bunchgrass lizard (<i>Sceloporus slevini</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Green ratsnake (<i>Senticolis triaspis</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Chihuahuan black-headed snake (<i>Tantilla wilcoxi</i>)	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Desert ornate box turtle (<i>Terrapene ornata</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Northern Mexican gartersnake (<i>Thamnophis eques megalops</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Birds			
Northern goshawk (<i>Accipiter gentilis</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Violet-crowned hummingbird (<i>Amazilia violiceps</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Baird's sparrow (<i>Ammodramus bairdii</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Arizona grasshopper sparrow (<i>Ammodramus savannarum ammolagus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Golden eagle (<i>Aquila chrysaetos</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Northern gray hawk (<i>Asturina nitida maximus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
Western burrowing owl (<i>Athene cunicularia hypugaea</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Common black hawk (<i>Buteogallus anthracinus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
Lucifer hummingbird (<i>Calothorax lucifer</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Northern beardless-tyrannulet (<i>Camptostoma imberbe</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Buff-collared nightjar (<i>Caprimulgus ridgwayi</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Gilded flicker (<i>Colaptes chrysoides</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Broad-billed hummingbird (<i>Cynanthus latirostris</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
American peregrine falcon (<i>Falco peregrinus anatum</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Cactus ferruginous pygmy owl (<i>Glaucidium brasilianum cactorum</i>)	For all action alternatives, the proposed project is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Pinyon jay (<i>Gymnorhinus cyanocephalus</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Whiskered screech owl (<i>Megascops trichopsis</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Gould's wild turkey (<i>Meleagris gallopavo mexicana</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Abert's towhee (<i>Melospiza aberti</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Sulphur-bellied flycatcher (<i>Myiodynastes luteiventris</i>)	Not included.	Due to the broad distribution of this species and based on its relatively secure status, for all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Varied bunting (<i>Passerina versicolor</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Arizona Botteri's sparrow (<i>Peucaea botterii arizonae</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Arizona woodpecker (<i>Picoides arizonae</i>)	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Desert purple martin (<i>Progne subis hesperia</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Elegant trogon (<i>Trogon elegans</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	For all action alternatives, the proposed project may affect but is not likely to adversely affect the Mexican spotted owl and would have no effect on designated critical habitat for the Mexican spotted owl.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	For all action alternatives, the proposed project may affect and is likely to adversely affect the southwestern willow flycatcher and designated critical habitat for the southwestern willow flycatcher.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Yellow-eyed junco (<i>Junco phaeonotus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Fishes			
Gila chub (<i>Gila intermedia</i>)	For all action alternatives, the proposed project, the project may affect and is likely to adversely affect the Gila chub and may affect and is likely to adversely affect designated critical habitat for the Gila chub.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Gila topminnow (<i>Poeciliopsis occidentalis occidentalis</i>)	For all action alternatives, the proposed project, the project may affect and is likely to adversely affect the Gila topminnow.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Desert pupfish (<i>Cyprinodon macularius</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Longfin dace (<i>Agosia chrysogaster</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Mammals			
Northern pygmy mouse (<i>Baiomys taylori ater</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Mexican long-tongued bat (<i>Choeronycteris mexicana</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Pale Townsend's big-eared bat (<i>Corynorhinus townsendii pallescens</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Black-tailed prairie dog (<i>Cynomys ludovicianus</i>)	Not included.	Not included.	For all action alternatives, the proposed project will have no impact on individuals, and is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Banner-tailed kangaroo rat (<i>Dipodomys spectabilis</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.
Spotted bat (<i>Euderma maculatum</i>)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Greater western mastiff bat (<i>Eumops perotis californicus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Allen's lappet-browed bat (<i>Idionycteris phyllotis</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Western red bat (<i>Lasiurus blossevillii</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Western yellow bat (<i>Lasiurus xanthinus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
California leaf-nosed bat (<i>Macrotus californicus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Hooded skunk (<i>Mephitis macroura milleri</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Fringed myotis (<i>Myotis thysanodes</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
Cave myotis (<i>Myotis velifer</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
White-nosed coati (<i>Nasua narica</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Cockrum's desert shrew (<i>Notiosorex cockrumi</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.	Not included.	Not included.
Pocketed free-tailed bat (<i>Nyctinomops femorosaccus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
Big free-tailed bat (<i>Nyctinomops macrotis</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
Fulvous harvest mouse (<i>Reithrodontomys fulvescens</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
Plains harvest mouse (<i>Reithrodontomys montanus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
Yellow-nosed cotton rat (<i>Sigmodon ochrognathus</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	Not included.
Arizona shrew (<i>Sorex arizonae</i>)	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Jaguar (<i>Panthera onca</i>)	For all action alternatives, the proposed project may affect and is likely to adversely affect the jaguar and may affect and is likely to adversely affect jaguar proposed critical habitat.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Lesser long-nosed bat (<i>Leptonycteris curasoae yerbabuena</i>)	For all action alternatives, the proposed project may affect and is likely to adversely affect the lesser long-nosed bat.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.

Species Name	Effects Determination in BE (December 2013)	Effects Determination in First BE Addendum (December 2013)	Effects Determination in Second BE Addendum (May 2016)
Ocelot (<i>Leopardus pardalis</i>)	For all action alternatives, the proposed project may affect and is likely to adversely affect the ocelot.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a loss of population viability.
Mexican gray wolf (<i>Canis lupus baileyi</i>)	Not included.	Not included.	For all action alternatives, the proposed project will have no effect on individuals, and is not likely to result in a loss of population viability.
Snails			
Sonoran talussnail (<i>Sonorella magdalenensis</i>)	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of viability.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.
Succineid snails (all species in Family Succineidae)	Not included.	Not included.	For all action alternatives, the proposed project may impact individuals but is not likely to result in a downward trend toward Federal listing as threatened or endangered or a loss of population viability.

Assessment of 2015–2016 Wildfires

Additional wildfires occurred between 2015 and 2016. Past wildfires have been recovering over time, and these newer fires will also recover over time. The fire locations and relative sizes were reviewed against known habitat for special-status species in the analysis area; none of these fires would have substantial impacts on species or habitats within the analysis area. No changes in the overall impacts disclosed in the FEIS have resulted from these wildfires.

January 2014 Ashby Memorandum on Water Rights Transfer

The concerns regarding the legal uncertainty associated with severance and transfer of water rights is not explicitly stated in the “Biological Resources” section. The conclusion in the FEIS that the mitigation would not completely offset impacts to species and habitat remains a valid conclusion, whether the Cienega Creek water rights transfer occurs or not.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

The FEIS acknowledges that the mitigation proposed under the CWA 404 permit would not necessarily happen, and identifies the remaining effectiveness if this does not happen and only a conservation easement is implemented. The conclusion in the FEIS that the mitigation would not completely offset impacts to species and habitat remains a valid conclusion, whether the mitigation at Sonoita Creek Ranch is implemented as expected or not.

Locational Information for Sensitive Plant Species

The effects determination for each sensitive plant species is contained in the December 2013 BE and the two subsequent addenda; these effect determinations are summarized in table 2. These determinations are based on assessment of suitable habitat, and assume that within suitable habitat individual plants may be present and would therefore be impacted by the project disturbance. Locational information for individuals confirms this assumption and does not result in any change to the effect determination.

Summary of Findings

April 2016 Amended Final BO

With respect to the April 2016 Amended Final BO, new information and changed conditions have resulted in changes to the baseline conditions for several species considered in the FEIS, notably Chiricahua leopard frog, jaguar, and ocelot. However, with the exception of three new species analyzed in the April 2016 Amended Final BO (western yellow-billed cuckoo, northern Mexican gartersnake, and desert pupfish), the effects determinations contained in the April 2016 Amended Final BO are identical to those contained in the October 2013 Final BO. As such, no new information or changed conditions have been identified for these species that would change the conclusions of impacts presented in the FEIS for biological resources.

Western yellow-billed cuckoo and northern Mexican gartersnake were both analyzed in the FEIS, as they were considered sensitive species, and were then listed as threatened after the FEIS was published. The USFWS reached the following conclusions in the April 2016 Amended Final BO:

“The adverse effects that occur in the action area do not reach the scale where recovery of the species would be precluded. Adverse effects are anticipated to be of a small scale in relation to the entire range of the cuckoo, and are unlikely to destroy or adversely modify the critical habitat in the action area to the extent that recovery would be precluded for many of the reasons found in the conclusion and discussion above.” (USFWS 2016, p. 257)

“After reviewing the current status of the northern Mexican gartersnake, the environmental baseline for the action area, the effects of the proposed Rosemont Mine Project to the northern Mexican gartersnake and its primary prey species, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the northern Mexican gartersnake nor destroy or adversely modify its proposed critical habitat.” (USFWS 2016, p. 190)

These conclusions are similar to those reached by the Forest Service in the FEIS for both species: “...all action alternatives may impact individuals but are not likely to result in a downward trend toward Federal listing as threatened or endangered or in a loss of population viability...” (FEIS, pp. 684, 686). The inclusion of these two species in the April 2016 Amended Final BO represents new information or changed conditions, but does not change the conclusion of impacts presented in the FEIS for biological resources.

Unlike western yellow-billed cuckoo and northern Mexican gartersnake, desert pupfish were not analyzed in the FEIS; desert pupfish were introduced by BLM into two locations within the analysis area in July 2013, but this was not disclosed to the Forest Service until mid-2014, after publication of the FEIS. The USFWS reached the following conclusions in the April 2016 Amended Final BO:

“Since the impacts of the proposed action do not affect any natural desert pupfish populations and the action area is small (one site) compared to the range of the species, it is unlikely that the proposed action would cause large-scale physical alteration to the species’ habitat, thus making it unlikely that a tipping point away from recovery would be reached. We believe that desert pupfish will still be present on Las Cienegas NCA 150 years after closure of the mine since adequate waters will be present at multiple sites to support at least 500 overwintering desert pupfish in the metapopulation. We believe this even with the higher temperatures and lower dissolved oxygen levels that are likely to be present then. Dissolved oxygen should only be an issue at Cieneguita Wetlands, and not the other sites where pupfish have been, or may be, released.

The adverse effects that do occur in the action area do not reach the scale where recovery of the species would be delayed or precluded. The effects of the proposed action are not anticipated to reach any tipping point that would preclude the conservation and recovery of the desert pupfish.” (USFWS 2016, pp. 135–136)

While desert pupfish was not analyzed in the FEIS, three other fish species were (Gila chub, Gila topminnow, and longfin dace). The conclusion reached by USFWS in the April 2016 Amended Final BO for desert pupfish is similar to the conclusions reached for the other fish species analyzed in the FEIS.

First and Second Addenda to Biological Evaluation

With respect to the two amendments to the BE, new information and changed conditions have resulted in changes to the baseline conditions for species considered in the FEIS. However, the effects determinations contained in the May 2016 second amendment to the BE are identical to those contained in the BE/first BE amendment from December 2013. The new species not included in the FEIS but analyzed in the second BE amendment are considered new information; however, all conclusions indicate that there is not likely to be a loss of population viability or a downward trend toward listing of the species as threatened or endangered.

Assessment of 2015–2016 Wildfires

Additional wildfires have occurred in the area in 2015 and 2016 and have resulted in changes to baseline conditions. However, this new information would not result in any change to analysis methodology or conclusions of impacts presented in the FEIS for biological resources for the following reasons:

- The FEIS anticipated the ongoing occurrence of wildfires;
- Fires that were analyzed in the FEIS as past fires have recovered to varying degrees, which offsets the occurrence of new wildfires to some extent, just as the 2015–2016 fires will recover over time;
- Given the size and location of the 2015–2016 wildfires, this represents a continuation of a trend that was addressed in the FEIS; and
- The Coronado conducted a GIS analysis of the fire boundaries and acreage against known habitat for sensitive or threatened and endangered species and did not identify any substantial percentage loss to these habitats.

January 2014 Ashby Memorandum on Water Rights Transfer

With respect to the January 2014 water rights memorandum, the uncertainty associated with the water right transfer is already acknowledged in the FEIS, and therefore no new information or changed

conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for biological resources.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

With respect to the July 2015 Kondolf and Ashby memorandum and the June 2016 WET review memorandum, the uncertainty with respect to implementation of the Sonoita Creek Ranch conservation measures, the potential for the lands to only be set aside for conservation and not restoration, and the location of Sonoita Creek Ranch within a different watershed than the impacts from the mine are already stated in the FEIS. As such, no new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for biological resources.

Locational Information for Sensitive Plant Species

The location information for individuals of sensitive plant species provided to the Forest Service confirms that certain species are present and may be impacted by project disturbance. This confirms the assumption contained in the FEIS, the December 2013 BE, and the two BE addenda, and does not result in any changes to effect determinations for these sensitive plant species.

Landownership and Boundary Management

No new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for landownership and boundary management.

Livestock Grazing

No new information or changed conditions was identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for livestock grazing.

Dark Skies

No new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for dark skies.

Visual Resources

Summary of Applicable New Information and/or Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

Baseline Conditions Considering New Information and Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

Summary of FEIS Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Wildfires occur in the analysis area annually, and were considered in the FEIS as part of the existing conditions with respect to visual resources. Wildfires were assessed primarily for their impact to viewsheds along the Arizona National Scenic Trail.

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Additional wildfires that occurred between 2015 and 2016. While new wildfires are apparent on the landscape, they do not violate forest plan scenic integrity objectives. Past wildfires are recovering over time, and these newer fires will also recover over time. No changes in the overall impacts disclosed in the FEIS have resulted from these wildfires.

Summary of Findings

Assessment of 2015–2016 Wildfires

Additional wildfires have occurred in the area in 2015 and 2016 and have resulted in changes to baseline conditions. However, this new information would not result in any change to analysis methodology or conclusions of impacts presented in the FEIS for visual resources.

Recreation and Wilderness

Summary of Applicable New Information and/or Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

Baseline Conditions Considering New Information and Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

Summary of FEIS Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Wildfires occur in the analysis area annually, and were considered in the FEIS as part of the existing conditions with respect to recreation and wilderness. Wildfires were assessed primarily for their impact to specific wilderness areas (Mt. Wrightson Wilderness).

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Additional wildfires occurred in 2015 and 2016. Wildfires may temporarily displace recreational use from the area of the activities while fire suppression activities are ongoing, and, depending on the area, may decrease recreational use until some vegetative recovery has occurred. The newer wildfires are unlikely to result in any substantive change in recreation use or use patterns in the analysis area. None of these fires occurred within wilderness areas.

Summary of Findings

Assessment of 2015–2016 Wildfires

Additional wildfires have occurred in the area in 2015 and 2016 and have resulted in changes to baseline conditions. However, this new information would not result in any change to analysis methodology or conclusions of impacts presented in the FEIS for recreation and wilderness.

Hazardous Materials

No new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for hazardous materials.

Fuels and Fire Management

Summary of Applicable New Information and/or Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

Baseline Conditions Considering New Information and Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

Summary of FEIS Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Wildfires occur in the analysis area annually, and were considered in the FEIS as part of the existing conditions with respect to fire history and trends in fuel loading and fire management.

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

The wildfires that occurred between 2015 and 2016 reduced grass fuels in the areas that were burned. This fuel reduction will be short-lived, as vegetation is expected to recolonize the burned areas. These newer wildfires would result in no measurable change to any analysis factor or impact conclusion for fuels and fire management.

Summary of Findings

Assessment of 2015–2016 Wildfires

Additional wildfires have occurred in the area in 2015 and 2016 and have resulted in changes to baseline conditions. However, this new information would not result in any change to analysis methodology or conclusions of impacts presented in the FEIS for fuels and fire management.

Transportation/Access

No new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for transportation and access.

Noise

No new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for noise.

Public Health and Safety

Summary of Applicable New Information and/or Changed Conditions

Buffalo Solder Electronic Testing Range

In December 2015, concerns were raised with the Coronado about the potential for the Rosemont Copper Project to interfere with military operations associated with the Buffalo Soldier Electronic Testing Range, part of the Fort Huachuca Sentinel Landscape. Through the Sentinel Landscapes Partnership, the Departments of Agriculture, Defense, and the Interior are working with a variety of partners to align resources and implement a comprehensive, multiple-tool approach to promoting and sustaining compatible land uses in a manner that protects nearby military test and training needs.

The Coronado contacted representatives from both Fort Huachuca as well as Davis-Monthan Air Force Base to determine whether there was any potential for impacts to military activities. Representatives from both installations indicated that there would be no impacts to their operations from construction or operation of the Rosemont Copper Project (Garrett 2016b).

Baseline Conditions Considering New Information and Changed Conditions

Buffalo Solder Electronic Testing Range

The baseline conditions for public health and safety described in the FEIS remain valid, with no changes or modifications.

Summary of FEIS Analysis Methodology and Impact Conclusions

Buffalo Solder Electronic Testing Range

There are no changes to the analysis methodology or conclusion of impacts for public health and safety from those described in the FEIS.

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

Buffalo Solder Electronic Testing Range

No new information or changed conditions were identified that would affect the analysis of public health and safety presented in the FEIS.

Summary of Findings

Buffalo Solder Electronic Testing Range

The new information identified regarding the Buffalo Soldier Electronic Testing Range and Sentinel Landscapes Partnership does not result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for public health and safety.

Cultural Resources

Summary of Applicable New Information and/or Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

July 2015 Kondolf/Ashby Memorandum on Sonoita Creek Ranch and June 2016 WET Review Memorandum

Sonoita Creek Ranch was identified in the FEIS as a mitigation measure for cultural resources. The Kondolf and Ashby memorandum raises concerns about implementation of mitigation for aquatic and riparian resources at Sonoita Creek Ranch, but does not contain any indication that lands would not be set aside as conservation lands, which is the benefit for cultural resources. As such, even though Sonoita Creek Ranch is identified as a mitigation for cultural resources, this document does not constitute new information or changed conditions with respect to cultural resources.

Baseline Conditions Considering New Information and Changed Conditions

Assessment of 2015–2016 Wildfires

See the “Air Quality and Climate Change” section for the full discussion of these wildfires.

Summary of FEIS Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Wildfires occur in the analysis area annually, and were considered in the FEIS as part of the existing conditions with respect to cultural resources. Wildfires were assessed primarily for their impact to culturally important plant species.

Consideration of New Information and Changed Conditions in Analysis Methodology and Impact Conclusions

Assessment of 2015–2016 Wildfires

Additional wildfires occurred in 2015 and 2016. Vegetation communities affected by past wildfires are recovering over time, and vegetation communities affected by newer fires will also recover over time. Because of this recovery, it is not likely that any Traditional Cultural Properties or cultural landscapes were permanently impacted. Some of these wildfires may have removed resource collecting areas, but based on the acreage, it is not expected that any resource was substantially reduced or completely eliminated as a result. Existing cultural resource surveys in the project record were reviewed to identify any known archaeological sites within the area affected by these fires. No known archaeological sites are located within the boundaries of the Gunsite Pass, Ojo Blanco, Rosemont #1 or Rosemont #2 fires; several known lithic scatters are located within the boundaries of the Oaktree fire. No changes in the overall impacts disclosed in the FEIS have resulted from these wildfires.

Summary of Findings

Assessment of 2015–2016 Wildfires

Additional wildfires have occurred in the area in 2015 and 2016 and have resulted in changes to baseline conditions. However, this new information would not result in any change to analysis methodology or conclusions of impacts presented in the FEIS for cultural resources.

Socioeconomics and Environmental Justice

No new information or changed conditions were identified that would result in changes to the description of baseline conditions, the analysis methodology, or the conclusions of impacts presented in the FEIS for socioeconomics and environmental justice.

Participants in Review

This Rosemont Copper Project Second SIR was prepared under the supervision of the U.S. Forest Service (Forest Service). The individuals who contributed to the preparation of this document are listed below.

Forest Service

Angela Barclay – Wildlife Program Manager

Art Elek – Fire Prevention Officer

Debby Kriegel – Landscape Architect

David Mehalic - Archaeologist

Greg Olsen – Hydrologist

Mindy Vogel – Minerals Program Manager

Kerwin Dewberry – Forest Supervisor

SWCA Environmental Consultants

Terry Chute – NEPA Consultant

Chris Garrett – Hydrologist, Project Manager

Heidi Orcutt-Gachiri – Technical Editor

Shari Bell – Publication Specialist

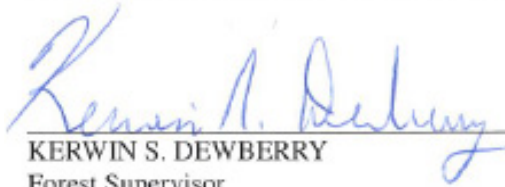
Stacy Campbell – Biologist

Conclusions and Determination

This report has identified and evaluated new information and changed circumstances that are applicable to the analysis conducted for the Rosemont Copper Project FEIS. The interdisciplinary team review conducted for this report considered all resource areas addressed in the FEIS. New information was compared with that addressed in the FEIS, and determinations made regarding whether incorporation of the new information would result in changes to baseline conditions, analysis methodology, or the conclusion of impacts.

While consideration of some new information resulted in changes to some baseline conditions and analysis methodologies, it did not result in major changes to any of the conclusions of impacts disclosed in the FEIS. The scope and range of effects considered in the analysis disclosed in the FEIS remain valid.

Based upon the results of the interdisciplinary team review of new information, I have determined that a supplement or revision of the Rosemont Copper Project EIS is not warranted.



KERWIN S. DEWBERRY
Forest Supervisor
Coronado National Forest

Date July 21, 2016

Literature Cited

- Ashby, J. 2014. *Technical Memorandum – Arizona Water Rights Analysis Support (Order Number EP-G149-00202)*. Golden, Colorado: PG Environmental. January 31.
- Chute, T. 2016. *Process Memorandum to File, Review of 2015–2016 Wildfires*. Tucson, Arizona: SWCA Environmental Consultants Inc. April 25, Revised July 5.
- Garrett, C. 2016a. *Process Memorandum to File, Review of New Information – Integrated Hydro Systems Modeling Review*. Tucson, Arizona: SWCA Environmental Consultants Inc. May 10.
- . 2016b. *Process Memorandum to File, Forest Service Coordination with U.S. Military Installations*. Tucson, Arizona: SWCA Environmental Consultants Inc. May 3.
- Hudbay Minerals. 2016a. Proposed Conservation Measures. In *Letter from Katherine Ann Arnold, Director, Environment, Hudbay Minerals to Mindy Vogel, Coronado National Forest*. Tucson, Arizona: Hudbay Minerals. February 11.
- . 2016b. Clarification of Conservation Measures. In *Letter from Katherine Ann Arnold, Director, Environment, Hudbay Minerals to Kerwin Dewberry, Forest Supervisor, Coronado National Forest*. Tucson, Arizona: Hudbay Minerals. February 24.
- . 2016c. Clarification of Conservation Property Commitments. In *Letter from Katherine Ann Arnold, Director, Environment, Hudbay Minerals, to Kerwin Dewberry, Forest Supervisor, Coronado National Forest*. Tucson, Arizona: Hudbay Minerals. March 18.
- Integrated Hydro Systems, LLC (Integrated Hydro Systems). 2016. *Review of Potential Impacts of the Proposed Rosemont Mine, southeast of Tucson, Arizona on Las Cienegas National Conservation Area (LCNCA) Hydrologic System*. Golden, Colorado: Integrated Hydro Systems, LLC. May 6.
- Kondolf, M., and J. Ashby. 2015. *Technical Memorandum – Conceptual Design for Sonoita Creek, AZ, Technical Review Support (Order Number EP-G149-00241)*. PG Environmental. July 27.
- Powell, B., J. Fonseca, and F. Postillion. 2015. *Memorandum – New Analysis of Stormflow and Groundwater Data from Davidson Canyon: Evidence for Influence of Stormwater Recharge of Groundwater*. December 13.
- SWCA Environmental Consultants (SWCA). 2013. *Biological Evaluation, Rosemont Copper Project, Santa Rita Mountains, Nogales Ranger District*. Prepared for U.S. Forest Service, Coronado National Forest. Tucson, Arizona: SWCA Environmental Consultants. December.
- . 2016. *Second Addendum to the Biological Evaluation Rosemont Copper Project, Santa Rita Mountains Nogales Ranger District*. Prepared for U.S. Forest Service, Coronado National Forest. Tucson, Arizona: SWCA Environmental Consultants. May 26.

- U.S. Fish and Wildlife Service (USFWS). 2016. *Amended Final Reinitiated Biological and Conference Opinion for the Rosemont Copper Mine, Pima County, Arizona*. April 28.
- U.S. Forest Service (Forest Service). 2012. Chapter 10 – Environmental Analysis. FSH 1909.15 – National Environmental Policy Act Handbook.
- . 2013. *Addendum to Biological Evaluation, Rosemont Copper Project Santa Rita Mountains, Nogales Ranger District*. December 13.
- . 2014. Response Letter from Regional Forester. In *Letter from Calvin Joyner, Regional Forester, U.S. Forest Service to Gayle Hartmann, President, Save the Scenic Santa Ritas*. File Code: 1570/2810. Albuquerque, New Mexico: U.S. Forest Service. June 13.
- . 2015. *Supplemental Information Report, Rosemont Copper Project*. May 2015.
- Water and Earth Technologies, Inc. 2016. *Response to Technical Memorandum dated July 27, 2015 by Dr. Mathias Kondolf and James Ashby*. Prepared for Rosemont Copper Company. Fort Collins, Colorado: Water and Earth Technologies, Inc. June 29.
- WestLand Resources, Inc. (WestLand Resources). 2011. *Offsite Riparian Habitat Analysis and Mapping. Project No. 1049.14*. Prepared for Rosemont Copper Company. Tucson, Arizona: WestLand Resources, Inc. August 17.
- . 2012. Trip Report for Cienega Creek Site Visit Conducted on October 26-28, 2011 and November 3, 2011. Project No. 1049.14. Prepared for Rosemont Copper Company. Tucson, Arizona: WestLand Resources, Inc. May 4.
- . 2016a. Summary of Rosemont Copper Company’s Sonoita Creek Ranch Restoration Project; WestLand Project No. 1049.14. In *Letter from Brian Lindenlaub, WestLand Resources, to Jean Calhoun, U.S. Fish and Wildlife Services*. Tucson, Arizona: WestLand Resources. February 18.
- . 2016b. *Riparian Vegetation along Portions of Davidson Canyon Wash and Cienega Creek; Rosemont Copper Project*. Project No. 1049.14. Prepared for Rosemont Copper Company. Tucson, Arizona: WestLand Resources, Inc. February 16.
- WestLand Resources, Water and Earth Technologies and NEIRBO Hydrogeology. 2016. Response to Powell et al. (2015), “New Analysis of Stormflow and Groundwater Data from Davidson Canyon: Evidence for Influence of Stormwater Recharge of Groundwater.” Project Number 1049.91. Prepared for Rosemont Copper Company. April 19.