



ECONOMIC ANALYSIS OF CRITICAL
HABITAT DESIGNATION FOR THE
JAGUAR

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prepared for:

U.S. Fish and Wildlife Service

4401 N. Fairfax Drive

Arlington, VA 22203

prepared by:

Industrial Economics, Incorporated

2067 Massachusetts Avenue

Cambridge, MA 02140

617/354-0074

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LIST OF ACRONYMS AND ABBREVIATIONS

Act	Endangered Species Act
ACUB	Army Compatible Use Buffer
ADOT	Arizona Department of Transportation
AGFD	Arizona Department of Fish and Game
ALRIS	Arizona Land Resource Information System
ASLD	Arizona State Lands Department
AVCA	Altar Valley Conservation Alliance
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMPs	Best Management Practices
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CBP	U.S. Customs and Border Protection
CNF	Coronado National Forest
Corps	US Army Corps of Engineers
DOD	U.S. Department of Defense
DOI	U.S. Department of the Interior
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FR	Federal Register
Freeport	Freeport-McMoRan, Inc.
GIS	Geographic Information Systems
HCP	Habitat Conservation Plan
IEc	Industrial Economics, Incorporated
INRMP	Integrated Natural Resources Management Plan
LRMP	Land and Resource Management Plan
MBG	Malpai Borderlands Group
NAICS	North American Industry Classification System

NEPA	National Environmental Policy Act
NMDOT	New Mexico Department of Transportation
NPS	National Park Service
NRCS	National Resource Conservation Service
NWR	National Wildlife Refuge
OMB	U.S. Office of Management and Budget
RFA	Regulatory Flexibility Act
Rosemont	Rosemont Copper Company
SBA	Small Business Administration
SBREFA	Small Business Regulatory Enforcement Fairness Act
Service	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service

EXECUTIVE SUMMARY

1. The purpose of this report is to evaluate the potential economic impacts associated with the designation of critical habitat for the federally listed jaguar (*Panthera onca*). This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service (Service).
2. The Service published the proposed rule for the designation of critical habitat for the jaguar on August 20, 2012.¹ The Service revised this proposal in 2013 after receiving updated information from the Jaguar Recovery Team. The revised proposed critical habitat designation is presented as six units, totaling approximately 858,137 acres. Units 1, 2, 3, 4, and part of 5 are within Arizona; and Units 6 and part of 5 are in New Mexico. Jaguar habitat continues from southern Arizona and New Mexico to southern South America. The revised proposed critical habitat represents the northernmost section of jaguar habitat and is the only habitat for the species in the United States.²

FRAMEWORK FOR THE ANALYSIS

3. This analysis estimates economic impacts of jaguar conservation efforts associated with the following categories of economic activity: (1) Federal lands management; (2) border protection activities; (3) mining; (4) transportation activities; (5) private residential or commercial development; (6) military activities; (7) livestock grazing and other activities; and (8) Tohono O’odham Nation activities. We estimate economic impacts from 2013 (expected year of final critical habitat designation) to 2032 (a 20-year period of analysis). This 20-year analysis period reflects the maximum amount of time under which future activities and economic impacts associated with the Proposed Rule can be reliably projected, given available data and information.
4. This analysis characterizes all projected impacts as either baseline costs (i.e., those impacts expected to occur absent the designation of critical habitat) or incremental impacts (i.e., those impacts expected to occur as a result of critical habitat designation). The Service provides guidance on distinguishing the incremental impacts of the designation, as described in greater detail in Chapter 2 of this report. In summary, this analysis assigns costs to the baseline or incremental scenarios based on current management and changes in economic activity likely to occur with the proposed critical habitat designation. Given the transient nature of the jaguar, project proponents are compelled to take steps to protect the jaguar even without critical habitat in areas considered both occupied and unoccupied by the Service. The Service believes that

¹ 2012 Proposed critical habitat 77 FR 50214 *et seq.*

² 2012 Proposed critical habitat 77 FR 50215; Email communication with U.S. Fish and Wildlife Service, April 22, 2013.

conservation efforts required to avoid jeopardy to the species will be similar to those required to avoid adverse modification of critical habitat, except in cases where an activity “could create a situation in which a unit of critical habitat could become inaccessible to jaguars. The loss of one critical habitat unit would not constitute jeopardy to the species, but it could constitute destruction or adverse modification.”³

Key Findings

Quantified incremental impacts anticipated to result solely from jaguar critical habitat designation are \$4.2 million, in present value terms over the next 20 years. The annualized incremental impacts of critical habitat are \$370,000. These costs are comprised of administrative costs, as well as conservation costs associated with mining activities at the Rosemont mine in Unit 3. The types of conservation measures considered likely to be requested include conservation recommendations in the final 2013 biological opinion for the Rosemont mine. Information is not available to fully quantify all costs of implementing these conservation measures.

Other potential impacts include:

- **Mining and related transportation infrastructure.** While anticipated conservation efforts due to jaguar critical habitat would not preclude mining activities in critical habitat areas, the potential exists for mining companies to choose not to proceed to production due to the designation of critical habitat. If this were to occur, economic activity that would have been associated with the mines would not occur. Industry estimates of future mine productivity suggest that mines in proposed critical habitat areas could represent over a billion dollars in gross domestic product and over 9,000 jobs nationwide.
- **Grazing.** It is possible that some ranchers may withdraw applications for NRCS funding following jaguar critical habitat in order to avoid any potential obligations to consult with the Service. While such actions would result in reduced income for these ranchers, the NRCS funds would likely be reallocated elsewhere in the region.
- **Tohono O’odham Nation.** The Nation is concerned critical habitat could affect the Nation’s ability to manage natural resources on their sovereign lands. In addition, although the Tohono O’odham Nation does not have immediate plans to develop the area proposed as critical habitat, numerous activities occur within this area, including transportation and development associated with U.S. Customs and Border Control, activities at the Kitt Peak National Observatory, and construction of communication towers.

Key Uncertainties:

- ***The number and location of future projects in proposed critical habitat areas are often unknown.*** We estimate the number of future actions that may result in consultation based on interviews with land managers, available data on activity locations and land ownership, and past history of consultation by activity type. To the extent that future actions differ from past actions, our analysis could overestimate or underestimate costs.
- ***Incremental project modifications beyond what would have been recommended under the baseline to avoid jeopardy are generally unlikely, unless a project is likely to permanently alter habitat or sever connectivity to Mexico.*** The Service and a number of land managers agree that few changes to recommendations resulting from consultations in response to critical habitat designation are expected. However, to the extent that additional conservation efforts are undertaken for critical habitat, estimates of incremental impacts would be understated in this report.

³ U.S. Fish and Wildlife Service. August 28, 2012. *Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar*. Letter to Jennifer Baxter from Steven L. Spangle, p. 15.

KEY FINDINGS

5. Exhibit ES-1 summarizes the total impacts likely to occur if all of the units proposed are designated as critical habitat. Quantified incremental impacts anticipated to result from this designation are \$4.2 million over the 20 years following the designation in present value terms assuming a seven percent discount rate. If we assume the social rate of time preference is three percent, quantified incremental impacts increase to \$5.6 million over 20 years in present value terms. The annualized incremental impacts of critical habitat are estimated to be \$370,000, regardless of the discount rate assumption.
6. Absent the designation of critical habitat, efforts are likely to be undertaken to protect the jaguar based on its status as a listed species under the Act, other endangered and threatened species in the area, and general conservation measures by land managers. Depending on the discount rate applied, we estimate that these baseline costs will range from \$2.8 million to \$3.9 million in the first 20 years, with a seven and three percent discount rate, respectively. On an annualized basis, baseline impacts are likely to range from \$240,000 to \$250,000 depending on the discount rate assumption. Additionally, many baseline measures that benefit the jaguar, such as maintenance of habitat and open space, conservation measures for other species, monitoring, and more are not quantified in this analysis due to a lack of cost data on these actions.

EXHIBIT ES-1. SUMMARY OF FORECAST QUANTIFIED ECONOMIC IMPACTS, 2013 TO 2032 (2013\$)

DISCOUNT RATE ASSUMPTIONS	PRESENT VALUE 2013 - 2032	ANNUALIZED
INCREMENTAL IMPACTS		
7%	\$4.2 million*	\$370,000
3%	\$5.6 million*	\$370,000
BASELINE IMPACTS		
7%	\$2.8 million*	\$240,000
3%	\$3.9 million*	\$250,000
Note: Impacts are estimated for the time period 2013 through 2032 (20 years from anticipated publication of the final rule). *Estimates include our best estimate of potential costs, and do not include potential upper bound scenario developed for mining activities.		

7. Exhibit ES-2 shows the distribution of incremental and baseline impacts across proposed critical habitat units (in the remainder of the Executive Summary, impacts are presented assuming a seven percent discount rate; see Appendix B for values assuming a three percent discount rate).

EXHIBIT ES-2. FORECAST BASELINE AND INCREMENTAL IMPACTS BY UNIT AND SUBUNIT, 2013 TO 2032 (2013\$, SEVEN PERCENT DISCOUNT RATE)

UNIT	UNIT NAME	BASELINE IMPACTS		INCREMENTAL IMPACTS	
		PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	Baboquivari-Coyote Subunit	\$250,000	\$22,000	\$44,000	\$3,900
1b	Southern Baboquivari Subunit	\$140,000	\$12,000	\$21,000	\$1,900
2	Atascosa Unit	\$310,000	\$27,000	\$47,000	\$4,100
3	Patagonia Unit*	\$1,600,000	\$140,000	\$4,000,000	\$350,000
4a	Whetstone Subunit	\$27,000	\$2,400	\$17,000	\$1,500
4b	Whetstone-Santa Rita Subunit	\$6,300	\$550	\$3,600	\$310
4c	Whetstone-Huachuca Subunit	\$190,000	\$17,000	\$6,100	\$540
5	Peloncillo Unit	\$160,000	\$15,000	\$39,000	\$3,400
6	San Luis Unit	\$87,000	\$7,700	\$2,700	\$240
Total		\$2,800,000	\$240,000	\$4,200,000	\$370,000

*Does not include upper bound scenario for mining activities.

DISCUSSION OF IMPACTS TO SPECIFIC ECONOMIC ACTIVITIES

8. Exhibit ES-3 illustrates quantified incremental impacts by activity. Of the \$370,000 in annualized incremental impacts, conservation activities associated with mining activities are the largest component, followed by administrative costs. Other potential impacts that could not be adequately quantified due to uncertainty are described in Exhibit ES-3. These include potential impacts to Tribal lands, NRCS grants, transportation activities, as well as an upper bound mining scenario in which mining activities do not occur as a result of critical habitat designation. In the following sections, we discuss each category of economic activity shown in Exhibit ES-3 in greater detail.

**EXHIBIT ES-3. SUMMARY OF FORECAST INCREMENTAL IMPACTS BY ACTIVITY, 2013 TO 2032
(2013\$, SEVEN PERCENT DISCOUNT RATE)**

ACTIVITY	PRESENT VALUE	ANNUALIZED	PERCENT OF TOTAL IMPACTS	POTENTIAL ADDITIONAL IMPACTS
Federal lands management	\$180,000	\$16,000	4.4%	--
Border protection	\$17,000	\$1,500	0.4%	--
Mining	\$3,900,000	\$340,000	92%	<ul style="list-style-type: none"> If mining companies choose not to proceed to production due to the designation of critical habitat, economic activity that would have been associated with the mines would not occur. Industry estimates of future mine productivity suggest that mines in proposed critical habitat areas could represent over a billion dollars in gross domestic product and over 9,000 jobs nationwide.
Transportation	\$5,900	\$520	0.1%	<ul style="list-style-type: none"> If mining plans move forward, changes to planned road improvements could occur that themselves could result in conservation efforts for jaguar that are not captured in this analysis.
Development	\$0	\$0	0%	--
Military	\$20,000	\$1,700	0.5%	--
Grazing	\$24,000	\$2,100	0.6%	<ul style="list-style-type: none"> It is possible that some ranchers may withdraw applications for NRCS funding following jaguar critical habitat in order to avoid any potential obligations to consult with the Service.
Other	\$82,000	\$7,300	2.0%	--
Tribal	Unknown	Unknown	Unknown	<ul style="list-style-type: none"> Administrative or project modification costs associated with future projects on Tohono O'odham Nation lands. Negative impacts on the Nation's ability to manage its lands independent of Federal oversight.
Total:	\$4,200,000	\$370,000	100%	--
Note: Totals may not sum due to rounding.				

Border Protection

9. U.S. Customs and Border Protection (CBP) reports that the agency already considers potential impacts of its operations on jaguar in all proposed critical habitat units. Following critical habitat designation, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (beyond consideration of whether the actions are likely to jeopardize the continued existence of the species). The Service has stated that projects which alter the essential physical or biological features to an extent that appreciably reduces the conservation value of the critical habitat or sever connectivity to Mexico have the potential to result in adverse modification of critical habitat. CBP does not currently anticipate that planned activities in critical habitat areas will cause permanent changes to landscape or sever connectivity to Mexico. As such, planned actions are not anticipated to result in adverse modification of critical habitat designation. Therefore, CBP does not anticipate that jaguar critical habitat will change the outcome of future section 7 consultations regarding jaguar and its habitat associated with border operations in proposed critical habitat areas. As such, quantified incremental costs are limited to administrative costs of consultation.
10. Conservation efforts expected under the baseline are anticipated to occur for jaguar, both as recommended through section 7 consultation, and otherwise under CBP's existing best practices guidelines. Such conservation efforts are likely to include monitoring for jaguars, directing night-time lighting, limiting public access to new roads, closing old roads, and closing or restoring unauthorized roads in or near jaguar movement corridors to help offset increase in improved or new roads at a ratio of 2:1. While specific future conservation efforts are unknown, we utilize available data on past conservation efforts to estimate that CBP will spend approximately \$48,000 per year on jaguar monitoring efforts, as well \$312,000 per consultation on other actions. Using the past consultation as a guide to the number of future actions, we anticipated that in total, using a seven percent discount rate, baseline costs will be \$770,000 over 20 years, or \$68,000 annualized (2013 dollars), related to approximately two formal consultations over the next 20 years. Because some conservation efforts could not be quantified (e.g. costs of directing nighttime lighting or closing unauthorized roads), these estimates may be somewhat understated. Incremental costs, which are estimated to include the additional administrative costs of considering critical habitat in consultation, are anticipated to be \$17,000, or \$1,500 annualized (2013 dollars).

Mining

11. Two large-scale mining projects, the Rosemont Copper Project and the Hermosa Project, are proposed in critical habitat Unit 3. Both projects have the potential to reduce connectivity to Mexico, and thus have the potential to require substantial conservation measures to avoid adverse modification of critical habitat. This unit is considered occupied, and the jaguar has been considered in previous consultations for mining operations. As a result, both baseline and incremental impacts may occur in this unit.
12. We estimate costs of the conservation measures requested in the recent biological opinion for the Rosemont mine, issued in October 2013, which includes multiple species in

addition to the jaguar. Based on the biological opinion, baseline conservation efforts that may benefit the jaguar are likely to include:

- Carnivore species monitoring (approximately \$100,000 annually);⁴
- Lighting mitigation through the adoption of alternative lighting plans; and
- Weekly road-kill monitoring.

In addition to these efforts, the biological opinion identifies actions that would appear to benefit jaguar critical habitat in particular. The costs of these incremental efforts are likely to include:

- An unknown amount for spring restoration and revegetation of the reclamation area;
- \$150,000 annually for management of offsetting conservation lands on Sonoita Creek Ranch; and
- Approximately \$72,000 annually and \$120,000 annually for management of offsetting conservation lands on Davidson Canyon Watershed parcels and Helvetia Ranch North, respectively, assuming the per-acre management costs are similar to those on Sonoita Creek Ranch.⁵

The biological opinion notes that some of these efforts, including the management of conservation lands, will be undertaken to benefit multiple species, in addition to the jaguar. Therefore, these costs may overstate the incremental impacts of jaguar critical habitat designation alone.

13. We also consider a second scenario, in which the Rosemont mine would have gone forward, but chooses not operate due to the designation of critical habitat for jaguar. We quantify the potential loss in value-added from employment, revenue, and potential market impacts, drawing on an existing study of the expected economic contribution of the mines. Based on this study, for the Rosemont mine, these impacts may include the loss of \$722 million in gross regional product annually at the local level, \$872 million annually at the State level, or \$1.43 billion annually at the national level. In addition, benefits associated with the estimated 494 direct jobs (approximately 9,043 direct and indirect jobs nationwide) created by the mine could be lost.⁶ For the Hermosa Project, these impacts may include up to \$91 million annually in estimated benefits, accounting

⁴ U.S. Fish and Wildlife Service. Final Biological and Conference Opinion for the Rosemont Copper Mine, Pima County, Arizona. October 30, 2013.

⁵ U.S. Fish and Wildlife Service. Final Biological and Conference Opinion for the Rosemont Copper Mine, Pima County, Arizona. October 30, 2013.

⁶ L. William Seidman Research Institute, W.P. Carey School of Business, Arizona State University. "An Assessment of the Economic Impacts of the Rosemont Copper Project on the Economies of the Cochise/Pima/Santa Cruz Counties Study Area, the State of Arizona, and the United States using the REMI Regional Economic Forecasting Model." May 2012.

for the costs of production and tax responsibilities.⁷ While forecasting the specific volume of lost economic value is difficult, it is clear that economic impact of a decision not to open either mine would be large, particularly at the regional and State level.

14. We also forecast \$66,000 in present value baseline administrative impacts and \$22,000 in present value incremental administrative costs associated with section 7 consultations for the two planned mining projects, mineral explorations, and necessary amendments to the Coronado National Forest management plan to allow large-scale mining activity.

Federal Lands Management

15. The U.S. Bureau of Land Management (BLM), U.S. Forest Service (USFS), U.S. National Park Service (NPS), and Service land managers in proposed critical habitat areas state that they already consider potential impacts to jaguar when conducting activities within proposed critical habitat areas. The Service has stated that projects which cause permanent changes to landscape or sever connectivity to Mexico have the potential to result in adverse modification of critical habitat. However, for activities other than mining (which is discussed in a separate chapter), Federal agencies do not anticipate that planned activities in critical habitat areas will cause permanent changes to landscape or sever connectivity to Mexico. As such, planned actions are not anticipated to result in adverse modification of critical habitat designation. Therefore, we do not anticipate that the proposed designation will change the outcome of future section 7 consultations on Federal lands management regarding jaguar and its habitat. As such, quantified costs are limited to administrative costs of consultation. Using a seven percent discount rate, baseline costs are \$200,000, or \$18,000 annualized (2013 dollars), and incremental costs are \$180,000, or \$16,000 annualized (2013 dollars).

Transportation Activities

16. Arizona Department of Transportation (ADOT) already considers potential impacts of its projects on jaguar in the three Arizona counties where critical habitat for the jaguar is proposed.⁸ No major roads intersect the proposed critical habitat area in New Mexico. While the construction of new roads has the potential to sever connectivity of jaguar habitat, no such projects are planned in critical habitat areas in the foreseeable future.
17. We estimate that approximately two formal consultations and seven technical assistance efforts will occur related to minor transportation projects over the next 20 years in proposed critical habitat areas. The Service and ADOT do not anticipate that jaguar critical habitat will change the outcome of these future section 7 consultations. Therefore, quantified incremental costs are limited to administrative costs of considering potential critical habitat impacts in future consultations. Incremental costs are estimated to be \$5,900, or \$520 annualized (2013 dollars).

⁷ The Hermosa Project Preliminary Economic Assessment reports the undiscounted net present value of the mine as \$1.027 billion. For consistency with other costs presented in this analysis, we annualize that value at a seven percent discount rate over 20 years. (M3 Engineering & Technology Corporation. "Hermosa Project Preliminary Economic Assessment - Santa Cruz County, Arizona." November 12, 2012.)

⁸ Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

18. Baseline costs include costs associated with constructing a wildlife corridor for multiple species, including antelope and deer, but that may also benefit the jaguar. Baseline costs also include administrative costs. Baseline costs are estimated at \$390,000, or \$34,000 annualized (2013 dollars), discounted at seven percent.

Development

19. The vast majority of the 129,246 acres of privately owned lands proposed as jaguar critical habitat are rural. County planners state that these areas are unlikely to be developed in the foreseeable future, with the exception of areas around Patagonia, Arizona in Unit 3 and on the eastern border of Unit 2. However, even if these areas are developed, they may not have a Federal nexus for consultation. The most likely nexus for development projects is typically through Corps' section 404 Clean Water Act permitting process, and the proposed designation is unlikely to require such permits due to its dryland (desert) habitat. As such, future consultations related to residential and commercial development activities are not currently anticipated in proposed critical habitat areas. No incremental impacts of critical habitat designation on residential or commercial development are forecast.
20. Even absent critical habitat designation for jaguar, some private lands in Unit 1 may be purchased and set aside for conservation as mitigation through the Conservation Lands System for development occurring outside of critical habitat areas in more rural areas. These actions may benefit the jaguar even absent critical habitat designation. However, costs of these conservation actions are not quantified for purposes of this analysis.

Military

21. While the jaguar is generally not present at Fort Huachuca in Unit 3 and Subunit 4c, the Department of Defense (DOD) is aware that the species can be present and has incorporated the species into its management planning. Therefore, the Service and DOD do not anticipate that jaguar critical habitat will change the outcome of future section 7 consultations regarding the jaguar and its habitat associated with operations at Fort Huachuca.
22. Because management of the jaguar is passive in nature (i.e. no specific changes to management or operations at Fort Huachuca are anticipated to accommodate jaguar conservation), the cost of conservation efforts under the baseline are not quantified. As such, both baseline and incremental costs are limited to the administrative costs of consultation. Using a seven percent discount rate, baseline costs are estimated to be \$10,000, or \$900 annualized over the next 20 years (2013 dollars), and incremental costs are \$20,000, or \$1,700 annualized (2013 dollars).

Grazing

23. In general, most private and State lands in proposed critical habitat for the jaguar are currently used for agricultural production, most commonly for livestock grazing. These activities do not typically require Federal permitting or funding for operation. However, many ranchers receive some funding from NRCS, often for conducting range improvements or conservation activities. While consultations on NRCS activities are rare,

several public commenters as well as NRCS have noted that some ranchers may withdraw applications for NRCS funding following jaguar critical habitat designation in order to avoid any potential obligations related to consultations between NRCS and the Service. If this effect resulted from critical habitat designation, it would be considered incremental. However, the likelihood of such withdrawals is unknown. While such actions would result in reduced income for these ranchers, the NRCS funds would likely be reallocated elsewhere in the region.

24. At least two substantial conservation efforts have been initiated by ranchers under the baseline in an effort to obtain an incidental take permit for the jaguar, including the Malpai Borderlands Group HCP as well as the Altar Valley Conservation Alliance. Most efforts of this group involve maintaining natural landscape and open space. These efforts are not quantified for purposes of this analysis. Total administrative baseline impacts to grazing and agriculture are \$14,000, or \$1,200 annualized over the next 20 years (2013 dollars). Incremental costs, including administrative costs of consultation, are \$24,000, or \$2,100 annualized over the next 20 years (2013 dollars).

Tribal Activities

25. Approximately 51,308 acres of lands belonging to the Tohono O'odham Nation are included within proposed Unit 1a and 26,759 acres are included within proposed Unit 1b. Communication with the Tohono O'odham Nation indicated that of most concern is the potential impact that the designation of critical habitat could have on the Nation's ability to manage natural resources on their sovereign lands. Due to the trust relationship between the United States and Tribes, a significant number of Tribal activities involve Federal funding or oversight that serve as a nexus for section 7 consultation. The Tohono O'odham Nation does not have immediate plans to develop the area proposed as critical habitat. However, the Nation expressed some concern that potential development within the communities of Fresnal Canyon and Pan Tak may be affected. Because any potential impacts on these communities is uncertain, this analysis is not able to forecast costs associated with Tribal activities. However, this analysis notes that unquantified impacts to Tribal sovereignty and cultural resources may occur. We also note that a limited number of non-Tribal entities currently conduct activities on Nation lands, including CBP and Kitt Peak National Observatory.

Other Activities

26. Limited other activities occur within the proposed critical habitat area. We use historical rates of consultation for activities not described above to determine future rates of consultation for other activities. Agencies involved in these consultations have included: the Federal Energy Regulatory Commission (FERC), U.S. Department of Energy, the U.S. Army Corps of Engineers (Corps), Arizona Department of Environmental Quality, the Arizona Department of Water Resources, the U.S. Environmental Protection Agency, the U.S. Department of Agriculture (USDA), the Federal Communications Commission, the Animal and Plant Health Inspection Service, the Federal Aviation Administration, the Federal Emergency Management Agency, and other Federal and non-Federal agencies. Due to limited additional conservation efforts resulting from consultation, we estimate

only administrative costs of consultation. Baseline impacts are \$180,000, or \$16,000 annualized over the next 20 years (2013 dollars), and incremental impacts are \$82,000, or \$7,300 annualized over the next 20 years (2013 dollars).

POTENTIAL BENEFITS

27. The primary purpose of this rulemaking is to enhance conservation of the jaguar. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance to Federal agencies on best practices for preparing economic analyses of proposed rulemakings, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research. Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking. In this report, we include a qualitative description of the categories of benefits potentially resulting from the listing and the designation and indicate the units where such benefits may occur.

IMPACTS TO SMALL ENTITIES AND THE ENERGY INDUSTRY

28. Appendix A of this report includes an analysis of the distributional impacts of the proposed critical designation on small entities and the energy industry. Exhibit ES-4 presents the results of the threshold analysis developed to support the Service's determination regarding whether the proposed rule will have a significant economic impact on a substantial number of small entities, as required by the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).
29. In addition, Executive Order 13211 requires agencies to prepare and submit a "Statement of Energy Effects" for all "significant energy actions." As described in that appendix, the proposed rule is unlikely to increase the cost of energy production in the U.S. in excess of one percent.

EXHIBIT ES-4. RFA/SBREF A THRESHOLD ANALYSIS RESULTS SUMMARY

ACTIVITY	INDUSTRY (NAICS CODES)	SMALL ENTITY SIZE STANDARD (MILLIONS OF DOLLARS)	TOTAL NUMBER OF ENTITIES	NUMBER OF SMALL ENTITIES	NUMBER OF AFFECTED SMALL ENTITIES ¹ (PERCENT OF TOTAL SMALL ENTITIES)	INCREMENTAL ECONOMIC IMPACTS TO SMALL BUSINESSES ²	IMPACTS AS % OF ANNUAL REVENUES ³																																																
Transportation	Highway, Street and Bridge Construction (237310)	33.5	120	110	9 (7%)	\$875 to \$7,875 ⁴	0.09%																																																
	Other Heavy and Civil Engineering Construction (237990)	33.5	30	28				Agriculture and Grazing	Beef Cattle Ranching and Farming (112111)	0.75	80	74	0 (0%)	\$0 per entity ⁵	0%	Cotton Farming (115111)	0.75	3	1	Mining	Iron Ore Mining (212210)	500 employees	0	0	4 (13%)	\$875 to \$3,500 ⁶	-	Gold Ore Mining (212221)	500 employees	6	6	Silver Ore Mining (212222)	500 employees	1	1	Lead Ore and Zinc Ore Mining (212231)	500 employees	6	6	Copper Ore and Nickel Ore Mining (212234)	500 employees	33	8	Uranium-Radium-Vanadium Ore Mining (212291)	500 employees	0	0	All Other Metal Ore Mining (212299)	500 employees	0	0	Support Activities for Metal Mining (213114)	7	9	8
Agriculture and Grazing	Beef Cattle Ranching and Farming (112111)	0.75	80	74	0 (0%)	\$0 per entity ⁵	0%																																																
	Cotton Farming (115111)	0.75	3	1				Mining	Iron Ore Mining (212210)	500 employees	0	0	4 (13%)	\$875 to \$3,500 ⁶	-	Gold Ore Mining (212221)	500 employees	6	6		Silver Ore Mining (212222)	500 employees	1	1				Lead Ore and Zinc Ore Mining (212231)	500 employees	6	6	Copper Ore and Nickel Ore Mining (212234)	500 employees	33	8	Uranium-Radium-Vanadium Ore Mining (212291)	500 employees	0	0	All Other Metal Ore Mining (212299)	500 employees	0	0	Support Activities for Metal Mining (213114)	7	9	8	Support Activities for Nonmetallic Minerals, except fuels (213115)	7	3	3				
Mining	Iron Ore Mining (212210)	500 employees	0	0	4 (13%)	\$875 to \$3,500 ⁶	-																																																
	Gold Ore Mining (212221)	500 employees	6	6																																																			
	Silver Ore Mining (212222)	500 employees	1	1																																																			
	Lead Ore and Zinc Ore Mining (212231)	500 employees	6	6																																																			
	Copper Ore and Nickel Ore Mining (212234)	500 employees	33	8																																																			
	Uranium-Radium-Vanadium Ore Mining (212291)	500 employees	0	0																																																			
	All Other Metal Ore Mining (212299)	500 employees	0	0																																																			
	Support Activities for Metal Mining (213114)	7	9	8																																																			
	Support Activities for Nonmetallic Minerals, except fuels (213115)	7	3	3																																																			

Notes:

1. To estimate the number of affected small entities, this analysis assumes one small entity per forecast section 7 consultation. For Agriculture and Grazing, this assumes one small entity per NRCS funding instance.
 2. For these activities, we conservatively estimate that all administrative costs of consultation will be incurred by a small entity in a single year. Therefore, we use the total, undiscounted third party incremental costs of a formal consultation.
 3. Annual revenues are estimated using Risk Management Association (RMA), *Annual Statement Studies: Financial Ratio Benchmarks 2012 to 2013*, 2012. For each NAICS code, RMA provides the net sales and the number of entities falling within several sales categories: \$0 to \$1 million, \$1 to 3 million, \$3 to \$5 million, \$5 to 10 million, or \$10 to \$25 million. Based on the number of entities and total net sales falling within each sales category, we developed an estimate of the weighted average net sales (revenues) per small entity: for transportation related firms, annual revenues were estimated to be approximately \$8.6 million; for companies involved in agriculture and grazing, revenues are estimated at \$430,000 annually; for mining firms, annual revenue information was not available, but due to the highly capitalized nature of the mining industry, mining firms are assumed to have high annual revenues such that per entity impacts of \$2,625 resulting from the designation of critical habitat are likely to be insignificant.
 4. We are uncertain in what year consultations and technical assistance requests on transportation activities will occur over the next 20 years. For the purposes of this analysis, we assume affected small entities will participate in approximately nine consultations or technical assistance requests over 20 years, or less than one per year. However, if we assume that a single small entity participates in multiple formal consultations in a single year, the administrative costs of such activity are still likely to be less than one percent of annual tax revenues (e.g., nine consultations x \$875/\$9,000,000 = 0.09 percent of annual revenues).
 5. Potential impacts related to NRCS funding are not quantified.
 6. We are uncertain in what year consultations on mining will occur over the next 20 years. For the purposes of this analysis, we assume affected small entities will participate in approximately four consultations over 20 years, one of which will be associated with the Hermosa Project and will involve Wildcat Silver Corporation. However, if we assume that a single small entity participates in multiple consultations in a single year, the administrative costs of such activity are still likely to be less than one percent of annual revenues. Although data on annual revenues for mining companies were unavailable, due to the highly capitalized nature of the mining industry companies involved in mining operations are likely to produce revenues large enough that the cost of undertaking three consultations in a single year would likely be less than one percent of annual revenues (e.g., four consultations x \$875 = \$3,500. \$3,500 represents one percent of annual revenues of \$350,000. Mining companies are likely to produce revenues of greater than \$350,000 annually).
- Source:** Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers," on January 3, 2013.

KEY SOURCES OF UNCERTAINTY

30. At the end of Chapter 2 and activity-specific chapters where specific situations are highlighted, we include a discussion of the key sources of uncertainty and major assumptions affecting the calculation of impacts.
31. In addition, critical habitat is primarily protected through section 7 of the Act, which requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or adversely modify critical habitat. For each activity, we discuss the potential for a Federal nexus to exist, compelling consultation under section 7 with the Service. We assume a nexus is likely where a consultation has occurred for the jaguar in the past and based on conversations with land managers.
32. Finally, in each section, we make assumptions about the typical conservation efforts likely to be undertaken, and their costs, based on information gathered through interviews with stakeholders and past consultation efforts. Given historical consultation results and conversations with the Service and other stakeholders, it is unlikely that conservation measures will be requested beyond those requested in the baseline, with the potential exception of large mining projects. If further conservation measures are requested for other activities, calculated impacts will be an underestimate. To the extent that the suite of conservation efforts undertaken in the future varies from these assumptions, impacts may be under- or over-stated.

CHAPTER 1 | BACKGROUND

1.1 INTRODUCTION

33. This chapter provides an overview of the proposed critical habitat for the jaguar (*Panthera onca*). It includes a summary of past legal actions that relate to the current proposal, maps of the area proposed for designation, and a description of activities that may affect or threaten the proposed critical habitat.

1.1.1 PREVIOUS FEDERAL ACTIONS

34. The Service listed the jaguar as endangered on March 30, 1972. Key regulatory milestones for the jaguar include:

- **1972:** The Service published a rule listing the jaguar on March 30, 1972 under the Endangered Species Conservation Act of 1969.⁹ On January 7, 1975, the jaguar was listed on the foreign species list under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).¹⁰ Although the Endangered Species Act (the Act) in 1973 incorporated all species on the ECSA list, the jaguar was not considered present in the United States, and thus some confusion as to whether it was covered under the Act persisted for many years.¹¹ On August 2, 1992, the American Southwest Sierra Institute and Life Net sent a petition to the Service to formally list the jaguar as endangered in the United States.¹²
- **1997:** The Service finalized the listing for the jaguar and four other species on July 22, 1997, clarifying the jaguar's endangered status in the United States. Critical habitat was determined to be "not prudent" due to a concern that increased threats could occur if maps highlighting the extent of the species were made public.¹³
- **2006:** A complaint by the Center for Biological Diversity led the Service to re-evaluate the 1997 prudency determination. On July 12, 2006, the Service made a determination that the jaguar would not be more vulnerable if critical habitat were designated due to publically available information existing on the locations

⁹ 2012 Proposed critical habitat 77 FR 50215.

¹⁰ Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Viewed on October 9, 2012 at <http://www.cites.org/eng/resources/species.html>

¹¹ 1972 Final Rule, 37 FR 6476 *et seq.*

¹² 2012 Proposed critical habitat 77 FR 50215.

¹³ 2012 Proposed critical habitat 77 FR 50215.

of jaguar in the United States at that time.¹⁴ However, the Service found that critical habitat was not prudent because the areas in the United States were not beneficial to the species as whole. The Service's conclusion was based on the fact that international jaguar experts had identified specific areas important to jaguars, all of which are located south of the United States. The Center for Biological Diversity again challenged the Service's decision that critical habitat was not prudent for the jaguar.¹⁵

- **2009:** The United States District Court for the District of Arizona noted that the presence of physical and biological features essential to the jaguar in the United States was a factor that the Service should have considered in making the Service's prudency determination in *Center for Biological Diversity v. Kempthorne*, CV 07-372-TUC JMR and *Defenders of Wildlife v. Hall*, CV08-335 TUC JMR on March 30, 2009. The District Court then required that the Service issue a new determination in regards to critical habitat.¹⁶
- **2010:** On January 13, 2010, the Service determined that there were physical and biological features that may be used by the jaguar in the United States, stating that designation of critical habitat would be beneficial and therefore prudent.¹⁷ On October 18, 2010, the Service agreed to: convene a bi-national Jaguar Recovery Team, work with the Conservation Breeding Specialist Group of Species Survival Commission/ International Union for Conservation of Nature, and initiate a recovery outline and critical habitat designation.
- **2012:** In April 2012, a Recovery Outline for the jaguar was issued by The Technical Subgroup of the Jaguar Recovery Team in conjunction with the Implementation Subgroup of the Jaguar Recovery Team and the U.S. Fish and Wildlife Service. This document describes two units: the Northwestern and Pan American Recovery Units.¹⁸ The area within the United States is located within "the secondary area of the Northwestern Management Unit within the Northwestern Recovery Unit for the jaguar."¹⁹ The Service published the proposed rule for the designation of critical habitat designation on August 20, 2012.²⁰

¹⁴ 2006; 71 FR 39335.

¹⁵ 2012 Proposed critical habitat 77 FR 50215-50216.

¹⁶ 2012 Proposed critical habitat 77 FR 50216.

¹⁷ 2012 Proposed critical habitat 77 FR 50216.

¹⁸ Jaguar Recovery Team. April 2012. Recovery Outline for the Jaguar (*Panthera onca*).

¹⁹ 2012 Proposed critical habitat 77 FR 50218.

²⁰ 2012 Proposed critical habitat 77 FR 50214 *et seq.*

1.1.2 PROPOSED CRITICAL HABITAT DESIGNATION

35. The proposed rule would designate approximately 858,137 acres of critical habitat across six units in Pima, Santa Cruz, and Cochise Counties, Arizona, and Hidalgo County, New Mexico. Subunit 1a, Unit 2, Unit 3, Subunit 4a, Unit 5, and Unit 6 are considered occupied while Subunits 1b, 4b, and 4c are considered unoccupied by the jaguar. Of the proposed acreage, approximately 526,191 acres (61 percent) are federally managed, 124,633 acres (15 percent) are managed by the State of Arizona, 129,246 acres (15 percent) are privately managed, and 78,067 acres (nine percent) are managed by the Tohono O’odham Nation. Federal lands are managed by the USFS, the NPS, the BLM, and the Service. State lands comprise State Trust lands and State Park lands of Arizona. Exhibit 1-1 provides information on land ownership within the proposed critical habitat, and Exhibit 1-2 provides an overview map of the proposed critical habitat area. Exhibits 1-3a and 1-3b provide land ownership information for critical habitat areas.

EXHIBIT 1-1. LAND OWNERSHIP IN PROPOSED CRITICAL HABITAT, BY SUBUNIT (ACRES)

UNIT	UNIT NAME	STATE	TOTAL	FEDERAL	STATE	TRIBAL	PRIVATE
OCCUPIED							
1a	Baboquivari-Coyote Subunit	Arizona	93,130	10,862	22,831	51,308	8,130
2	Atascosa Unit	Arizona	144,864	132,961	5,672	0	6,231
3	Patagonia Unit	Arizona	366,615	265,566	29,274	0	71,775
4a	Whetstone Subunit	Arizona	62,478	39,699	13,455	0	9,325
5	Peloncillo Unit	Arizona and New Mexico	102,723	70,160	19,426	0	13,138
6	San Luis Unit	New Mexico	7,714	0	0	0	7,714
UNOCCUPIED							
1b	Southern Baboquivari Subunit	Arizona	48,070	1,543	15,213	26,759	4,555
4b	Whetstone-Santa Rita Subunit	Arizona	12,710	1,313	11,396	0	0
4c	Whetstone-Huachuca Subunit	Arizona	19,832	4,088	7,366	0	8,379
TOTAL ACRES			858,137	526,191	124,633	78,067	129,246
TOTAL PERCENT			100%	61%	15%	9%	15%
Source: Email communication with U.S. Fish and Wildlife Service, April 22, 2013.							

1.2 ECONOMIC ACTIVITIES CONSIDERED IN THIS ANALYSIS

36. Review of the proposed rule, revised proposed rule, consultation history, existing conservation plans, and public comments on the proposed rulemaking identified the following economic activities that may incur impacts related to conservation of jaguar and its habitat:

- (1) **Forest management.** Existing management plans for the Forest Service, Bureau of Land Management, National Park Service, and Service lands may not align with jaguar conservation.²¹
- (2) **Border activity.** Border-related activity, both illegal and legal, can limit connectivity of jaguar habitat between the United States and Mexico. Especially harmful are pedestrian fences, which are not permeable to jaguars.²²
- (3) **Mining.** Mineral extraction and mining operations increase human presence, often in rural areas, and can render an area unsuitable for jaguar.²³
- (4) **Transportation.** Widening or construction of roadways can limit jaguar mobility and further fragment habitat.²⁴
- (5) **Development.** Construction or expansion of human developments can disrupt the jaguar through severing connectivity of critical habitat.²⁵
- (6) **Military activities.** Military activities in remote areas increase human presence.²⁶
- (7) **Agriculture and Private Grazing.** Agriculture and grazing are prevalent in the region.²⁷
- (8) **Tribal Activities.** Tribal activities include all uses of the Tribal land and water rights.

The proposed rule also identifies climate change as a threat to jaguar and its habitat, as future drought could affect jaguar habitat. However, the Service states that the location and magnitude of potential climate change effects are not known, and it does not intend to initiate any section 7 consultations related to activities that could contribute to climate change. Therefore, we do not focus on climate change in the economic analysis. Additionally, illegal poaching of jaguar was considered one of the greatest threats at the time of the listing; however, poaching is not considered a current threat to jaguars in the United States.²⁸

1.3 ORGANIZATION OF THE REPORT

37. The remainder of this report is organized into eleven chapters and three appendices. Chapter 2 discusses the framework employed in the analysis, while Chapters 3 through 10 describe baseline protections currently afforded the jaguar and its habitat and the potential

²¹ 2012 Proposed critical habitat, 77 FR 50230-50231.

²² 2012 Proposed critical habitat, 77 FR 50224.

²³ 2012 Proposed critical habitat, 77 FR 50224.

²⁴ 2012 Proposed critical habitat, 77 FR 50224.

²⁵ 2012 Proposed critical habitat, 77 FR 50224.

²⁶ 2012 Proposed critical habitat, 77 FR 50224.

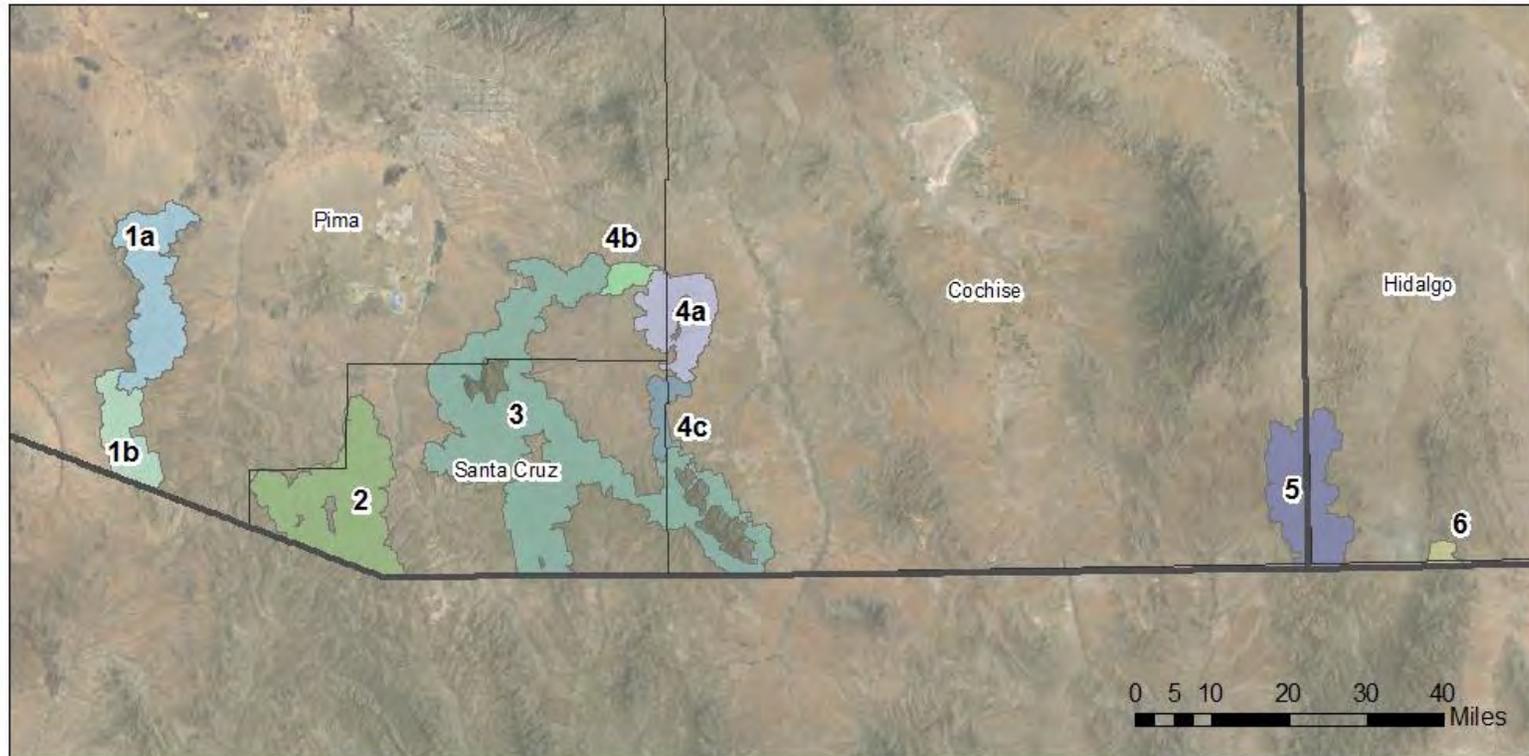
²⁷ 2012 Proposed critical habitat, 77 FR 50230-50231.

²⁸ 2012 Proposed critical habitat, 77 FR 50216.

incremental impacts of designating critical habitat, for each potentially affected economic activity, and Chapter 11 follows to explain the economic benefits of the proposed designation.

- Chapter 2 – Framework for Analysis
- Chapter 3 – Potential Economic Impacts to Federal Lands Management Activities
- Chapter 4 – Potential Economic Impacts to U.S. Border Protection Activities
- Chapter 5 – Potential Economic Impacts to Mining Activities
- Chapter 6 – Potential Economic Impacts to Transportation Infrastructure Construction
- Chapter 7 – Potential Economic Impacts to Development
- Chapter 8 – Potential Economic Impacts to Military Activities
- Chapter 9 – Potential Economic Impacts to State Land Managers, Grazing, Agriculture and Other Activities
- Chapter 10 – Potential Economic Impacts to the Tohono O’odham Nation
- Chapter 11 – Potential Economic Benefits
- Appendix A – Small Business and Energy Impacts Analyses
- Appendix B – Sensitivity of Results to Discount Rate
- Appendix C – Incremental Effects Memorandum to IEC

EXHIBIT 1-2. OVERVIEW OF JAGUAR PROPOSED CRITICAL HABITAT



Legend
States
Counties

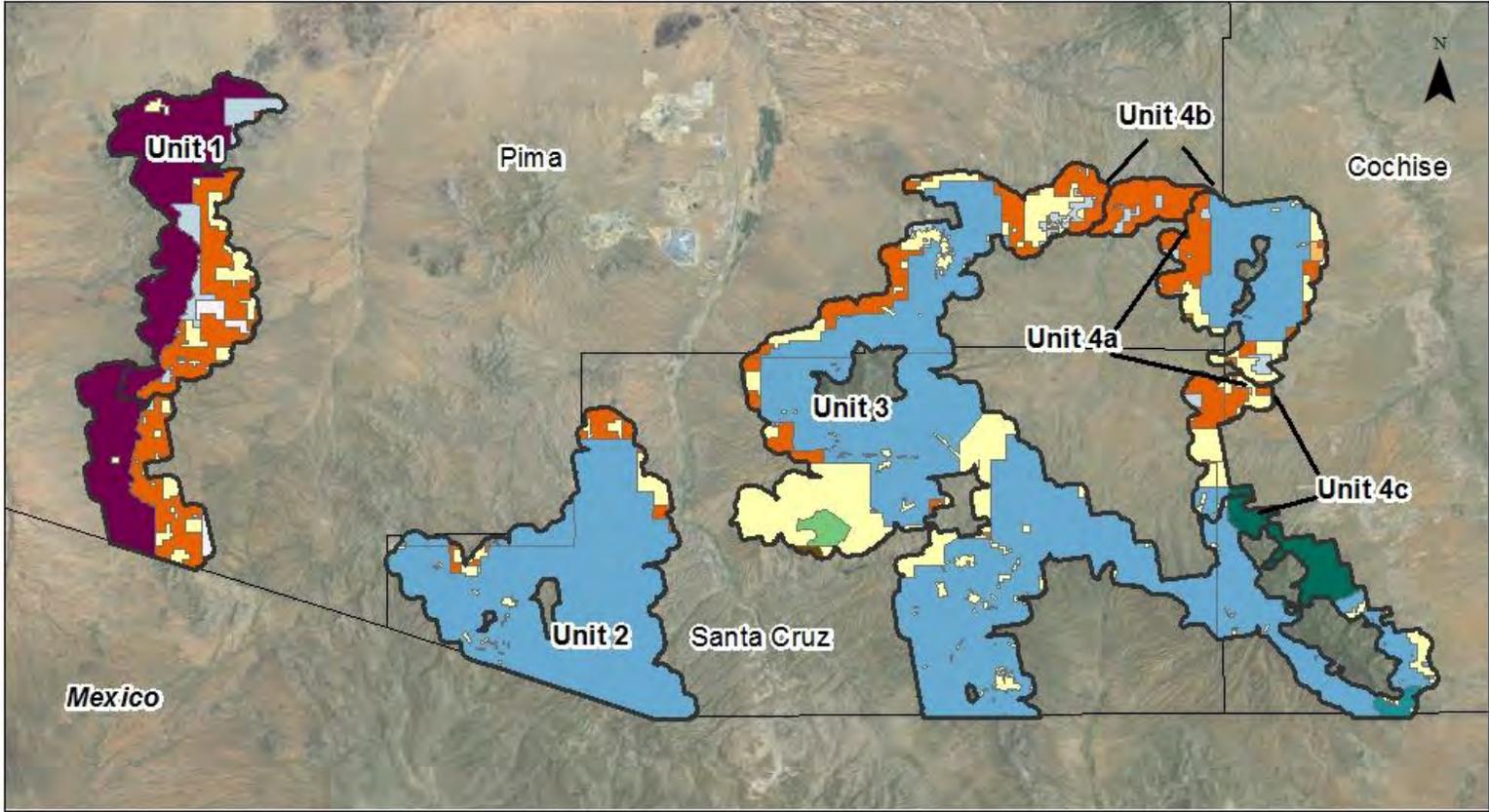
1:1,226,000

IEc

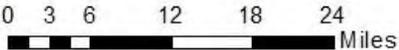
Coordinate System:
NAD 1983, UTM Zone 12N

INDUSTRIAL ECONOMICS, INCORPORATED

EXHIBIT 1-3A. LAND OWNERSHIP IN JAGUAR PROPOSED CRITICAL HABITAT, UNITS 1 THROUGH 4



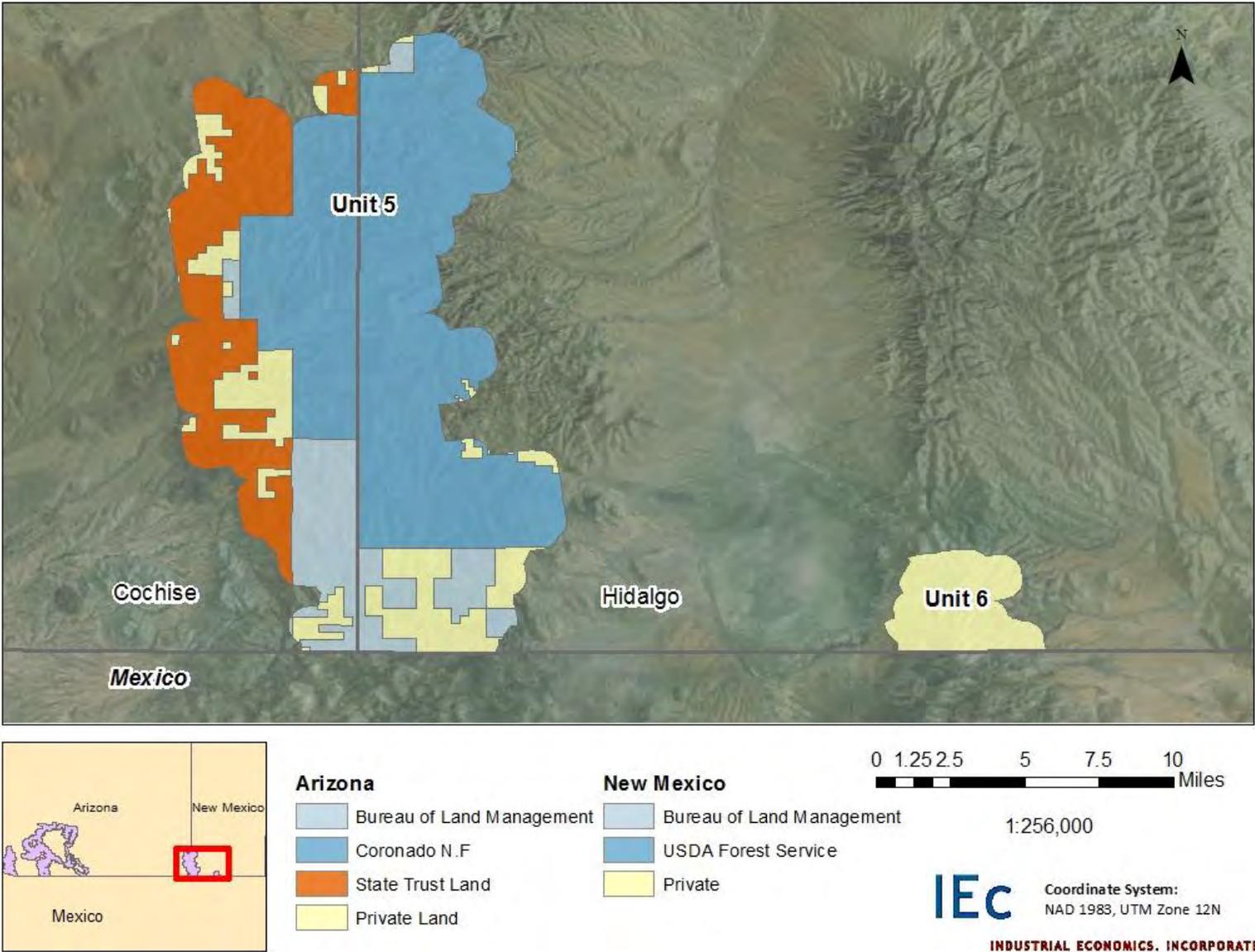
- Arizona**
- Buenos Aires N.W.R
 - Bureau of Land Mgmt.
 - Coronado N.F
 - Coronado N.M
 - Fort-Huachuca
 - Kartchner Caverns SP
 - State Trust Land
 - Game and Fish
 - Sonoita Creek NA
 - Tohono Indian Res.
 - Private Land
 - Other



1:692,673

IEC Coordinate System:
NAD 1983, UTM Zone 12N
INDUSTRIAL ECONOMICS, INCORPORATED

EXHIBIT 1-3B. LAND OWNERSHIP IN JAGUAR PROPOSED CRITICAL HABITAT, UNITS 5 AND 6



CHAPTER 2 | FRAMEWORK FOR THE ANALYSIS

38. The purpose of this report is to estimate the economic impact of actions taken to protect the jaguar and its habitat. This analysis examines the impacts of restricting or modifying specific land uses or other activities for the benefit of the species and its habitat within the proposed critical habitat area. This analysis employs "without critical habitat" and "with critical habitat" scenarios. The "without critical habitat" scenario represents the baseline for the analysis, considering protections otherwise accorded the jaguar; for example, under the Federal listing and other Federal, State, and local regulations. The "with critical habitat" scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts are those not expected to occur absent the designation of critical habitat for the jaguar. The analysis forecasts both baseline and incremental impacts likely to occur after the proposed critical habitat is finalized.
39. This information is intended to assist the Secretary of the U.S. Department of the Interior (DOI) in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.²⁹ In addition, this information allows the Service to address the requirements of Executive Orders 12866 (as amended by Executive Order 13563) and 13211, and the RFA, as amended by the SBREFA.³⁰
40. This chapter describes the framework for this analysis. First, it describes case law that led to the selection of the framework applied in this report. Next, we describe in economic terms the general categories of economic effects that are the focus of the impact analysis, including a discussion of both efficiency and distributional effects. This chapter then defines the analytic framework used to measure these impacts in the context of critical habitat regulation and the consideration of benefits. It concludes with a presentation of the information sources relied upon in the analysis.
- 2.1 BACKGROUND**
41. The U.S. Office of Management and Budget's (OMB) guidelines for conducting economic analysis of regulations direct Federal agencies to measure the costs of a regulatory action against a baseline, which it defines as the "best assessment of the way

²⁹ 16 U.S.C. §1533(b)(2).

³⁰ Executive Order 12866, *Regulatory Planning and Review*, September 30, 1993; Executive Order 13563, *Improving Regulation and Regulatory Review*, January 18, 2011; Executive Order 13211, *Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use*, May 18, 2001; 5 U.S.C. §5601 *et seq.*; and Pub Law No. 104-121.

the world would look absent the proposed action.”³¹ In other words, the baseline includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat. Impacts that are incremental to that baseline (i.e., occurring over and above existing constraints) are attributable to the proposed regulation. Significant debate has occurred regarding whether assessing the impacts of the Service’s proposed regulations using this baseline approach is appropriate in the context of critical habitat designations.

42. In 2001, the U.S. Tenth Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable co-extensively to other causes.³² Specifically, the court stated,

“The statutory language is plain in requiring some kind of consideration of economic impact in the CHD [critical habitat designation] phase. Although 50 C.F.R. 402.02 is not at issue here, the regulation’s definition of the jeopardy standard as fully encompassing the adverse modification standard renders any purported economic analysis done utilizing the baseline approach virtually meaningless. We are compelled by the canons of statutory interpretation to give some effect to the congressional directive that economic impacts be considered at the time of critical habitat designation. . . . Because economic analysis done using the FWS’s [Fish and Wildlife Service’s] baseline model is rendered essentially without meaning by 50 C.F.R. § 402.02, we conclude Congress intended that the FWS conduct a full analysis of all of the economic impacts of a critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes. Thus, we hold the baseline approach to economic analysis is not in accord with the language or intent of the ESA [Endangered Species Act].”³³

43. Since that decision, however, courts in other cases have held that an incremental analysis of impacts stemming solely from the critical habitat rulemaking is proper.³⁴ For example, in the March 2006 ruling that the August 2004 critical habitat rule for the Peirson's milk-vetch was arbitrary and capricious, the United States District Court for the Northern District of California stated,

³¹ U.S. Office of Management and Budget, “Circular A-4,” September 17, 2003, accessed at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

³² *New Mexico Cattle Growers Assn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

³³ *Ibid.*

³⁴ In explanation of their differing conclusion, later decisions note that in *New Mexico Cattle Growers*, the U.S. Tenth Circuit Court of Appeals relied on a Service regulation that defined “destruction and adverse modification” in the context of section 7 consultation as effectively identical to the standard for “jeopardy.” Courts had since found that this definition of “adverse modification” was too narrow. For more details, see the discussion of *Gifford Pinchot Task Force v. United States Fish and Wildlife Service* provided later in this section.

“The Court is not persuaded by the reasoning of *New Mexico Cattle Growers*, and instead agrees with the reasoning and holding of *Cape Hatteras Access Preservation Alliance v. U.S. Dep’t of the Interior*, 344 F. Supp 2d 108 (D.D.C. 2004). That case also involved a challenge to the Service’s baseline approach and the court held that the baseline approach was both consistent with the language and purpose of the ESA and that it was a reasonable method for assessing the actual costs of a particular critical habitat designation *Id* at 130. ‘To find the true cost of a designation, the world with the designation must be compared to the world without it.’”³⁵

44. More recently, in 2010, the U.S. Ninth Circuit Court of Appeals came to similar conclusions during its review of critical habitat designations for the Mexican spotted owl and 15 vernal pool species.³⁶ Plaintiffs in both cases requested review by the Supreme Court, which declined to hear the cases in 2011.
45. In order to address the divergent opinions of the courts and provide the most complete information to decision-makers, this economic analysis reports both:
- The baseline impacts of protections afforded the jaguar absent critical habitat designation; and
 - The estimated incremental impacts precipitated specifically by the designation of critical habitat for the species.

Summed, these two types of impacts comprise the fully co-extensive impacts of conservation in areas considered for critical habitat designation.

46. Several Courts of Appeal, including the Ninth Circuit and the Fifth Circuit, have invalidated the Service’s regulation defining destruction or adverse modification of critical habitat.³⁷ At this time the Service is analyzing whether destruction or adverse modification would occur based on the statutory language of the Act itself, which requires the Service to consider whether the agency’s action is likely “to result in the destruction or adverse modification of habitat which is determined by the Service to be critical” to the conservation of the species. To perform this analysis, the Service considers how the proposed action is likely to impact the function of the critical habitat unit in question. To assist us in evaluating these likely impacts, the Service provided a memorandum characterizing the effects of critical habitat designation over and above those associated with the listing (see Appendix C). A detailed description of the

³⁵ *Center for Biological Diversity et al., Plaintiffs, v. United States Bureau of Land Management et al., Defendants and American Sand Association, et al., Defendant Intervenors*. Order re: Cross Motions for Summary Judgment, Case 3:03-cv-02509 Document 174 Filed 03/14/2006, pages 44-45.

³⁶ *Home Builders Association of Northern California v. United States Fish and Wildlife Service*, 616 F.3d 983 (9th Cir. 2010), cert. denied, 179 L. Ed 2d 301, 2011 U.S. Lexis 1392, 79 U.S.L.W. 3475 (2011); *Arizona Cattle Growers v. Salazar*, 606 F. 3d 1160 (9th Cir. 2010), cert. denied, 179 L. Ed. 2d 300, 2011 U.S. LEXIS 1362, 79 U.S.L.W. 3475 (2011).

³⁷ *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004); *Sierra Club v. U. S. Fish and Wildlife Service*, 245 F.3d 434 (5th Cir. 2001).

methodology used to define baseline and incremental impacts is provided later in this section.

2.2 CATEGORIES OF POTENTIAL ECONOMIC EFFECTS OF SPECIES CONSERVATION

47. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the jaguar and its habitat (hereinafter referred to collectively as “jaguar conservation efforts”). Economic efficiency effects generally reflect “opportunity costs” associated with the commitment of resources required to accomplish species and habitat conservation. For example, if the set of activities that may take place on a parcel of land is limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of jaguar conservation efforts.
48. This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of species conservation efforts unduly burden a particular group or economic sector. For example, while conservation efforts may have a small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts.

2.2.1 EFFICIENCY EFFECTS

49. At the guidance of OMB and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect jaguar habitat, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.³⁸
50. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal land manager may enter into a section 7 consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price

³⁸ For additional information on the definition of “surplus” and an explanation of consumer and producer surplus in the context of regulatory analysis, see: Gramlich, Edward M., *A Guide to Benefit-Cost Analysis* (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, September 2000, accessed at <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

-- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

51. Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, protection measures that reduce or preclude the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the market.

2.2.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

52. Measurements of changes in economic efficiency focus on the net impact of conservation efforts, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.³⁹ This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

Impacts on Small Entities and Energy Supply, Distribution, and Use

53. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be affected by future species conservation efforts.⁴⁰ In addition, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation efforts on the energy industry and its customers.⁴¹

Regional Economic Effects

54. Regional economic impact analysis can provide an assessment of the potential localized effects of conservation efforts. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that represent the relationship between a change in one sector of the economy (e.g., expenditures by recreators) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreators). These economic data provide a quantitative estimate of the magnitude of shifts of jobs

³⁹ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, accessed at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

⁴⁰ 5 U.S.C. §601 *et seq.*

⁴¹ Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001.

and revenues in the local economy. Regional economic impacts are not expected for most industries in proposed critical habitat for jaguar. However, this report discusses potential regional economic impacts to surface mining.

55. The use of regional input-output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.
56. Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

2.3 ANALYTIC FRAMEWORK AND SCOPE OF THE ANALYSIS

57. This analysis: 1) identifies those economic activities most likely to threaten the jaguar and its habitat; 2) describes the baseline regulatory protection for the species; and 3) monetizes the incremental economic impacts to avoid adverse modification of the proposed critical habitat area. This section provides a description of the methodology used to separately identify baseline protections from the incremental impacts stemming from the proposed designation of critical habitat for the jaguar. This evaluation of impacts in a "with critical habitat designation" versus a "without critical habitat designation" framework effectively measures the net change in economic activity associated with the proposed rulemaking.

2.3.1 IDENTIFYING BASELINE IMPACTS

58. The baseline for this analysis is the existing state of regulation, prior to the designation of critical habitat, which provides protection to the species under Act, as well as under other Federal, State and local laws and guidelines. This "without critical habitat designation" scenario also considers a wide range of additional factors beyond the compliance costs of regulations that provide protection to the listed species. As recommended by OMB, the baseline incorporates, as appropriate, trends in market conditions, implementation of other regulations and policies by the Service and other government entities, and trends in other factors that have the potential to affect economic costs and benefits, such as the rate of regional economic growth in potentially affected industries.

59. Baseline protections include sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections to the extent that they are expected to occur absent the designation of critical habitat for the species. This analysis describes these baseline regulations, and where possible, provides examples of the potential magnitude of the costs of these baseline protections. The primary focus, however, is not on baseline costs, since these will not be affected by the proposed regulation. Instead, the focus of this analysis is on monetizing the incremental impacts forecast to result from the proposed critical habitat designation.
- Section 7 of Act, absent critical habitat designation, requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species. Consultations under the jeopardy standard result in administrative costs, as well as impacts of conservation efforts resulting from consideration of this standard.
 - Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."⁴² The economic impacts associated with this section manifest themselves in sections 7 and 10.
 - Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop an Habitat Conservation Plan (HCP) for a listed animal species in order to meet the conditions for issuance of an Incidental Take Permit in connection with a land or water use activity or project.⁴³ The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately avoided or minimized. The development and implementation of HCPs is considered a baseline protection for the species and habitat unless the HCP is determined to be precipitated by the designation of critical habitat, or the designation influences stipulated conservation efforts under HCPs.

Enforcement actions taken in response to violations of the Act are not included in this analysis.

60. The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction. If compliance with the Clean Water Act or State environmental quality laws, for example, protects habitat for the species, such protective efforts are considered to be baseline protections and costs associated with these efforts are categorized accordingly. Of note, however, is that such efforts may not be considered baseline in the case that they would not have been triggered absent the designation of

⁴² 16 U.S.C. 1532.

⁴³ U.S. Fish and Wildlife Service. 2002. "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.

critical habitat. In these cases, they are considered incremental impacts and are discussed below.

2.3.2 IDENTIFYING INCREMENTAL IMPACTS

61. This analysis quantifies the potential incremental impacts of this rulemaking. The focus of the incremental analysis is to determine the impacts on land uses and activities from the designation of critical habitat that are above and beyond those impacts resulting from existing required or voluntary conservation efforts being undertaken due to other Federal, State, and local regulations or guidelines.
62. When critical habitat is designated, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (in addition to considering whether the actions are likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations, and the additional impacts of implementing conservation efforts (i.e., reasonable and prudent alternatives) resulting from the protection of critical habitat are the direct compliance costs of designating critical habitat. These costs are not in the baseline and are considered incremental impacts of the rulemaking. Exhibit 2-1 depicts the decision analysis regarding whether an impact should be considered incremental.
63. Incremental impacts may be the direct compliance costs associated with additional effort for consultations, reinitiated consultations, new consultations occurring specifically because of the designation, and additional conservation efforts that would not have been requested under the jeopardy standard. Additionally, incremental impacts may include indirect impacts resulting from reaction to the potential designation of critical habitat (e.g., implementing jaguar conservation in an effort to avoid designation of critical habitat), triggering of additional requirements under State or local laws intended to protect sensitive habitat, and uncertainty and perceptual effects on markets.

Approach to Identifying Incremental Impacts

64. To inform the economic analysis, the Service provided a memorandum describing its expected approach to conservation for the jaguar following critical habitat designation (Appendix C). Specifically, the Service's memorandum provides information on how the Service intends to address projects that might lead to adverse modification of critical habitat as distinct from projects that may jeopardize the species. The application of the memorandum's conclusions is depicted graphically in Exhibit 2-1.

The nature and extent of potential impacts of critical habitat on a particular area or planned activity will depend on several variables, including:

- **Whether there is a Federal nexus to activities expected to occur within the designated critical habitat.** If there is a Federal nexus associated with a planned activity in proposed critical habitat areas, then we assume that a section 7 consultation will likely occur, unless an action agency has informed us that consultations on particular actions are unlikely. If there is not a Federal nexus associated with a planned activity in proposed critical habitat areas, we assume

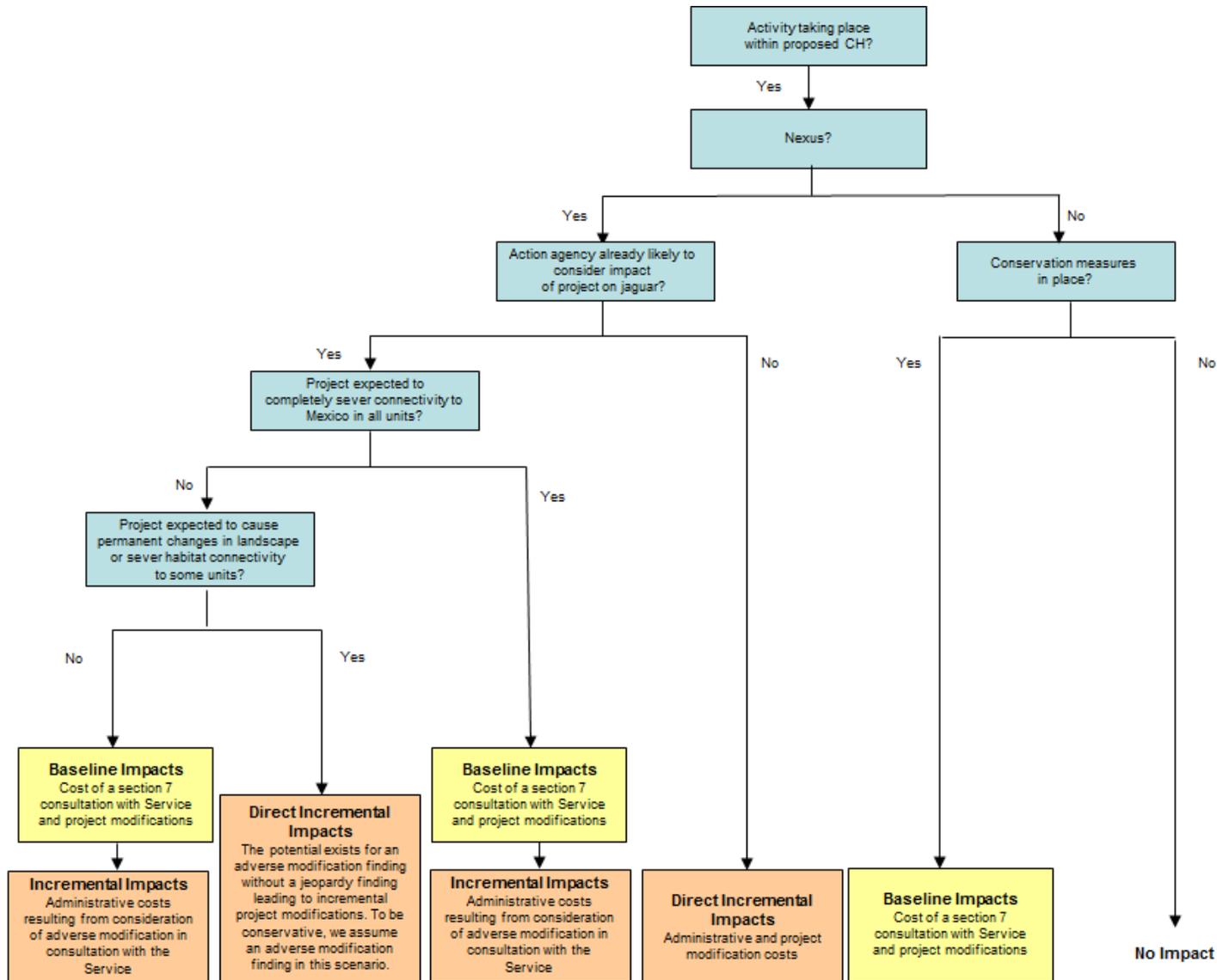
that a future consultation on that activity is unlikely to occur related to jaguar and its critical habitat. The analysis considers whether indirect impacts to activities without a Federal nexus may occur due to critical habitat designation.

- **Whether Action agencies already consider potential impacts on jaguar habitat of projects of this type in this area.** To determine whether Action agencies already are likely to consider jaguar impacts and undertake project modifications that benefit habitat areas even absent critical habitat designation, we 1) examine the consultation history and 2) conduct interviews with agencies about their awareness of jaguar absent critical habitat. In general, we assume that if an Action agency has consulted on jaguar in the past on a particular activity in the relevant area, and conservation efforts have or are being undertaken, that that action would likely already have occurred under the baseline for the analysis.
- **Whether the project will sever connectivity to Mexico.** In our review of Service consultations for many listed species over broad geographic areas with and without critical habitat designation, it is our observation that the Service historically has rarely determined that a project will destroy or adversely modify critical habitat without also jeopardizing the existence of the species. However, the Service has stated that projects which sever connectivity of the species' habitat "could create a situation in which a unit of critical habitat could become inaccessible to jaguars. The loss of one critical habitat unit would not constitute jeopardy to the species, but it could constitute destruction or adverse modification."⁴⁴ Therefore this analysis considers the potential for projects that could result in severance of connectivity to one or more units of critical habitat.

Exhibit 2-1 summarizes the decision framework described in this section; we will use this framework to identify the incremental impacts of the designation.

⁴⁴ U.S. Fish and Wildlife Service. August 28, 2012. *Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar*. Letter to Jennifer Baxter from Steven L. Spangle, p. 15.

EXHIBIT 2-1. FRAMEWORK FOR DETERMINING BASELINE AND INCREMENTAL IMPACTS



Source: U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011 (see Appendix A).

Direct Impacts

65. The direct, incremental impacts of critical habitat designation stem from the consideration of the potential for destruction or adverse modification of critical habitat during section 7 consultations. The two categories of direct, incremental impacts of critical habitat designation are: 1) the administrative costs of conducting section 7 consultation; and 2) implementation of any conservation efforts requested by the Service through section 7 consultation to avoid potential destruction or adverse modification of critical habitat.⁴⁵
66. Section 7(a)(2) of the Act requires Federal agencies to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. In some cases, consultations will involve the Service and another Federal agency only, such as the U.S. Army Corps of Engineers (Corps). Often, they will also include a third party involved in projects that involve a permitted entity, such as the recipient of a Clean Water Act section 404 permit.
67. During a consultation, the Service, the Action agency, and the entity applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, and the potential effects to the species and designated critical habitat associated with the proposed activity, the Federal agency, and whether there is a private applicant involved.
68. Section 7 consultations with the Service may be either informal or formal. *Informal consultations* consist of discussions between the Service, the Action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat, and are designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a *formal consultation* is required if the Action agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in the Service's determination in its biological opinion of whether the action is likely to jeopardize a species or adversely modify critical habitat, along with an incidental take statement permitting take. In the case of jeopardy or adverse modification findings, the biological opinion includes reasonable and prudent alternatives to minimize those impacts. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

Administrative Section 7 Consultation Costs

69. Parties involved in section 7 consultations include the Service, a Federal "action agency," and in some cases, a private entity involved in the project or land use activity. The action

⁴⁵ The term conservation efforts is intended to broadly capture efforts that stakeholders may undertake for the species, regardless of whether these efforts are explicitly called for in a section 7 consultation.

agency (i.e., the Federal nexus necessitating the consultation) participates in the section 7 consultation with the Service and receives the resulting biological opinion. While consultations are required for activities that involve a Federal nexus and may affect a species regardless of whether critical habitat is designated, the designation may increase the effort for consultations in the case that the project or activity in question may adversely modify critical habitat. Administrative efforts for consultation may therefore result in both baseline and incremental impacts.

70. In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:

- 1) **Additional effort to address adverse modification in a new consultation -** New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the listing issues. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.
- 2) **Re-initiation of consultation to address adverse modification -** Consultations that have already been completed on a project or activity (but for which the project or activity is not yet completed) may require re-initiation to address critical habitat. In this case, the costs of re-initiating the consultation, including all associated administrative and project modification costs are considered incremental impacts of the designation.
- 3) **Incremental consultation resulting entirely from critical habitat designation -** Critical habitat designation may trigger additional consultations that may not occur absent the designation (e.g., for an activity for which adverse modification may be an issue, while jeopardy is not, or consultations resulting from the new information about the location of species habitat provided by the designation). Such consultations may, for example, be triggered in critical habitat areas that are not occupied by the species. All associated administrative and project modification costs of these consultations are considered incremental impacts of the designation.

71. The administrative costs of these consultations vary depending on the specifics of the project. One way to address this variability is to show a range of possible costs of consultation, as it may not be possible to predict the precise outcome of each future consultation in terms of level of effort. Review of consultation records and discussions with multiple Service field offices resulted in a range of estimated administrative costs of consultation. For simplicity, the average of the range of costs in each category is applied in this analysis (see Exhibit 2-2).

EXHIBIT 2-2. RANGE OF ADMINISTRATIVE CONSULTATIONS COSTS (2013\$)

BASELINE ADMINISTRATIVE COSTS OF CONSULTATION					
CONSULTATION TYPE	SERVICE	FEDERAL AGENCY	THIRD PARTY	BIOLOGICAL ASSESSMENT	TOTAL COSTS
CONSULTATION CONSIDERING JEOPARDY (DOES NOT INCLUDE CONSIDERATION OF ADVERSE MODIFICATION)					
Technical Assistance	\$428	n/a	\$788	n/a	\$1,220
Informal	\$1,840	\$2,330	\$1,540	\$1,500	\$7,130
Formal	\$4,130	\$4,650	\$2,630	\$3,600	\$15,000
Programmatic	\$12,500	\$10,400	n/a	\$4,200	\$27,100
INCREMENTAL ADMINISTRATIVE COSTS OF CONSULTATION					
CONSULTATION TYPE	SERVICE	FEDERAL AGENCY	THIRD PARTY	BIOLOGICAL ASSESSMENT	TOTAL COSTS
NEW CONSULTATION RESULTING ENTIRELY FROM CRITICAL HABITAT DESIGNATION (TOTAL COST OF A CONSULTATION CONSIDERING BOTH JEOPARDY AND ADVERSE MODIFICATION)					
Technical Assistance	\$570	n/a	\$1,050	n/a	\$1,620
Informal	\$2,450	\$3,100	\$2,050	\$2,000	\$9,500
Formal	\$5,500	\$6,200	\$3,500	\$4,800	\$20,000
Programmatic	\$16,700	\$13,900	n/a	\$5,600	\$36,100
NEW CONSULTATION CONSIDERING ONLY ADVERSE MODIFICATION (UNOCCUPIED HABITAT)					
Technical Assistance	\$428	n/a	\$788	n/a	\$1,220
Informal	\$1,840	\$2,330	\$1,540	\$1,500	\$7,130
Formal	\$4,130	\$4,650	\$2,630	\$3,600	\$15,000
Programmatic	\$12,500	\$10,400	n/a	\$4,200	\$27,100
RE-INITIATION OF CONSULTATION TO ADDRESS ADVERSE MODIFICATION					
Technical Assistance	\$285	n/a	\$525	n/a	\$810
Informal	\$1,230	\$1,550	\$1,030	\$1,000	\$4,750
Formal	\$2,750	\$3,100	\$1,750	\$2,400	\$10,000
Programmatic	\$8,330	\$6,930	n/a	\$2,800	\$18,100
ADDITIONAL EFFORT TO ADDRESS ADVERSE MODIFICATION IN A NEW CONSULTATION (ADDITIVE WITH BASELINE COSTS, SHOWN ABOVE, OF CONSIDERING JEOPARDY)					
Technical Assistance	\$143	n/a	\$263	n/a	\$405
Informal	\$613	\$775	\$513	\$500	\$2,380
Formal	\$1,380	\$1,550	\$875	\$1,200	\$5,000
Programmatic	\$4,160	\$3,460	n/a	\$1,400	\$9,030
<p>Source: IEc analysis of full administrative costs is based on data from the Federal Government Schedule Rates, Office of Personnel Management, 2010, and a review of consultation records from several Service field offices across the country conducted in 2002.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. Estimates are rounded to three significant digits and may not sum due to rounding. 2. Estimates reflect average hourly time required by staff. 					

Section 7 Conservation Effort Impacts

72. Section 7 consultation considering critical habitat may also result in additional conservation effort recommendations specifically addressing potential destruction or adverse modification of critical habitat. For future consultations considering jeopardy and adverse modification, and for re-initiations of past consultations to consider critical habitat, the economic impacts of conservation efforts undertaken to avoid adverse modification are considered incremental impacts of critical habitat designation. For consultations that are forecast to occur specifically because of the designation (incremental consultations), impacts of all associated conservation efforts are assumed to be incremental impacts of the designation.

Indirect Impacts

73. The designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to the provisions of section 7 under the Act. Indirect impacts are those unintended changes in economic behavior that may occur outside of the Act, through other Federal, State, or local actions, and that are caused by the designation of critical habitat. For example:
- **Triggering Other State and Local Laws.** Under certain circumstances, critical habitat designation may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation.
 - **Time Delays.** Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the need to reinitiate the section 7 consultation process and/or compliance with other laws triggered by the designation. To the extent that delays result from the designation, they are considered indirect, incremental impacts of the designation. This analysis does anticipate that time delay impacts due to this rule will be important. As such, time delay impacts are not quantified.
 - **Regulatory Uncertainty or Stigma -** Government agencies and affiliated private parties who consult with the Service under section 7 may face uncertainty concerning whether reasonable and prudent alternatives will be recommended by the Service and what the nature of these alternatives will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. Where information suggests that this type of regulatory uncertainty stemming from the designation may affect a project or economic behavior, associated impacts are considered indirect, incremental impacts of the designation. In some cases, the public may perceive that critical habitat designation may result in limitations on private property uses above and beyond those associated with anticipated conservation efforts and regulatory uncertainty described above. Public attitudes about the limits or restrictions that critical habitat may impose can cause real economic effects to

property owners, regardless of whether such limits are actually imposed. As the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets may decrease. This analysis is not able to quantify possible stigma impacts, but includes qualitative discussion of the potential for such impacts to occur. In particular, this analysis discusses the potential for stigma impacts associated with agricultural activities.

2.3.3 BENEFITS

74. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.⁴⁶ OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.⁴⁷
75. In the context of critical habitat, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.⁴⁸ *Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*
76. Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

2.3.4 GEOGRAPHIC SCOPE OF THE ANALYSIS

77. Economic impacts of jaguar conservation are considered across the entire area proposed for revised critical habitat designation, as defined in Chapter 1. Results are presented by proposed revised critical habitat unit and subunit.

⁴⁶ Executive Order 12866, Regulatory Planning and Review, September 30, 1993.

⁴⁷ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, accessed at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

⁴⁸ *Ibid.*

2.3.5 ANALYTIC TIME FRAME

78. Ideally, the time frame of this analysis would be based on the expected time period over which the critical habitat regulation is expected to be in place. Specifically, the analysis would forecast impacts of implementing this rule through species recovery (i.e., when the rule is no longer required). Recent guidance from OMB indicates that “if a regulation has no predetermined sunset provision, the agency will need to choose the endpoint of its analysis on the basis of a judgment about the foreseeable future.”⁴⁹ The “foreseeable future” for this analysis includes, but is not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Forecasted impacts will be based on the planning periods for potentially affected projects and will look out over a 20-year time horizon for most activities (2013 through 2032). OMB supports this time frame stating that “for most agencies, a standard time period of analysis is ten to 20 years, and rarely exceeds 50 years.”⁵⁰ We recognize that in some cases, the timeframe over which future impacts can be reasonably forecast may be longer than this period, and this is discussed where appropriate in the analysis.

2.4 INFORMATION SOURCES

79. The primary sources of information for this report are communications with, and data provided by, personnel from the Service, local governments and other stakeholders. In addition, this analysis relies upon the Service’s section 7 consultation records, as well as data on baseline land use obtained from county planning authorities. A complete list of references is provided at the end of this document.

2.5 CAVEATS TO ECONOMIC ANALYSIS

80. We rely on the best available information derived from interviews with stakeholders, publicly available data, and historical precedence through the recent consultation history for the jaguar for our analysis of likely future conservation measures for the jaguar. Exhibit 2-3 summarizes the key assumptions in the analysis, and the potential impacts of those assumptions on the results of the analysis.

⁴⁹ U.S. Office of Management and Budget. 2011. “Regulatory Impact Analysis: Frequently Asked Questions (FAQs),” February 7, 2011. Accessed at http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4_FAQ.pdf on May 3, 2011.

⁵⁰ *Ibid.*

EXHIBIT 2-3. ASSUMPTIONS AND CAVEATS IN THE ECONOMIC ANALYSIS

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
The number and location of future projects in proposed critical habitat areas are often unknown.	May underestimate or overestimate costs.	Unknown. We estimate the number of future actions that may result in consultation based on interviews with land managers, available data on activity locations and land ownership, and past history of consultation by activity type. To the extent that future actions differ from past actions, our analysis could overestimate or underestimate costs.
Incremental project modifications beyond what would have been recommended under the baseline to avoid jeopardy are generally unlikely, unless a project is likely to permanently alter habitat or sever connectivity to Mexico.	May underestimate costs.	Potentially major. The Service and a number of land managers agree that few changes to recommendations resulting from consultations in response to critical habitat designation are expected. However, to the extent that additional conservation efforts are undertaken for critical habitat, estimates of incremental impacts would be understated in this report. We note that costs associated with incremental project modifications for the Rosemont mine are included, to the extent that cost information was available, in this analysis.

CALCULATING PRESENT VALUE AND ANNUALIZED IMPACTS

This analysis compares economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of economic impacts of past or future costs to present value terms requires the following: a) past or projected future costs of critical habitat designation; and b) the specific years in which these impacts have been or are expected to be incurred. With these data, the present value of the past or future stream of impacts (PV_c) from year t to T is measured in 2012 dollars according to the following standard formula:

$$PV_c = \sum_t^T \frac{C_t}{(1+r)^{t-2012}}$$

C_t = cost of jaguar critical habitat conservation efforts in year t

r = discount rate^a

Impacts for each activity in each unit are also expressed as annualized values. Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). For this analysis, activities employ a forecast period of 20 years. Annualized future impacts (APV_c) are calculated by the following standard formula:

$$APV_c = PV_c \left[\frac{r}{1 - (1+r)^{-N}} \right]$$

N = number of years in the forecast period (in this analysis, 20 years)

^a To discount and annualize costs, guidance provided by the OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent, which some economists believe better reflects the social rate of time preference. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003.)

CHAPTER 3 | POTENTIAL ECONOMIC IMPACTS TO FEDERAL LANDS MANAGEMENT⁵¹

81. This chapter evaluates both baseline and incremental conservation efforts for the jaguar related to activities occurring on lands managed by the BLM, U.S. Forest Service (USFS), the NPS, and the Service (Buenos Aires National Wildlife Refuge (NWR)). Specific activities considered in this chapter include grazing and ranching operations; recreational activities including hunting, hiking, and nature watching; fire management; and travel management. This chapter excludes mining activity, which is discussed in Chapter 5 of this analysis. Additionally, because of their unique management regime, border protection activities are discussed in Chapter 4 and DOD lands are addressed Chapter 8 of this analysis.
- 3.1 SUMMARY OF IMPACTS TO FEDERAL LANDS MANAGEMENT**
82. BLM, USFS, NPS, and Service (Buenos Aires NWR) land managers in proposed critical habitat areas state that they already consider potential impacts to jaguar when conducting activities within these areas. In support of these statements, since 1995 there have been 20 past formal consultations on Federal land management activities.⁵²
83. Section 7 of the Act requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat, in addition to considering whether the actions are likely to jeopardize the continued existence of the species. As discussed in Chapter 2, the Service has stated that projects which cause permanent changes to landscape or sever connectivity to Mexico have the potential to result in adverse modification of critical habitat for the jaguar.
84. However, for activities other than border patrol activities (which are discussed in Chapter 4), mining (which is discussed in Chapter 5), and DOD activities (which are discussed in Chapter 8), Federal agencies, such as BLM, USFS, and the Service, do not anticipate that planned activities in proposed critical habitat areas will cause permanent changes to the landscape or sever connectivity to habitat in Mexico. As such, planned actions are not anticipated to result in adverse modification of critical habitat for the jaguar. Therefore, we do not anticipate that the proposed designation will change the outcome of future section 7 consultations on Federal lands management regarding jaguar and its habitat, and expect that incremental costs will be limited to administrative costs of consultation. In

⁵¹ This chapter addresses activities on Federal lands excluding border patrol and military activities, and mining.

⁵² The consultation history received by the Service extended from 1995 through 2012. U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.

addition, while the Service considers Subunits 1b, 4b and 4c of proposed critical habitat to be unoccupied by the jaguar, Federal land managers currently consider the jaguar and its general habitat in land management planning.

- 85. Using a seven percent discount rate, forecast baseline administrative costs of consultation are \$200,000, or \$18,000 annualized (2013 dollars), and forecast incremental costs are \$180,000, or \$16,000 annualized (2013 dollars).

3.2 OVERVIEW OF ACTIVITY AND PAST CONSERVATION EFFORTS

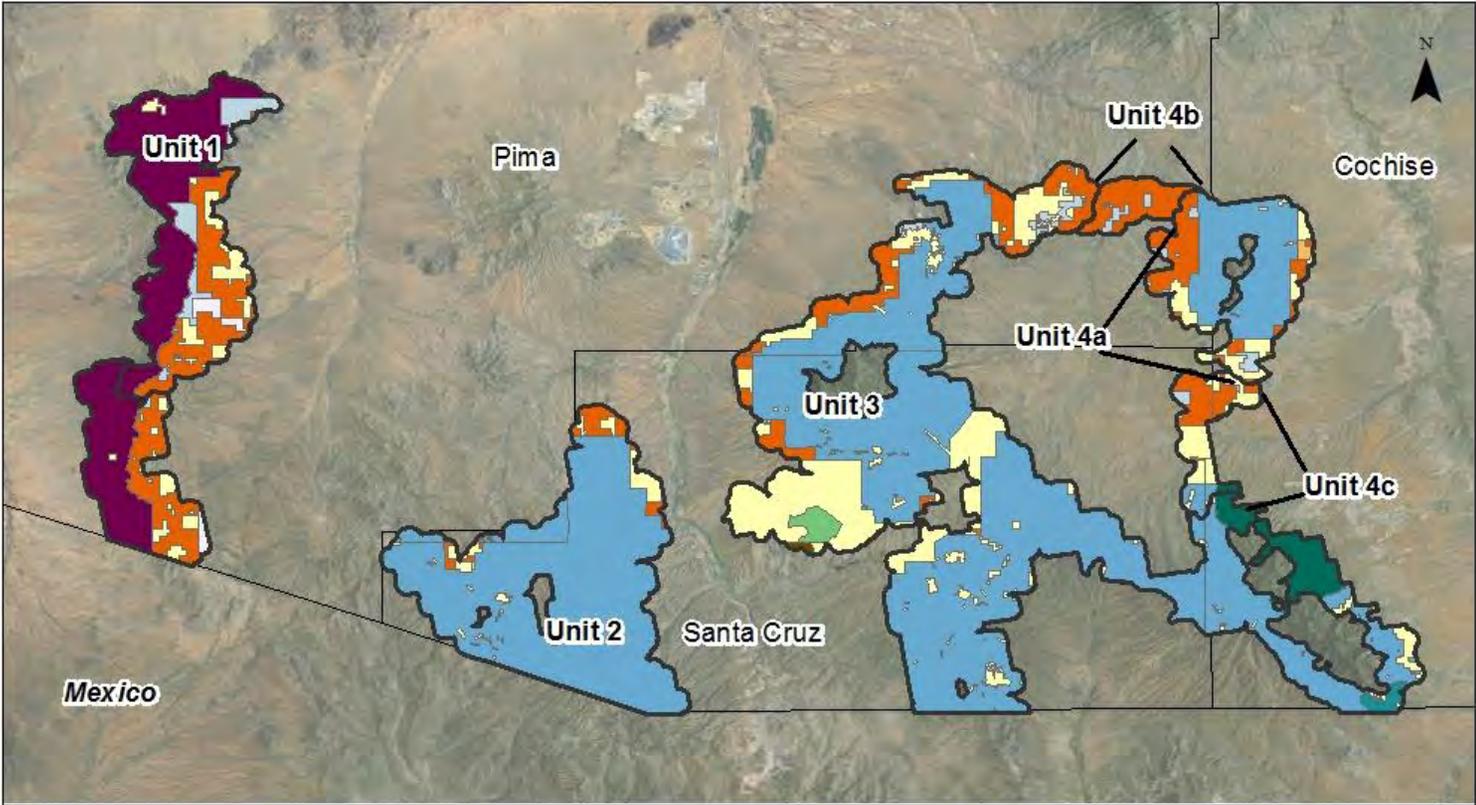
- 86. The majority of the proposed critical habitat area falls on Federal lands (63 percent). BLM and USFS manage most of the proposed Federal lands in Subunits 1a and 1b, Units 2 and 3, Subunits 4a and 4c, and Unit 5 (see Exhibits 3-1, 3-2 and 3-3). As shown, Federal lands occur in all proposed units other than unit 6.

EXHIBIT 3-1. LAND OWNERSHIP WITHIN PROPOSED CRITICAL HABITAT BY FEDERAL AGENCY, EXCLUDING FORT HUACHUCA (ACRES)

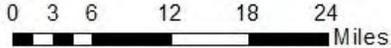
UNIT	SUBUNIT	UNIT NAME	USFS	BLM	NPS	NWR	TOTAL FEDERAL LANDS	PERCENT FEDERALLY-OWNED
1	a	Baboquivari-Coyote Subunit	0	8,737	0	2,125	10,862	12%
1	b	Southern Baboquivari Subunit	0	209	0	1,333	1,543	3%
2		Atascosa Unit	132,878	82	0	0	132,961	92%
3		Patagonia Unit	244,664	3,060	2,728	0	265,566	72%
4	a	Whetstone Subunit	37,507	2,192	0	0	39,699	64%
4	b	Whetstone-Santa Rita Subunit	0	1,313	0	0	1,313	10%
4	c	Whetstone-Huachuca Subunit	2,485	851	0	0	4,088	21%
5		Peloncillo Unit	59,317	10,843	0	0	70,160	68%
6		San Luis Unit	0	0	0	0	0	0%
TOTAL ACRES			476,851	27,288	2,728	3,458	526,191	61%

Source: Email communication with U.S. Fish and Wildlife Service, April 22, 2013.

EXHIBIT 3-2. LAND OWNERSHIP WITHIN PROPOSED CRITICAL HABITAT UNITS 1, 2, 3 AND 4



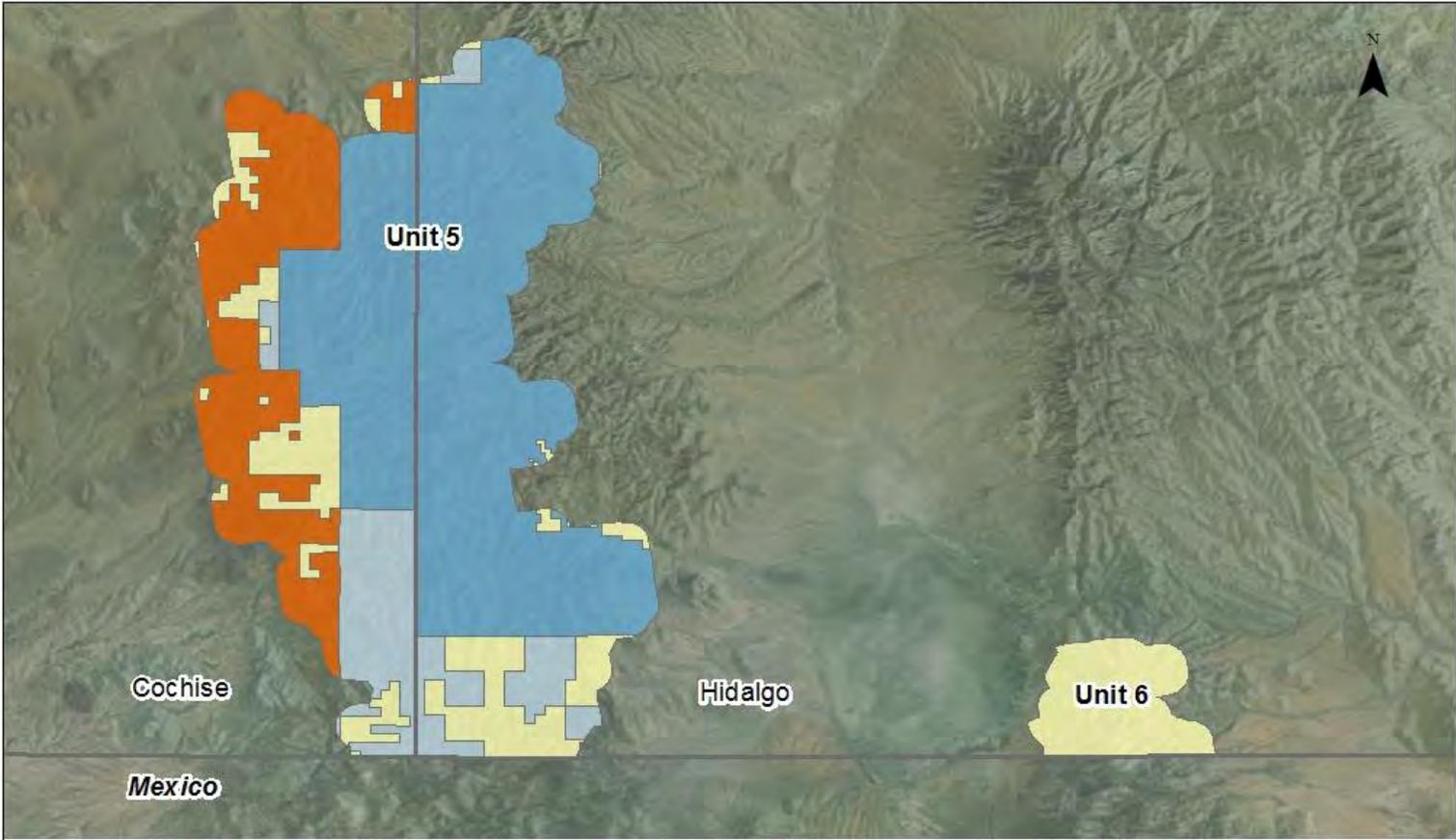
- Arizona**
- | | |
|----------------------|--------------------|
| Buenos Aires N.W.R | State Trust Land |
| Bureau of Land Mgmt. | Game and Fish |
| Coronado N.F | Sonora Creek NA |
| Coronado N.M | Tohono Indian Res. |
| Fort-Huachuca | Private Land |
| Kartchner Cavems SP | Other |



1:692,673

IEC Coordinate System:
NAD 1983, UTM Zone 12N
INDUSTRIAL ECONOMICS, INCORPORATED

EXHIBIT 3-3. LAND OWNERSHIP WITHIN PROPOSED CRITICAL HABITAT UNITS 5 AND 6

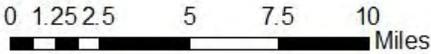


Arizona

- Bureau of Land Management
- Coronado N.F
- State Trust Land
- Private Land

New Mexico

- Bureau of Land Management
- USDA Forest Service
- Private



1:256,000

IEc Coordinate System:
NAD 1983, UTM Zone 12N
INDUSTRIAL ECONOMICS, INCORPORATED

87. The Service indicates in the Proposed Rule that, “we do not anticipate activities such as grazing, ranching operations, or limited recreational activity would have adverse effects to jaguar critical habitat, nor do we anticipate activities consistent with the stated goals or recovery actions of the Recovery Outline for the Jaguar (Jaguar Recovery Team 2012) or the future recovery plan for the species would constitute adverse modification.”⁵³ Further, the Service states in the proposed rule that “Actions with effects to the PCEs or physical and biological feature of jaguar critical habitat that are discountable, insignificant, or wholly beneficial are considered as not likely to adversely affect critical habitat and do not require formal consultation if the Service concurs in writing with that Federal action agency determination. Examples of these actions may include fuels-management activities, prescribed fire, or closing and re-vegetating roads.”⁵⁴ Thus, these Federal lands management activities may be considered to have little impact on critical habitat for jaguar, and others could be considered beneficial. Other activities, however, could have a negative impact on jaguar critical habitat. These are discussed below.
88. While Federal land managers have varying levels of conservation for the jaguar, all take some conservation actions for their lands based on the Federal Land Policy and Management Act of 1976, which states that “...the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that...will preserve and protect certain public lands in their natural condition; (and) that will provide food and habitat for fish and wildlife...”⁵⁵ The following sections describe in more detail ongoing and planned conservation measures taken by relevant Federal land managers that are likely to benefit the jaguar.

3.2.1 U.S. FOREST SERVICE - CORONADO NATIONAL FOREST

89. Coronado National Forest (CNF) overlaps Units 2 and 3, Subunits 4a, 4b, and 4c, and Unit 5.⁵⁶ Activities within CNF include: grazing, mining, ranching, transportation, power line construction, border related activities, recreational activities, nature watching, and hunting.⁵⁷ This section addresses all activities occurring in CNF other than mining, which is addressed in Chapter 5, and border patrol activities, which are addressed in Chapter 4.
90. While there are no specific conservation measures for the jaguar in place on CNF, there are some actions and mitigations that may aid in jaguar recovery. The National Forest Management Act of 1976 provides direction that the USFS “...where appropriate and to the extent practicable, will preserve and enhance the diversity of plant and animal

⁵³ 2012. Proposed critical habitat. 77 FR 50233.

⁵⁴ 2012. Proposed critical habitat. 77 FR 50233.

⁵⁵ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, pp. 6-7.

⁵⁶ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, p. 6.

⁵⁷ Personal communication with Larry Jones, Coronado National Forest, United States Forest Service, November 16, 2012.

communities.”⁵⁸ More specifically, a goal of CNF is to create more resilient ecosystems. For example, in areas overgrown with mesquite, CNF removes the mesquite or invasive species to return to native stand conditions.⁵⁹ CNF’s Land and Resource Management Plan (LRMP) also incorporates Standards and Guidelines that will help the long-term recovery of the jaguar, such as low total miles of roads and low road density, and preventing cross-country travel in vehicles. This will help minimize human disturbance in remote areas.⁶⁰ Under the LRMP there are specifics about assessing population viability for threatened and endangered species in CNF, which includes the jaguar. Because CNF already considers the jaguar in all units that overlap the proposed critical habitat area, CNF does not anticipate major changes in the LRMP following critical habitat designation.⁶¹

91. Since 1995 the USFS has conducted eight informal and nine formal consultations that mention the jaguar in proposed critical habitat areas related to activities other than mining. USFS also participated in one programmatic consultation for continued implementation of LRMPs for 11 southwestern National Forests and National Grasslands. Historical consultations are listed in Exhibit 3-4, below. USFS indicates that there were no additional measures taken specifically for jaguar protection.

⁵⁸ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, pp. 7.

⁵⁹ Personal communication with Larry Jones, United States Forest Service, November 16, 2012.

⁶⁰ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, p. 6.

⁶¹ Personal communication with Larry Jones, United States Forest Service, November 16, 2012.

EXHIBIT 3-4. JAGUAR CONSULTATION HISTORY IN CORONADO NATIONAL FOREST⁶²

YEAR	CONSULTATION NAME
REINITATED FORMAL	
1988	Grazing for Kunde and Papago allotments
INFORMAL	
1997	Pine flat interface prescribed burn
2002	Herbicide treatments along public roads on National Forest lands in Arizona
2003	Proposed woodland shrub vegetation treatment within the hot air fire management area
2004	All-terrain vehicle jamboree event
2006	Los Burros ecosystem management area
2008	Ongoing grazing reauthorization in Jackwood and Price Canyon Allotments
2008	Coronado National Forest ongoing Grazing 8 Pedregosa Allotments
2010	Lake allotment on Nogales Ranger District
FORMAL	
2004	Duquesne, Hayfield, and Lochiel Allotment Management Plans
2007	Allotment management plans for Horseshoe, Sulpher Draw, Sanford, Cienaga allots, Chiracahua Chiricahua Mountains, Douglas RD, and Coronado National Forest
2008	Ongoing grazing on five allotments in the northern Chiricahua Mountains, Douglas Ranger District
2008	Reinitiation on seven grazing allotments in the central Chiricahua Mountains
2008	Huachuca FireScape Project
2009	Peterson Ranch Pond Renovation
2010	Horseshoe Fire
2010	Special use permit for Border Patrol helicopter landing zones in the Patagonia Mountains
PROGRAMMATIC	
2005	Programmatic consultation on the continued implementation of LRMPs for 11 National Forests and National Grasslands of the Southwestern Region
Note: This consultation history excludes consultations on mining activity, which are discussed in Chapter 5 of this analysis.	

92. CNF anticipates that a programmatic consultation will be reinitiated for the Huachuca FireScape with the proposed designation.⁶³ The Huachuca FireScape project was completed in 2009 as a three-agency, landscape-scale Environmental Assessment and biological opinion for fire management over 400,000 acres of southeastern Arizona.⁶⁴

⁶² U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.

⁶³ Personal communication with Larry Jones, United States Forest Service, November 16, 2012.

⁶⁴ Firescape. Huachuca FireScape. Viewed on February 5, 2013 at: <http://www.azfirescape.org/huachuca>.

Additionally, CNF may reinitiate consultation on grazing activities. There is a programmatic grazing consultation expiring soon and federal grazing permits for individual allotments are undergoing National Environmental Policy Act (NEPA) review. CNF is uncertain whether there will be one programmatic consultation or individual consultations for grazing plans and allotments. There are also other species to consider in the area, such as the Chiricahua leopard frog and yellow billed cuckoo. The NEPA schedule on the allotments varies by critical habitat unit and listed species.⁶⁵

3.2.2 U.S. BUREAU OF LAND MANAGEMENT

93. BLM manages habitat lands in Subunits 1a and 1b, Units 2 and 3, Subunits 4a, 4b, and 4c, and Unit 5. Activities occurring within proposed critical habitat on BLM lands include: recreation, livestock grazing, and mineral extraction. BLM lands contain fish and wildlife, designated wilderness and wilderness characteristics, and natural, scenic, scientific and cultural values.⁶⁶
94. BLM's policy is "to manage habitat with emphasis on ecosystems to ensure self-sustaining populations and a natural abundance and diversity of wildlife, fish, and plant resources on public lands."⁶⁷ While BLM does not manage directly for the jaguar, they consider the jaguar in the context of planning for management practices in the proposed critical habitat area. Because jaguars occur sporadically in the study area, BLM considers its potential presence in all units and subunits.⁶⁸ Some areas managed by BLM are designated as wilderness; these areas benefit the jaguar without specific management. There are no major projects planned within the proposed critical habitat area.⁶⁹
95. The only project that has had significant past conservation effort with regards to the jaguar is livestock grazing. BLM has conducted informal consultations for grazing operations in the past, and the agency carried out a programmatic consultation for its grazing activities in 2012. BLM did not implement substantial management changes as a result of that consultation, following the conclusion that grazing activities were not likely to adversely affect the jaguar. BLM does not anticipate additional management changes as a result of the critical habitat designation.⁷⁰

⁶⁵ Personal communication with Larry Jones, United States Forest Service, November 16, 2012.

⁶⁶ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, p. 8.

⁶⁷ BLM manual 6500.06 from U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, pp. 7.

⁶⁸ Personal communication with Tim Hughes, T&E Coordinator, Bureau of Land Management on October 4, 2012, and email communication with Tim Hughes on October 4, 2012.

⁶⁹ Personal communication with Tim Hughes, T&E Coordinator, Bureau of Land Management on October 4, 2012, and email communication with Tim Hughes on October 4, 2012.

⁷⁰ Personal communication with Tim Hughes, T&E Coordinator, Bureau of Land Management on October 4, 2012, and email communication with Tim Hughes on October 19 and 22, 2012.

96. Since 1995 BLM has conducted five informal and three formal consultations with the Service within the proposed critical habitat, only one of which involved formally consulting on the jaguar. These consultations are listed in Exhibit 3-5.

EXHIBIT 3-5. JAGUAR CONSULTATION HISTORY FOR BLM⁷¹

YEAR	CONSULTATION NAME
INFORMAL	
1999	Audubon and Nature Conservancy research ranch prescribed fires proposal
2001	Camper Ranch Modified Competitive Sale
2006	Programmatic emergency stabilization and rehabilitation plan
2009	Canelo Fire consultation
2012	Oak Creek herbicide treatment
FORMAL	
2006	Kinder Morgan Petroleum Products Pipeline
2006	Gila District Livestock Grazing Program consultation reinitiation
2007	Safford Wildland Fire Use

3.2.3 U.S. NATIONAL PARK SERVICE - CORONADO NATIONAL MEMORIAL

97. NPS manages land in the Coronado National Memorial, which overlaps 2,728 acres of proposed critical habitat in Unit 3. No specific conservation measures are undertaken for the jaguar, however, “the purpose of the Memorial is to preserve and interpret the natural and human history of the area.”⁷² Activities on the land are mostly recreational, where visitors drive, hike, and utilize the trail system. Heaviest traffic occurs along Montezuma Pass Road, which is the only road connection to the Huachuca Mountains. There are administrative functions on the park such as maintenance, picnic areas in grasslands, and some housing. Additionally, CBP conducts border activity in the Park to mitigate illegal crossings. Other activities are limited.
98. Management of land in the Memorial is generally thought to be in line with jaguar conservation, and includes education, monitoring for other species, and general habitat maintenance. Most activities by NPS involve research, park improvements, and water treatment. For example, the Memorial is currently working on spotted owl and lesser long-nosed bat surveys. The Memorial manages non-native weed invasion, but otherwise leaves the habitat to develop naturally. The only major projects anticipated on the Memorial are the grading of dirt roads, which happens twice a year, a road resurfacing project at Montezuma Pass, and a tower for border protection proposed by CBP near

⁷¹ U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.

⁷² U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, pp. 9.

Montezuma Pass. NPS does not expect to consult on most activities, as practices generally do not impact the jaguar.⁷³

99. Three major management plans exist on the Coronado National Memorial. NPS indicates that the General Management Plan and Long-Range Interpretive Plan for 2008 through 2015 are generally in line with jaguar conservation.⁷⁴ The Fire Management Plan is not likely to affect the jaguar, but could indirectly affect the jaguar through its habitat.⁷⁵ Consultations could potentially be reinitiated on all three plans as a result of the proposed critical habitat designation, but changes to the plans are not anticipated.⁷⁶
100. NPS has undertaken one technical assistance effort and one reinitiated formal consultation that considered the jaguar. The technical assistance was for the NPS abandoned mine lands closure program in Arizona in 2009, and the reinitiated consultation was for a helipad on Coronado National Memorial at Montezuma Pass in 2012.⁷⁷

3.2.4 U.S. FISH AND WILDLIFE SERVICE - BUENOS AIRES NATIONAL WILDLIFE REFUGE

101. The Service manages 1,333 acres of Subunit 1b and 2,125 acres of Subunit 1a on the Buenos Aires National Wildlife Refuge (NWR). The NWR manages habitat with a “commitment to benefit a wide array of species, while focusing on a few key species and maximizing their habitat quality and/or quantity.” The NWR does not specifically manage for the jaguar, but its actions likely benefit the jaguar “through maintenance of a healthy, diverse landscape that makes available resources required by the species, while also minimizing permanent human impacts within its habitat.”⁷⁸ There is minimal activity on the NWR and the area is mainly managed for protection of the land. The primary users are bird watchers and hunters, in addition to minimal use by recreationalists who use the land for photography, education, biking, and camping.⁷⁹
102. Regardless of the proposed critical habitat designation for the jaguar, the NWR is working to help the University of Arizona jaguar monitoring team conduct research and install cameras. This is of minimal cost to the NWR as only a small amount of staff time is used to help in these efforts. The NWR does not expect any major changes in

⁷³ Personal communication with Jason Metaljak, National Park Service, January 11, 2013.

⁷⁴ Personal communication with Jason Metaljak, National Park Service, January 11, 2013.

⁷⁵ U.S. Department of the Interior, National Park Service. 2005. Coronado National Memorial, Arizona. Fire Management Plan.

⁷⁶ Personal communication with Jason Metaljak, National Park Service, January 11, 2013.

⁷⁷ U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.

⁷⁸ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, pp. 9.

⁷⁹ Personal communication with Sally Gall, Buenos Aires National Wildlife Refuge, U.S. Fish and Wildlife Service, January 15, 2013.

management with the proposed rule as there are no projects planned in the area, and the NWR is already managed for habitat preservation.⁸⁰

103. The Service has undertaken four formal consultations and one technical assistance effort on the NWR that include the jaguar in some capacity. The formal consultations were a Comprehensive Conservation Plan for Buenos Aires NWR in 2002, Buenos Aires NWR Habitat Management Plan in 2009, Buenos Aires Brown Canyon Fuel Reduction Prescribed Burn in 2009, and Buenos Aires NWR Multi-Unit Burn Plan for 2012 through 2017 in 2012. The technical assistance effort was for the Buenos Aires NWR Habitat Management Plan in 2007.⁸¹

3.3 ANALYTIC APPROACH

104. In determining future conservation measures for the jaguar, we spoke with Federal land managers and reviewed the consultation history for the jaguar. Where planning information was sparse, we used the consultation history to determine the past rate of consultation for the jaguar, and estimated that the rate would be similar in the future. We then spread costs across units by the acreage of overlapping areas. From this information, we were able to determine administrative baseline and incremental impacts of consultation.

3.4 BASELINE AND INCREMENTAL IMPACTS

3.4.1 U.S. FOREST SERVICE - CORONADO NATIONAL FOREST

105. In this analysis, we anticipate two reinitiated programmatic consultations in 2013 for CNF: one for the Huachuca FireScape and one for grazing. Additionally, we estimate approximately nine formal and nine informal consultations, which are assumed to be evenly distributed across the 20 year timeframe of this analysis based on the past rate of consultation between USFS and the Service. Beyond these administrative costs of consultation, no further conservation measures are expected for the jaguar, as baseline forest management is not believed to cause harm to the jaguar or its habitat. Total forecast baseline costs of consultation are \$110,000, or 9,800 annualized at a seven percent discount rate (2013 dollars). Total incremental costs of consultation are \$80,000, or \$7,000 annualized at a seven percent discount rate (2013 dollars).

3.4.2 U.S. BUREAU OF LAND MANAGEMENT

106. It is unlikely that BLM would change overall management practices based on the proposed jaguar critical habitat designation.⁸² However, possible conservation measures may include providing monitoring reports from the Tucson field office, and reinitiating consultation if practices are modified beyond the scope of the program which was consulted on. BLM land managers are not certain whether they would reinitiate by

⁸⁰ Personal communication with Sally Gall, Buenos Aires National Wildlife Refuge, U.S. Fish and Wildlife Service, January 15, 2013.

⁸¹ U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.

⁸² Personal communication with Tim Hughes, T&E Coordinator, Bureau of Land Management on October 4, 2012, and email communication with Tim Hughes on October 4, 2012.

allotment or on a programmatic basis for grazing. BLM will likely reinitiate consultation in 2013 with regard to jaguar proposed critical habitat, revised critical habitat for the Southwestern willow flycatcher, and Acuna cactus and its critical habitat.⁸³

107. We estimate one reinitiated programmatic consultation in 2013 for grazing, and approximately six informal and three formal consultations evenly distributed across the 20 year timeframe of the analysis based on the past rate of consultation between BLM and the Service, excluding the reinitiated formal Gila District Livestock Grazing Program consultation. Beyond these administrative costs of consultation, no further conservation measures are expected for the jaguar on BLM lands as the jaguar is considered in management of all subunits under the baseline. Future costs may be incurred for monitoring reports under the baseline, as is suggested in the Safford grazing consultation, but these costs are not quantified for purposes of this analysis. Total baseline costs of consultation are \$51,000, or \$4,500 annualized at a seven percent discount rate. Total incremental costs of consultation are \$35,000, or \$3,100 annualized at a seven percent discount rate.

3.4.3 U.S. NATIONAL PARK SERVICE - CORONADO NATIONAL MEMORIAL

108. Due to the limited economic activity in Coronado National Memorial, we anticipate little change to NPS management of this area. We forecast approximately one technical assistance effort and one reinitiated formal consultation evenly distributed over the 20 year timeframe of the analysis based on the past rate of consultation between NPS and the Service. Additionally, we forecast the cost of three reinitiated formal consultations due to the possibility of reinitiating consultation for the General Management Plan, Long-Range Interpretive Plan for 2008, and Fire Management Plan. Beyond these administrative costs of consultation, no further conservation measures are expected for the jaguar. Total baseline costs of consultation are \$770, or \$68 annualized at a seven percent discount rate. Total incremental costs of consultation are \$37,000, or \$3,200 annualized at a seven percent discount rate.

3.4.4 U.S. FISH AND WILDLIFE SERVICE - BUENOS AIRES NATIONAL WILDLIFE REFUGE

109. Due to limited economic activity in Buenos Aires NWR, we anticipate little change in Service management of this area. We forecast two reinitiated formal consultations for the Buenos Aires NWR Habitat Management Plan and Buenos Aires Multi-Unit Burn Plan in 2013. Additionally, we forecast approximately four formal consultations and one technical assistance effort evenly distributed across the 20 year timeframe of the analysis based on the past rate of consultation of the Service for the jaguar. Beyond these administrative costs of consultation, no further conservation measures are expected for the jaguar. Total baseline costs of consultation are \$39,000, or \$3,400 annualized at a seven percent discount rate. Total incremental costs of consultation are \$33,000, or

⁸³ Personal communication with Tim Hughes, T&E Coordinator, Bureau of Land Management on October 4, 2012, and email communication with Tim Hughes on October 22, 2012.

\$2,900 annualized at a seven percent discount rate. Overall costs across units borne by Federal land managers are displayed in Exhibit 3-6.

EXHIBIT 3-6. FORECAST BASELINE AND INCREMENTAL COSTS OF JAGUAR CONSERVATION BORNE BY FEDERAL LAND MANAGERS BY UNIT

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	\$40,000	\$3,500	\$30,000	\$2,800
1b	\$15,000	\$1,300	\$13,000	\$1,100
2	\$31,000	\$2,800	\$22,000	\$2,000
3	\$64,000	\$5,600	\$81,000	\$7,200
4a	\$13,000	\$1,100	\$9,100	\$800
4b	\$2,400	\$200	\$1,700	\$150
4c	\$2,200	\$190	\$1,500	\$130
5	\$34,000	\$3,000	\$24,000	\$2,100
6	\$0	\$0	\$0	\$0
Total	\$200,000	\$18,000	\$180,000	\$16,000

CHAPTER 4 | POTENTIAL ECONOMIC IMPACTS TO U.S. BORDER PROTECTION ACTIVITIES

110. This chapter evaluates both baseline conservation measures for the jaguar on U.S. border protection activities (i.e., activities related to operations by the CBP), as well as the potential for critical habitat designation to result in additional (“incremental”) conservation efforts for the jaguar. The proposed critical habitat extends along the U.S.-Mexico border from Pima County, Arizona (Unit 1), through Santa Cruz County, Arizona (Units 2 and 3), through Cochise County, Arizona (Unit 5), to Hidalgo County, New Mexico (Units 5 and 6).
- 4.1 SUMMARY OF FORECAST IMPACTS TO BORDER PROTECTION ACTIVITIES**
111. CBP reports that it already considers potential impacts of its operations on jaguar in all proposed critical habitat units. Following critical habitat designation, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (beyond consideration of whether the actions are likely to jeopardize the continued existence of the species). As discussed in Chapter 2, the Service has stated that projects which alter the essential physical or biological features to an extent that appreciably reduces the conservation value of the critical habitat or sever connectivity to Mexico have the potential to result in adverse modification of critical habitat. CBP does not currently anticipate that planned activities in critical habitat areas will cause permanent changes to landscape or sever connectivity to Mexico. As such, planned actions are not anticipated to result in adverse modification of critical habitat. Therefore, CBP does not anticipate that jaguar critical habitat will change the outcome of future section 7 consultations regarding jaguar and its habitat associated with border operations in proposed critical habitat areas, and thus incremental costs will be limited to administrative costs of consultation.
112. Conservation efforts expected under the baseline are anticipated to occur for jaguar, both as recommended through section 7 consultation, and otherwise under CBP’s existing best practices guidelines. Such conservation efforts are likely to include monitoring for jaguars, directing night-time lighting, limiting public access to new roads, closing old roads, and closing or restoring unauthorized roads in or near jaguar movement corridors to help offset increase in improved or new roads. While specific future conservation efforts are unknown, we utilize available data on past conservation efforts to estimate that CBP will spend approximately \$48,000 per year on jaguar monitoring efforts, as well \$312,000 per consultation on other actions. Using the past consultation as a guide to the number of future actions, we anticipated that in total, using a seven percent discount rate, baseline costs will be \$770,000 over 20 years, or \$68,000 annualized (2013 dollars).

These costs are forecast to result from approximately two formal consultations over the next 20 years. Because some conservation efforts could not be quantified (e.g. costs of directing nighttime lighting or closing unauthorized roads), this forecast may be somewhat understated. Incremental costs, which are forecast to include the additional administrative costs of considering critical habitat in consultation, are anticipated to be \$17,000, or \$1,500 annualized (2013 dollars).

4.2 OVERVIEW OF ACTIVITY AND PAST CONSERVATION EFFORTS

113. Five out of six units of proposed critical habitat include areas along the U.S.-Mexico border, all of which the Service considers to be occupied for the jaguar, except Subunit 1b. Exhibit 4-1 presents estimates of the linear distance (in miles) of proposed critical habitat along the border by unit. As shown, critical habitat includes nearly 39 miles of U.S.-Mexico border. The border areas proposed as jaguar critical habitat are presented in Exhibit 4-3. Landowners along the U.S. border include the Tohono O’odham Nation, the State of Arizona, CNF, Coronado National Memorial (National Parks Service), the Bureau of Land Management, and private landowners.

EXHIBIT 4-1. LENGTH OF EACH UNIT OF JAGUAR PROPOSED CRITICAL HABITAT ALONG THE U.S. MEXICO BORDER (IN MILES)

UNIT	UNIT NAME	LENGTH ALONG BORDER (MILES)
OCCUPIED		
1a	Baboquivari-Coyote Subunit	0
2	Atascosa Unit	15.3
3	Patagonia Unit	11.4
4a	Whetstone Subunit	0
5	Peloncillo Unit	5.6
6	San Luis Unit	4.3
UNOCCUPIED		
1b	Southern Baboquivari Subunit	5.9
4b	Whetstone-Santa Rita Subunit	0
4c	Whetstone-Huachuca Subunit	0
TOTAL MILES		42.5
Source: ArcGIS Shapefile of proposed critical habitat provided by the U.S. Fish and Wildlife Service on March 26, 2013.		

114. Currently, CBP provides funding to the Service to implement jaguar monitoring and recovery efforts to help offset negative impacts of CBP activities along the border. Specifically, CBP provides funding to the international borderlands region jaguar survey and monitoring program, as well as to the Jaguar Recovery Team, which is developing a recovery plan for the jaguar. The State-led AZ-NM Jaguar Conservation Team (Jaguar Conservation Team) includes State, local, and Federal cooperators, and voluntary participation by private individuals. The Team aims to conserve the jaguar in the United

States and encourage conservation efforts in Mexico. While activity of the Team has been limited since 2009, the AGFD plans to reconvene the Team.⁸⁴

115. CBP also follows specified best management practices (BMPs) for the jaguar. Construction and maintenance projects must have a biological monitor on site to ensure all BMPs and mitigation plans are followed. BMPs state that “1) if construction or maintenance activities continue at night, all lights will be shielded to direct light only onto the work site and the area necessary to ensure the safety of the workers, and 2) roads will be designated to minimize animal collisions and fragmentation of threatened and endangered populations to the extent practicable.”⁸⁵ Jaguar-specific conservation practices previously included actively participating in University of Arizona jaguar monitoring team meetings and activities (activity of this Team is currently limited), and currently include provision of funds to support a jaguar monitoring study using camera traps, which is being conducted by the University of Arizona. Camera monitoring is noted to cost \$48,000 per year.⁸⁶
116. The Service has mentioned the jaguar in two previous formal consultations. One of these was in 2008 for the Secure Border Initiative (SBI)net Tucson West Project, which involved the construction of towers spanning 80 linear miles. The Service found that CBP operations were not likely to jeopardize the continued existence of the jaguar. However, the Service noted that certain planned construction activities may result in degradation of jaguar habitat and disturbance to jaguars. Conservation efforts to protect the jaguar were included both during the planning and post construction phases. CBP indicated that they would design roads to minimize collisions and fragmentation of habitat. After construction, CBP would create plans for road closures and complete an annual report until all Conservation Best Management Practices for the jaguar had been completed. Specific recommended conservation measures included:
- CBP should provide \$312,000 to monitor effects of the proposed tower project on the jaguar, including camera traps, vehicles, supplies, and personnel to determine which unauthorized roads to close and how to guide future project design;
 - CBP should prevent public access of new border patrol roads through gating, physical barriers, fencing, etc., in combination with appropriate signage; and
 - CBP should close or restore unauthorized roads in or near jaguar movement corridors to help offset increase in improved or new roads at a ratio of 2:1.

⁸⁴ U.S. Fish and Wildlife Service. August 28, 2012. *Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar*. Letter to Jennifer Baxter from Steven L. Spangle, p. 6.

⁸⁵ U.S. Border Patrol Tucson Sector. December 2008. 4.0 Best Management Practices and Mitigation Measures.

⁸⁶ U.S. Fish and Wildlife Service/U.S. Border Patrol Tucson Sector. List of Best Management Practices for Protected Species.

The Service also recommended that CBP participate in implementation of the Jaguar Conservation Framework and the Jaguar Conservation Team, however, this team has not met since February 2009.⁸⁷

117. Additionally, in 2007, CBP formally consulted with the Service on the potential impacts of a pedestrian fence on the jaguar. Pedestrian fences restrict jaguar movement across the border, and have the potential to prevent connectivity and, possibly, to extirpate the jaguar from the United States. The Service found that construction of the pedestrian fence would adversely affect the jaguar, but would not jeopardize the existence of the species. The action permanently removed 225 acres of desert scrub and desert grassland habitat, as well as some riparian vegetation at the major washes. The fence was expected to result in increased illegal activity on either side of the fence and therefore require increased law enforcement activities in jaguar habitat areas. CBP indicated that this project included actions to prevent illegal vehicular and foot traffic in areas that would adversely affect habitat and disturb jaguars. Other conservation efforts included the following:
- Vegetation would be maintained in the washes and no lights will be placed near washes.
 - CBP will support survey and monitoring efforts and conservation and recovery measures through the Service, the Arizona Game and Fish Department (AGFD), and Tohono O’odham Nation.
 - CBP will also install additional technology, such as cameras and sensors, to the east and west of the fence segments and near other gaps to prevent illegal pedestrians.
 - CBP should assist with the implementation of the Jaguar Conservation Framework and participate on the Jaguar Conservation Team.^{88,89}
118. The Service reinitiated one consultation and conducted two formal consultations, one informal consultation and 12 technical assistance efforts with CBP or the Department of Homeland Security that consider the jaguar.⁹⁰ Exhibit 4-2 lists the nature of these consultations.

⁸⁷ U.S. Department of the Interior. September 4, 2008. Biological opinion on Secure Border Initiative (SBI)net Tucson West Tower Project, Ajo, Tucson, Casa Grande, Nogales, and Sonoita Stations Area of Operation, U.S. Border Patrol, Tucson Sector, Arizona.

⁸⁸ U.S. Department of the Interior. August 29, 2007. Pedestrian fence along the U.S. and Mexico border near Sasabe, Pima County; Nogales, Santa Cruz County; and near Naco and Douglas, Cochise County.

⁸⁹ The Jaguar Conservation Team has not met since February 2009.

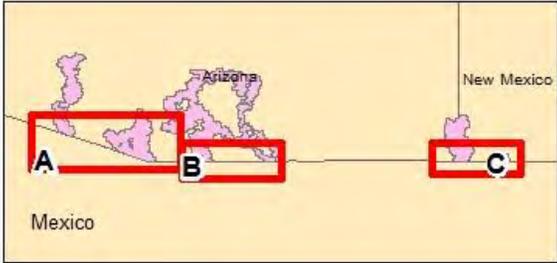
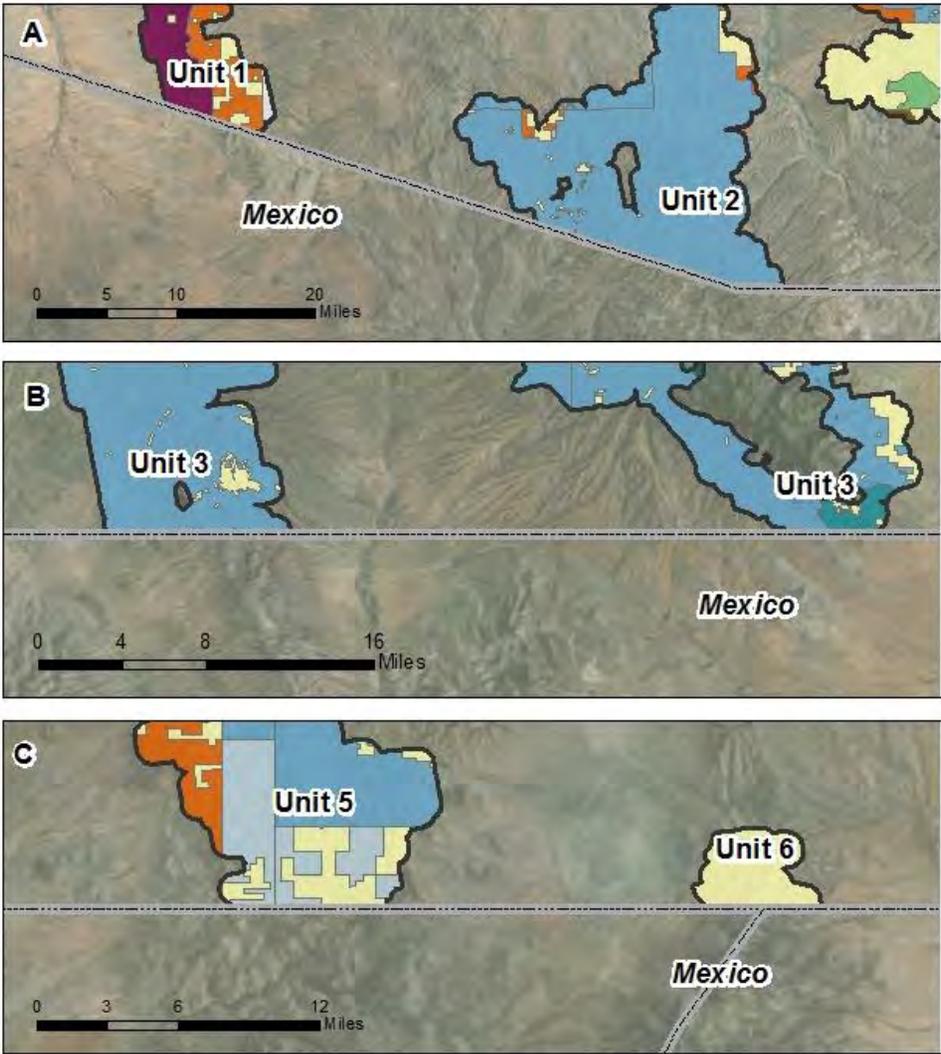
⁹⁰ We included all consultations with CBP or the Department of Homeland Security that include the jaguar and excluded any consultations that were outside the proposed critical habitat area based on the geographical description.

**EXHIBIT 4-2. CONSULTATION HISTORY FOR CBP AND THE DEPARTMENT OF HOMELAND SECURITY
IN THE PROPOSED CRITICAL HABITAT FOR THE JAGUAR⁹¹**

YEAR	CONSULTATION NAME
REINITIATED	
2012	Land mobile radio modernization for tactical communications
INFORMAL	
2012	Border patrol actions in San Rafael Valley
FORMAL	
2007	Pedestrian fencing
2008	SBI net Tucson West Project
TECHNICAL ASSISTANCE	
2007	SBI net in the Tucson Sector
2008	Sonoita Border Patrol Station
2008	Vehicle fencing segments
2008	Pedestrian and vehicle fencing
2009	Border fencing
2009	Supplemental EA
2009	Pedestrian and vehicle fencing
2009	SBI net Tucson West Project
2010	Road improvements
2011	Tactical infrastructure maintenance and repairs
2011	Tactical infrastructure maintenance and repairs (separate from above)
2011	Mobile backscatter X-Ray inspection system

⁹¹ U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.

EXHIBIT 4-3. PROPOSED CRITICAL HABITAT FOR THE JAGUAR ALONG THE U.S. MEXICO BORDER



IEC Coordinate System:
NAD 1983, UTM Zone 12N
INDUSTRIAL ECONOMICS, INCORPORATED

4.3 ANALYTIC APPROACH

119. In determining future conservation measures for the jaguar, we spoke with CBP and reviewed the consultation history for the jaguar. Because specific information on the type and location of future CBP projects was sparse, we used the consultation history to determine the past rate of consultation for the jaguar, and assumed that the rate of future consultation would be similar in the future as the past. From this information, we were able to determine administrative baseline and incremental impacts of consultation.

4.4 FORECAST BASELINE AND INCREMENTAL IMPACTS

120. CBP anticipates that future management for the jaguar will be primarily passive in nature (i.e., areas should be left undisturbed whenever possible). CBP plans several minor construction projects over the next five to seven years, but no large facilities are planned in proposed critical habitat areas.⁹² However, CBP notes that future project plans can be dictated by Congress, and therefore priorities could change over time.⁹³

121. Because no large projects can be anticipated, we estimate the rate of future consultation on the jaguar with CBP from the recent consultation history. Based on the past rate of consultation over the past 18 years, we anticipate that approximately two formal, one informal, and 13 technical assistance efforts will occur with CBP between 2013 and 2032. We anticipate that, under the baseline, CBP will spend \$48,000 per year on monitoring efforts based on CBP's Best Management Practices, and \$312,000 on each formal consultation based on the outcomes of the SBI-net consultation in 2008.

122. Following critical habitat designation, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (beyond consideration of whether the actions are likely to jeopardize the continued existence of the species). As discussed in Chapter 2, the Service has stated that projects which cause permanent changes to landscape or sever connectivity to Mexico have the potential to result in adverse modification of critical habitat.

123. CBP does not currently anticipate that planned activities in critical habitat areas will cause permanent changes to landscape or sever connectivity to Mexico.⁹⁴ As such, planned actions are not anticipated to result in adverse modification of critical habitat designation. Therefore, CBP does not anticipate that jaguar critical habitat will change the outcome of future section 7 consultations regarding jaguar and its habitat associated with border operations in proposed critical habitat areas. As such, forecast incremental costs are limited to administrative costs of considering potential impacts to jaguar critical habitat in consultations that are already expected to occur absent critical habitat.

⁹² Personal conversation with Jennifer Hass, Department of Homeland Security, Customs and Border Protection, on November 16, 2012.

⁹³ Personal conversation with Jennifer Hass, Department of Homeland Security, Customs and Border Protection, on November 16, 2012.

⁹⁴ Personal conversation with Jennifer Hass, Department of Homeland Security, Customs and Border Protection, on November 16, 2012.

124. We assume there is an equal probability of these consultations and baseline costs occurring in any given year over the next twenty years. We estimate that total baseline costs will be \$770,000, or \$68,000 annualized at a seven percent discount rate. Incremental costs are anticipated to be \$17,000 over the next 20 years (discounted at seven percent), or \$1,500 annualized (2013 dollars). Exhibit 4-4 summarizes the baseline and incremental costs to border activities.

EXHIBIT 4-4. FORECAST COSTS OF PROPOSED CRITICAL HABITAT DESIGNATION ON BORDER ACTIVITIES

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1b	\$110,000	\$10,000	\$2,400	\$210
2	\$240,000	\$22,000	\$6,200	\$550
3	\$220,000	\$19,000	\$4,600	\$410
5	\$110,000	\$9,400	\$2,200	\$200
6	\$85,000	\$7,500	\$1,700	\$150
Total	\$770,000	\$68,000	\$17,000	\$1,500

CHAPTER 5 | POTENTIAL ECONOMIC IMPACTS TO MINING ACTIVITIES

125. This chapter considers the potential for impacts to mining operations resulting from conservation of the jaguar. This chapter addresses both baseline conservation measures and the incremental impacts that may result from the designation of critical habitat. In particular, this chapter focuses on two large mining operations currently planned within the area proposed as jaguar critical habitat. The chapter also considers impacts to smaller-scale mineral explorations on Federal lands.
126. The chapter proceeds as follows: Section 5.1 summarizes the conclusions of the baseline and incremental analyses; Section 5.2 provides an overview of mining activities and jaguar conservation in the area proposed for critical habitat; Section 5.3 describes our analytic approach to estimating impacts; Sections 5.4 and 5.5 estimate baseline and incremental impacts, respectively; and Section 5.6 concludes with a discussion of potential sources of uncertainty. Because of significant uncertainty with respect to potential impacts to the two large, planned mining projects, a potential upper bound cost scenario is discussed separately from other impacts estimated throughout this report.
- 5.1 SUMMARY OF IMPACTS TO MINING ACTIVITIES**
127. Overall, this analysis forecasts \$1.2 million in present value baseline impacts associated with mining activities, of which \$66,000 are administrative impacts. Most of these costs are likely to occur as a result of baseline conservation measures implemented for the protection of the jaguar, such as road-kill monitoring and the minimization of nighttime lighting. Although they are included in the baseline estimates where possible, some of these baseline conservation measures are intended to benefit multiple species, and therefore only a portion of these costs may be attributed to conservation of the jaguar. Available information on the cost of these conservation measures is summarized in Exhibit 5-1 below.
128. The incremental analysis forecasts \$3.9 million in present value impacts associated with mining activities, of which \$22,000 are administrative costs. On an annualized basis, total incremental impacts associated with mining activities are estimated to be approximately \$340,000. Forecast conservation measures are primarily associated with conservation efforts in the biological opinion issued for one of the two mines in October 2013. Exhibit 5-1 summarizes available cost information for these conservation measures. In addition, incremental costs may be associated with conservation measures such as restoration of surface springs and revegetation, but information on the incremental costs of these measures was not available.

129. Because the large mining operations within proposed critical habitat have not yet moved to production, we also consider a scenario in which the recommended conservation measures are so costly that the mining operations choose not to continue to production. As a result, the upper bound on the incremental cost associated with the designation of critical habitat is the loss of value added (i.e., employment, revenue, and other market impacts) from these mines. These impacts are evaluated at local, State, and national levels, using existing economic impact studies conducted for each of the mines. Although we are unable to predict the likelihood of mining companies making such a decision, the recent biological opinion suggests that the first scenario, in which most conservation measures are implemented in the baseline, is more likely to occur.

EXHIBIT 5-1. SUMMARY OF FORECAST IMPACTS TO MINING ACTIVITIES

TYPE OF IMPACT	DESCRIPTION OF IMPACT	FORECAST IMPACT
BASELINE		
Administrative costs	<ul style="list-style-type: none"> • 1 formal consultation in 2013 for the Rosemont Mine; • 1 programmatic consultation in 2013 for the Coronado National Forest Land and Resource Management Plan; • 1 formal consultation in 2014 for the Hermosa Project; and • 2.5 informal consultations over 20 years for mineral exploration. 	\$66,000 present value, or \$5,800 annually
Conservation Measures	<ul style="list-style-type: none"> • Minimization of nighttime lighting and road-kill and species monitoring at the Rosemont Mine; • Baseline studies and environmental monitoring for the Hermosa Project, as well as potential conservation measures that cannot be predicted at this time; and • Baseline conservation measures for mineral explorations that cannot be predicted at this time. 	Uncertain (Monetized impacts are \$100,000 annually for carnivore monitoring at the Rosemont Mine.)
INCREMENTAL		
Administrative Costs	<ul style="list-style-type: none"> • 1 formal consultation in 2013 for the Rosemont Mine; • 1 programmatic consultation in 2013 for the Coronado National Forest Land and Resource Management Plan; • 1 formal consultation in 2014 for the Hermosa Project; and • 2.5 informal consultations over 20 years for mineral exploration. 	\$22,000 present value, or \$1,900 annually
Conservation Measures	<ul style="list-style-type: none"> • Restoration of surface springs, revegetation of mine reclamation area, and management of conservation lands for the Rosemont Mine; and • Habitat conservation measures for the Hermosa Project and mineral explorations that cannot be predicted at this time. • Alternatively, in the event that the mines do not move to production, unrealized local, State, and national benefits of the mining operations. 	Uncertain (Monetized impacts are \$340,000 annually for management of three separate conservation areas for the Rosemont Mine.)

5.2 OVERVIEW OF ACTIVITY AND PAST CONSERVATION EFFORTS

130. A number of mining operations are active throughout proposed critical habitat, primarily in proposed Unit 3 in Arizona. Mining operations may disturb the jaguar by increasing human activity and lighting at night, or by direct destruction of habitat and movement corridors. In general, mining companies are concerned that the designation of critical habitat will result in restrictions or interruptions in water conveyance or diversions. Because mining activities require adequate water supply, such restrictions could significantly impact mining operations.⁹⁵ Additionally, the size of some mining operations could hinder jaguar movement, leading to location restrictions that would negatively affect mining operations.

131. Since the listing of the species in 1997, three section 7 consultations and two technical assistance efforts associated with mining activities have considered the jaguar. One of these is a recently completed formal consultation addressing the Rosemont Copper Project, described below. Two informal consultations addressed mineral exploration on USFS lands in 2008 and 2012. The two technical assistance efforts addressed the Entrada Bonita Project, which was carried out by the Arizona Department of Mines and Mineral Resources in 2006, and the National Park Service's Arizona Abandoned Mine Lands Closure Program in 2009. Typical conservation measures to avoid impacts to the jaguar and its habitat have included:

- Minimizing the number and brightness of lights onsite;
- Shielding lights to avoid illuminating areas beyond the necessary workspace; and
- Minimizing project footprints to preserve movement corridors.

Importantly, these conservation efforts align with those that the Service may request to avoid adverse modification of critical habitat:

- Re-vegetating and restoring areas of large-scale habitat removal;
- Modifying or eliminating nighttime lighting;
- Reducing the footprint of large facilities;
- Minimizing the amount of human and vehicular activity; and
- Offsetting permanent habitat loss, modification, or fragmentation with permanently protected habitat.⁹⁶

132. Of the mining operations being developed within proposed critical habitat, two large projects – the Rosemont Mine and the Hermosa Project – will likely have to consider potential adverse modification of jaguar habitat. Both of these projects will occur on USFS land, and require section 7 consultation. Additionally, mineral exploration efforts are expected to occur throughout the region. These projects are described in the following sections. Exhibit 5-2 shows the location of the two large, planned mines.

⁹⁵ Meidinger, D. Fennemore Craig, P.C. on behalf of Rosemont Mine. Email communication on October 4, 2012.

⁹⁶ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, p. 16.

5.2.1 ROSEMONT COPPER PROJECT

133. The Rosemont Copper Project calls for a 4,500-acre pit mine to be developed in Pima County, Arizona, and operated by the Rosemont Copper Company (Rosemont), a subsidiary of the Augusta Resource Corporation, a Canadian firm. The Rosemont mine is currently undergoing permitting and expects to begin production in 2015.⁹⁷ The mine site for this project lies approximately 30 miles southeast of Tucson along the Santa Rita Mountains, and is located on 3,500 acres of USFS-managed land and 995 acres of privately-owned lands within proposed Unit 3 for the jaguar.⁹⁸ This unit is considered occupied by the jaguar. The Proposed Rule notes that the size of this operation could hinder habitat connectivity with existing habitat in Mexico, and as a result, has the potential to adversely modify jaguar critical habitat.⁹⁹ However, the recently completed biological opinion for the Rosemont Mine found that adverse modification was not likely to result from the proposed operation.¹⁰⁰
134. The Rosemont deposit contains approximately 667 million tons of proven, economically viable copper reserves and an additional 919 million tons that may not yet be economically viable to mine. The economic life of the mine is forecast to be 21 years.¹⁰¹ A 2012 report conducted by Arizona State University for the Rosemont Copper Company estimates that the Rosemont Mine will result in an average increase in local economic activity of \$1.2 billion annually over the 21-year production period.¹⁰² Regional economic activity is defined as demand for goods and services from local suppliers. The Rosemont Mine is also expected to provide \$25.7 million annually in local tax revenue over the life of the mine. Additionally, this report estimates that the mine will directly employ up to 494 people and, based on anticipated expenditures by Rosemont for goods and services plus employee spending, will indirectly support 3,335 other jobs for residents of Arizona.¹⁰³ During construction of the mine, which is expected to take four years, local economic activity will increase by approximately \$293 million annually, and local government revenues will increase by \$11 million annually.¹⁰⁴

⁹⁷ Augusta Resource Corporation Overview, accessed at <http://www.augustaresource.com/About-Us/Overview/default.aspx> on October 1, 2012.

⁹⁸ James, N. Fennemore Craig, P.C. on behalf of Rosemont Copper Company. Public comment submitted on October 19, 2012.

⁹⁹ 2012 Proposed critical habitat 77 FR 50233.

¹⁰⁰ U.S. Fish and Wildlife Service. Final Biological and Conference Opinion for the Rosemont Copper Mine, Pima County, Arizona. October 30, 2013.

¹⁰¹ James, N. Fennemore Craig, P.C. on behalf of Rosemont Copper Company. Public comment submitted on October 19, 2012.

¹⁰² L. William Seidman Research Institute, W.P. Carey School of Business, Arizona State University. "An Assessment of the Economic Impacts of the Rosemont Copper Project on the Economies of the Cochise/Pima/Santa Cruz Counties Study Area, the State of Arizona, and the United States using the REMI Regional Economic Forecasting Model." May 2012.

¹⁰³ L. William Seidman Research Institute, W.P. Carey School of Business, Arizona State University. "An Assessment of the Economic Impacts of the Rosemont Copper Project on the Economies of the Cochise/Pima/Santa Cruz Counties Study Area, the State of Arizona, and the United States using the REMI Regional Economic Forecasting Model." May 2012.

¹⁰⁴ L. William Seidman Research Institute, W.P. Carey School of Business, Arizona State University. "An Assessment of the Economic Impacts of the Rosemont Copper Project on the Economies of the Cochise/Pima/Santa Cruz Counties Study Area, the State of Arizona, and the United States using the REMI Regional Economic Forecasting Model." May 2012.

135. The Draft Environmental Impact Statement (EIS) for the Rosemont Mine, conducted in accordance with NEPA requirements, identifies several conservation measures for the mine that may benefit the jaguar. For example, outdoor lighting will incorporate shields, dimmers, timers, and/or motion detectors, and will minimize the lumens used.¹⁰⁵ Additionally, in its biological opinion of the project, the Service requested conservation efforts such as restoration of surface springs, revegetation of the reclamation area, road-kill monitoring, camera monitoring for the species, and purchase of offsetting conservation lands.¹⁰⁶

5.2.2 HERMOSA PROJECT

136. In addition to the Rosemont Mine, the Hermosa Project, a large silver pit mine being developed by Wildcat Silver, may be affected by the designation of critical habitat. The Hermosa Project will be located on USFS lands within the Coronado National Forest at the northern end of the Patagonia Mountains. The mine site is approximately eight miles north of the Mexican border and 15 miles northeast of the City of Nogales in Santa Cruz County, Arizona. The proposed mine site is within proposed Unit 3 for the jaguar. This mine, once operating, is anticipated to be the largest silver mine in the United States, producing approximately 126 million ounces of silver and 230,000 ounces of gold over the 16-year forecast life of the mine, as well as manganese, zinc, copper, and lead.¹⁰⁷
137. The Hermosa Project is still in early planning stages and is approximately two years behind the Rosemont Mine.¹⁰⁸ Currently available information does not identify the year when production is expected to begin. However, the timeline for completing required NEPA process, generally in the form of an EIS, takes approximately two to five years and will occur prior to construction and operation of the mine. This implies that the mine may not open prior to 2017.
138. Existing land uses on the project site include livestock grazing on the USFS Farrell Grazing Allotment and recreational activities such as hiking, biking, horseback riding, off-road vehicle use, and bird watching.¹⁰⁹ Construction of the mine is expected to limit these activities. However, the Hermosa Project is expected to result in the creation of 152 jobs during mine production. Total undiscounted revenues are expected to be approximately \$3.96 billion over the life of the mine.¹¹⁰

¹⁰⁵ U.S. Forest Service Southwestern Region. "Draft Environmental Impact Statement for the Rosemont Copper Project." Volume 1, Chapter 2. September 2011.

¹⁰⁶ U.S. Fish and Wildlife Service. Final Biological and Conference Opinion for the Rosemont Copper Mine, Pima County, Arizona. October 30, 2013.

¹⁰⁷ M3 Engineering & Technology Corporation. "Hermosa Project Preliminary Economic Assessment - Santa Cruz County, Arizona." November 12, 2012.

¹⁰⁸ Meidinger, D. and James, N. Fennemore Craig, P.C. on behalf of Rosemont Mine and Wildcat Silver. Telephone communication on October 10, 2012.

¹⁰⁹ M3 Engineering & Technology Corporation. "Hermosa Project Preliminary Economic Assessment - Santa Cruz County, Arizona." November 12, 2012.

¹¹⁰ M3 Engineering & Technology Corporation. "Hermosa Project Preliminary Economic Assessment - Santa Cruz County, Arizona." November 12, 2012.

5.2.3 ADDITIONAL MINING ACTIVITIES

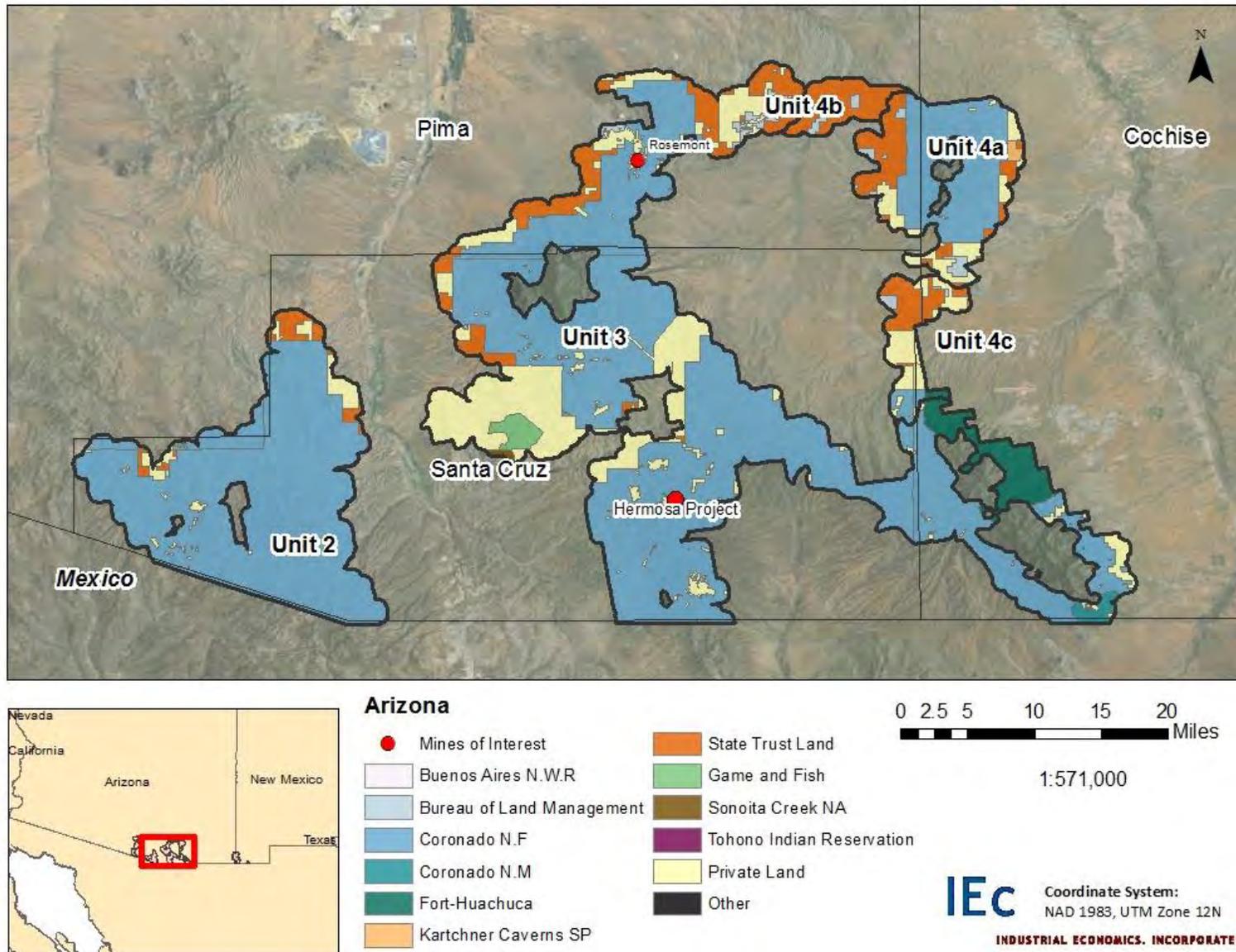
139. Another large mining company, Freeport-McMoRan (Freeport), owns land within proposed jaguar critical habitat. Freeport currently has no planned projects for these areas.¹¹¹ Should the company decide to undertake mining activities on lands overlapping proposed critical habitat, incremental impacts similar to those described above could occur.
140. Additionally, mineral exploration efforts occur throughout the CNF in proposed Unit 3.¹¹² In the past, these activities have involved both metallic and non-metallic mineral resources, such as limestone or opal.¹¹³ Depending on the results of these explorations, additional mining activity could occur; however, we are unable to predict such activity at this time.

¹¹¹ Meidinger, D. and James, N. Fennemore Craig, P.C. on behalf of Rosemont Mine and Wildcat Silver. Telephone communication on October 10, 2012.

¹¹² Meidinger, D. and James, N. Fennemore Craig, P.C. on behalf of Rosemont Mine and Wildcat Silver. Telephone communication on October 10, 2012.

¹¹³ Telephone communication with K. Sandwell-Weiss, Geologist, U.S. Forest Service, on November 28, 2012.

EXHIBIT 5-2. OVERVIEW OF MINING ACTIVITIES WITHIN PROPOSED CRITICAL HABITAT



5.3 ANALYTIC APPROACH

141. Mining activity generally occurs in proposed Unit 3, which is considered occupied by the jaguar. As described above, the consultation history for the jaguar includes section 7 consultations associated with mining operations in this area. As a result, all future section 7 consultations are assumed to include both baseline costs to consider jeopardy to the species and incremental costs to consider adverse modification of critical habitat. The rest of this section describes our approach to estimating baseline and incremental costs associated with consultations and resulting conservation measures for the Rosemont mine, the Hermosa Project, and mineral exploration. All costs are attributed to proposed Unit 3.
142. Impacts associated with the Rosemont mine include administrative costs of one formal section 7 consultation.¹¹⁴ This consultation involved as action agencies USFS and the Corps, which requires a section 404 Clean Water Act permit for mine drainage. Although that consultation was completed in October 2013, we consider both baseline costs and costs associated with the consideration of proposed critical habitat in that consultation. In addition, construction of the Rosemont Mine will require programmatic amendments to the 1986 Coronado National Forest Land and Resource Management Plan to create a new management area allowing copper mining.¹¹⁵ We estimate impacts associated with one programmatic section 7 consultation in 2013 for this amendment.¹¹⁶ Because this revision has been ongoing since 2006, this estimate may overstate impacts attributable to the jaguar.¹¹⁷
143. We also consider impacts associated with implementing conservation measures under two scenarios. At the low end, we assume that Rosemont operations are not affected but that the mine implements the conservation measures listed in the biological opinion, which include lighting changes, road-kill monitoring, species surveys and monitoring, habitat restoration and revegetation, and the purchase of conservation lands to preserve movement corridors. These conservation measures generally align with those previously requested for the jaguar in the consultation history. Some of the requested conservation measures, such as lighting changes and road-kill and species monitoring, appear to directly benefit the species rather than its habitat. We therefore consider these types of conservation measures to be baseline impacts. We conservatively assume that other types of conservation measures, such as restoration of surface springs, revegetation of habitat, and the purchase of conservation lands, are incremental impacts of the designation of critical habitat. However, we also note that some of the requested conservation measures, such as species monitoring and the

¹¹⁴ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, p. 11.

¹¹⁵ U.S. Forest Service Southwestern Region. "Draft Environmental Impact Statement for the Rosemont Copper Project." Volume 1, Chapter 2. September 2011.

¹¹⁶ Jones, L. United States Forest Service. Personal communication on November 16, 2012.

¹¹⁷ U.S. Forest Service Southwestern Region. "Draft Environmental Impact Statement for the Rosemont Copper Project." Volume 1, Chapter 2. September 2011.

purchase of conservation lands, are intended to benefit multiple species in addition to the jaguar. Although we conservatively attribute the full cost to the jaguar, we note that this assumption likely overstates the cost of jaguar conservation.

144. At the high end, we assume that the Rosemont mine chooses not to open for operation due to the designation of critical habitat and the cost of conservation measures to avoid adverse modification. As an upper bound estimate of possible impacts, we account for the expected loss in employment, revenue, and potential market impacts, drawing on an existing study of the expected economic contribution of the mine. To estimate high-end economic losses, we rely on the 2012 Economic Impact Assessment conducted by Arizona State University. Even if production does not occur at this mine, we do not anticipate changes to global mineral prices and therefore do not estimate such market effects.
145. Because the Hermosa Project is approximately two years behind the Rosemont mine in terms of planning, we assume that the Hermosa Project will undergo a formal section 7 consultation in 2014 and will begin production in 2017 (two years after the Rosemont mine). To forecast baseline and incremental impacts associated with the Hermosa Project, we rely on information provided in the 2012 Hermosa Project Preliminary Economic Assessment. Because this project is still in early planning stages, information on economic impacts is limited.
146. Impacts associated with mineral exploration outside of these two mines are also likely. According to the USFS, small-scale mineral explorations typically do not require section 7 consultation.¹¹⁸ For explorations that do require consultation, the Service notes that these efforts typically result in informal section 7 consultation.¹¹⁹ The USFS indicated that mineral exploration may increase as a result of high mineral prices. For example, the USFS is aware of more than 20 mining claims that have been staked in the past year, most for exploratory drilling.¹²⁰ However, because it is difficult to predict the number of potential explorations that will require section 7 consultations over the analysis period, we use the historical consultation rate to predict the future rate. We identified two technical assistance efforts for mining exploration on USFS land that occurred since the listing of the species in 1997, implying 2.5 efforts over the 20-year study period. We conservatively assume these efforts will require informal consultation, as suggested by the Service, rather than technical assistance. In addition to administrative impacts, these exploration projects may also incur costs associated with implementing baseline conservation measures. Depending on the results of these exploration projects, additional mining activity could occur and result in additional administrative and project modification costs; however, we are unable to predict such activity at this time.

¹¹⁸ Telephone communication with K. Sandwell-Weiss, Geologist, U.S. Forest Service, on November 28, 2012.

¹¹⁹ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, p. 11.

¹²⁰ Telephone communication with K. Sandwell-Weiss, Geologist, U.S. Forest Service, on November 28, 2012.

147. Because Freeport does not have any currently planned projects for its lands within proposed critical habitat, we do not estimate impacts to its operations. If Freeport decides to undertake mining activities on these lands, impacts could include administrative costs of section 7 consultation and costs associated with implementing conservation measures, including incremental employment and revenue losses or delays, should the designation of critical habitat restrict future mine operations.
148. This analysis also does not quantify any impacts associated with time delay. Because large-scale mines such as the Rosemont mine and the Hermosa Project are required to conduct baseline environmental assessments, such as those required by the NEPA process, we assume that any delay due to the designation of critical habitat will not alter existing production schedules.

5.4 FORECAST BASELINE IMPACTS

149. Baseline economic impacts associated with mining operations include the portion of section 7 consultations addressing jeopardy of the species, as well as potential conservation measures requested to avoid jeopardy. Total impacts are approximately \$1.2 million in present value terms, or \$110,000 on an annualized basis. This includes approximately \$66,000 in present value administrative impacts, or \$5,800 on an annualized basis. Additional costs are likely to be incurred for conservation measures, such as minimization of nighttime lighting and road-kill monitoring, but we are unable to fully quantify those costs. Additional detail is provided below.

5.4.1 ROSEMONT COPPER PROJECT

150. Administrative impacts associated with the Rosemont Mine include the baseline level of costs for one formal section 7 consultation and one programmatic section 7 consultation in 2013. These costs are estimated to be \$42,000 in present value terms, discounted at seven percent.
151. In addition, several baseline conservation measures were requested to avoid impacts to the jaguar and its habitat. Costs associated with these conservation measures include:
- An unknown amount for lighting mitigation through the adoption of alternative lighting plans;
 - An unknown amount for weekly road-kill monitoring; and
 - Approximately \$100,000 annually for species monitoring.¹²¹

As described in the Rosemont Copper Project Light Pollution Mitigation Recommendation Report, changes to lighting design may be implemented for the

¹²¹ The biological opinion for the Rosemont mine specifies that Rosemont should provide \$50,000 to fund camera studies for jaguar and ocelot. However, the biological opinion notes that this amount is “likely only enough funding to conduct carnivore monitoring in a limited geographic area for about six months.” Because the biological opinion requests jaguar surveys and monitoring for the life of the mine plus five years post-closure, we assume that Rosemont will need to spend \$100,000 annually to meet this requirement. (U.S. Fish and Wildlife Service. Final Biological and Conference Opinion for the Rosemont Copper Mine, Pima County, Arizona. October 30, 2013.)

benefit of nearby astronomical observatories as well as the jaguar.¹²² As a result, the full cost of implementing lighting changes may not be attributable to jaguar conservation. Conservation measures such as habitat restoration, revegetation, and purchasing offsets may in some cases be requested in the baseline. However, this analysis conservatively assigns costs associated with these conservation measures to the incremental scenario, assuming that these types of conservation measures are more likely to be requested to avoid adverse modification of critical habitat than to avoid jeopardy to the species.

5.4.2 HERMOSA PROJECT

152. Impacts associated with the Hermosa Project include the baseline level of administrative costs of one formal section 7 consultation in 2014. These costs are estimated to be \$14,000 in present value terms, discounted at seven percent.
153. Additionally, the Hermosa Project may prepare an environmental assessment or EIS and conduct environmental monitoring to benefit the jaguar in the baseline. Conservation measures undertaken as part of the EIS process include studying existing biological resources and stormwater, air, and groundwater quality. These studies will cost approximately \$2.5 million, in addition to the cost of preparing an environmental assessment or EIS, which may range from \$250,000 to \$500,000.¹²³ Monitoring of environmental conditions will also be required during mine operations to demonstrate compliance with various required environmental permits. Although none of these costs result directly from the listing of the jaguar, a portion of these costs may contribute to jaguar conservation. Additional baseline costs may result from implementation of conservation measures similar to those requested for the Rosemont Mine. Due to the high level of uncertainty about baseline conservation associated with the Hermosa Project, because the mine is still in the early planning stage, we do not estimate costs other than administrative impacts in this analysis.

5.4.3 ADDITIONAL MINING ACTIVITIES

154. Impacts associated with additional mineral exploration include the baseline portion of administrative costs of 2.5 informal section 7 consultations over the 20-year analysis period. These costs are estimated to be \$10,000 in present value terms or \$890 on an annualized basis, discounted at seven percent.
155. In addition, baseline conservation measures may be requested for these exploration projects. Without specific information on the size and location of project sites, we are unable to quantify impacts associated with typical conservation measures.

¹²² Monrad, Christian K. et al. Monrad Engineering Inc. Rosemont Copper Project Light Pollution Mitigation Recommendation Report. January 24, 2012.

¹²³ M3 Engineering & Technology Corporation. "Hermosa Project Preliminary Economic Assessment - Santa Cruz County, Arizona." November 12, 2012.

5.5 FORECAST INCREMENTAL IMPACTS

156. Forecast incremental economic impacts associated with mining operations include costs of addressing adverse modification of critical habitat in the context of a section 7 consultation, as well as costs of implementing associated conservation measures. Total incremental impacts are approximately \$3.9 million in present value terms, or \$340,000 on an annualized basis. This includes approximately \$22,000 in present value administrative impacts, or \$1,900 annually. Although costs associated with requested conservation measures are not able to be fully quantified, additional detail is provided in the following section.
157. Alternatively, incremental costs may include the unrealized economic benefits of the Rosemont Mine and Hermosa Project if the mines choose not to move to production as a result of the designation of critical habitat. Unrealized economic benefits may include employment, revenue, and market changes.

5.5.1 ROSEMONT COPPER PROJECT

158. Administrative impacts associated with the Rosemont Mine include the incremental level of costs for one formal section 7 consultation and one programmatic section 7 consultation in 2013. These costs are estimated to be \$14,000 in present value terms, discounted at seven percent.
159. Due to the proposed size of the Rosemont mine, the company expressed concern that feasible alternatives to avoid adverse modification of critical habitat did not exist. The company was therefore concerned that the designation of critical habitat would result in substantial impacts to the mine.¹²⁴ Although the recently issued biological opinion did not find that the operation was likely to result in adverse modification of jaguar critical habitat, the incremental impact of the designation could include the total loss of economic benefits expected to result from production at the Rosemont mine, if the company chooses not to proceed to production. Based on the conservation measures requested in the biological opinion, we believe such a decision is unlikely. For example, the incremental costs of these conservation efforts include:
- An unknown amount for spring restoration and revegetation of the reclamation area (this conservation measure may be attributable to conservation of multiple species in addition to the jaguar);
 - Approximately \$150,000 annually for management of offsetting conservation lands on Sonoita Creek Ranch, or approximately \$125 per acre,¹²⁵ and

¹²⁴ Meidinger, D. and James, N. Fennemore Craig, P.C. on behalf of Rosemont Mine and Wildcat Silver. Telephone communication on October 10, 2012.

¹²⁵ The biological opinion for the Rosemont Mine states that Rosemont will contribute \$150,000 annually for ten years for the management of 1,200 acres on Sonoita Creek Ranch, unless the ranch is managed through an in-lieu fee program. For purposes of this analysis, we assume that this annual amount is equal to the expected cost of jaguar conservation management on these lands.

- An unknown amount for management of offsetting conservation lands on Davidson Canyon Watershed parcels and Helvetia Ranch North.¹²⁶ If we assume that management costs are comparable to the \$125 per acre per year for management of Sonoita Creek Ranch, the cost to manage 574 acres on Davidson Canyon Watershed parcels would be approximately \$72,000 annually, and the cost to manage 940 acres on Helvetia Ranch North would be approximately \$120,000 annually. The total spent on management of all three conservation areas would be approximately \$340,000 annually.
160. If the Rosemont mine does not reach production, the economic benefits of the mine would not be realized. The 2012 report conducted by Arizona State University for the Rosemont Copper Company provides estimates of the economic activity created by the mine at the local, State, and national level. While we were unable to confirm the specific estimates presented in this report, it is clear that the economic impact of a decision not to open the mine could be large, particularly at the regional and State level.¹²⁷ However, as described in greater detail below, these estimates represent an upper bound on the possible impact of lost production because the estimates do not account for opportunity costs of alternative land uses or the displacement of mining activity to other locations that could occur if the Rosemont Mine does not move to production.

¹²⁶ U.S. Fish and Wildlife Service. Final Biological and Conference Opinion for the Rosemont Copper Mine, Pima County, Arizona. October 30, 2013.

¹²⁷ L. William Seidman Research Institute, W.P. Carey School of Business, Arizona State University. "An Assessment of the Economic Impacts of the Rosemont Copper Project on the Economies of the Cochise/Pima/Santa Cruz Counties Study Area, the State of Arizona, and the United States using the REMI Regional Economic Forecasting Model." May 2012.

**RESULTS OF THE ARIZONA STATE UNIVERSITY ECONOMIC IMPACT ANALYSIS
OF THE ROSEMONT COPPER PROJECT**

In May 2012, the L. William Seidman Research Institute at Arizona State University conducted an economic analysis of the impacts of the Rosemont Copper Project for the Rosemont Company. If the Rosemont mine does not reach production, the economic benefits of the mine would not be realized and would be considered incremental impacts of critical habitat designation. We report the results of this analysis rather than separately quantifying potential impacts associated with the mine.

Local Impacts - Cochise, Pima, and Santa Cruz Counties

- Production activities at the mine will increase economic activity by approximately \$1.2 billion annually and will generate approximately \$25.7 million annually in local government revenue, over the forecast 21-year life of the mine. This represents an average annual increase in gross regional product of approximately \$722 million.
- The mine will employ up to 494 people, and will indirectly support an additional 3,335 jobs as a result of vendor purchases and employee spending.

Impacts within the State of Arizona

- Production activities will increase Statewide economic activity by approximately \$1.4 billion annually and will generate approximately \$46 million annually in State government revenue. This represents an average annual increase in gross regional product of approximately \$872 million.
- The mine will indirectly support 4,581 jobs Statewide as a result of vendor purchases and employee spending.

National Impacts

- Production activities will increase national economic activity by approximately \$2.5 billion annually and will generate approximately \$235 million annually in Federal government revenue. This represents an average annual increase in gross domestic product of approximately \$1.43 billion.
- The mine will indirectly support 9,043 jobs nationally as a result of vendor purchases and employee spending.

Local, State, and national economic benefits are also anticipated as a result of four years of pre-production construction and engineering of the Rosemont Mine. Although these annual impacts will be less than those associated with mine production (as summarized above), the pre-production contribution of mine development is also expected to be large.

We note that these estimates represent the upper bound of impacts resulting from the loss of production at the Rosemont Mine because of the exclusion from the analysis of opportunity costs associated with alternative land uses, substitute mine sites, or other costs associated with mine production. For these reasons, measures of changes in gross regional product may provide a more accurate accounting of the value added by the mine than measures of changes in total economic activity.

5.5.2 HERMOSA PROJECT

161. Impacts associated with the Hermosa Project include the incremental portion of administrative costs of one formal section 7 consultation in 2014. These costs are estimated to be \$4,700 in present value terms, discounted at seven percent.
162. We assume that the conservation efforts requested for the Hermosa Project will be similar to those requested for the Rosemont Mine. However, if the Hermosa Project is not able to continue to production due to the designation of jaguar critical habitat, the economic impacts of the mine would not be realized. According to the Preliminary Economic Assessment conducted by M3 Engineering & Technology

Corporation for Wildcat Silver, these impacts include the creation of 152 direct jobs and undiscounted total revenues of \$3.96 billion over the life of the mine. The Preliminary Economic Assessment estimates the total value added of the Hermosa Project, accounting for costs of production and tax responsibilities, at \$1.027 billion undiscounted present value over the 16-year life of the mine.¹²⁸ Annualized at a seven percent discount rate over the 20-year period of this analysis, this represents an impact of approximately \$91 million per year. Additional regional or national benefits may be lost if production does not occur; however, given the early stage of mine planning, information on these potential economic benefits is not available.

5.5.3 ADDITIONAL MINING ACTIVITIES

- 163. Cost impacts associated with additional mineral exploration include the incremental level of administrative costs of 2.5 informal section 7 consultations over the 20-year analysis period. These costs are estimated to be \$3,400 in present value terms or \$298 on an annualized basis, discounted at seven percent.

5.6 CAVEATS TO ECONOMIC ANALYSIS OF MINING ACTIVITIES

- 164. Exhibit 5-3 summarizes the key assumptions of the analysis of economic impacts to mining activities, as well as the potential direction and relative scale of bias introduced by these assumptions.

EXHIBIT 5-3. KEY ASSUMPTIONS OF THE ANALYSIS OF ECONOMIC IMPACTS TO MINING ACTIVITIES

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
Costs associated with some conservation measures, both baseline and incremental, that will likely be requested for future mining operations are unknown.	May result in an underestimate of costs.	Possibly major. Information on the cost of potential conservation efforts, such as the minimization of nighttime lighting, road-kill monitoring, and restoration and revegetation activities, is not available. In some cases, these conservation efforts have been requested for the benefit of multiple species or other causes. As a result, the extent to which those efforts should be attributed to the jaguar is uncertain.

¹²⁸ M3 Engineering & Technology Corporation. "Hermosa Project Preliminary Economic Assessment - Santa Cruz County, Arizona." November 12, 2012.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
The likelihood that the Rosemont Mine and the Hermosa Project will choose not to continue to production due to jaguar conservation measures is unknown.	May result in an overestimate of costs.	Possibly major. This analysis reports estimated economic impacts associated with the lack of mine production, assuming that conservation measures requested for the benefit of the jaguar and its habitat at these large-scale mines may be so costly that the mines choose not to move to production. These estimates do not account for opportunity costs associated with alternative land uses or relocation of mining activity to substitute sites. In addition, the recent biological opinion for the Rosemont mine suggests that requested conservation measures are unlikely to be so costly as to hinder mine development.
The designation of critical habitat will not result in additional delay to mining operations beyond what is already included in project timelines for baseline environmental assessments, such as the NEPA process.	May result in an underestimate of costs.	Likely minor. Because Unit 3 is considered occupied by the jaguar, section 7 consultation with the Service is required in the baseline. Additional time and effort for the consideration of adverse modification is not expected to be significant.
Impacts associated with amendment of the Coronado National Forest Land and Resource Management Plan are equal to the cost of re-initiation of programmatic section 7 consultation in 2013.	May result in an overestimate of costs.	Likely minor. Although this amendment has been ongoing since 2006, some effort will be required to address proposed jaguar critical habitat. This assumption only affects the estimate of administrative costs.
The future rate of section 7 consultation for mineral exploration activities will be similar to the historical rate.	May result in an underestimate of costs.	Likely minor. While USFS has suggested that the rate of exploration may increase, information on planned activities is not available. This assumption likely only affects the estimate of administrative costs associated with informal section 7 consultations.
Future section 7 consultations for mineral exploration activities will require informal consultation rather than technical assistance.	May result in an overestimate of costs.	Likely minor. According to the historical consultation rate, mineral explorations have only required technical assistance. To the extent that future activities require a similar level of effort, this analysis overstates administrative impacts.

CHAPTER 6 | FORECAST ECONOMIC IMPACTS TO TRANSPORTATION INFRASTRUCTURE CONSTRUCTION

165. This chapter forecasts potential incremental impacts of jaguar critical habitat designation on planned activities conducted by the ADOT, U.S. Department of Transportation's Federal Highways Administration (FHWA), and the New Mexico Department of Transportation (NMDOT). In addition, conservation efforts that benefit the jaguar that are likely to occur under the baseline related to these activities are evaluated.
- 6.1 SUMMARY OF IMPACTS TO TRANSPORTATION INFRASTRUCTURE CONSTRUCTION**
166. ADOT already considers potential impacts of its projects on jaguar in the three Arizona counties where critical habitat for the jaguar is proposed.¹²⁹ No major roads likely to have a Federal nexus for section 7 consultation intersect the proposed critical habitat area in New Mexico. Thus, we only forecast costs associated with transportation projects in Arizona. While the construction of new roads has the potential to sever connectivity of jaguar habitat, we are not aware of any such projects planned for critical habitat areas, in either state, in the foreseeable future.
167. In Arizona, we estimate that approximately two formal consultations and seven technical assistance efforts will occur related to minor transportation projects over the next 20 years in proposed critical habitat areas. The Service and ADOT do not anticipate that jaguar critical habitat will change the outcome of these future section 7 consultations. Therefore, quantified incremental costs are limited to administrative costs of considering potential critical habitat impacts in future consultations. Incremental costs are estimated to be \$5,900, or \$520 annualized (2013 dollars).
168. Baseline costs include costs associated with constructing a wildlife corridor that will benefit multiple species, including antelope and deer, as well as administrative costs. Baseline costs are estimated at \$390,000, or \$34,000 annualized (2013 dollars), discounted at seven percent. Impacts of the proposed critical habitat designation are summarized in Exhibit 6-1.

¹²⁹ Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

EXHIBIT 6-1. FORECAST IMPACTS OF THE PROPOSED CRITICAL HABITAT DESIGNATION ON TRANSPORTATION ACTIVITIES (2013 DOLLARS), DISCOUNTED AT SEVEN PERCENT

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	\$190,000	\$17,000	\$1,200	\$110
2	\$920	\$81	\$310	\$27
3	\$8,500	\$750	\$2,800	\$250
4b	\$920	\$81	\$310	\$27
4c	\$190,000	\$17,000	\$1,200	\$110
Total	\$390,000	\$34,000	\$5,900	\$520

6.2 OVERVIEW OF ACTIVITY AND PAST CONSERVATION EFFORTS

169. The proposed rule states that “an increase in road density... tends to fragment habitat and isolate populations of jaguars and other wildlife.”¹³⁰ Existing roads crossing critical habitat include:

- Highways 386 and 86 in Subunit 1a;
- Highway 289 in Unit 2;
- Highway 82 through Unit 3 and Subunit 4c;
- Highway 83 through Unit 3 and Subunit 4b; and
- Highway 92 through Unit 3.

As such, the four proposed critical habitat units in Arizona are crossed by highways, while the two New Mexico units are not, as shown in Exhibit 6-2. The remaining portions of this chapter focus on proposed critical habitat areas in Arizona.

170. While ADOT does not currently conduct conservation measures specifically for the jaguar, ADOT considers whether its projects may affect the jaguar in planned projects in proposed critical habitat areas.¹³¹ ADOT reports that roads within the proposed critical habitat are secondary roads, as opposed to primary roads, and indicated that they are generally two lane roads with limited use.¹³²

171. Since 1995 the Service has included jaguar in six previous technical assistance efforts with ADOT and the FHWA in areas within or nearby the proposed critical habitat area for jaguar. All of these consultations occurred in 2010. According to the

¹³⁰ 2012. Proposed critical habitat. 77 FR 50223.

¹³¹ Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

¹³² Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

Service's database, no informal or formal consultations have occurred on transportation projects that included the jaguar within the proposed critical habitat area. Specifically, technical assistance efforts were conducted for:

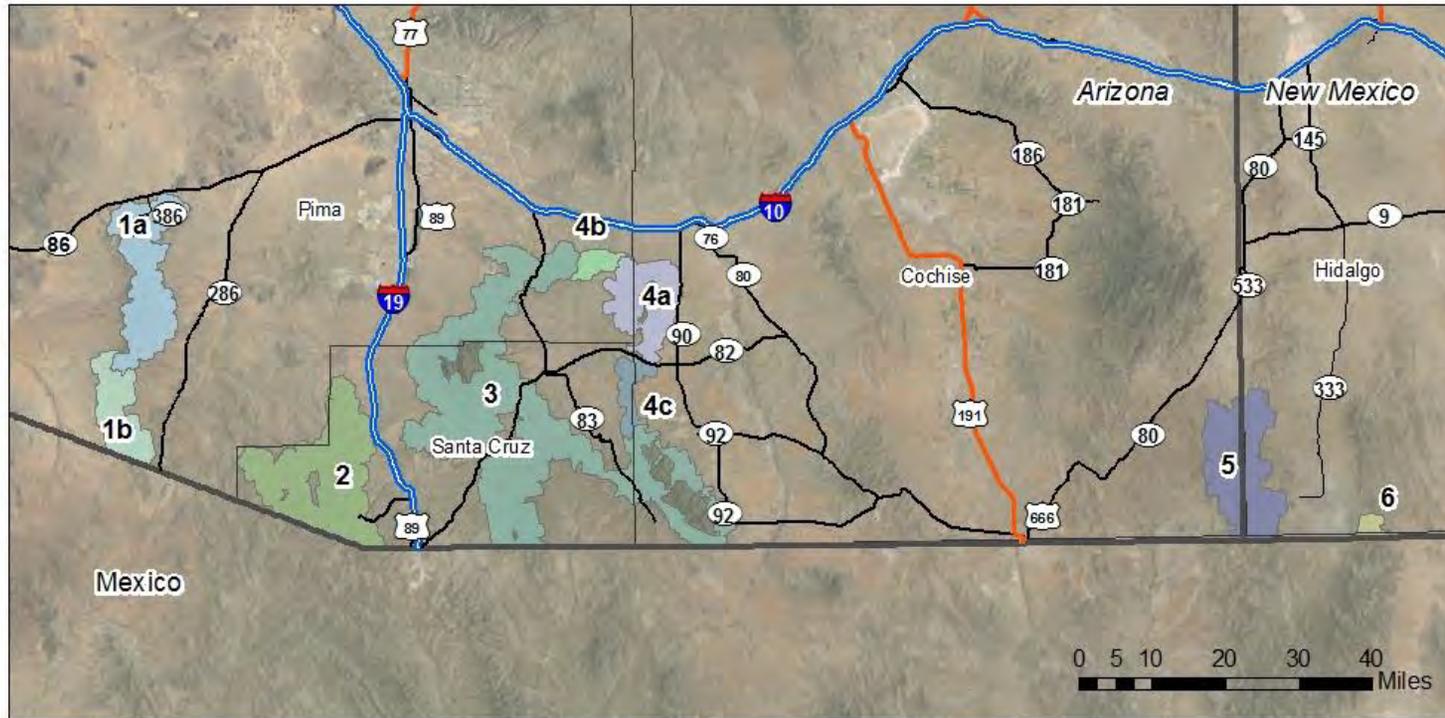
- Pima County pavement preservation projects;
- San Xavier pavement preservation;
- ADOT pavement preservation on SR 86 on TON and Pima County;
- Tucson Boulevard multi-use path;
- Kolb Road connection with Sabino Canyon Road; and
- SR 86 widening in the Kit Peak Section.¹³³

No conservation efforts were undertaken specifically for the jaguar following these technical assistance efforts. However, ADOT currently undertakes conservation efforts for other listed species, such as cacti, which have the potential to benefit the jaguar.¹³⁴

¹³³ U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.

¹³⁴ Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

EXHIBIT 6-2. HIGHWAYS THAT INTERSECT PROPOSED CRITICAL HABITAT FOR THE JAGUAR



Legend

-  Limited Access
-  Highway
-  Major Road
-  Other Road
-  States
-  Counties

1:1,226,000



Coordinate System:
NAD 1983, UTM Zone 12N

INDUSTRIAL ECONOMICS, INCORPORATED

6.3 ANALYTIC APPROACH

172. In determining future conservation measures for the jaguar, we spoke with ADOT and reviewed the consultation history for the jaguar. Based on these discussions, we identified two projects that may result in a future consultation on jaguar in the foreseeable future. We also identified potential costs associated with implementing conservation efforts for jaguar for these projects. We used the consultation history to determine the past rate of technical assistance efforts for the jaguar, and estimated that the rate would be similar in the future. From this information, we were able to determine administrative baseline and incremental impacts of consultation.

6.4 BASELINE AND INCREMENTAL IMPACTS

173. We have identified two transportation-related projects that may result in future consultation on the jaguar in critical habitat areas. First, the potential exists for a wildlife crossing to be built on either Highway 86 or Highway 82. The Regional Transportation Authority has funds to construct a crossing whose primary function would be to serve mountain lions, antelope, and deer, but could also benefit the jaguar.²³² While the current proposed location for this crossing is on the northern border of the proposed jaguar critical habitat, ADOT has also been considering putting a crossing for antelope on Route 82 between Subunits 4a and 4c.²³³ ADOT estimates the cost of a wildlife crossing to be approximately \$1 million.²³⁴ We include the cost of one wildlife crossing in the baseline, as the project would benefit the jaguar, but is expected to be constructed even absent critical habitat designation. Due to uncertainty about the location and timing of the crossing, potential costs of this action are split between Unit 1 and Unit 4c, and distributed evenly over the nine year period from 2024 through 2032, which is the potential timeframe of the project. We note that it is possible that the wildlife crossing may not, in fact, be constructed within the proposed critical habitat area for jaguar.

174. In Unit 3, proposed mining operations at Rosemont Mine could require an upgrade to Highway 83, which currently cannot support high volume mining traffic.²³⁵ Although the future of the Rosemont Mine is uncertain, we assume that one formal consultation will occur related to road improvement projects on Highway 83 associated with future mining activities. Although a history of formal consultation on transportation projects does not exist for jaguar in proposed critical habitat areas, similar to conservation efforts for construction activities at the U.S.-Mexico border, conservation measures for the species are expected to include species monitoring and limitations to nighttime work.²³⁶ Because

²³² Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

²³³ Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

²³⁴ Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

²³⁵ Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

²³⁶ Please reference Chapter 4 of this analysis for additional detail about past requirements for construction-related projects at the U.S.-Mexico border.

these efforts are associated with species conservation, and would be expected absent critical habitat designation, they are considered to be baseline impacts.

175. ADOT also has plans to fix the guard rail, cut trees, and improve drainage on the Highway 82 in Unit 3.²³⁷ We assume that ongoing projects such as these will not result in consultation for the jaguar.
176. ADOT already considers potential impacts of its projects on jaguar in the three Arizona counties where critical habitat for the jaguar is proposed.²³⁸ Based on the past rate of consultation as well as ADOT planned projects, we anticipate approximately seven technical assistance efforts on jaguar in critical habitat areas between 2013 and 2032, and two formal consultations, as discussed above. Total baseline costs, which include costs of constructing the wildlife crossing as well as administrative costs to consider the jaguar in consultation, are estimated to be \$390,000, or \$34,000 annualized at a seven percent discount rate.
177. The construction of new roads would have the potential to sever connectivity of jaguar habitat and result in adverse modification of critical habitat. However, currently planned projects are not expected to sever connectivity. Thus, the Service and ADOT do not anticipate that jaguar critical habitat will change the outcome of future section 7 consultations regarding jaguar and its habitat associated with transportation projects in the proposed critical habitat area. Therefore, incremental costs are limited to administrative costs associated with considering potential impacts of actions on critical habitat in future consultations. These incremental costs are estimated to be \$5,900, or \$520 annualized (2013 dollars).

²³⁷ Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

²³⁸ Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

CHAPTER 7 | POTENTIAL ECONOMIC IMPACTS TO RESIDENTIAL AND COMMERCIAL DEVELOPMENT ACTIVITIES

178. This chapter evaluates potential incremental impacts of jaguar critical habitat designation on residential and commercial development activities. In addition, conservation efforts that benefit the jaguar that are likely to occur under the baseline related to these activities are evaluated.

7.1 SUMMARY OF FORECAST IMPACTS TO DEVELOPMENT ACTIVITIES

179. The vast majority of the 129,246 acres of privately own lands proposed as jaguar critical habitat are rural. County planners state that these areas are unlikely to be developed in the foreseeable future, with the exception of areas around Patagonia, Arizona, in Unit 3 and on the eastern border of Unit 2. However, even if these areas are developed, they may not have a Federal nexus for section 7 consultation. The most likely nexus for development projects is typically through Corps, as part of the section 404 Clean Water Act permitting process. The proposed designation is unlikely to require such a permit due to its dryland (desert) habitat. As such, future consultations related to residential and commercial development activities are not currently anticipated in proposed critical habitat areas. No incremental impacts of critical habitat designation on residential or commercial development are forecast.

180. Even absent critical habitat designation for jaguar, some private lands in Unit 1 may be purchased and set aside for conservation as mitigation for development occurring outside of critical habitat areas in more rural areas. These actions may benefit the jaguar even absent critical habitat designation. However, costs of these conservation actions are not quantified for purposes of this analysis.

7.2 OVERVIEW OF ACTIVITY

181. Privately owned lands comprise 15 percent of proposed critical habitat for the jaguar. Exhibit 7-1 summarizes the privately owned acres in critical habitat by county. As shown, the majority of private land in the proposed critical habitat designation occurs in Santa Cruz County. As shown in Exhibit 7-2, proposed critical habitat falls outside of any major urban areas.

EXHIBIT 7-1. PRIVATELY OWNED CRITICAL HABITAT AREAS BY COUNTY

COUNTY	STATE	CRITICAL HABITAT UNIT(S)	ACRES OF PRIVATE LAND (APPROXIMATE)
Pima	Arizona	1a, 1b, 2, 4a, 4b	31,100
Santa Cruz	Arizona	2,3,4c	63,500
Cochise	Arizona	3, 4a, 4c, 5	20,200
Hidalgo	New Mexico	5, 6	14,200
Total			129,000
<p>Note: Acreages are approximate, and estimates may not sum due to rounding and GIS mapping conversion issues.</p> <p>Sources: Areas were calculated using U.S. Fish and Wildlife Service on March 26, 2013; Arizona Land Resource Information System (ALRIS) land ownership data from 2012; New Mexico Resource Geographic Information System Program 2007 land ownership data; and ArcGIS ESRI data. One exception includes two parcels of land totally 2,000 acres marked as privately owned lands in Subunit 1a by ALRIS that the U.S. Fish and Wildlife Service indicated are part of the Buenos Aires NWR in email communication on April 13, 2013.</p>			

7.2.1 PIMA COUNTY, ARIZONA

182. Approximately 31,100 acres of privately owned lands are proposed as jaguar critical habitat in Pima County. These lands fall into units 1a, 1b, 2, 4a, and 4b. Most private lands within proposed jaguar critical habitat are zoned as low density, and many areas are considered to be rural homesteads, where housing lots are required to be larger than three acres, and are often used as locations for mobile homes or for livestock grazing activities.²³⁹ Zoning of private lands in proposed critical habitat areas are presented in Exhibit 7-3, and are summarized as follows:

- 58 percent are zoned as “low intensity rural,” which are areas that are zoned and planned for residential use, natural use, or cluster open space;
- 18 percent are zoned as “resource transition,” which are private lands with environmentally sensitive characteristics;
- Two percent are zoned as “resource productive,” which are areas the county intends for cultivated and ranching lands that are valued for their productive capabilities and which should be protected from encroachment by incompatible uses;
- One percent is zoned as “medium intensity rural.”²⁴⁰

183. All of these zones are limited to development of 0.3 residences per acre.²⁴¹ Remaining acres are classified as “other.”

²³⁹ Personal communication with Jim Veomett, Pima County Planning Department, December 11, 2012.

²⁴⁰ GIS data received via email communication with Jim Veomett, Pima County Planning Department, on December 19, 2012.

²⁴¹ Pima County Development Services Department Planning Division. 2012. Pima County: Comprehensive Plan Update. Land Use Intensity Legend. Viewed on December 31, 2012 at: <http://www.pimaxpress.com/Planning/Default.htm>

184. Outside of Tohono O’odham lands, Unit 1 lands are part of Pima County’s Conservation Land System (as shown in Exhibit 7-3), which are areas that the County uses as habitat mitigation for development elsewhere in the County.²⁴² As a result, Pima County does not anticipate significant development activity within the proposed critical habitat designation. Planners state that, due to their generally dry habitat, proposed private lands in Pima County are unlikely to require a Federal permit for development activities.²⁴³

7.2.2 SANTA CRUZ COUNTY, ARIZONA

185. Approximately 63,500 acres of privately owned lands are proposed as jaguar critical habitat in Santa Cruz County. These lands fall into units 2, 3, and 4c. As shown in Exhibit 7-4, most privately owned lands in Santa Cruz County within proposed critical habitat fall into a rural zoning district, meaning that dwellings are over 180,000 square feet. One exception is a small overlap of proposed critical habitat Unit 3 with the town of Patagonia, Arizona. A small area in Unit 2 has also been developed.
186. Patagonia is a town with population of approximately 900, which, due to its location in the middle of the CNF, has historically served as a supply center for nearby mines and ranches. Currently, the town advertises itself as a tourist destination for hikers, historians, and birders.²⁴⁴ On either side of Highway 82 near Patagonia, large lots have been platted, some of which are developed as commercial or residential properties. While these areas are largely undeveloped, zoning could allow permits for up to 250 residences per lot.²⁴⁵ In an area south of Patagonia, about 30 large lots have been platted in an area known as the Mesas. On the eastern boundary of Unit 2, west of I-19, several homes have also been developed. Regardless, due to their generally dryland habitats, Federal permits are not typically required for development activities in these areas unless they affect wash areas.²⁴⁶

7.2.3 COCHISE COUNTY, ARIZONA

187. Approximately 20,200 acres of privately owned lands are proposed in Cochise County. These lands fall into units 3, 4a, 4c, and 5. As shown in Exhibit 7-5, 95 percent of privately owned areas are zoned as rural, with one home per four acres. Additionally, approximately three percent are single family residential on a lot of at least 43,000 square feet, two percent are general business, and all other categories are less than one percent of privately owned areas (less than 12 acres).²⁴⁷

²⁴² GIS data received via email communication with Jim Veomett on December 19, 2012.

²⁴³ Personal communication with Jim Veomett, Pima County Planning Department, December 11, 2012.

²⁴⁴ Patagonia. Accessed at <http://www.patagoniaaz.com/Patagonia.html> on January 10, 2013.

²⁴⁵ Personal communication with Mary Dahl, Santa Cruz County, December 4, 2012.

²⁴⁶ Personal communication with Jim Veomett, Pima County Planning Department, December 11, 2012.

²⁴⁷ GIS data received via email correspondence with Walter Domann, GIS Coordinator, and Michael Turisk, Planning Manager. Cochise County, January 11 and 14, 2013.

7.2.4 HIDALGO COUNTY, NEW MEXICO

188. Approximately 14,200 acres of privately owned lands are proposed as jaguar critical habitat in Hidalgo County. These lands fall into units 5 and 6. Privately owned lands in Hidalgo County within the proposed critical habitat are generally used for ranching and mining.²⁴⁸ While future home development is possible in proposed critical habitat areas, the County states that such development is unlikely.²⁴⁹ In addition, the only Federal nexus likely for privately owned lands in the County is NRCS funding for agriculture and ranching.²⁵⁰

7.3 BASELINE AND INCREMENTAL IMPACTS

189. Private residential or commercial development activities are not currently anticipated in Pima or Hidalgo counties.²⁵¹ Some development is possible in Santa Cruz County near Patagonia, Arizona and on the eastern border of unit 2.²⁵² However, there are unlikely to be any Federal permits or Federal funding for development activities in the privately owned areas proposed as jaguar critical habitat.²⁵³ As such, landowners do not generally need to undertake Section 7 consultations or conservation measures for threatened or endangered species. While local ranchers do take advantage of NRCS programs, these programs are not expected to play a role in development activities.
190. Since there are no previous Section 7 consultations on development within the proposed critical habitat area on private lands, county planners did not identify any projects that are expected to result in section 7 consultation, and Federal permits are unlikely for development in proposed areas, we do not forecast incremental costs related to the proposed critical habitat designation.
191. Even absent critical habitat designation for jaguar, some private lands in Unit 1 may be purchased and set aside for conservation as mitigation for development occurring outside of critical habitat areas in more rural areas. These actions may benefit the jaguar even absent critical habitat designation. However, costs of these conservation actions are not quantified for purposes of this analysis.

²⁴⁸ Personal communication with Jody Hatch, Assessor, Hidalgo County, December 3, 2012.

²⁴⁹ Personal communication with Jody Hatch, Assessor, Hidalgo County, December 3, 2012.

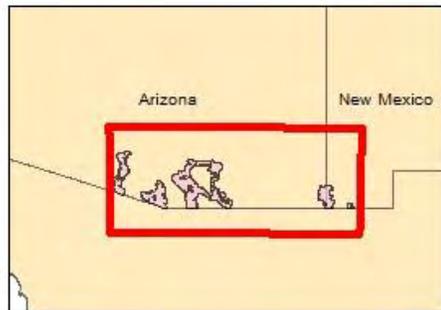
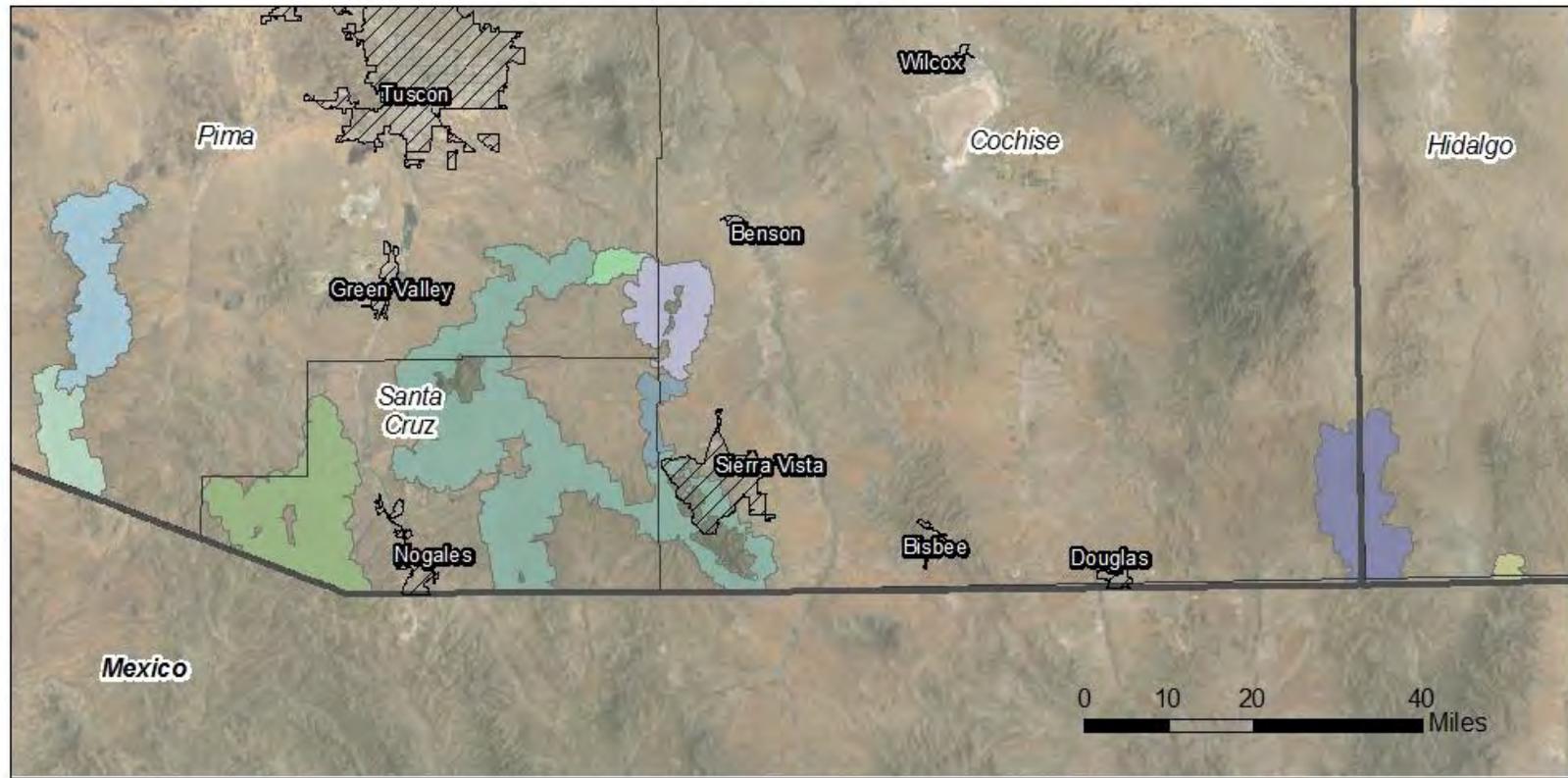
²⁵⁰ Personal communication with Jody Hatch, Assessor, Hidalgo County, December 3, 2012.

²⁵¹ Personal communication with Jody Hatch, Assessor, Hidalgo County, December 3, 2012; Personal communication with Jim Veomett, Pima County Planning Department, December 11, 2012.

²⁵² Personal communication with Mary Dahl, Santa Cruz County, December 4, 2012.

²⁵³ Personal communication with Mary Dahl, Santa Cruz County, December 4, 2012; Personal communication with Jody Hatch, Assessor, Hidalgo County, December 3, 2012; Personal communication with Jim Veomett, Pima County Planning Department, December 11, 2012.

EXHIBIT 7-2. URBAN AREAS NEAR PROPOSED CRITICAL HABITAT FOR THE JAGUAR



Legend

-  Urban areas
-  States
-  Counties

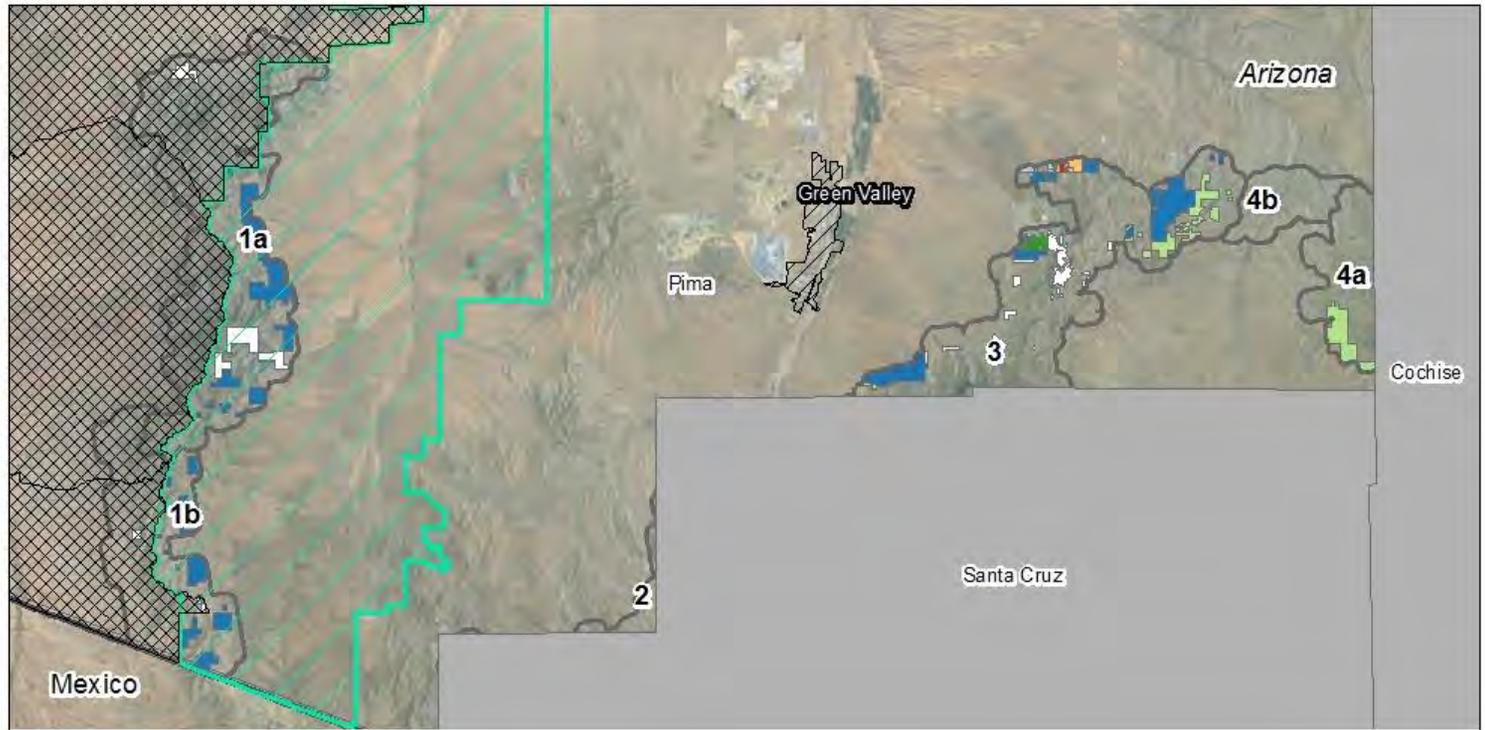
1:1,145,500

IEc

Coordinate System:
NAD 1983, UTM Zone 12N

INDUSTRIAL ECONOMICS, INCORPORATED

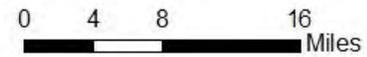
EXHIBIT 7-3. ZONING OF PRIVATELY OWNED LANDS IN PIMA COUNTY WITHIN PROPOSED CRITICAL HABITAT FOR THE JAGUAR



Legend

- Activity Centers
- Low intensity rural
- Low intensity urban
- Medium intensity rural
- Medium intensity urban
- Other
- Resource productive
- Resource transition
- Proposed Critical Habitat
- Conservation Lands System
- Urban areas
- States
- Tohono O'odham Nation lands

1:527,000

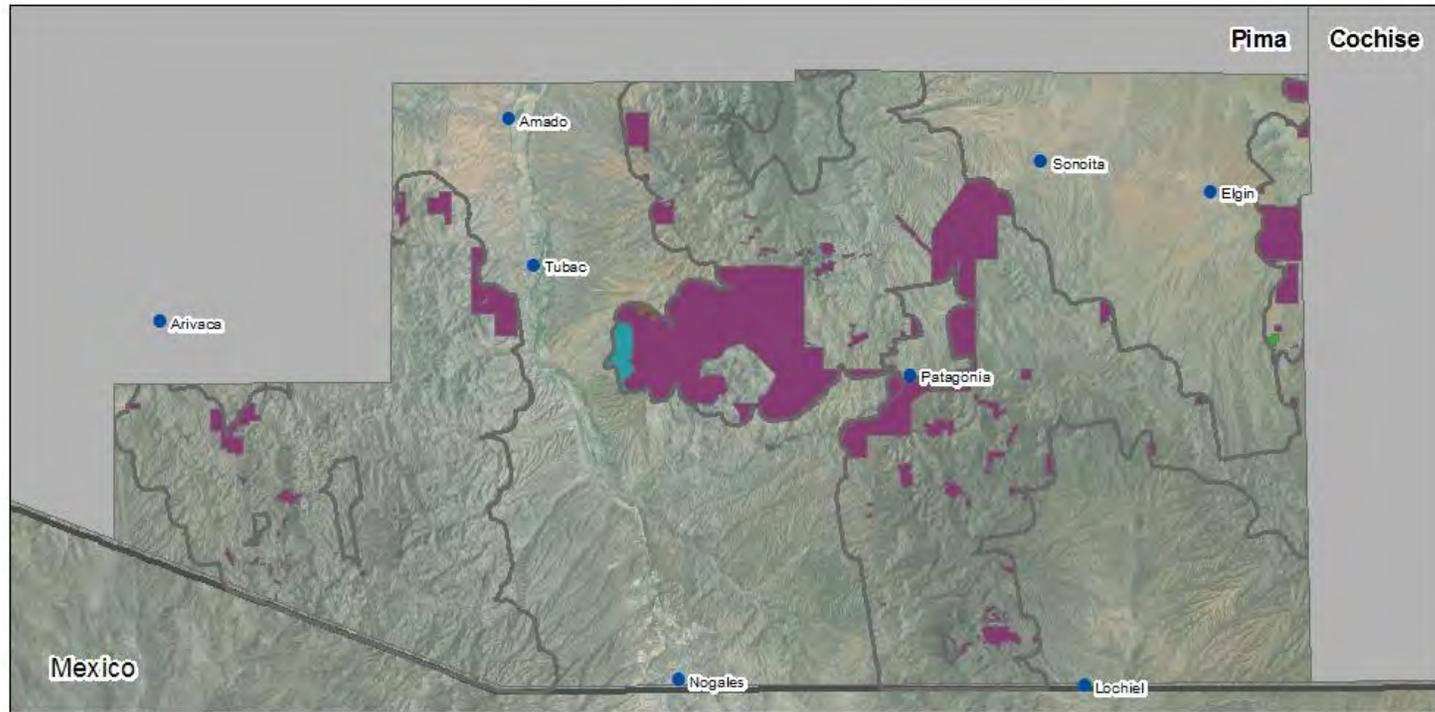


Coordinate System:
NAD 1983, UTM Zone 12N

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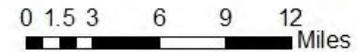
INDUSTRIAL ECONOMICS, INCORPORATED

EXHIBIT 7-4. ZONING OF PRIVATELY OWNED LANDS IN SANTA CRUZ COUNTY WITHIN PROPOSED CRITICAL HABITAT FOR THE JAGUAR



Zoning in Santa Cruz County

- General Rural Zoning District - 180,000 sq ft per dwelling unit
- Mobile Home Residential Zoning District - 5,000 sq ft per dwelling unit
- Residential Zoning District - 18,000 sq ft per dwelling unit
- Residential Zoning District - 7,500 sq ft per dwelling unit



1:403,600



Coordinate System:
NAD 1983, UTM Zone 12N

INDUSTRIAL ECONOMICS, INCORPORATED

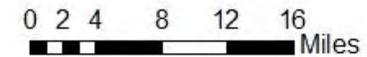
EXHIBIT 7-5. ZONING OF PRIVATELY OWNED LANDS IN COCHISE COUNTY WITHIN PROPOSED CRITICAL HABITAT FOR THE JAGUAR



Zoning in Cochise County

- General business
- Heavy industry, or Rural; 1 home per 4 acres
- Single family residential; 1 home per 43,000 sq ft
- Rural; 1 home per 2 acres
- Rural; 1 home per 4 acres
- Single household/Manufactured home residential
- Transitional-residential; 1 home per 36,000 sq ft

1:600,000



IEc

Coordinate System:
NAD 1983, UTM Zone 12N

INDUSTRIAL ECONOMICS, INCORPORATED

CHAPTER 8 | POTENTIAL ECONOMIC IMPACTS TO U.S. MILITARY ACTIVITIES

192. This chapter evaluates potential incremental impacts of jaguar critical habitat designation on U.S. military activities (i.e., activities related to operations by the DOD). The only DOD installation that intersects proposed critical habitat for the jaguar is Fort Huachuca in Cochise County, Arizona, which overlaps Unit 3 and Subunit 4c. Conservation efforts that may benefit jaguar critical habitat that are likely to occur under the baseline related to these activities are also evaluated.

8.1 SUMMARY OF FORECAST IMPACTS TO MILITARY ACTIVITIES

193. While the jaguar is generally not present at Fort Huachuca in Unit 3 and Subunit 4c, DOD is aware that the species can be present and has incorporated the species into its management planning. Therefore, the Service and DOD do not anticipate that jaguar critical habitat will change the outcome of future section 7 consultations regarding the jaguar and its habitat associated with operations at Fort Huachuca.

194. Because management of the jaguar is passive in nature (i.e. no specific changes to management or operations at Fort Huachuca are anticipated to accommodate jaguar conservation), the cost of conservation efforts under the baseline are not quantified. As such, both baseline and incremental costs are limited to the administrative costs of consultation. Using a seven percent discount rate, baseline costs are estimated to be \$10,000, or \$900 annualized over the next 20 years (2013 dollars), and incremental costs are \$20,000, or \$1,700 annualized (2013 dollars).

EXHIBIT 8-1. SUMMARY OF IMPACTS TO MILITARY ACTIVITIES WITHIN THE PROPOSED CRITICAL HABITAT DESIGNATION BY UNIT

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
3	\$9,700	\$860	\$19,000	\$1,700
4c	\$480	\$43	\$930	\$82
Total	\$10,000	\$900	\$20,000	\$1,700

8.2 OVERVIEW OF ACTIVITY AND PAST CONSERVATION EFFORTS

195. Fort Huachuca is “home to the U.S. Army Intelligence Center and School, Network Enterprise Technology Command, Joint-services Unmanned Aerial Vehicle Program, Joint Interoperability Test Command, the Electronic Proving Ground, and the Intelligence and Electronic Warfare Test Directorate. The Fort specializes in research, development, testing, and evaluation of intelligence, electronic warfare, and information systems.”²⁵⁴ Approximately 15,115 acres of DOD lands at Fort Huachuca overlap Unit 3, which the Service considers to be occupied for the jaguar, and 752 acres of Subunit 4c, which it considers to be unoccupied. Fort Huachuca lands and their overlap with proposed critical habitat for jaguar are shown in Exhibit 8-2.
196. The Sikes Improvement Act of 1997 requires DOD facilities to prepare an Integrated Natural Resources Management Plan (INRMP) for installations with significant natural resources in order to provide conservation and rehabilitation of natural resources.²⁵⁵ Fort Huachuca completed an INRMP that addresses endangered and threatened species.²⁵⁶ The Fort Huachuca INRMP includes management of water sources, woodlands, fire management, fuel management, and coordination with other Federal landowners, protecting habitat on Fort lands.²⁵⁷ The INRMP did not originally include the jaguar and its habitat; however, Appendix 7 was added to focus on specific benefits of the INRMP to federally listed species, including the jaguar. Appendix 7 outlines how INRMP management actions provide conservation benefits for the jaguar. These actions include: ecosystem and hunting management intended to ensure adequate jaguar prey; water resource protection measures; fire management activities that maintain canopy cover; prohibition of recreation at night; briefings on threatened and endangered species; and a cooperative relationship with the University of Arizona’s Wild Cat Research and Conservation Center.²⁵⁸
197. The Fort reports that there is limited human presence and disturbance within the proposed critical habitat area. Additionally, public activities are limited and most maneuvers at the Fort do not permanently disturb habitat.²⁵⁹ Currently, human access to mountainous areas is limited by rugged topography, where travel exists only on a few four-wheel drive dirt roads. Single-lane dirt roads exist in many areas of the Fort, but these roads do not carry heavy equipment or maneuver units. The Fort does not allow off-road travel due to agave management, as agaves serve as a food source for the endangered lesser long nosed bat.

²⁵⁴ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, p. 8.

²⁵⁵ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, p. 7.

²⁵⁶ 2012 Proposed critical habitat 77 FR 50233.

²⁵⁷ Personal conversation with Kim Mulhern, Chief, Environmental and Natural Resources Division, Fort Huachuca, Department of the Army, on October 15, 2012.

²⁵⁸ McFarland, Daniel J. Public comment on behalf of Fort Huachuca submitted on September 13, 2013.

²⁵⁹ U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle, p. 8.

The Fort-owned lands are surrounded by a fence to exclude cattle. However, this fence should not exclude jaguar. The Fort does not have plans for construction activities in proposed critical habitat areas.²⁶⁰

198. In addition to consultation actions on the Fort's lands, the Fort's Army Compatible Use Buffer (ACUB) program, approved in 2007, is working to create buffer zones to avoid encroachment that would affect military activities by limiting growth and groundwater pumping, helping protect the river, and protecting Fort Huachuca and the community.²⁶¹ The goal is to protect grasslands in order to prevent further development that will affect endangered and threatened species. Several landowners participate in conservation easements, with the largest being the Babacomari Ranch north of the Fort's boundary.²⁶²
199. Priority areas under ACUB are shown in Exhibit 8-2, where 5,797 acres of priority areas overlap proposed critical habitat in Subunits 4a and 4c. Of these, 4,730 acres of conservation easements were completed prior to 2012 in Subunits 4a and 4c, and 796 acres in Subunit 4c are planned to be completed in 2013. Partners in these areas include the Arizona Land and Water Trust, The Nature Conservancy, BLM, and the State of Arizona.²⁶³

8.3 ANALYTIC APPROACH

200. In determining future conservation measures for the jaguar, we spoke with Fort Huachuca and reviewed the consultation history for the jaguar. From this information, we were able to determine administrative baseline and incremental impacts of consultation.

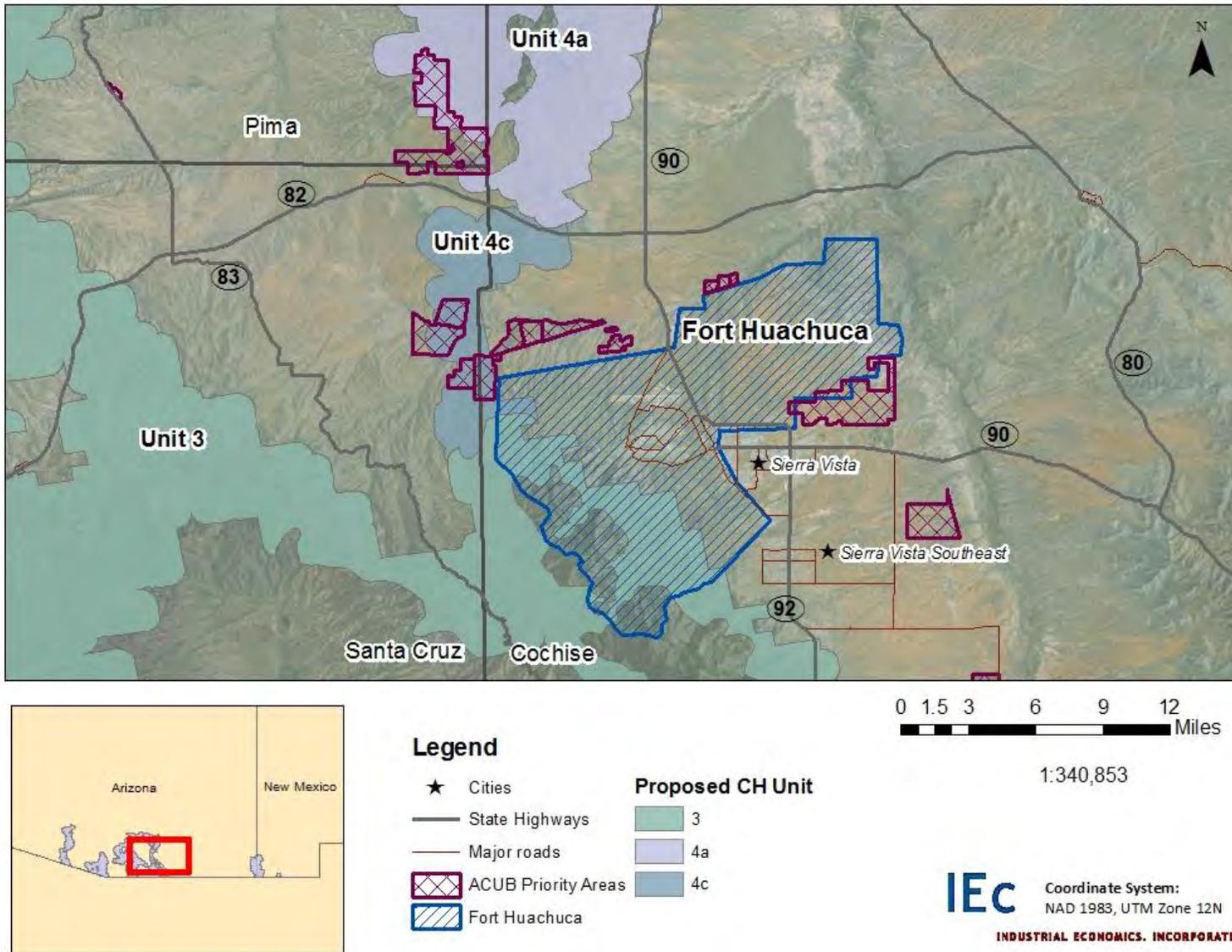
²⁶⁰ Personal conversation with Kim Mulhern, Chief, Environmental and Natural Resources Division, Fort Huachuca, Department of the Army, on October 15, 2012.

²⁶¹ Metcalf, Jessica. 2007. Fort Huachuca Conservation Easements Reach 1,400 Acres. Environmental Update, U.S. Army Environmental Command. Viewed on December 9, 2012 at: <http://aec.army.mil/usaec/newsroom/update/fall07/fall0710.html>.

²⁶² Personal communication with Dawn Rohr, Department of the Army, January 7, 2013.

²⁶³ GIS data received via email communication with Dawn Rohr, Department of the Army, January 7, 2013.

EXHIBIT 8-2. OVERLAP OF FORT HUACHUCA LANDS WITH PROPOSED CRITICAL HABITAT FOR THE JAGUAR



8.4 BASELINE AND INCREMENTAL IMPACTS

201. While the jaguar is generally not present at Fort Huachuca, DOD is aware that the species can be present and has already incorporated the species into its management planning.²⁶⁴ The Service has included jaguar in a previous formal consultation in 2007 related to Fort Huachuca operations. In the 2007 consultation, the Service found that Fort Huachuca operations may affect, but were not likely to adversely affect the jaguar, and no explicit conservation actions were recommended to be protective of jaguar. The Service conducted one technical assistance effort with DOD related closure of the Paul K. Allan Hall U.S. Army Reserve Center in Tucson in 2012.
202. The INRMP for Fort Huachuca was completed as an ecosystem management plan rather than evaluating impacts species-by-species.^{265,266} However, according to a public comment submitted by DOD, an appendix has been added to the INRMP to focus on specific benefits of the ecosystem management plan to the jaguar and its habitat.²⁶⁷ DOD anticipates that there will be a reinitiation of the formal consultation on the INRMP to specifically consider the jaguar and its habitat. This reinitiated consultation is assumed to be incremental to critical habitat designation. An informal biological assessment is already under development.²⁶⁸
203. The jaguar is thought to benefit from a lack of habitat disturbance, and the Service has not recommended active conservation efforts for the jaguar at the Fort in the past. In addition, the Fort does not currently plan to disturb habitat areas. Thus, future management of the jaguar is anticipated to continue to be passive in nature at Fort Huachuca, (i.e. no specific changes to management or operations at Fort Huachuca are anticipated to accommodate jaguar conservation). As such, costs associated with future conservation efforts are not anticipated. To the extent that the Fort undertakes management actions for other endangered or managed species in the future, particularly any that require land acquisition, these actions may also benefit the jaguar under the baseline.
204. DOD is in the process of creating a new master plan for funding needs that will identify specific projects for which the Department would need to consult on the jaguar. However, DOD states that it is unlikely that future projects will be undertaken in mountain ranges, where critical habitat is proposed. Thus, DOD does not anticipate that Fort operations are

²⁶⁴ Personal conversation with Kim Mulhern, Chief, Environmental and Natural Resources Division, Fort Huachuca, Department of the Army, on October 15, 2012.

²⁶⁵ To be conservative, we assume that consultation for the INRMP would be attributed to the proposed critical habitat designation for the jaguar, though it may have been reinitiated regardless of the designation.

²⁶⁶ Personal conversation with Kim Mulhern, Chief, Environmental and Natural Resources Division, Fort Huachuca, Department of the Army, on October 15, 2012.

²⁶⁷ McFarland, Daniel J. Public comment on behalf of Fort Huachuca submitted on September 13, 2013.

²⁶⁸ Personal conversation with Kim Mulhern, Chief, Environmental and Natural Resources Division, Fort Huachuca, Department of the Army, on October 15, 2012.

likely to require additional consultation or conservation actions following the proposed critical habitat designation for the jaguar.²⁶⁹

205. Under the baseline, we anticipate approximately one formal consultation and one technical assistance effort between 2013 and 2032 based on the rate of past consultation actions. These efforts will require some additional incremental effort to consider potential impacts of critical habitat designation. We also anticipate one incremental formal consultation in 2013 to include the jaguar in the INRMP. As such, total quantified baseline costs are estimated to be \$10,000, or \$900 annualized at a seven percent discount rate. Incremental costs are estimated to be \$20,000, or \$1,700 annualized at a seven percent discount rate.

²⁶⁹ Personal conversation with Kim Mulhern, Chief, Environmental and Natural Resources Division, Fort Huachuca, Department of the Army, on October 15, 2012.

CHAPTER 9 | POTENTIAL ECONOMIC IMPACTS TO OTHER ACTIVITIES, INCLUDING LIVESTOCK GRAZING

206. This chapter evaluates potential incremental impacts of jaguar critical habitat designation on activities that have not yet been considered in this report, including livestock grazing on State and private lands. Conservation efforts that may benefit jaguar critical habitat that are likely to occur under the baseline related to these activities are also evaluated.

9.1 SUMMARY OF IMPACTS TO OTHER ACTIVITIES

207. In general, most private and State lands in proposed critical habitat lands for the jaguar are currently used for agricultural production, most commonly for livestock grazing. These activities do not typically require federal permitting or funding for operation. However, many ranchers receive some funding from NRCS, often for conducting range improvements or conservation activities. While consultations on NRCS activities are rare, several public commenters, Altar Valley Conservation Alliance (AVCA), and NRCS have noted that some ranchers may withdraw applications for NRCS funding following jaguar critical habitat in order to avoid potential obligations to consult with the Service. AVCA and individual ranchers “will be much more hesitant in the future about seeking NRCS or other federal agency funding for conservation projects due to concerns about jaguar critical habitat.”²⁷⁰ Additionally, NRCS notes that farmers may choose not accept funding due to the proposed critical habitat designation. A precedent for such actions was set when farmers turned away from NRCS after the wolf was listed. However, NRCS notes that such resistance is typically due to the presence and listing of the species, rather than the designation of critical habitat.²⁷¹ However, to the extent that this effect is expected to result from critical habitat designation, we consider it to be incremental, although we are not able to quantify it in this analysis.
208. At least two substantial conservation efforts have been initiated by ranchers under the baseline to attempt to obtain an incidental take permit for the jaguar, including HCPs for the Malpai Borderlands Group (MBG) and AVCA. Most MBG efforts involve maintaining natural landscape, including prescribed fire efforts, and maintaining open space. These baseline conservation efforts are not quantified for purposes of this analysis. Quantified baseline impacts include administrative impacts of considering jaguar in future consultations. These baseline costs are estimated to be \$14,000, or \$1,200 annualized over the next 20 years (2013 dollars). While incremental costs to ranchers

²⁷⁰ Email communication with Walter Lane, Altar Valley Conservation Authority, December 7, 2012.

²⁷¹ Personal communication with Stu Tuttle, State Biologist, National Resource Conservation Service on November 27, 2012.

may include withdrawal from NRCS funding on private and state lands, data does not exist to confirm the probable number of occurrences, so these impacts are not analyzed quantitatively. Incremental costs quantified include administrative costs of consultation, which are \$24,000, or \$2,100 annualized over the next 20 years (2013 dollars).

209. A small number of miscellaneous other activities occur within the proposed critical habitat area that could affect jaguar critical habitat. A few examples of such activities include: construction of a sanctuary, fencing, power transmission lines, communication towers, natural gas pipelines, and creation of habitat conservation plans. In particular, the proposed Sierrita natural gas pipeline may cross the proposed designation and would have a Federal nexus through the Federal Energy Regulatory Commission (FERC).²⁷² We use historical rates of consultation for activities not described above to determine future rates of consultation for these activities, and estimate only administrative costs of consultation given no example projects that are likely to sever connectivity to Mexico. As such, baseline impacts are \$180,000, or \$16,000 annualized over the next 20 years (2013 dollars), and incremental impacts are \$82,000, or \$7,300 annualized over the next 20 years (2013 dollars).

9.2 OVERVIEW OF ACTIVITY AND PAST CONSERVATION EFFORTS

210. Together, State and private lands comprise 26 percent of proposed critical habitat for jaguar. Acreage of State and private lands by critical habitat unit are presented in Exhibit 9-1. Most of these lands are dedicated to agricultural use and, most commonly, to livestock grazing. The following sections provide an overview of current land use in proposed critical habitat areas, as well as an overview of ongoing conservation actions by private landowners for the jaguar.

EXHIBIT 9-1. STATE AND PRIVATE LAND OWNERSHIP IN JAGUAR PROPOSED CRITICAL HABITAT (ACRES)

UNIT	SUBUNIT	UNIT NAME	STATE	PRIVATE
1	a	Baboquivari-Coyote Subunit	22,831	8,130
1	b	Southern Baboquivari Subunit	15,213	4,555
2		Atascosa Unit	5,672	6,231
3		Patagonia Unit	29,274	71,775
4	a	Whetstone Subunit	13,455	9,325
4	b	Whetstone-Santa Rita Subunit	11,396	0
4	c	Whetstone-Huachuca Subunit	7,366	8,379
5		Peloncillo Unit	19,426	13,138
6		San Luis Unit	0	7,714
TOTAL ACRES			124,633	129,246
Source: Email communication with U.S. Fish and Wildlife Service, April 22, 2013.				

²⁷² Parker, Dennis. Public comment submitted on behalf of Jim and Sue Chilton, the Chilton Ranch, the Pima Natural Resources Conservation District, the Arizona Cattle Growers' Association, the Southern Arizona Cattlemen's Protective Association, and the Coalition of Arizona/New Mexico Counties, on July 30, 2013.

9.2.1 LIVESTOCK GRAZING ON STATE AND PRIVATE LANDS

211. In general, private lands and State trust lands in proposed critical habitat lands for the jaguar are used for agricultural production, and most commonly for livestock grazing by private ranchers. Proposed critical habitat overlaps Arizona State Trust Lands in Subunits 1a and 1b, Units 2 and 3, and Subunits 4a, 4b and 4c. Proposed critical habitat does not overlap state lands in New Mexico. The Arizona State Land Department reports that the majority of State Trust Lands in Arizona, about 85 percent, are leased for livestock grazing.²⁷³ These activities do not typically require Federal permitting or funding for operation. However, many ranchers receive some funding from NRCS, often for conducting range improvements such as pipeline, fencing, or prescribed fire actions. In addition, two consortiums of ranchers have attempted to develop HCPs for their activities, the MBG and the AVCA.
212. Estimated annual NRCS funding amounts for Pima, Santa Cruz and Cochise Counties in Arizona and Hidalgo County in New Mexico are presented in Exhibit 9-2.²⁷⁴

EXHIBIT 9-2. ANNUAL NRCS FUNDING

COUNTY	ANNUAL CONTRACT AMOUNT (\$)	NUMBER OF CONTRACTS PER YEAR	SIZE OF COUNTY (ACRES)	PERCENT OF COUNTY IN CRITICAL HABITAT
Pima ¹	\$727,000	15	5,910,000	4.4%
Santa Cruz ¹	\$300,000	7	802,000	47.6%
Cochise ¹	\$3,150,000	52	4,010,000	3.9%
Hidalgo ²	\$667,000	10	2,210,000	2.7%
TOTAL	\$4,840,000	72	12,900,000	6.6%
Notes: 1.) Data used for Pima, Santa Cruz, and Cochise Counties, Arizona included funding from the 2002 and 2008 Farm Bills, so data was assumed to span 10 years, including 2003 through 2008 for contracts under the 2002 Farm Bill, and 2009 through 2012 for contracts under the 2008 Farm Bill. 2.) Data for Hidalgo County, New Mexico included funding from 2007 to 2012, or six years of funding data.				

Malpai Borderlands Group HCP

213. The MBG HCP was approved in 2007. The HCP covered areas, which includes 328,000 acres that have been incorporated into conservation easements near the U.S. Mexico border in Hidalgo County. The HCP area intersects proposed critical habitat for the jaguar in Units 5 and 6. While the jaguar is mentioned but not covered in the HCP, the critical

²⁷³ Personal communication with Will Sommers, Arizona State Land Department, November 29, 2012.

²⁷⁴ Data for Arizona received via email communication from Dennis Kimberlin, Assistant State Conservationist, NRCS, Phoenix, Arizona on December 27, 2012. Data for New Mexico received via email communication with Rosabeth Garcia-Sais, NRCS, Albuquerque, New Mexico on January 11, 2013.

habitat area likely benefits from conservation measures and open-space initiatives provided for the 19 wildlife and plant species of concern in the plan. While the group considered including measures for the jaguar, the experts who reviewed the HCP indicated that the habitat was not important for the species, so conservation was not pursued. MBG does, however, pay anyone in the United States for livestock killed by a jaguar and supports “efforts to address the maintenance of the jaguar population.”²⁷⁵

214. We assume that conservation actions undertaken that would benefit the jaguar as part of this HCP would occur under the baseline for this analysis. The Service states that “the covered activities included in their HCP do not impact the jaguar; therefore, it seems unlikely that they would choose to add the species to their HCP.”²⁷⁶

Altar Valley Conservation Alliance

215. The Altar Valley Conservation Alliance (AVCA) is a non-profit organization comprised of local private ranchers working to conserve the Altar Valley watershed for future generations.²⁷⁷ AVCA works with Federal, State and local agencies to manage the valley, where conservation and restoration projects likely benefit the jaguar. Projects have included a large prescribed fire project as well as development of a draft HCP, which has not been finalized.²⁷⁸ While AVCA does not have conservation measures specifically targeted at the jaguar, conservation measures such as retention of open space and improving the natural landscape help create an environment beneficial to the jaguar.²⁷⁹

State Trust Land

216. While specific conservation efforts for the jaguar have not been undertaken by the Arizona State Lands Department (ASLD), much of proposed State lands are wooded, providing large undisturbed areas of potential jaguar habitat.

9.2.2 STATE PARK - KATCHNER CAVERNS

217. Katchner Caverns State Park overlaps 727 acres of proposed critical habitat in Subunit 4a.²⁸⁰ There are no specific conservation measures in place for the jaguar. The park is fenced but the fence can be crossed by large animals. The area is primarily open space and guided tours are offered in two caves areas. There are also two campgrounds, wastewater treatment, and volunteer residences in the park.²⁸¹

²⁷⁵ Email communication with William McDonald, Malpai Borderlands Group, January 8, 2013.

²⁷⁶ U.S. Fish and Wildlife Service. August 28, 2012. *Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar*. Letter to Jennifer Baxter from Steven L. Spangle.

²⁷⁷ Altar Valley Conservation Association, accessed at <http://altarvalleyconservation.org/> on October 10, 2012.

²⁷⁸ U.S. Fish and Wildlife Service. August 28, 2012. *Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar*. Letter to Jennifer Baxter from Steven L. Spangle, pp. 6.

²⁷⁹ Email communication with Walter Lane, Altar Valley Conservation Alliance, December 7, 2012 and December 11, 2012.

²⁸⁰ U.S. Fish and Wildlife Service. GIS Data provided on September 5, 2012.

²⁸¹ Personal communication with Christopher DeMille, Katchner Caverns State Park, November 26, 2012.

9.2.3 OTHER ACTIVITIES

218. Consultations and technical assistance efforts have also occurred for various other activities and the jaguar, some of which may have affected areas within proposed critical habitat areas. Agencies involved in these consultations have included: the Federal Energy Regulatory Commission (FERC), U.S. Department of Energy, the Corps, Arizona Department of Environmental Quality, the Arizona Department of Water Resources, the U.S. Environmental Protection Agency, the U.S. Department of Agriculture (USDA), the Federal Communications Commission, the Animal and Plant Health Inspection Service, the Federal Aviation Administration, the Federal Emergency Management Agency, and other Federal and non-Federal agencies. Overall, consultations not mentioned elsewhere in the report that may have occurred within the proposed critical habitat area include 12 formal consultations and 14 informal consultations. In addition, 52 technical assistance efforts occurred related to these other actions.²⁸²

9.3 ANALYTIC APPROACH

219. In determining future conservation measures for the jaguar, we spoke with the Arizona Land Department, Arizona State Parks, and NRCS, and reviewed the consultation history for the jaguar. We also obtained NRCS funding data for the Pima, Santa Cruz, Cochise, and Hidalgo counties to determine funding levels near proposed critical habitat areas that could be at risk of being turned away following critical habitat designation.

9.4 BASELINE AND INCREMENTAL IMPACTS

9.4.1 AGRICULTURE AND GRAZING ON PRIVATE AND STATE LANDS

Public concern

220. A number of ranching entities expressed concern about the potential impacts of jaguar critical habitat on their operations. In particular, MBG states that ranchers rely on Federal and state leases for their operations to survive as only one or two ranches have sufficient land for grazing solely on privately owned lands.²⁸³ AVCA is concerned that the proposed critical habitat designation will limit ranchers' ability to manage their lands, especially in actions requiring Federal involvement. AVCA receives assistance with prescribed burns from the Service through the Buenos Aires NWR. Additionally, AVCA receives funding from the National Fish and Wildlife Foundation, a non-profit organization that receives Federal funding, which may also result in a Federal nexus.
221. The MBG also raises concerns about the proposed critical habitat designation. MBG compensates ranchers for livestock killed by jaguar in the United States and considers conservation measures for the jaguar in northwest Chihuahua and northeast Sonora close to the border in supporting efforts to address maintenance of the jaguar population. In addition to AVCA and the MBG, the Hidalgo County Cattle Growers; Midbar Ranch; Chilton Ranch LLC, Chilton Ranch & Cattle Company and Chilton Family; New Mexico Farm and Livestock Bureau; Rice-Shelley Families (ranch); New Mexico Cattle Growers;

²⁸² U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.

²⁸³ Email communication with William McDonald, Malpai Borderlands Group, January 8, 2013.

New Mexico Wool Growers; Rancho Seco LLC; and High Haven Ranch wrote comments to the Service in opposition to the proposed critical habitat designation.²⁸⁴

222. As noted above, agricultural and grazing activities on private lands within proposed critical habitat for the jaguar are frequently supported by voluntary participation in a number of programs sponsored by NRCS, which provides farmers and ranchers with funding and technical assistance for voluntary conservation activities through the Environmental Quality Incentives Program (EQIP), Wildlife Habitat Incentives Program (WHIP) and Conservation Stewardship Program (CSP). It is possible that, fearing that receiving Federal funding would potentially require them to maintain jaguar habitat, ranchers and farmers may decline participation in Federal programs. For example, AVCA indicates that farmers and ranchers will likely be more hesitant about receiving NRCS or other Federal funding for conservation projects if the proposed critical habitat is designated.²⁸⁵ However, NRCS questions the assumption that farmers would refuse funding to avoid a Federal nexus as they have not seen similar actions due to other critical habitat designations in the region. Instead, concerns tend to be strongest when endangered species have a well-known presence; this suggests that any impacts related to changes in program participation would occur in the baseline rather than due to critical habitat designation.²⁸⁶ NRCS indicates that in the end, it is the farmer or rancher's decision of the plans that they pursue and whether to opt for financial assistance.²⁸⁷ NRCS states that the only instance where NRCS would not fund a project would be if there were both short and long term negative effects on the species or its habitat.²⁸⁸

Consultation Forecast

223. The Service has included the jaguar in three past consultations with NRCS (one formal and two informal), and two consultations with the USDA (one formal and one informal). The formal consultation with NRCS was for the Altar Valley Fire Management Plan in 2005, and the two informal consultations with NRCS were a programmatic consultation on NRCS conservation practices in Arizona in 2009 and a NRCS conservation practice programmatic consultation in 2011. The formal consultation with the USDA was for Helvetia, McBeth, Squaw Gulch, and Thurber Allotments in 2008, and the informal consultation was for Border I and Border II prescribed burns and border fuelwood harvest in 2008.²⁸⁹

²⁸⁴ Review of the Federal Register October 22, 2012.

²⁸⁵ Email communication with Walter Lane, Altar Valley Conservation Alliance, December 7, 2012 and December 11, 2012.

²⁸⁶ Personal communication with Stu Tuttle, State Biologist, Natural Resource Conservation Service, November 27, 2012.

²⁸⁷ Personal communication with Kristen Egen, District Conservationist, Natural Resource Conservation Service, November 27, 2012.

²⁸⁸ Email communication with Stu Tuttle, State Biologist, Nature Resource Conservation Service, January 10, 2013.

²⁸⁹ U.S. Fish and Wildlife Service. Consultation history for the jaguar, activity code 22410-2008-F-0027, sent via email on September 5, 2012.

224. NRCS considers all of southeastern Arizona to be potential jaguar habitat.²⁹⁰ In past consultations, the primary focus for the jaguar included range management practices and fencing, including minimum heights of the fence bottom wire to allow jaguar to roam freely. Few conservation measures specific to the jaguar have been requested in the past. However, NRCS states that it generally recommends conservation measures such as cleaning machinery before entering and exiting a site in riparian areas, but costs of these measures are unknown.²⁹¹ These measures are likely to benefit the jaguar.
225. NRCS anticipated reinitiating the three past consultations mentioned. In particular, NRCS questions whether the Altar Valley Fire Management Plan, which could potentially involve burning areas of proposed critical habitat for the jaguar, could require any modifications. With the proposed critical habitat designation, NRCS would likely have to educate field staff, though costs of such a program are uncertain. NRCS is concerned that the designation could stress the working relationship between ranchers and NRCS, as ranchers are generally in opposition to the proposed rule.²⁹²

9.4.2 STATE TRUST LANDS

226. It is conceivable that ASLD could determine that future state-permitted range projects require changes due to critical habitat designation for jaguar, as ASLD has permitting authority for those activities. Range improvement projects are often reviewed by Arizona Game and Fish Department for impacts to listed species. However, ASLD states that it is likely that most activities do not negatively influence the jaguar, and thus such changes are not anticipated in this analysis.²⁹³ The proposed critical habitat designation does not include state lands in New Mexico.

9.4.3 STATE PARKS - KATCHNER CAVERNS

227. Katchner Caverns is not federally managed and therefore no Federal nexus is likely for park actions. In any case, the State Park does not have any major projects planned and does not expect any changes with the proposed critical habitat designation.²⁹⁴ No consultations have occurred related to Katchner Caverns State Park and the jaguar or its habitat.²⁹⁵ No impacts are expected in Katchner Caverns.

9.4.4 SUMMARY OF IMPACTS TO LIVESTOCK GRAZING ACTIVITIES

228. Based on the history of consultation, we estimate approximately one formal consultation and one informal consultation will occur with the 20-year timeframe of the analysis based on the past rate of consultation between the USDA and the Service. In addition, we

²⁹⁰ Personal communication with Stu Tuttle, State Biologist, Natural resource Conservation Service, November 27, 2012.

²⁹¹ Email communication with Stu Tuttle, State Biologist, Nature Resource Conservation Service, January 10, 2013.

²⁹² Personal communication with Stu Tuttle, State Biologist, Natural resource Conservation Service, November 27, 2012.

²⁹³ Personal communication with Will Sommers, Arizona State Land Department, November 29, 2012.

²⁹⁴ Personal communication with Christopher DeMille, Katchner Caverns State Park, November 26, 2012.

²⁹⁵ U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.

estimate that NRCS will reinitiate one formal and two informal consultations with the Service in 2013.

229. Total baseline costs of consultation are \$14,000, or \$1,200 annualized at a seven percent discount rate. Total incremental costs of consultation are \$24,000, or \$2,100 annualized at a seven percent discount rate. Total impacts related to administrative costs and NRCS funding that could be withdrawn are shown in Exhibit 9-3.

EXHIBIT 9-3. TOTAL COSTS TO AGRICULTURE AND GRAZING RELATED TO NRCS ACTIVITIES AND ADMINISTRATIVE COSTS OF CONSULTATION IN THE PROPOSED CRITICAL HABITAT DESIGNATION (2013\$, SEVEN PERCENT DISCOUNT RATE)

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	\$1,500	\$130	\$2,600	\$230
1b	\$780	\$69	\$1,400	\$120
2	\$2,400	\$210	\$4,100	\$360
3	\$6,000	\$530	\$10,000	\$910
4a	\$1,000	\$90	\$1,800	\$160
4b	\$210	\$18	\$360	\$32
4c	\$320	\$28	\$560	\$49
5	\$1,700	\$150	\$2,900	\$260
6	\$130	\$11	\$220	\$19
Total	\$14,000	\$1,200	\$24,000	\$2,100

9.4.4 OTHER ACTIVITIES

230. Through the past rate of consultation, and a re-initiation rate of 10 percent,²⁹⁶ we calculated the costs of the proposed rule on other activities. Using a seven percent discount rate, baseline costs are \$180,000, or \$16,000 annualized, and incremental costs are \$82,000, or \$7,300 annualized. Exhibit 9-4 displays these costs by proposed critical habitat unit.

²⁹⁶ The Service will likely reinitiate consultation at a five to ten percent rate, so we use ten percent as a conservative estimate. U.S. Fish and Wildlife Service. August 28, 2012. *Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar*. Letter to Jennifer Baxter from Steven L. Spangle, pp. 13.

EXHIBIT 9-4. ADMINISTRATIVE COSTS OF CONSULTATION BY PROPOSED CRITICAL HABITAT UNIT FOR OTHER ACTIVITIES

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	\$20,000	\$1,700	\$8,900	\$790
1b	\$10,000	\$900	\$4,600	\$410
2	\$31,000	\$2,700	\$14,000	\$1,200
3	\$78,000	\$6,900	\$35,000	\$3,100
4a	\$13,000	\$1,200	\$6,000	\$530
4b	\$2,700	\$240	\$1,200	\$110
4c	\$4,200	\$370	\$1,900	\$170
5	\$22,000	\$1,900	\$9,900	\$870
6	\$1,600	\$140	\$740	\$65
Total	\$180,000	\$16,000	\$82,000	\$7,300

9.5 CAVEATS TO ECONOMIC ANALYSIS OF OTHER ACTIVITIES

231. In terms of incremental costs, the Arizona State Land Department, Arizona State Parks and NRCS are only expected to incur administrative costs in jaguar conservation efforts; however, NRCS funding may be redistributed across the state causing effects to ranchers and farmers within the proposed critical habitat area. There is uncertainty to whether ranchers and farmers will decide to refuse NRCS funding to avoid Federal nexus on their lands, so our assumption that no funding will be dropped may be an underestimate of impacts of the proposed designation.

CHAPTER 10 | POTENTIAL ECONOMIC IMPACTS TO THE TOHONO O'ODHAM NATION

232. Lands belonging to one Native American Tribe – the Tohono O'odham Nation – are included within the boundaries of the proposed jaguar critical habitat. Approximately 51,308 acres of Tohono O'odham Nation (Nation) lands are within proposed Unit 1a, which is considered occupied by the jaguar, and 26,759 acres of trust lands are within proposed Unit 1b, which is considered unoccupied. The Proposed Rule also notes that multiple other Tribes may have some interest in the geographic area of the jaguar's range, but do not have lands in trust within the proposed designation. These Tribes include the Gila River Indian Community, Salt River-Maricopa Indian Community, Ak Chin Indian Community, San Carlos Apache Nation, Hopi Tribe, Pascua Yaqui Tribe, Mescalero Apache Tribe, and Yavapai-Apache Nation.²⁹⁷ Because direct impacts to these Tribes are not anticipated, this chapter only considers potential economic impacts that may result from jaguar conservation to the Tohono O'odham Nation.
233. Given the unique characteristics of Tribal economies, the approach used to analyze potentially affected activities on Tribal lands is different than that for other types of activities. This chapter provides a qualitative discussion of economic conditions within the Tohono O'odham Nation, ongoing Tribal conservation efforts that may benefit the jaguar and its habitat, and concerns about critical habitat designation expressed by the Tribe. We then discuss the potential baseline and incremental impacts of critical habitat designation.
- 10.1 SUMMARY OF IMPACTS TO THE TOHONO O'ODHAM NATION**
234. In general, of most concern to the Tohono O'odham Nation is the potential impact that the designation of critical habitat could have on the Nation's ability to manage natural resources on their sovereign lands. It is important to note that because the Tohono O'odham Nation is considered a sovereign nation, the Tribe has a unique relationship with the U.S. government. Secretarial Order 3206 recognizes that Tribes have governmental authority to protect and manage their resources in the manner that is most beneficial to them. This analysis attempts to capture the concerns that the Tohono O'odham Nation has about potential impacts of critical habitat on Tribal land management activities, including that, due to Federal oversight, the Nation may be compelled to modify current plans for resource use.
235. In particular, this chapter discusses the potential for critical habitat to impact Tribes' ability to utilize natural resources for traditional uses and develop lands for commercial

²⁹⁷ 2012 proposed critical habitat. 77 FR 50237.

or other purposes. Because a portion of Nation lands that occur in proposed critical habitat are considered unoccupied by the jaguar, we assume that incremental conservation measures may be requested to avoid adverse modification of critical habitat. Detailed information on the location and costs of future conservation projects on Tohono O’odham lands was not available for this analysis. As such, costs of conservation efforts are not quantified, resulting in a probable underestimate of future impacts to the Tohono O’odham Nation. Furthermore, as discussed in section 10.6, incremental administrative impacts to the Tohono O’odham Nation are likely. However, the Nation could not provide information on specific projects planned for the future. Therefore, we do not quantify any administrative impacts to the Tribe, but do discuss potential projects qualitatively. Therefore, future impacts to the Nation may be understated by this analysis.

10.2 BACKGROUND AND APPROACH TO EVALUATING IMPACTS

236. As shown in Exhibit 10-1, approximately 78,067 acres of proposed critical habitat are located on lands belonging to the Tohono O’odham Nation. As stated in Executive Order 13175:

The United States has a unique legal relationship with Indian Tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions. Since the formation of the Union, the United States has recognized Indian Tribes as domestic dependent nations under its protection. The Federal Government has enacted numerous statutes and promulgated numerous regulations that establish and define a trust relationship with Indian Tribes.²⁹⁸

A recent presidential memorandum further charged executive departments and agencies with “engaging in regular and meaningful consultation and collaboration with Tribal officials in the development of Federal policies that have Tribal implications.”²⁹⁹

237. Department of Interior Secretarial Order 3206 recognizes that Tribes have governmental authority and the desire to protect and manage their resources in the manner that is most beneficial to them.³⁰⁰ In addition, as trustee for land held by the United States for Indian Tribes, the Bureau of Indian Affairs (BIA) provides technical assistance to the Tribes on forest management planning and oversees a variety of programs on Tribal lands. The Yavapai-Apache Nation states that “the Secretary of the Interior lacks legal authority to

²⁹⁸ Executive Order 13175, Consultation and Coordination with Indian Tribal Governments.

²⁹⁹ White House, Memorandum for the Heads of Executive Departments and Agencies: Subject: Tribal Consultation, November 5, 2009. Accessed at: <http://www.whitehouse.gov/the-press-office/memorandum-Tribal-consultation-signed-president>.

³⁰⁰ U.S. Department of Interior, Secretarial Order # 3206: Subject: American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act, June 1997.

designate critical habitat on the Nation's lands."³⁰¹ The San Carlos Apache Tribe has made similar remarks in regard to other proposed critical habitat designations.³⁰²

238. Given the unique characteristics of Tribal economies, the approach used to analyze potentially affected activities on lands of the Tohono O'odham Nation is different than that for other types of activities. The following section provides a discussion of the current socioeconomic status of the Tohono O'odham Nation. Available data demonstrate the economic vulnerability of the Nation; its economy is characterized by high unemployment, low income, and high poverty rates. In addition, unique circumstances of communities on Tribal lands affect re-employment opportunities. For example, Tribal members may be less mobile than non-Tribal members, and Tribal members who lose jobs may be hesitant to move off their Reservation to find work elsewhere. Thus, if jaguar conservation impacts employment opportunities on the Tohono O'odham Reservation, those impacts may be compounded by poor baseline economic conditions and a lack of local employment alternatives.

10.3 OVERVIEW OF TOHONO O'ODHAM NATION

239. The Tohono O'odham Nation is located on four non-contiguous parcels of land in southwestern Arizona and northern Mexico totaling more than 2.8 million acres. Within the United States, these lands encompass parts of Pinal, Pima, and Maricopa Counties, Arizona.³⁰³ Approximately 78,067 acres of critical habitat have been proposed within the Tohono O'odham Nation.
240. According to the Tribe, approximately 28,000 members live on Tribal lands in southwestern Arizona.³⁰⁴ However, the U.S. Census estimated the population of the Tohono O'odham Nation Reservation and off-Reservation trust lands in Arizona at 10,201 in 2010. The unemployment rate for this population was reported as 22.5 percent, and per capita income was \$10,057 in 2010. In comparison, the unemployment rate for the State of Arizona was 8.9 percent, and per capita income was \$25,784. In addition, approximately 43 percent of the Tribe's population lives below the poverty line, compared to 16 percent in the State of Arizona.³⁰⁵
241. The Tohono O'odham Nation's economy includes agricultural production, grazing, construction, and tourism. The Tribe owns three casinos, which employed over 2,400 people in 2004 and provided the majority of local employment and revenue.³⁰⁶

³⁰¹ Public comment from Susan B. Montgomery, Special Legal Counsel to the Yavapai-Apache Nation, Proposed Rule for designation of flycatcher critical habitat, October 14, 2011.

³⁰² Public comment from Susan B. Montgomery, Sparks, Tehan, and Ryley P.C., Special Counsel to the San Carlos Apache Tribe, "Comments to Proposed Rule to Draft Environmental Assessment and Final Draft Economic Analysis of Critical Habitat for the Gila chub," September 30, 2005.

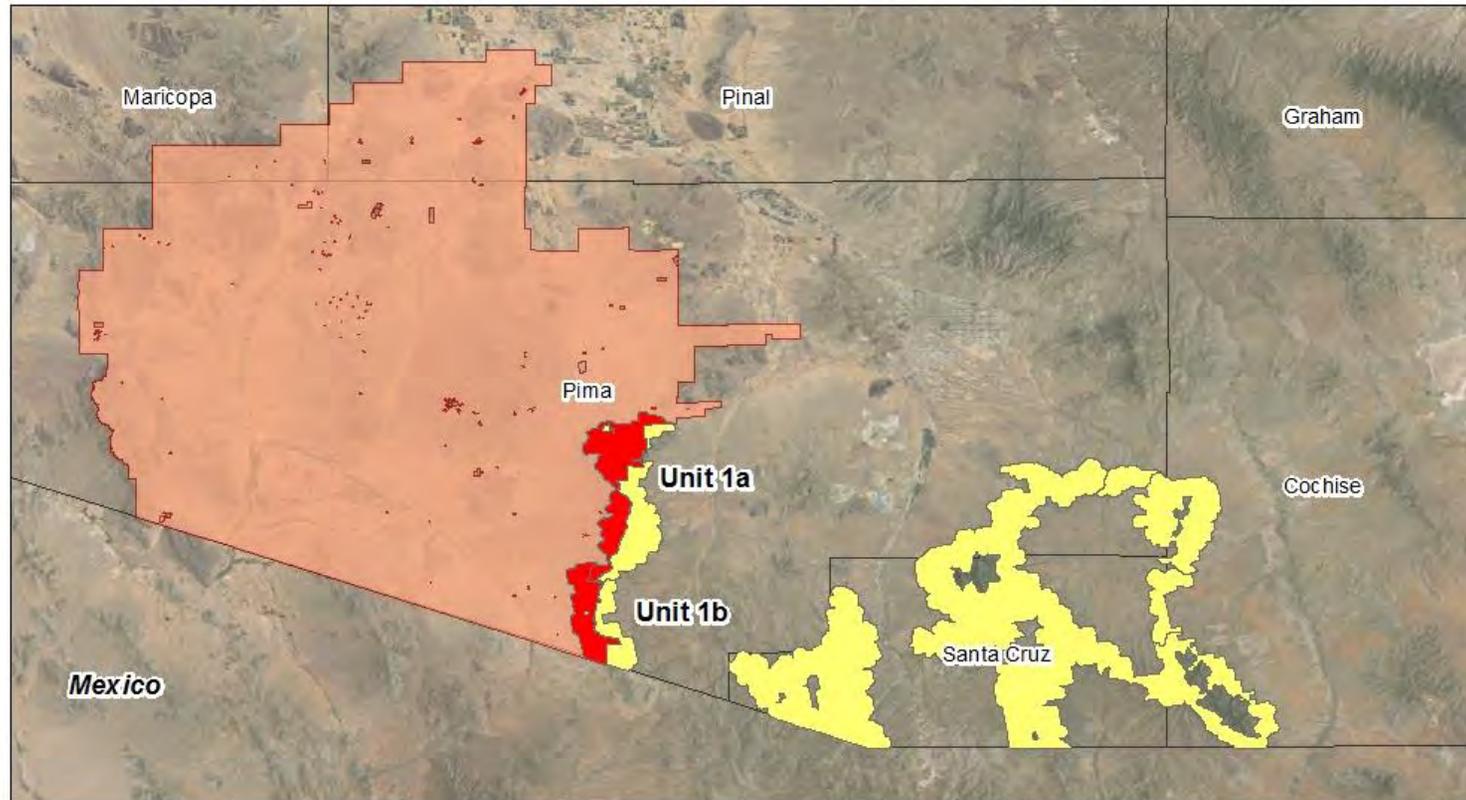
³⁰³ "About Tohono O'odham Nation." Accessed at <http://www.tonation-nsn.gov/default.aspx> on January 6, 2013.

³⁰⁴ "About Tohono O'odham Nation." Accessed at <http://www.tonation-nsn.gov/default.aspx> on January 6, 2013.

³⁰⁵ U.S. Census Bureau, 2007-2011 American Community Survey 5-Year Estimates.

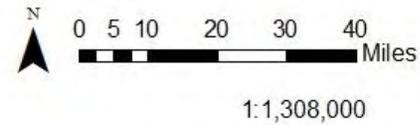
³⁰⁶ Tiller, Veronica E. Velarde. "Tiller's Guide to Indian Country: Economic Profiles of American Indian Reservations." Bow Arrow Publishing Company, 2005. (353)

EXHIBIT 10-1. TOHONO O'ODHAM NATION LANDS OVERLAPPING PROPOSED CRITICAL HABITAT



Legend

-  Tohono O'odham Nation within proposed CH
-  Proposed critical habitat
-  Tohono O'odham Nation



IEC Coordinate System:
NAD 1983, UTM Zone 12N
INDUSTRIAL ECONOMICS, INCORPORATED

10.4 BASELINE CONSERVATION EFFORTS

242. The jaguar has historically been a culturally significant species to the Tohono O’odham Nation, and as a result, the Nation has been working to develop several conservation measures for the jaguar, absent the designation of critical habitat. According to a public comment submitted by the Tohono O’odham Nation, the Tribe is currently developing an analysis of the cultural and environmental significance of the jaguar to the Nation. This analysis and a management plan that “addresses the conservation needs of the proposed critical habitat designation” are expected to be complete prior to the designation of critical habitat.²¹⁰ The Tohono O’odham Nation has also worked with the Service since 2007 to develop a plan for conducting jaguar surveys and monitoring, which are expected to be carried out in 2013. The Nation is also undertaking community outreach and education efforts as part of its draft jaguar management plan. According to the Tohono O’odham Nation, “by adopting voluntary conservation measures, the Nation ensures that habitat protection measures are implemented on the western side of Unit 1, providing early and consistent benefits to the jaguar that are greater than any benefit that would be provided by a critical habitat designation.”²¹¹

10.5 POTENTIALLY AFFECTED ACTIVITIES

243. The lands proposed as critical habitat for the jaguar are located near two Tribal communities. The Fresnal Canyon Community is approximately 1.5 miles outside of proposed critical habitat, and the Pan Tak community is only half a mile outside of the proposed critical habitat boundary. The Tohono O’odham Nation has expressed concern that activities in these communities could be affected by the designation of critical habitat.²¹² However, communication with a representative for the Tohono O’odham Nation indicated that there are no immediate plans to develop the area proposed as critical habitat.²¹³ Activities on Tribal lands that may be affected by the designation of critical habitat include development within the communities of Fresnal Canyon and Pan Tak; CBP activities including road construction; activities at the Kitt Peak National Observatory; and potential construction of a communications tower.²¹⁴ Ranching also occurs in limited areas throughout the Tohono O’odham Nation. Because of the uncertainty remaining about when, or if, these activities would occur, this analysis does not estimate costs associated with conservation measures for these projects.

244. Although the proposed Rosemont Copper Mine (see Chapter 5) does not fall within Tohono O’odham Nation lands, the mine is located within the Papagueria region,

²¹⁰ Norris, N., Jr. Chairman of the Tohono O’odham Nation. Public comment submitted on October 19, 2012. (Page 2)

²¹¹ Norris, N., Jr. Chairman of the Tohono O’odham Nation. Public comment submitted on October 19, 2012. (Page 3)

²¹² Norris, N., Jr. Chairman of the Tohono O’odham Nation. Public comment submitted on October 19, 2012.

²¹³ Howe, K. Tohono O’odham Nation. Telephone communication on November 20, 2012.

²¹⁴ Howe, K. Tohono O’odham Nation. Telephone communication on November 20, 2012.

which was historically inhabited by the Tribe. According to the public comment submitted by the Tribe, this area “has been used by tribes and their ancestors for at least 5,000 years. For hundreds of years, the Tohono O’odham specifically have used [this area] for living, hunting, gathering of medicinal plants and plants for food, gathering of materials for making baskets, and for the creation of sacred shrines.”²¹⁵ The Nation is therefore concerned that the Rosemont Mine may threaten these cultural resources, absent the designation of critical habitat. In this area, the Tohono O’odham Nation lacks the authority to adopt conservation measures to protect its historically and culturally significant lands.²¹⁶

10.6 ADMINISTRATIVE IMPACTS

245. Due to the trust relationship between the United States and Native American Tribes, a significant number of Tribal programs, activities, and development projects involve Federal funding or oversight. Therefore, where critical habitat is designated on Tribal lands, nearly all projects could have a Federal nexus for section 7 consultation.²¹⁷ Communication with the Tohono O’odham Nation did not identify any specific, planned projects that may result in section 7 consultation. We are also not aware of any previous section 7 consultations regarding activities on Tohono O’odham Nation lands. However, given the likelihood of a Federal nexus and the proposal to designate unoccupied critical habitat on Tohono O’odham lands, the Tohono O’odham Nation may incur incremental administrative impacts as a result of the designation. Should consultations occur in the future, costs associated with one fully incremental formal consultation considering adverse modification of critical habitat are expected to be \$20,000, of which \$3,500 could be incurred by the Tohono O’odham Nation. Due to uncertainty over future activities on Tribal lands, however, we do not forecast any consultations in this analysis.

²¹⁵ Norris, N., Jr. Chairman of the Tohono O’odham Nation. Public comment submitted on October 19, 2012. (Page 4)

²¹⁶ Norris, N., Jr. Chairman of the Tohono O’odham Nation. Public comment submitted on October 19, 2012.

²¹⁷ See, for example, Public comment from Susan B. Montgomery, Montgomery & Interpreter, plc, on behalf of the Yavapai-Apache Nation, December 27, 2010.

CHAPTER 11 | POTENTIAL ECONOMIC BENEFITS

246. The previous chapters of this report assess the economic impact of actions taken to protect the jaguar and its habitat. Specifically, the analysis forecasts impacts likely to occur both as a result of listing (baseline impacts) and as a result of critical habitat designation (incremental impacts) after the proposed critical habitat is finalized. This chapter contemplates potential economic benefits resulting from possible conservation efforts undertaken to protect the species and its habitat. First, we introduce economic methods that are commonly employed to quantify benefits of species and habitat conservation, and discuss the availability of existing literature to support valuation in the context of this rulemaking. We then provide a qualitative description of the potential categories of ancillary benefits that may result from the designation, and identify the units where such benefits may be generated.

KEY ISSUES AND CONCLUSIONS:

The primary goal of critical habitat designation for the jaguar is to support its long-term conservation. Conservation and recovery of the species may result in benefits, including use benefits (wildlife-viewing), non-use benefits (existence values), and ancillary ecosystem service benefits (e.g., increased habitat continuity).

The extent to which critical habitat designation for the jaguar may improve the species' population is unknown. That is, information is not available on the potential percent increase in jaguar populations, or the incremental change in the probability of recovery, generated by the incremental conservation efforts described in this analysis.

Absent information on the incremental change in jaguar populations or recovery potential associated with this rulemaking, we are unable to monetize associated incremental use and non-use benefits economic benefits. However, this chapter provides a qualitative discussion of the ancillary benefits that may result from implementation of the jaguar conservation efforts described in the report.

11.1 ESTIMATING INCREMENTAL BENEFITS

247. The primary intended benefit of critical habitat is to support the conservation of threatened and endangered species, such as the jaguar. Thus, attempts to develop monetary estimates of the benefits of this proposed critical habitat designation would focus on the public's willingness to pay to achieve the conservation benefits to jaguar resulting from this designation.
248. Quantification and monetization of species conservation benefits requires two primary pieces of information: (1) data on the incremental change in the probability of jaguar conservation that is expected to result from the designation; and (2) data on the public's willingness to pay for this incremental change.
249. As described in the previous chapters of the report, quantified incremental impacts of critical habitat designation are expected to be limited to the following:
- As discussed in Chapter 5, the designation of critical habitat for the jaguar is likely to require project modifications, such as the purchase of offsetting conservation lands, for large-scale **surface mining** activities. However, in many cases, these project modifications may be undertaken to benefit multiple species in addition to the jaguar.
 - Potential decisions by farmers and ranchers with lands overlapping the proposed designation to discontinue participation in **NRCS programs**. However, the decision of farmers and ranchers to withdraw from NRCS programs would not preclude future farming and ranching activity on lands in the areas proposed as critical habitat. Further, funds that would have been utilized in proposed critical habitat areas are likely to be redistributed in the States in which they were allocated. However, it is possible that because some NRCS funds are dedicated to conservation projects, it is possible that planned conservation actions that would have occurred in these areas absent critical habitat will no longer occur. Thus, in this instance, it is unclear whether critical habitat would result in conservation benefits to jaguar critical habitat areas.

11.2 ESTIMATING BASELINE BENEFITS

250. The previous chapters of this report assess impacts resulting from project modifications undertaken to avoid jeopardizing the jaguar. In this section, we describe the methods used by economists to value the benefits of such actions. Then, we provide a qualitative discussion of the categories of benefits potentially resulting from the implementation of such project modifications.

11.2.1 ECONOMIC METHODS USED TO VALUE USE AND NON-USE VALUES OF SPECIES AND HABITAT CONSERVATION

251. The primary intended benefit of listing a species and designating its critical habitat is to ensure the survival and long-term conservation of the species.²¹⁸ Various economic benefits, measured in terms of social welfare or regional economic performance, may result from conservation efforts. The benefits can be placed into two broad categories: (1) those associated with the primary goal of species survival and conservation (i.e., direct benefits), and (2) those additional beneficial services that derive from the conservation efforts but are not the purpose of the Act (i.e., ancillary benefits, such as improved habitat for other species).
252. Because the purpose of the Act is to provide for the conservation of endangered and threatened species, the benefits of actions taken under the Act are often measured in terms of the value placed by the public on species preservation (e.g., avoidance of extinction, and/or increase in a species' population). Such social welfare values for a species may reflect both use and non-use values for the species. Use values derive from a direct use for a species, such as commercial harvesting or recreational wildlife-viewing opportunities. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist (e.g., existence or bequest values).
253. As a result of actions taken to preserve endangered and threatened species, such as habitat management, various other benefits may accrue to the public. Conservation efforts may result in improved environmental quality, which in turn may have collateral human health or recreational use benefits. In addition, conservation efforts undertaken for the benefit of a threatened or endangered species may enhance shared habitat for other wildlife. Such benefits may result from modifications to projects, or may be collateral to such actions. For example, the development of a wildlife crossing for the jaguar is likely to result in ancillary benefits to other species, such as deer and antelope, in the form of creating increased habitat continuity.
254. Economists apply a variety of methodological approaches in estimating both use and non-use values for species and for habitat improvements, including stated preference and revealed preference methods. Stated preference techniques include such tools as the contingent valuation method, conjoint analysis, or contingent ranking methods. In simplest terms, these methods employ survey techniques, asking respondents to state what they would be willing to pay for a resource or for programs designed to protect that resource. A substantial body of literature has developed that describes the application of this technique to the valuation of natural resource assets.
255. More specific to use values for species or habitats, revealed preference techniques examine individuals' behavior in markets in response to changes in environmental or other amenities (i.e., people "reveal" their value by their behavior). For example,

²¹⁸ The term "conservation" means "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary" (16 U.S.C. 1532).

travel cost models are frequently applied to value access to recreational opportunities, as well as to value changes in the quality and characteristics of these opportunities. Basic travel cost models are rooted in the idea that the value of a recreational resource can be estimated by analyzing the travel and time costs incurred by individuals visiting the site. Another revealed preference technique is hedonic analysis, which is often employed to determine the effect of site-specific characteristics on property values.

11.2.2 USE AND NON-USE VALUATION STUDIES

256. Numerous published studies estimate individuals' willingness to pay to protect endangered species.²¹⁹ The economic values reported in these studies reflect various groupings of benefit categories (including both use and non-use values). For example, these studies assess public willingness to pay for wildlife-viewing opportunities, for the option for seeing or experiencing the species in the future, to assure that the species will exist for future generations, and simply knowing a species exists, among other values. This literature, however, addresses a relatively narrow range of species and circumstances compared to the hundreds of species and habitats that are the focus of the Act.
257. An ideal study for use in valuing the use and non-use values that may derive from the species' listing would be specific to the species, the policy question at hand (survival and recovery of the species), and the relevant population holding such values (e.g., citizens of the relevant states or of the United States as a whole). No such study has been undertaken to date for the jaguar.
258. Absent primary research specific to the policy question (benefits of listing the jaguar), resource management decisions can often be informed by applying the results of existing valuation research to a new policy question – a process known to economists as benefit transfer. Benefit transfer involves the application of unit value estimates, functions, data, and/or models from existing studies to estimate the benefits associated with the resource under consideration.
259. OMB has written guidelines for conducting credible benefit transfers. The important steps in the OMB guidance are: (1) specify the value to be estimated for the rulemaking; and (2) identify appropriate studies to conduct benefits transfer based on the following criteria:
- The selected studies should be based on adequate data, sound and defensible empirical methods and techniques;
 - The selected studies should document parameter estimates of the valuation function;

²¹⁹ See, for example, the summary in Richardson, L. and J. Loomis. March 2009. The Total Economic Value of Threatened, Endangered, and Rare Species: An Updated Meta-Analysis. *Ecological Economics* 68(5): 1535-1548.

- The study and policy contexts should have similar populations (e.g., demographic characteristics). The market size (e.g., target population) between the study site and the policy site should be similar;
- The good, and the magnitude of change in that good, should be similar in the study and policy contexts;
- The relevant characteristics of the study and policy contexts should be similar;
- The distribution of property rights should be similar so that the analysis uses the same welfare measure (i.e., if the property rights in the study context support the use of willingness-to-accept measures while the rights in the rulemaking context support the use of willingness-to-pay measures, benefits transfer is not appropriate); and
- The availability of substitutes across study and policy contexts should be similar.

260. We undertook a literature review to identify existing research regarding the use and non-use values the public holds for conserving the jaguar. Existing information on potential use and non-use values does not support a benefit transfer based analysis associated with jaguar populations. Specifically, existing studies focus on attitudes towards jaguar conservation in South America in light of conflicts resulting from human-carnivore coexistence, and on strategies for implementing or enhancing jaguar conservation in developed areas or in rural communities where carnivores can impose significant economic costs. Several of these studies describe qualitatively various benefits associated with conserving large carnivores, including existence benefits and ecosystem service benefits.^{220,221} Unfortunately, no study was identified that provides quantitative use and non-use economic values of jaguar conservation.
261. A recent study by Richardson and Loomis (2009) estimated a willingness-to-pay function to value threatened or endangered species based on estimates from multiple studies. The meta-analysis is based on 31 studies with 67 WTP observations published from 1985 to 2005 evaluating economic values of endangered, threatened or rare species primarily applying contingent valuation methods. The economic values reflect primarily recreational use, as well as nonuse values.²²²

²²⁰ Dickman, Amy J., Ewan A. Macdonald, and David W. Macdonald. 2010. A review of financial instruments to pay for predator conservation and encourage human-carnivore coexistence. *Proceedings of the National Academy of Sciences*. Vol. 108 (34): 13937-13944.

²²¹ Miller, Brian, et al. 2001. The Importance of Large Carnivores to Healthy Ecosystems. *Endangered Species Update*, Vol. 18, No. 5.

²²² Richardson, Leslie and John Loomis. The Total Economic Value of Threatened, Endangered and Rare Species: An Updated Meta-Analysis. *Ecological Economics* (2009): 1535-1548. This paper updates a 1996 study on the same topic by Loomis and White (Loomis, John and D.S. White. Economic Benefits of Rare and Endangered Species: A Meta-Analysis. *Ecological Economics* (1996): 197-206).

262. The species evaluated in the 31 studies include primarily marine and riverine species (whales, dolphins, seals, otters, sea lions, sea turtles, salmon and other listed fish species), some avian species (spotted owls, whooping cranes, red-cockaded woodpeckers, bald eagles, peregrine falcons, and wild turkeys), two land mammals (gray wolf, bighorn sheep), and one invertebrate (riverside fairy shrimp). Despite the inclusion of two land mammals, the meta-analysis does not incorporate studies that specifically evaluated benefits of jaguar conservation. Based on the benefit transfer guidelines described above, we do not believe it would be appropriate to transfer results from studies valuing wolves or sheep to jaguars. Even in the case that the values included in the model for the gray wolf and bighorn sheep could be useful in informing jaguar conservation benefits, a key variable required for estimating willingness-to-pay in this study is the change in the species population levels. We do not have information on the expected change in species population levels that may result from critical habitat designation for the jaguar. Thus, the study does not provide a means to quantify the benefits of critical habitat designation for the jaguar.

11.3 QUALITATIVE DISCUSSION OF ANCILLARY BENEFITS

263. Benefits beyond use and non-use values may also be achieved through a species listing. For example, the public may hold a value for habitat conservation, beyond its willingness to pay for conservation of a specific species. Studies have estimated the public's willingness to pay to preserve wilderness areas, for wildlife management and preservation programs, and for wildlife protection in general. These studies address categories of benefits (e.g., ecosystem integrity) that may be similar to the types of benefits provided by the listing.
264. The remainder of this Chapter provides a qualitative discussion of the ancillary benefits that may result from implementation of the jaguar conservation efforts described in the report.
265. Exhibit 11-1 summarizes potential benefits associated with the specific conservation efforts for the jaguar, as described in the report. In general, the ancillary benefits described in Exhibit 11-1 could derive from conservation measures that may be implemented to avoid jeopardizing the species. The categories of related economic benefits include:
- **Aesthetic benefits:** Social welfare gains may be associated with enhanced aesthetic quality of habitat. Preferences for aesthetic improvements may be measured through increased willingness-to-pay to visit a habitat region for recreation or increased visitation.
 - **Educational benefits:** Surveying and monitoring for the jaguar confers educational benefits in that more is known about the species and where populations exist. This knowledge could help direct future conservation efforts.

- **Property value benefits:** Open space preservation or decreased density of development resulting from jaguar conservation may increase adjacent or nearby property values.

266. In addition to these categories of potential benefits, all of the conservation efforts described in Exhibit 11-1 are related to the broader conservation and recovery of the species. All conservation efforts therefore relate to the maintenance or enhancement of the use (e.g., wildlife viewing) and non-use value (e.g., existence value) that the public may hold specifically for the jaguar. Further, many of the conservation efforts undertaken for the jaguar may also result in improvements to ecosystem health that are shared by other, coexisting species (including other endangered or threatened species). The maintenance or enhancement of use and non-use values for these other species, or for biodiversity in general, may also result from these conservation efforts for the jaguar.

EXHIBIT 11-1. POSSIBLE CONSERVATION EFFORTS FOR THE JAGUAR AND POTENTIAL ASSOCIATED ANCILLARY BENEFITS RELATED TO ACTIONS, INCLUDING THOSE CONDUCTED UNDER THE BASELINE

POSSIBLE CONSERVATION EFFORT	POTENTIAL ASSOCIATED BENEFITS	RELEVANT UNITS
Development of highway wildlife crossing	<ul style="list-style-type: none"> • Increased continuity of habitat for listed species • Aesthetic benefits • Property value benefits • Maintenance and enhancement of use and non-use values (e.g., wildlife-viewing and existence values). 	Subunit 1a or 4c
Reduced disturbance of habitat from mining activities, including the purchase of offsetting conservation lands	<ul style="list-style-type: none"> • Aesthetic benefits • Maintenance and enhancement of use and non-use values (e.g., wildlife-viewing and existence values) • Increased recreational opportunities • Preservation of habitat quality and connectivity • Preservation of air quality • Preservation of water quality 	Unit 3
Establishment of conservation easements near Fort Huachuca	<ul style="list-style-type: none"> • Aesthetic benefits • Property value benefits • Maintenance and enhancement of use and non-use values (e.g., wildlife-viewing and existence values). 	Subunits 4a and 4c
Monitoring for jaguars, including providing cameras and collaring	<ul style="list-style-type: none"> • Educational benefits • Maintenance and enhancement of use and non-use values (e.g., wildlife-viewing and existence values). 	Subunit 1b, Units 2 and 3, Subunit 4c, Units 5 and 6

POSSIBLE CONSERVATION EFFORT	POTENTIAL ASSOCIATED BENEFITS	RELEVANT UNITS
Limiting nighttime work and construction lighting	<ul style="list-style-type: none"> Maintenance and enhancement of use and non-use values (e.g., wildlife-viewing and existence values). 	All units
Limiting vehicular traffic along border and near construction activities	<ul style="list-style-type: none"> Maintenance and enhancement of use and non-use values (e.g., wildlife-viewing and existence values). 	Subunit 1b, Units 2, 3, 5, and 6
<p>Notes: All conservation efforts are intended to support the survival and/or recovery of the species.</p>		

REFERENCES

16 U.S.C. §1533(b)(2).

16 U.S.C. 1532.

175 F. 3d 1027, 1044 (D.C. Cir. 1999).

1972 Final Rule, 37 FR 6476 *et seq.*

2012 Proposed critical habitat 77 FR 50214 *et seq.*

5 U.S.C. §§601 *et seq.*

71 FR 39335.

773 F. 2d 327 (D.C. Cir. 1985).

“About Tohono O’odham Nation.” Accessed at <http://www.tonation-nsn.gov/default.aspx> on January 6, 2013.

Altar Valley Conservation Association, accessed at <http://altarvalleyconservation.org/> on October 10, 2012.

Arizona Cattle Growers v. Salazar, 606 F. 3d 1160 (9th Cir. 2010), cert. denied, 179 L. Ed. 2d 300, 2011 U.S. LEXIS 1362, 79 U.S.L.W. 3475 (2011).

Arizona Department of Mines and Mineral Resources, prepared by the L. William Seidman Research Institute, W.P. Carey School of Business, Arizona State University. “An Assessment of the Economic Impacts of the Rosemont Copper Project on the Economies of the Cochise/Pima/Santa Cruz Counties Study Area, the State of Arizona, and the United States.” November 2009.

Augusta Annual Information Form. Augusta Resource Corporation. March 19, 2012. Accessed at <http://www.augustaresource.com/Investors/Regulatory-Filings/default.aspx> on October 1, 2012.

Augusta Resource Corporation Overview, accessed at <http://www.augustaresource.com/About-Us/Overview/default.aspx> on October 1, 2012.

Center for Biological Diversity et al., Plaintiffs, v. United States Bureau of Land Management et al., Defendants and American Sand Association, et al., Defendant Intervenors. Order re: Cross Motions for Summary Judgment, Case 3:03-cv-02509 Document 174 Filed 03/14/2006, pages 44-45.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Viewed on October 9, 2012 at <http://www.cites.org/eng/resources/species.html>

- Dickman, Amy J., Ewan A. Macdonald, and David W. Macdonald. 2010. A review of financial instruments to pay for predator conservation and encourage human-carnivore coexistence. *Proceedings of the National Academy of Sciences*. Vol. 108 (34): 13937-13944.
- Email communication from Dennis Kimberlin, Assistant State Conservationist, NRCS, Phoenix, Arizona on December 27, 2012.
- Email communication with Rosabeth Garcia-Sais, NRCS, Albuquerque, New Mexico on January 11, 2013.
- Email communication with Stu Tuttle, State Biologist, Nature Resource Conservation Service, January 10, 2013.
- Email communication with Walter Lane, Altar Valley Conservation Alliance, December 7, 2012 and December 11, 2012.
- Email communication with William McDonald, Malpai Borderlands Group, January 8, 2013.
- Email communication with U.S. Fish and Wildlife Service, April 13, 2013 and April 22, 2013.
- Executive Order 12866, *Regulatory Planning and Review*, September 30, 1993.
- Executive Order 13175, Consultation and Coordination with Indian Tribal Governments.
- Executive Order 13211, *Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use*, May 18, 2001.
- Executive Order 13563, *Improving Regulation and Regulatory Review*, January 18, 2011.
- Federal Government Schedule Rates, Office of Personnel Management, 2010.
- Firescape. Huachuca FireScape. Viewed on February 5, 2013 at: <http://www.azfirescape.org/huachuca>.
- Gifford Pinchot Task Force v. United States *Fish and Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004).
- GIS data received via email communication with Dawn Rohr, Department of the Army, January 7, 2013.
- GIS data received via email communication with Jim Veomett, Pima County Planning Department, on December 19, 2012.
- Gramlich, Edward M., *A Guide to Benefit-Cost Analysis* (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990.
- Home Builders Association of Northern California v. United States Fish and Wildlife Service, 616 F.3d 983 (9th Cir. 2010), cert. denied, 179 L. Ed 2d 301, 2011 U.S. Lexis 1392, 79 U.S.L.W. 3475 (2011).

- Howe, K. Tohono O’odham Nation. Telephone communication on November 20, 2012.
- Jaguar Recovery Team. April 2012. Recovery Outline for the Jaguar (*Panthera onca*).
- James, N. Fennemore Craig, P.C. on behalf of Rosemont Copper Company. Public comment submitted on October 19, 2012.
- L. William Seidman Research Institute, W.P. Carey School of Business, Arizona State University. “An Assessment of the Economic Impacts of the Rosemont Copper Project on the Economies of the Cochise/Pima/Santa Cruz Counties Study Area, the State of Arizona, and the United States using the REMI Regional Economic Forecasting Model.” May 2012.
- M3 Engineering & Technology Corporation. “Hermosa Project Preliminary Economic Assessment – Santa Cruz County, Arizona.” November 12, 2012.
- McFarland, Daniel J. Public comment on behalf of Fort Huachuca submitted on September 13, 2013.
- Meidinger, D. and James, N. Fennemore Craig, P.C. on behalf of Rosemont Mine and Wildcat Silver. Telephone communication on October 10, 2012.
- Meidinger, D. Fennemore Craig, P.C. on behalf of Rosemont Mine. Email communication on October 4, 2012.
- Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>.
- Metcalf, Jessica. 2007. Fort Huachuca Conservation Easements Reach 1,400 Acres. Environmental Update, U.S. Army Environmental Command. Viewed on December 9, 2012 at: <http://aec.army.mil/usaec/newsroom/update/fall07/fall0710.html>.
- Miller, Brian, et al. 2001. The Importance of Large Carnivores to Healthy Ecosystems. *Endangered Species Update*, Vol. 18, No. 5.
- Monrad, Christian K. et al. Monrad Engineering Inc. Rosemont Copper Project Light Pollution Mitigation Recommendation Report. January 24, 2012.
- New Mexico Cattle Growers Assn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).
- Norris, N., Jr. Chairman of the Tohono O’odham Nation. Public comment submitted on October 19, 2012. (Page 2)
- Parker, Dennis. Public comment submitted on behalf of Jim and Sue Chilton, the Chilton Ranch, the Pima Natural Resources Conservation District, the Arizona Cattle Growers’ Association, the Southern Arizona Cattlemen’s

Protective Association, and the Coalition of Arizona/New Mexico Counties, on July 30, 2013.

Patagonia. Accessed at <http://www.patagoniaaz.com/Patagonia.html> on January 10, 2013.

Personal communication with Christopher DeMille, Katchner Caverns State Park, November 26, 2012.

Personal communication with Dawn Rohr, Department of the Army, January 7, 2013.

Personal communication with Jason Metaljak, National Park Service, January 11, 2013.

Personal communication with Jim Veomett, Pima County Planning Department, December 11, 2012.

Personal communication with Jody Hatch, Assessor, Hidalgo County, December 3, 2012.

Personal communication with Justin White, Arizona Department of Transportation, on October 10, 2012.

Personal communication with Kristen Egen, District Conservationist, Natural Resource Conservation Service, November 27, 2012.

Personal communication with Larry Jones, Coronado National Forest, United States Forest Service, November 16, 2012.

Personal communication with Mary Dahl, Santa Cruz County, December 4, 2012.

Personal communication with Stu Tuttle, State Biologist, Natural Resource Conservation Service, November 27, 2012.

Personal communication with Tim Hughes, T&E Coordinator, Bureau of Land Management on October 4, 2012, and email communication with Tim Hughes on October 4, 2012 and October 22, 2012.

Personal communication with Will Sommers, Arizona State Land Department, November 29, 2012.

Personal conversation with Jennifer Hass, Department of Homeland Security, Customs and Border Protection, on November 16, 2012.

Personal conversation with Kim Mulhern, Chief, Environmental and Natural Resources Division, Fort Huachuca, Department of the Army, on October 15, 2012.

Pima County Development Services Department Planning Division. 2012. Pima County: Comprehensive Plan Update. Land Use Intensity Legend. Viewed on December 31, 2012 at: <http://www.pimaxpress.com/Planning/Default.htm>

Pub Law No. 104-121.

- Public comment from Susan B. Montgomery, Montgomery & Interpreter, plc, on behalf of the Yavapai-Apache Nation, December 27, 2010.
- Public comment from Susan B. Montgomery, Sparks, Tehan, and Ryley P.C., Special Counsel to the San Carlos Apache Tribe, "Comments to Proposed Rule to Draft Environmental Assessment and Final Draft Economic Analysis of Critical Habitat for the Gila chub," September 30, 2005.
- Public comment from Susan B. Montgomery, Special Legal Counsel to the Yavapai-Apache Nation, Proposed Rule for designation of flycatcher critical habitat, October 14, 2011.
- Richardson, L. and J. Loomis. March 2009. The Total Economic Value of Threatened, Endangered, and Rare Species: An Updated Meta-Analysis. *Ecological Economics* 68(5): 1535-1548.
- Risk Management Association (RMA), *Annual Statement Studies: Financial Ratio Benchmarks 2012 to 2013*, 2012.
- Sierra Club v. U. S. Fish and Wildlife Service*, 245 F.3d 434 (5th Cir. 2001).
- Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act, pg. 20.
- Telephone communication with K. Sandwell-Weiss, Geologist, U.S. Forest Service, on November 28, 2012.
- Tiller, Veronica E. Velarde. "Tiller's Guide to Indian Country: Economic Profiles of American Indian Reservations." Bow Arrow Publishing Company, 2005. (353)
- U.S. Border Patrol Tucson Sector. December 2008. 4.0 Best Management Practices and Mitigation Measures.
- U.S. Census Bureau, 2007-2011 American Community Survey 5-Year Estimates.
- U.S. Department of Interior, Secretarial Order # 3206: Subject: American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act, June 1997.
- U.S. Department of the Interior, National Park Service. 2005. Coronado National Memorial, Arizona. Fire Management Plan.
- U.S. Department of the Interior. August 29, 2007. Pedestrian fence along the U.S. and Mexico border near Sasabe, Pima County; Nogales, Santa Cruz County; and near Naco and Douglas, Cochise County.
- U.S. Department of the Interior. September 4, 2008. Biological opinion on Secure Border Initiative (SBI)net Tucson West Tower Project, Ajo, Tucson, Casa Grande, Nogales, and Sonoita Stations Area of Operation, U.S. Border Patrol, Tucson Sector, Arizona.

- U.S. Environmental Protection Agency, Guidelines for Preparing Economic Analyses, EPA 240-R-00-003, September 2000, accessed at <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.
- U.S. Environmental Protection Agency. "Regulatory Flexibility Act/Small Business Regulatory Enforcement Fairness Act (RFA/SBREFA). What is a "small government?" Accessed at <http://www.epa.gov/sbrefa/government.htm> on August 10, 2005.
- U.S. Fish and Wildlife Service. 2002. "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.
- U.S. Fish and Wildlife Service. August 28, 2012. Incremental Effects Letter for the Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Jaguar. Letter to Jennifer Baxter from Steven L. Spangle.
- U.S. Fish and Wildlife Service. Consultation history for the jaguar, sent via email on September 5, 2012.
- U.S. Fish and Wildlife Service. Final Biological and Conference Opinion for the Rosemont Copper Mine, Pima County, Arizona. October 30, 2013.
- U.S. Fish and Wildlife Service/U.S. Border Patrol Tucson Sector. List of Best Management Practices for Protected Species.
- U.S. Forest Service Southwestern Region. "Draft Environmental Impact Statement for the Rosemont Copper Project." Volume 1, Chapter 2. September 2011.
- U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, accessed at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.
- U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003.
- U.S. Office of Management and Budget. 2011. "Regulatory Impact Analysis: Frequently Asked Questions (FAQs)," February 7, 2011. Accessed at http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4_FAQ.pdf on May 3, 2011.
- White House, Memorandum for the Heads of Executive Departments and Agencies: Subject: Tribal Consultation, November 5, 2009. Accessed at: <http://www.whitehouse.gov/the-press-office/memorandum-Tribal-consultation-signed-president>.
- Wildcat Silver Corporation. *Condensed Consolidated Interim Financial Statements For the Three and Nine Months Ended September 30, 2012*. Accessed at <http://www.wildcatsilver.com/Investors/financial-reports/default.aspx> on January 14, 2013.

APPENDIX A | SMALL BUSINESS AND ENERGY IMPACTS ANALYSES

267. This appendix considers the extent to which incremental impacts from critical habitat designation may be borne by small entities and the energy industry. The analysis presented in Section A.1 is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996. The energy analysis in Section A.2 is conducted pursuant to Executive Order No. 13211.
268. The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts resulting from the proposed critical habitat designation. The incremental impacts of the rulemaking are most relevant for the small business and energy impacts analyses because they reflect costs that may be avoided or reduced based on decisions regarding the composition of the Final Rule.

A.1 SBREFA ANALYSIS

269. When a Federal agency proposes regulations, the RFA requires the agency to prepare and make available for public comment an analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions as defined by the RFA).²²³ No initial regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have significant economic impact on a substantial number of small entities. To assist in this process, this appendix provides a screening level analysis of the potential for the designation of jaguar critical habitat to affect small entities.
270. To ensure broad consideration of impacts on small entities, the Service has prepared this small business analysis without first making the threshold determination in the Proposed Rule regarding whether the proposed critical habitat designation could be certified as not having a significant economic impact on a substantial number of small entities. This small business analysis will therefore inform the Service's threshold determination.

²²³ 5 U.S.C. § 601 et seq.

A.1.1 OVERVIEW OF RFA APPLICABILITY

271. This analysis is intended to improve the Service's understanding of the potential effects of the Proposed Rule on small entities and to identify opportunities to minimize these impacts in the final rulemaking. The Act requires the Service to designate critical habitat for threatened and endangered species to the maximum extent prudent and determinable. Section 4(b)(2) of the Act requires that the Service designate critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts, of specifying any particular area as critical habitat." This section grants the Secretary [of the Interior] discretion to exclude any area from critical habitat if (s)he determines "the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat." However, the Secretary may not exclude an area if it "will result in the extinction of the species."
272. Three types of small entities are defined in the RFA:
- **Small Business** - Section 601(3) of the RFA defines a small business as having the same meaning as small business concern under section 3 of the Small Business Act. This includes any firm that is independently owned and operated and is not dominant in its field of operation. The Small Business Administration (SBA) has developed size standards to carry out the purposes of the Small Business Act, and those size standards can be found in 13 CFR 121.201. The size standards are matched to NAICS industries. The SBA definition of a small business applies to a firm's parent company and all affiliates as a single entity.
 - **Small Governmental Jurisdiction** - Section 601(5) defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000. Special districts may include those servicing irrigation, ports, parks and recreation, sanitation, drainage, soil and water conservation, road assessment, etc. When counties have populations greater than 50,000, those municipalities of fewer than 50,000 can be identified using population reports. Other types of small government entities are not as easily identified under this standard, as they are not typically classified by population.
 - **Small Organization** - Section 601(4) defines a small organization as any not-for-profit enterprise that is independently owned and operated and not dominant in its field. Small organizations may include private hospitals, educational institutions, irrigation districts, public utilities, agricultural co-ops, etc.
273. The courts have held that the RFA/SBREFEA requires Federal agencies to perform a regulatory flexibility analysis of forecast impacts to small entities that are directly regulated. In the case of *Mid-Tex Electric Cooperative, Inc., v. Federal Energy Regulatory Commission (FERC)*, FERC proposed regulations affecting the manner in

which generating utilities incorporated construction work in progress in their rates. The generating utilities that expected to be regulated were large businesses; however, their customers -- transmitting utilities such as electric cooperatives -- included numerous small entities. In this case, the court agreed that FERC simply authorized large electric generators to pass these costs through to their transmitting and retail utility customers, and FERC could therefore certify that small entities were not directly impacted within the definition of the RFA.²²⁴

274. Similarly, *American Trucking Associations, Inc. v. Environmental Protection Agency* addressed a rulemaking in which EPA established a primary national ambient air quality standard for ozone and particulate matter.²²⁵ The basis of EPA's RFA/SBREFA certification was that this standard did not directly regulate small entities; instead, small entities were indirectly regulated through the implementation of State plans that incorporated the standards. The court found that, while EPA imposed regulation on States, it did not have authority under this rule to impose regulations directly on small entities and therefore small entities were not directly impacted within the definition of the RFA.
275. The SBA in its guidance on how to comply with the RFA recognizes that consideration of indirectly affected small entities is not required by the RFA, but encourages agencies to perform a regulatory flexibility analysis even when the impacts of its regulation are indirect.²²⁶ "If an agency can accomplish its statutory mission in a more cost-effective manner, the Office of Advocacy [of the SBA] believes that it is good public policy to do so. The only way an agency can determine this is if it does not certify regulations that it knows will have a significant impact on small entities even if the small entities are regulated by a delegation of authority from the Federal agency to some other governing body."²²⁷
276. The regulatory mechanism through which critical habitat protections are enforced is section 7 of the Act, which directly regulates only those activities carried out, funded, or permitted by a Federal agency. By definition, Federal agencies are not considered small entities, although the activities they may fund or permit may be proposed or carried out by small entities. Given the SBA guidance described above, this analysis considers the extent to which this designation could potentially affect small entities, regardless of whether these entities would be directly regulated by the Service through the Proposed Rule or by a delegation of impact from the directly regulated entity.

²²⁴ 773 F. 2d 327 (D.C. Cir. 1985).

²²⁵ 175 F. 3d 1027, 1044 (D.C. Cir. 1999).

²²⁶ Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act, pg. 20.

²²⁷ *Ibid.*, pg. 21.

277. This screening analysis focuses on small entities that may bear the incremental impacts of this rulemaking quantified in Chapters 3 through 11 of this economic analysis. As discussed in greater detail in Chapters 3 through 11, incremental impacts of the designation of critical habitat are likely to be limited to administrative costs of section 7 consultations, with the exception of potential indirect impacts to agriculture and grazing associated with foregone NRCS funding. Small entities may participate in section 7 consultation as a third party (the primary consulting parties being the Service and the Federal action agency). It is therefore possible that the small entities may spend additional time considering critical habitat due to the need for a section 7 consultation for the jaguar. Additional incremental costs of consultation that would be borne by the Federal action agency and the Service are not relevant to this screening analysis as these entities (Federal agencies) are not small.

A.1.2 ANALYSIS OF IMPACTS TO SMALL ENTITIES

278. As described in Chapters 3 through 11, activities that may be affected by the designation include: Forest Management, Border Protection, Mining, Transportation Construction, Development, Military Activities, and Other Activities, including Grazing and Agriculture, Recreation, Utility Construction, and Tribal Activities.
279. We do not expect critical habitat designation to result in impacts to small entities for the following entities: Forest Management, Border Protection, and Military Activities—as they do not involve third parties, only Federal and State agencies—and Development, Recreation, and Utility Construction—as we do not forecast any impacts to these activities. Additionally, Chapter 10 of this analysis details the potential incremental impacts of critical habitat designation on Tribes with lands overlapping the proposed designation. Tribes are generally not subject to review under the RFA/SBREFA. For example, in its guidance on preparing analyses in compliance with the RFA/SBREFA, the EPA states that, "for the purposes of the RFA, States and Tribal governments are not considered small governments but rather as independent sovereigns."^{228,229}

²²⁸ EPA. "Regulatory Flexibility Act/Small Business Regulatory Enforcement Fairness Act (RFA/SBREFA). What is a "small government?" Accessed at <http://www.epa.gov/sbrefa/government.htm> on August 10, 2005.

²²⁹ Tribal businesses, like other businesses, can be considered small entities under RFA/SBREFA if they meet the requisite size standards. The Small Business Size Regulations state that "Business concerns owned and controlled by Indian Tribes, Alaska Native Corporations (ANCs) organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601 *et seq.*), Native Hawaiian Organizations (NHOs), Community Development Corporations (CDCs) authorized by 42 U.S.C. 9805, or wholly-owned entities of Indian Tribes, ANCs, NHOs, or CDCs are not considered affiliates of such entities. Small Business Size Regulations, Title 13: Business Credit and Assistance, Chapter I: Small Business Administration, Part 121: Small Business Size Regulations. In Chapter 6, this analysis forecasts incremental administrative costs and qualitatively discusses concerns that are difficult to monetize, such as potential restrictions on the Tribes' ability to make use of natural resources, including water rights, on their sovereign lands. These monetized costs and potential non-monetized impacts are assumed to be borne by the Tribal government, and not Tribal businesses. As noted in Chapter 6, because Tribal governments generally have far fewer resources to draw from and often serve especially disadvantaged populations, impacts due to critical habitat designation may have a disproportionately negative effect on Tribes.

280. Estimated incremental costs that may be borne by small entities consist of administrative impacts of section 7 consultation related to Mining, Transportation Construction, and Agriculture and Grazing. These potential impacts are described in greater detail below.

- **Mining.** Chapter 5 describes potential impacts arising from three known formal consultations on the Rosemont Mine, the Hermosa Project, and the Coronado National Forest Land and Resource Management Plan. To be considered a small entity in this industry, companies must employ fewer than 500 people. Rosemont Copper anticipates employing up to 494 people directly at the Rosemont Mine.²³⁰ As of 2011, the parent company of Rosemont Copper - Augusta Resource Corporation - employed a total of 56 people throughout Canada and the United States.²³¹ It is therefore unlikely that, following construction of the Rosemont Mine, Augusta Resource Corporation will employ fewer than 500 people. The Coronado National Forest is a Federal entity and is not considered small. Therefore, no impacts to small entities are anticipated to result from these consultations.

It is uncertain whether Wildcat Silver will employ more than 500 workers during the operation of the Hermosa Project. Therefore, we conservatively assume that Wildcat Silver is a small entity. The cost of consultation for Wildcat Silver is approximately \$875. Although Wildcat Silver is considered to be an exploration stage enterprise and has yet to generate revenue from its operations, this cost is unlikely to be a significant burden on the company, as its assets exceeded \$60 million and it had more than \$3 million in cash and cash equivalents as of September 30, 2012.²³²

Additionally, in Chapter 5 of this analysis, we discuss the potential for jaguar critical habitat to affect other mineral mining operations. While incremental project modification impacts are not forecast for these activities, administrative costs related to 2.5 forecast informal consultations on mining exploration may involve small entities as third-party project proponents. It is uncertain whether third parties involved in these mining consultations will be small; however we conservatively assume that each forecast consultation on mining will involve a

²³⁰ Arizona Department of Mines and Mineral Resources, prepared by the L. William Seidman Research Institute, W.P. Carey School of Business, Arizona State University. "An Assessment of the Economic Impacts of the Rosemont Copper Project on the Economies of the Cochise/Pima/Santa Cruz Counties Study Area, the State of Arizona, and the United States." November 2009.

²³¹ Augusta Annual Information Form. Augusta Resource Corporation. March 19, 2012. Accessed at <http://www.augustaresource.com/Investors/Regulatory-Filings/default.aspx> on October 1, 2012.

²³² Wildcat Silver Corporation. *Condensed Consolidated Interim Financial Statements For the Three and Nine Months Ended September 30, 2012*. Accessed at <http://www.wildcatsilver.com/Investors/financial-reports/default.aspx> on January 14, 2013.

small entity. The cost of consultation is approximately \$875. This cost likely represents less than one percent of annual revenues for mining companies.²³³

- **Transportation Construction.** In this analysis, we forecast consultations on these activities, as discussed in Chapter 6. These consultations will likely not involve third parties, as transportation consultations typically only require administrative effort on the part of State DOTs and the Service. However, we conservatively assume that all consultations will involve a small third party. We forecast two formal consultations and seven technical assistance consultations on such projects that may involve small entities within the study area. Assuming that all transportation potential impacts are borne by nine small private entities, this amounts to less than one consultation per year. The per entity impact, ranging from approximately \$875 to \$7,875, represents less than one percent of annual revenues.^{234,235}
- **Agriculture and Grazing.** In this analysis, we forecast consultations on these activities, as discussed in Chapter 9. In this analysis we discuss potential impacts related to foregone NRCS funding, but do not quantify these impacts. While up to six separate small entities could be affected based on past rates of NRCS funding near proposed critical habitat, we do not expect these entities to bear a direct burden. Additionally, the possibility exists for administrative impacts to occur in association with two formal and three informal forecast consultations on agriculture and grazing projects that may involve small entities within the study

²³³ In Chapter 5, we estimate that approximately 2.5 consultations will occur over the 20-year time period of the analysis, potentially all incurred by small entities, in addition to the consultation with Wildcat Silver in 2014. For the purposes of this distributional analysis, we assume four individual small entities will participate in approximately one consultation at some point over 20 years. The full cost to a third party of a single consultation is \$875. If we assume that a single entity participates in multiple consultations in a single year, the administrative costs of such activity are still likely to be less than one percent of annual revenues. Although data on annual revenues for mining companies were unavailable, due to the highly capitalized nature of the mining industry, companies involved in mining operations are likely to produce revenues large enough that the cost of undertaking three consultations in a single year would likely be less than one percent of annual revenues (e.g., four consultations x \$875 = \$3,500. \$3,500 represents one percent of annual revenues of \$350,000. Mining companies are likely to produce revenues of greater than \$350,000 annually).

²³⁴ Annual revenues related to transportation activities are estimated using Risk Management Association (RMA), *Annual Statement Studies: Financial Ratio Benchmarks 2012 to 2013*, 2012. For each NAICS code, RMA provides the net sales and the number of entities falling within several sales categories: \$0 to \$1 million, \$1 to 3 million, \$3 to \$5 million, \$5 to 10 million, or \$10 to \$25 million. Based on the number of entities and total net sales falling within each sales category, we developed an estimate of the weighted average net sales (revenues) per small entity (within the following NAICS codes: 237310 and 237990) at \$9 million annually.

²³⁵ In Chapter 6, we estimate that approximately nine consultations will occur over the 20-year time period of the analysis. For the purposes of this distributional analysis, we assume nine individual small entities will participate in approximately one consultation at some point over 20 years. The full cost to a third party of a single consultation is \$875. If we assume that a single entity participates in multiple consultations in a single year, the administrative costs of such activity are still likely to be less than one percent of annual tax revenues (e.g., nine consultations x \$875/\$9,000,000 = 0.09 percent of annual revenues).

area. However, small entities are likely not directly involved in the consultation process between NRCS or USDA with the Service.

281. Exhibit A-1 presents the results of this analysis. It provides the relevant small entity thresholds by NAICS code, the total number of entities and small entities, and the estimated incremental impacts as a percentage of annual revenues.

EXHIBIT A-1. SUMMARY OF POTENTIAL IMPACTS ON SMALL ENTITIES

ACTIVITY	INDUSTRY (NAICS CODES)	SMALL ENTITY SIZE STANDARD (MILLIONS OF DOLLARS)	TOTAL NUMBER OF ENTITIES	NUMBER OF SMALL ENTITIES	NUMBER OF AFFECTED SMALL ENTITIES ¹ (PERCENT OF TOTAL SMALL ENTITIES)	INCREMENTAL ECONOMIC IMPACTS TO SMALL BUSINESSES ²	IMPACTS AS % OF ANNUAL REVENUES ³																																																
Transportation	Highway, Street and Bridge Construction (237310)	33.5	120	110	9 (7%)	\$875 to \$7,875 ⁴	0.09%																																																
	Other Heavy and Civil Engineering Construction (237990)	33.5	30	28				Agriculture and Grazing	Beef Cattle Ranching and Farming (112111)	0.75	80	74	0 (0%)	\$0 per entity ⁵	0%	Cotton Farming (115111)	0.75	3	1	Mining	Iron Ore Mining (212210)	500 employees	0	0	4 (13%)	\$875 to \$3,500 ⁶	-	Gold Ore Mining (212221)	500 employees	6	6	Silver Ore Mining (212222)	500 employees	1	1	Lead Ore and Zinc Ore Mining (212231)	500 employees	6	6	Copper Ore and Nickel Ore Mining (212234)	500 employees	33	8	Uranium-Radium-Vanadium Ore Mining (212291)	500 employees	0	0	All Other Metal Ore Mining (212299)	500 employees	0	0	Support Activities for Metal Mining (213114)	7	9	8
Agriculture and Grazing	Beef Cattle Ranching and Farming (112111)	0.75	80	74	0 (0%)	\$0 per entity ⁵	0%																																																
	Cotton Farming (115111)	0.75	3	1				Mining	Iron Ore Mining (212210)	500 employees	0	0	4 (13%)	\$875 to \$3,500 ⁶	-	Gold Ore Mining (212221)	500 employees	6	6		Silver Ore Mining (212222)	500 employees	1	1				Lead Ore and Zinc Ore Mining (212231)	500 employees	6	6	Copper Ore and Nickel Ore Mining (212234)	500 employees	33	8	Uranium-Radium-Vanadium Ore Mining (212291)	500 employees	0	0	All Other Metal Ore Mining (212299)	500 employees	0	0	Support Activities for Metal Mining (213114)	7	9	8	Support Activities for Nonmetallic Minerals, except fuels (213115)	7	3	3				
Mining	Iron Ore Mining (212210)	500 employees	0	0	4 (13%)	\$875 to \$3,500 ⁶	-																																																
	Gold Ore Mining (212221)	500 employees	6	6																																																			
	Silver Ore Mining (212222)	500 employees	1	1																																																			
	Lead Ore and Zinc Ore Mining (212231)	500 employees	6	6																																																			
	Copper Ore and Nickel Ore Mining (212234)	500 employees	33	8																																																			
	Uranium-Radium-Vanadium Ore Mining (212291)	500 employees	0	0																																																			
	All Other Metal Ore Mining (212299)	500 employees	0	0																																																			
	Support Activities for Metal Mining (213114)	7	9	8																																																			
	Support Activities for Nonmetallic Minerals, except fuels (213115)	7	3	3																																																			

Notes:

1. To estimate the number of affected small entities, this analysis assumes one small entity per forecast section 7 consultation. For Agriculture and Grazing, this assumes one small entity per NRCS funding instance.
 2. For these activities, we conservatively estimate that all administrative costs of consultation will be incurred by a small entity in a single year. Therefore, we use the total, undiscounted third party incremental costs of a formal consultation.
 3. Annual revenues are estimated using Risk Management Association (RMA), *Annual Statement Studies: Financial Ratio Benchmarks 2012 to 2013*, 2012. For each NAICS code, RMA provides the net sales and the number of entities falling within several sales categories: \$0 to \$1 million, \$1 to 3 million, \$3 to \$5 million, \$5 to 10 million, or \$10 to \$25 million. Based on the number of entities and total net sales falling within each sales category, we developed an estimate of the weighted average net sales (revenues) per small entity: for transportation related firms, annual revenues were estimated to be approximately \$8.6 million; for companies involved in agriculture and grazing, revenues are estimated at \$430,000 annually; for mining firms, annual revenue information was not available, but due to the highly capitalized nature of the mining industry, mining firms are assumed to have high annual revenues such that per entity impacts of \$2,625 resulting from the designation of critical habitat are likely to be insignificant.
 4. We are uncertain in what year consultations and technical assistance requests on transportation activities will occur over the next 20 years. For the purposes of this analysis, we assume affected small entities will participate in approximately nine consultations or technical assistance requests over 20 years, or less than one per year. However, if we assume that a single small entity participates in multiple formal consultations in a single year, the administrative costs of such activity are still likely to be less than one percent of annual tax revenues (e.g., nine consultations x \$875/\$9,000,000 = 0.09 percent of annual revenues).
 5. Potential impacts related to NRCS funding are not quantified.
 6. We are uncertain in what year consultations on mining will occur over the next 20 years. For the purposes of this analysis, we assume affected small entities will participate in approximately four consultations over 20 years, one of which will be associated with the Hermosa Project and will involve Wildcat Silver Corporation. However, if we assume that a single small entity participates in multiple consultations in a single year, the administrative costs of such activity are still likely to be less than one percent of annual revenues. Although data on annual revenues for mining companies were unavailable, due to the highly capitalized nature of the mining industry companies involved in mining operations are likely to produce revenues large enough that the cost of undertaking three consultations in a single year would likely be less than one percent of annual revenues (e.g., four consultations x \$875 = \$3,500. \$3,500 represents one percent of annual revenues of \$350,000. Mining companies are likely to produce revenues of greater than \$350,000 annually).
- Source:** Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers," on January 3, 2013.

A.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY

282. Pursuant to Executive Order No. 13211, “Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use,” issued May 18, 2001, Federal agencies must prepare and submit a “Statement of Energy Effects” for all “significant energy actions.” The purpose of this requirement is to ensure that all Federal agencies “appropriately weigh and consider the effects of the Federal Government’s regulations on the supply, distribution, and use of energy.”²³⁶
283. OMB provides guidance for implementing this Executive Order, outlining nine outcomes that may constitute “a significant adverse effect” when compared with the regulatory action under consideration:
- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
 - Reductions in fuel production in excess of 4,000 barrels per day;
 - Reductions in coal production in excess of 5 million tons per year;
 - Reductions in natural gas production in excess of 25 million Mcf (1,000 cubic feet) per year;
 - Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;
 - Increases in energy use required by the regulatory action that exceed the thresholds above;
 - Increases in the cost of energy production in excess of one percent;
 - Increases in the cost of energy distribution in excess of one percent; or
 - Other similarly adverse outcomes.²³⁷
284. We do not anticipate the proposed critical habitat designation to impact coal mining, oil extraction, or drilling activities taking place in the study area. Thus, none of these outcomes are anticipated.

²³⁶ Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>.

²³⁷ *Ibid.*

APPENDIX B | SENSITIVITY OF RESULTS TO DISCOUNT RATE

285. This appendix first summarizes the baseline and incremental impacts calculated assuming a three percent discount rate. We provide these exhibits to demonstrate the sensitivity of our results to the discount rate selected, and they can be compared with similar exhibits, presented in the Executive Summary and activity-specific chapters, which present results assuming a seven percent discount rate. We also present the stream of undiscounted costs for each activity.

EXHIBIT B-1. SUMMARY OF BASELINE AND INCREMENTAL IMPACTS BY UNIT AND SUBUNIT, 2012 TO 2041 (2013\$, THREE PERCENT DISCOUNT RATE)

UNIT	UNIT NAME	BASELINE IMPACTS		INCREMENTAL IMPACTS	
		PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	Baboquivari-Coyote Subunit	\$410,000	\$27,000	\$52,000	\$3,400
1b	Southern Baboquivari Subunit	\$190,000	\$12,000	\$25,000	\$1,700
2	Atascosa Unit	\$420,000	\$27,000	\$58,000	\$3,800
3	Patagonia Unit	\$2,100,000	\$140,000	\$5,400,000	\$350,000
4a	Coles Levee	\$37,000	\$2,400	\$20,000	\$1,300
4b	Whetstone-Santa Rita Subunit	\$8,500	\$550	\$4,300	\$280
4c	Whetstone-Huachuca Subunit	\$340,000	\$22,000	\$7,900	\$520
5	Peloncillo Unit	\$220,000	\$15,000	\$47,000	\$3,100
6	San Luis Unit	\$120,000	\$7,700	\$3,500	\$230
Total		\$3,900,000	\$250,000	\$5,600,000	\$370,000
Note: Totals may not sum due to rounding.					

EXHIBIT B-2. SUMMARY OF INCREMENTAL IMPACTS BY ACTIVITY (2013\$, THREE PERCENT DISCOUNT RATE)

ACTIVITY	PRESENT VALUE	ANNUALIZED	PERCENTAGE OF TOTAL IMPACTS
Federal lands management	\$210,000	\$14,000	3.8%
Border protection	\$23,000	\$1,500	0.4%
Mining	\$5,200,000	\$340,000	93%
Transportation	\$9,000	\$590	0.2%
Development	\$0	\$0	0%
Military	\$23,000	\$1,500	0.4%
Grazing	\$26,000	\$1,700	0.5%
Other	\$110,000	\$6,900	1.9%
Tribal	\$0	\$0	0%
Total	\$5,600,000	\$370,000	100%

Note: Totals may not sum due to rounding.

EXHIBIT B-3. BASELINE AND INCREMENTAL COSTS OF JAGUAR CONSERVATION BORNE BY FEDERAL LAND MANAGERS BY UNIT (2013\$, THREE PERCENT DISCOUNT RATE)

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	\$54,000	\$3,500	\$36,000	\$2,400
1b	\$21,000	\$1,300	\$15,000	\$960
2	\$42,000	\$2,800	\$27,000	\$1,700
3	\$86,000	\$5,600	\$92,000	\$6,000
4a	\$17,000	\$1,100	\$11,000	\$700
4b	\$3,300	\$220	\$2,000	\$120
4c	\$2,900	\$190	\$1,800	\$110
5	\$46,000	\$3,000	\$28,000	\$1,800
Total	\$270,000	\$18,000	\$210,000	\$14,000

EXHIBIT B-4. IMPACTS OF THE PROPOSED CRITICAL HABITAT DESIGNATION ON BORDER ACTIVITIES (2013\$, THREE PERCENT DISCOUNT RATE)

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1b	\$150,000	\$10,000	\$3,200	\$210
2	\$330,000	\$22,000	\$8,400	\$550
3	\$290,000	\$19,000	\$6,200	\$410
5	\$140,000	\$9,400	\$3,000	\$200
6	\$120,000	\$7,500	\$2,300	\$150
Total	\$1,000,000	\$68,000	\$23,000	\$1,500

EXHIBIT B-5. SUMMARY OF FORECAST IMPACTS TO MINING ACTIVITIES (2013\$, THREE PERCENT DISCOUNT RATE)

TYPE OF IMPACT	DESCRIPTION OF IMPACT	FORECAST IMPACT
BASELINE		
Administrative costs	<ul style="list-style-type: none"> 1 formal consultation in 2013 for the Rosemont Mine; 1 programmatic consultation in 2013 for the Coronado National Forest Land and Resource Management Plan; 1 formal consultation in 2014 for the Hermosa Project; and 2.5 informal consultations over 20 years for mineral exploration. 	\$70,000 present value, or \$4,600 annually
Conservation Measures	<ul style="list-style-type: none"> Minimization of nighttime lighting and road-kill and species monitoring at the Rosemont Mine; Baseline studies and environmental monitoring for the Hermosa Project, as well as potential conservation measures that cannot be predicted at this time; and Baseline conservation measures for mineral explorations that cannot be predicted at this time. 	Uncertain (Monetized impacts are \$100,000 annually for carnivore monitoring at the Rosemont Mine.)
INCREMENTAL		
Administrative Costs	<ul style="list-style-type: none"> 1 formal consultation in 2013 for the Rosemont Mine; 1 programmatic consultation in 2013 for the Coronado National Forest Land and Resource Management Plan; 1 formal consultation in 2014 for the Hermosa Project; and 2.5 informal consultations over 20 years for mineral exploration. 	\$23,000 present value, or \$1,500 annually
Conservation Measures	<ul style="list-style-type: none"> Restoration of surface springs, revegetation of mine reclamation area, and management of conservation lands for the Rosemont Mine; and Habitat conservation measures for the Hermosa Project and mineral explorations that cannot be predicted at this time. Alternatively, in the event that the mines do not move to production, unrealized local, State, and national benefits of the mining operations. 	Uncertain (Monetized impacts are \$340,000 annually for management of three separate conservation areas for the Rosemont Mine.)

EXHIBIT B-6. IMPACTS OF THE PROPOSED CRITICAL HABITAT DESIGNATION ON TRANSPORTATION ACTIVITIES (2013\$, THREE PERCENT DISCOUNT RATE)

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	\$330,000	\$21,000	\$2,000	\$130
2	\$1,200	\$81	\$410	\$27
3	\$12,000	\$810	\$4,100	\$270
4b	\$1,200	\$81	\$410	\$27
4c	\$330,000	\$21,000	\$2,000	\$130
Total	\$670,000	\$44,000	\$9,000	\$590

EXHIBIT B-7. SUMMARY OF IMPACTS TO MILITARY ACTIVITIES WITHIN THE PROPOSED CRITICAL HABITAT DESIGNATION BY UNIT (2013\$, THREE PERCENT DISCOUNT RATE)

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
3	\$13,000	\$860	\$22,000	\$1,400
4c	\$650	\$43	\$1,100	\$71
Total	\$14,000	\$900	\$23,000	\$1,500

EXHIBIT B-8. TOTAL COSTS TO AGRICULTURE AND GRAZING RELATED TO NRCS ACTIVITIES IN THE PROPOSED CRITICAL HABITAT DESIGNATION (2013\$, THREE PERCENT DISCOUNT RATE)

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	\$2,000	\$130	\$2,800	\$180
1b	\$1,100	\$69	\$1,400	\$94
2	\$3,200	\$210	\$4,400	\$280
3	\$8,000	\$530	\$11,000	\$720
4a	\$1,400	\$90	\$1,900	\$120
4b	\$280	\$18	\$380	\$25
4c	\$440	\$28	\$600	\$39
5	\$2,300	\$150	\$3,100	\$200
6	\$170	\$11	\$230	\$15
Total	\$19,000	\$1,200	\$26,000	\$1,700

EXHIBIT B-9. ADMINISTRATIVE COSTS OF CONSULTATION BY PROPOSED CRITICAL HABITAT UNIT FOR OTHER ACTIVITIES (2013\$, THREE PERCENT DISCOUNT RATE)

UNIT	BASELINE		INCREMENTAL	
	PRESENT VALUE	ANNUALIZED	PRESENT VALUE	ANNUALIZED
1a	\$27,000	\$1,700	\$11,000	\$750
1b	\$14,000	\$900	\$5,900	\$390
2	\$42,000	\$2,700	\$18,000	\$1,200
3	\$110,000	\$6,900	\$45,000	\$3,000
4a	\$18,000	\$1,200	\$7,700	\$500
4b	\$3,700	\$240	\$1,600	\$100
4c	\$5,700	\$370	\$2,400	\$160
5	\$30,000	\$1,900	\$13,000	\$830
6	\$2,200	\$140	\$950	\$62
Total	\$250,000	\$16,000	\$110,000	\$6,900

EXHIBIT B-10. SUMMARY OF UNDISCOUNTED INCREMENTAL IMPACTS BORNE BY FEDERAL LAND MANAGERS BY UNIT (2013\$)

UNIT	PRESENT VALUE	ANNUALIZED
1a	\$42,000	\$2,100
1b	\$17,000	\$840
2	\$32,000	\$1,600
3	\$100,000	\$5,200
4a	\$13,000	\$640
4b	\$2,300	\$120
4c	\$2,100	\$100
5	\$33,000	\$1,700
Total	\$250,000	\$12,000

EXHIBIT B-11. SUMMARY OF UNDISCOUNTED INCREMENTAL IMPACTS TO BORDER ACTIVITIES BY UNIT (2013\$)

UNIT	PRESENT VALUE	ANNUALIZED
1b	\$4,200	\$210
2	\$11,000	\$550
3	\$8,100	\$410
5	\$4,000	\$200
6	\$3,000	\$150
Total	\$30,000	\$1,500

EXHIBIT B-12. SUMMARY OF UNDISCOUNTED INCREMENTAL IMPACTS TO MINING ACTIVITIES BY UNIT (2013\$)

UNIT	PRESENT VALUE	ANNUALIZED
3	\$6,800,000	\$340,000
Total	\$6,800,000	\$340,000

EXHIBIT B-13. SUMMARY OF UNDISCOUNTED INCREMENTAL IMPACTS TO TRANSPORTATION ACTIVITIES BY UNIT (2013\$)

UNIT	PRESENT VALUE	ANNUALIZED
1a	\$3,000	\$150
2	\$540	\$27
3	\$5,500	\$280
4b	\$540	\$27
4c	\$3,000	\$150
Total	\$13,000	\$640

EXHIBIT B-14. SUMMARY OF UNDISCOUNTED INCREMENTAL IMPACTS TO MILITARY ACTIVITIES BY UNIT (2013\$)

UNIT	PRESENT VALUE	ANNUALIZED
3	\$26,000	\$1,300
4c	\$1,300	\$64
Total	\$27,000	\$1,400

EXHIBIT B-15. SUMMARY OF UNDISCOUNTED INCREMENTAL IMPACTS TO AGRICULTURE AND GRAZING ACTIVITIES BY UNIT (2013\$)

UNIT	PRESENT VALUE	ANNUALIZED
1a	\$3,000	\$150
1b	\$1,600	\$78
2	\$4,700	\$230
3	\$12,000	\$590
4a	\$2,000	\$100
4b	\$410	\$21
4c	\$640	\$32
5	\$3,300	\$170
6	\$250	\$12
Total	\$28,000	\$1,400

EXHIBIT B-16. SUMMARY OF UNDISCOUNTED INCREMENTAL IMPACTS TO OTHER ACTIVITIES BY UNIT (2013\$)

UNIT	PRESENT VALUE	ANNUALIZED
1a	\$15,000	\$730
1b	\$7,500	\$370
2	\$23,000	\$1,100
3	\$57,000	\$2,900
4a	\$9,700	\$490
4b	\$2,000	\$99
4c	\$3,100	\$150
5	\$16,000	\$800
6	\$1,200	\$60
Total	\$130,000	\$6,700

APPENDIX C
INCREMENTAL EFFECTS MEMORANDUM TO IEc



United States Department of the Interior

U.S. Fish and Wildlife Service

Arizona Ecological Services Office

2321 West Royal Palm Road, Suite 103

Phoenix, Arizona 85021-4951

Telephone: (602) 242-0210 Fax: (602) 242-2513



In reply refer to:

AESO/SE

August 28, 2012

Ms. Jennifer Baxter, Project Director
Industrial Economics, Incorporated
2067 Massachusetts Avenue
Cambridge, Massachusetts 02140-1340

Re: Incremental Effects Letter for the Economic Analysis for the Proposed Rule to
Designate Critical Habitat for the Jaguar

Dear Ms. Baxter:

The purpose of this letter is to provide information to serve as a basis for conducting an economic analysis of the proposed critical habitat for the jaguar. This information will fulfill the request as identified in the November 30, 2010, Memorandum, *Guidance for Preparing Incremental Effects Memo* (from Jennifer Baxter, Industrial Economics, Inc., to Douglas Krofta, Service).

Section 4(b)(2) of the Endangered Species Act (Act) requires the Service to consider the economic, national security, and other impacts of designating a particular area as critical habitat. The Service may exclude an area from critical habitat if it determines that the benefits of exclusion outweigh the benefits of including the area as critical habitat, unless the exclusion will result in the extinction of the species. To support its weighing of the benefits of excluding versus including an area as critical habitat, the Service prepares an economic analysis for each proposed critical habitat rule describing and monetizing, where possible, the economic impacts (costs and benefits) of the proposed regulation.

Most courts have held that the Service only needs to consider the incremental impacts imposed by the critical habitat designation over and above those impacts imposed as a result of listing the species. For example, the Ninth Circuit Court of Appeals reached this conclusion twice within the last few years, and the U.S. Supreme Court declined to hear any further appeal from those rulings (*Arizona Cattle Growers' Assoc. v. Salazar*, 606 F.3d 116, (9th Cir. June 4, 2010) cert. denied, 179 L. Ed. 2d 300, 2011 U.S. LEXIS 1362, 79 U.S.L.W. 3475 (2011); *Home Builders Association of Northern California v. United States Fish & Wildlife Service*, 616 F. 3rd 983 (9th Cir. 2010) cert. denied, 179 L. Ed. 2d 300, 2011 U.S. LEXIS 1362, 79 U.S.L.W. 3475 (2011)).

Ms. Jennifer Baxter, Project Director

However, the prevailing court decisions in the Tenth Circuit Court of Appeals do not allow the incremental analysis approach. Instead the Tenth Circuit requires that the Service consider both the baseline economic impacts imposed due to listing the species and the additional incremental economic impacts imposed by designating critical habitat (*New Mexico Cattle Growers Ass'n v. FWS*, 248 F.3d 1277 (10th Cir. May 11, 2001)). As a consequence, an economic analysis for critical habitat that is being designated within States that fall within the jurisdiction of the Tenth Circuit should include a coextensive cost evaluation which addresses, and quantifies to the extent feasible, all of the conservation-related impacts associated with the regulatory baseline (those resulting under the jeopardy standard under section 7 of the Act, and under sections 9 and 10 of the Act). In other words, the allocation of impacts should show those that are part of the regulatory baseline and those that are unique to the critical habitat designation.

There are a number ways that designation of critical habitat could influence activities, but one of the important functions of this letter is to provide detailed information about the differences between actions required to avoid jeopardy versus actions that may be required to avoid adverse modification. The Service is working to update the regulatory definition of adverse modification since it was invalidated by a prior court ruling. In the meantime, we will rely on guidance provided by the Director's December 9, 2004, Memorandum, *Application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act*. This memo explains that the conclusion for a section 7 analysis of a Federal action is to determine if the "critical habitat would remain functional (or retain the current ability for the primary constituent elements to be functionally established) to serve the intended conservation role of the species..." (p. 3). The information provided below is intended to identify the possible economic, national security, and other impacts for this species under the two different section 7 consultation standards.

Background

The jaguar was listed as endangered in 1972 in accordance with the Endangered Species Conservation Act of 1969 (37 FR 6476). A final rule clarifying that endangered status for the species extended into the United States was published in 1997 (62 FR 39147). The 1997 clarifying rule included a determination that designation of critical habitat for the jaguar was not prudent because of the possibility of "take" if jaguar locations were known was the most significant threat to the jaguar (62 FR 39147). Since that time, the issue of whether critical habitat should be designated for the jaguar in the United States has been the subject of ongoing litigation and subsequent findings. Our second prudency determination found that information concerning the location of jaguars in the United States was now available to the public through other sources and that designation of critical habitat would not be expected to increase the degree of threat to the species. However, it determined that there was no habitat in the United States which was essential to the conservation of the species (July 12, 2006, 71 FR 39335; *Center for Biological Diversity v. Kempthorne*, CV 07-372- TUC JMR (Lead) and *Defenders of Wildlife v. Hall*, CV08-335 TUC JMR (Consolidated) (D. Ariz., Mar. 30, 2009; 75 FR 1741)). In our most recent finding (75 FR 1741), we determined that designation of critical habitat for the jaguar in the United States was prudent. This finding was based on the fact that there are physical and biological features that can be used by jaguars in the United States and that the designation of critical habitat for the United States habitat would be beneficial to the species. This prudency

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finding also solicited comments and information to assist us in preparing a proposed rule to designate critical habitat for the jaguar in the United States.

Our approach in proposing critical habitat for the jaguar is based on the 2012 Recovery Outline for the Jaguar. The 2012 Recovery Outline for the Jaguar finds that the Northwestern Recovery Unit is essential for the conservation of the species. Portions of southeastern Arizona and southwestern New Mexico are included in the Northwestern Recovery Unit because they provide areas to support some individuals during transient movements by providing patches of habitat (perhaps in some cases with a few resident jaguars), and as areas for cyclic expansion and contraction of the nearest core area and breeding population. The spatial and biological dynamics that allow this unit to function require connectivity between the northern Mexican population of jaguars in Sonora and jaguar habitat areas in the southeastern Arizona and southwestern New Mexico. Therefore, proposed critical habitat is necessary to maintain and enhance connectivity within the U.S. portion of the Northwestern Recovery Unit. The 2012 Recovery Outline also finds that it would benefit the jaguar species as a whole to allow further connectivity of the Northwestern Recovery Unit with other jaguar populations elsewhere in Mexico.

In total, we are proposing approximately 874,252 acres (ac) (353,797 hectares (ha)) in six units for designation as jaguar critical habitat in Cochise, Pima, and Santa Cruz counties, Arizona; and Hidalgo County, New Mexico. This proposed designation includes lands under Federal (65 percent), State (13 percent), Tribal (9 percent), private (12 percent) and unclassified (less than 0.01 percent) land ownership. Some units and subunits are considered occupied because they contain an undisputed Class 1 record at the time of listing and all of the PCEs as described in the proposed rule; other subunits are considered unoccupied, but essential to the conservation of the species, because they provide connectivity from occupied areas to Mexico, as described in the paragraph above and in the proposed rule.

The six units include the following:

- Unit 1, or the Baboquivari Unit, encompassing approximately 138,975 ac (56,241 ha) in the Baboquivari Mountains, Arizona. This unit is divided into the following two subunits:
 - 1a: Baboquivari-Coyote Subunit, which is considered occupied and includes the Coyote, Quinlan, Saucito, and northern Baboquivari Mountains.
 - 1b: Southern Baboquivari Subunit, which is considered unoccupied, but provides connectivity to Mexico through the southern extent of the Baboquivari Mountains.
- Unit 2, or the Atascosa Unit, encompassing approximately 143,578 ac (58,104 ha) in the Tumacacori, Atascosa, and Pajarito Mountains, Arizona. This unit is considered occupied.
- Unit 3, or the Patagonia Unit, encompassing approximately 343,033 ac (138,821 ha) in the Santa Rita, Patagonia, and Huachuca mountains and Canelo Hills, Arizona. This unit is considered occupied.

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- Unit 4, or the Whetstone Unit, encompassing approximately 105,498 ac (42,694 ha) in the Whetstone Mountains and connections to the Santa Rita and Huachuca mountains, Arizona. This unit is divided into the following three subunits:
 - 4a: Whetstone Subunit, which is considered occupied and includes the Whetstone Mountains.
 - 4b: Whetstone-Santa Rita Subunit, which is considered unoccupied, but provides a northern connection between subunit 4a and Unit 3 (an occupied unit providing connectivity to Mexico).
 - 4c: Whetstone-Huachuca Subunit, which is considered unoccupied, but provides a southern connection between subunit 4a and the Unit 3 (an occupied unit providing connectivity to Mexico).
- Unit 5, or the Peloncillo Unit, encompassing approximately 99,559 ac (40,290 ha) in the Peloncillo Mountains, Arizona and New Mexico. This unit is considered occupied.
- Unit 6, or the San Luis Unit, encompassing approximately 7,590 ac (3,071 ha) in the San Luis Mountains, New Mexico. This unit is considered occupied.

Baseline Analysis

The following discussion describes the existing regulatory circumstances that are anticipated to continue based on the listing of the species. In the baseline scenario, section 7 of the Endangered Species Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of the jaguar.

Conservation plans and regulatory mechanisms that provide protection to the species and its habitat without critical habitat designation

Throughout its range, the jaguar has a very active conservation constituency and many conservation planning efforts and actions have been taken in a number of countries across its range to address the species' needs. However, because critical habitat is only designated in the United States, the list below is limited to those existing conservation actions that apply to the United States. This list includes areas, plans, regulations, and actions that have, and likely will continue to, provide protections to the jaguar and its habitat without a critical habitat designation. All of these items represent actions/areas that are anticipated to occur within the proposed designation.

Conservation Plans/Efforts

The following are ongoing conservation efforts that provide some benefits to the jaguar and are considered part of the baseline because these activities will occur with or without critical habitat designation.

1. Recovery Outline for the Jaguar (Recovery Outline)

A Recovery Outline for the jaguar was published in 2012 to provide a preliminary strategy for jaguar conservation until a full recovery plan is completed (currently in progress). While not a regulatory document, the Recovery Outline (and subsequent

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Recovery Plan) generally describes conservation strategies and those measures that can be implemented to recover the jaguar. They are prioritized mainly to benefit jaguars in core areas where documented breeding currently occurs (in Mexico), with other actions recommended in the United States as opportunities arise.

2. Arizona Game and Fish Department (AGFD), New Mexico Department of Game and Fish, and the State-led AZ-NM Jaguar Conservation Team (Jaguar Conservation Team)

The Jaguar Conservation Team is comprised of State, local, and Federal cooperators, with voluntary participation of many private individuals. The Team's objectives are to contribute to conserving the jaguar in Arizona and New Mexico and to encourage parallel efforts in Mexico. The Jaguar Conservation Team developed the Jaguar Conservation Agreement to provide opportunities and incentives for interested parties to become involved with jaguar conservation activities including: collection of biological information (to provide a sound scientific basis for decisions); consideration of relevant cultural, economic, and political factors; design and implementation of a comprehensive approach to conservation (including public education); and monitoring, evaluation, and feedback.

The Jaguar Conservation Team has made several conservation-related accomplishments, including: 1) collaboration with Mexico on jaguar conservation; 2) a jaguar-based educational curriculum (in Spanish and English) that meets State and National standards that is used in area schools; 3) enhanced public awareness of jaguar presence and conservation needs; 4) increased penalties under State law for unlawful killing of jaguars (in Arizona these increased penalties apply only if the jaguar is delisted federally); 5) a jaguar detection project (using still and video "camera traps"); 6) a system for evaluating and archiving sighting reports; 7) GIS-based evaluations of areas and habitats of historical and recent jaguar occurrence in Arizona and New Mexico for delineation of primary emphasis areas in both states for this conservation effort; 8) delineation of research recommendations intended to guide studies and provide the Jaguar Conservation Team with information requisite to science-based conservation efforts; 9) a rural outreach program; and 10) regular public forums in Arizona and New Mexico for discussion of jaguar-related issues. Although activity by this Team has virtually ceased since February 2009, due to a variety of reasons, the AGFD intends to reconvene the Jaguar Conservation Team.

3. Malpai Borderlands Group (MBG) Habitat Conservation Plan (HCP)

The MBG is organized and led by ranchers who live and work in an 800,000-ac (323,750-ha) region that extends from the foot of the Chiricahua Mountains in Arizona, east to the Playas Valley in Southwest New Mexico. The MBG pursues activities and programs directed at protecting and restoring the ecological diversity and productivity of the land within their region. In 2008, the group completed an HCP covering 19 wildlife and plant species of concern (including 9 listed species) within their region. While the jaguar is not listed as a covered species in the HCP, it likely benefits from the conservation measures and open-space initiatives provided for in the HCP.

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4. Altar Valley Conservation Alliance (AVCA)

The AVCA is a group of local ranchers working to conserve the landscape of the Altar Valley. Located southwest of Tucson, Arizona, the Altar Valley comprises approximately 610,000 acres of Sonoran desert grassland, some of the most biologically rich and ecologically threatened biotic communities in the state. Private ranches work with Federal, State and local agencies to manage the valley, which is the largest unfragmented watershed in Pima County, outside of the Tohono O'odham Nation to the west. While the jaguar is not addressed specifically in the activities conducted by the AVCA, the conservation and restoration projects conducted in the Altar Valley likely benefit the species.

Conservation Due to Section 7 Consultations

The following projects, resulting from past section 7 consultations, provide some benefits to the jaguar and are considered part of the baseline because these benefits will continue with or without critical habitat designation.

4. Jaguar monitoring and recovery efforts in the United States

To help offset effects of some border security activities on the jaguar, U.S. Customs and Border Protection (CBP) provided funding to the Service to implement jaguar monitoring and recovery efforts in the United States. A jaguar survey and monitoring program has been developed and is currently being implemented in the International borderlands region of Arizona and New Mexico. This funding has also been used to create a Jaguar Recovery Team and initiate the work of developing a recovery plan for the jaguar.

5. Closure and restoration of unauthorized roads

According to our 2008 Biological Opinion on the Secure Border Initiative Tucson West Tower Project, the CBP offered to close and/or restore unauthorized roads to help offset the border-related increase of improved or new roads at a ratio of 2:1. They are currently behind schedule on implementing this conservation measure for the jaguar.

Federal Regulations/Acts

The following Federal laws and regulations provide some benefits to the jaguar and are considered part of the baseline because these benefits will continue with or without critical habitat designation.

6. Federal Land Policy and Management Act

The Federal Land Policy and Management Act of 1976 requires that "...the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values;

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that...will preserve and protect certain public lands in their natural condition; (and) that will provide food and habitat for fish and wildlife..." Furthermore, it is the policy of the Bureau of Land Management "to manage habitat with emphasis on ecosystems to ensure self-sustaining populations and a natural abundance and diversity of wildlife, fish, and plant resources on public lands" (BLM manual 6500.06).

7. National Forest Management Act

The National Forest Management Act of 1976 directs that the National Forest System "...where appropriate and to the extent practicable, will preserve and enhance the diversity of plant and animal communities."

8. Sikes Act

The Sikes Act Improvement Act of 1997 (Sikes Act) (16 U.S.C. 670a) sets forth resource management policies and guidance for U.S. military installations and requires the preparation of Integrated Natural Resource Management Plans (INRMP) for installations—such as Fort Huachuca—with significant natural resources. The Sikes Act provides that the "...Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations..." and that an INRMP is to be prepared to facilitate implementation of that program [16 U.S.C. 670a (a)(1)(A) and (B)]. The Act also specifies that: Consistent with the use of military installations to ensure the preparedness of the Armed Forces, the Secretaries of the military departments shall carry out [the aforementioned program] to provide for—(A) the conservation and rehabilitation of natural resources on military installations; (B) the sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping and non-consumptive uses; and (C) subject to safety requirements and military security, public access to [Fort Huachuca] to facilitate the use [16 U.S.C. 670a (a)(3)]. While Fort Huachuca's INRMP currently does not contain measures specifically addressing the jaguar, it may provide some benefits to the jaguar through measures designed for other species.

9. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES is an international agreement between governments to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The jaguar is listed under Appendix I, meaning it is considered one of the most endangered among CITES-listed animals and plants. Because Appendix I animals and plants are threatened with extinction, CITES prohibits international trade in specimens of these species (with some exceptions).

10. Other Listed Species

A number of species listed as threatened or endangered under the Act also occur within the rugged vegetated habitat used by the jaguar. As a result, the jaguar receives some

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collateral benefits in the area of habitat overlap. For example, Mexican spotted owls are sensitive to some disturbance activities within their home ranges, which means that restrictions on activities in these areas can also benefit the jaguar by limiting disturbance in areas of habitat overlap.

Federal Land Management

The following Federal agencies own and manage lands within some of the areas proposed as critical habitat. Their ongoing land management activities are considered part of the baseline because they will provide some benefits to the jaguar with or without critical habitat designation.

11. Department of Defense

The Department of Defense manages habitat for the jaguar on Fort Huachuca, located in Unit 3 and Subunit 4c. Fort Huachuca is home to the U.S. Army Intelligence Center and School, Network Enterprise Technology Command, Joint-services Unmanned Aerial Vehicle Program, Joint Interoperability Test Command, the Electronic Proving Ground, and the Intelligence and Electronic Warfare Test Directorate. The Fort specializes in research, development, testing, and evaluation of intelligence, electronic warfare, and information systems. Because jaguars require large open areas with minimal human disturbance, and most military maneuvers associated with the activities above do not involve permanent disturbance within jaguar habitat, some benefits should be provided to the jaguar by limiting human presence and disturbance within its habitat. Additionally, public activities on lands owned and managed by the Fort are limited, which also provides some benefits to the jaguar by minimizing human presence.

12. U.S. Bureau of Land Management

The Bureau of Land Management (BLM) manages habitat for the jaguar in Subunits 1a and 1b; Units 2 and 3; Subunits 4a, 4b, and 4c; and Unit 5. The mission of the BLM is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations. The BLM is responsible for the balanced management of public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based on the principles of multiple use and sustained yield, a combination of uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources. These resources include recreation; range; timber; minerals; watershed; fish and wildlife; designated wilderness and wilderness characteristics, and natural, scenic, scientific, and cultural values. While no conservation activities are specifically geared towards the jaguar, management activities that provide for open space should offer some benefits to the species by making available areas of habitat containing resources required by the species, while also minimizing permanent human impacts within jaguar habitat.

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13. U.S. Forest Service

The Forest Service manages habitat for the jaguar on the Coronado National Forest (CNF) in the Douglas, Nogales, and Sierra Vista Ranger Districts in Units 2 and 3; Subunits 4a, 4b, and 4c; and Unit 5. The current Land and Resource Management Plan for the CNF incorporates Standards and Guidelines that are positive for the long-term conservation and recovery of the jaguar, such as low total miles of roads and low road density throughout the forest, as well as the prohibition of cross-country travel in vehicles, all of which benefits the jaguar by minimizing human disturbance in remote areas. Additionally, the CNF currently considers the jaguar during section 7 consultations on forest lands south of Interstate 10 and is an active participant on the Jaguar Recovery Team. We expect that forest management activities the CNF conducts will continue to consider the needs of the jaguar into the future.

14. National Park Service (NPS)

The National Park Service manages habitat for the jaguar in Unit 3 on the Coronado National Memorial. Coronado National Memorial commemorates and interprets the significance of Francisco Vásquez de Coronado's expedition and the resulting cultural influences of 16th century Spanish colonial exploration in the Americas. While no conservation activities are specifically geared towards the jaguar, the purpose of the Memorial is to preserve and interpret the natural and human history of the area, which should provide some benefits to the jaguar by making available areas of open space containing resources required by the species, while also minimizing permanent human impacts within jaguar habitat.

15. U.S. Fish and Wildlife Service National Wildlife Refuges

The Buenos Aires National Wildlife Refuge (BANWR) manages habitat for the jaguar in Subunits 1a and 1b. The BANWR's approach to habitat management is the commitment to benefit a wide array of species, while focusing on a few key species and maximizing their habitat quality and/or quantity. While no conservation activities are specifically geared towards the jaguar, all actions should provide some benefits to the jaguar through maintenance of a healthy, diverse landscape that makes available resources required by the species, while also minimizing permanent human impacts within its habitat.

State Wildlife Laws

16. Arizona

The State of Arizona describes the jaguar as a "species of greatest conservation need" in AGFD's Wildlife Action Plan, and current penalties for unlawfully killing a jaguar are deferred to those that would apply through a violation of section 9 of the Act. However, increased penalties under State law for the unlawful killing of jaguars will apply in Arizona, if the jaguar is delisted.

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17. New Mexico

The State of New Mexico describes the jaguar as a “restricted species,” the definition of which is “any listed large exotic cat species or subspecies.” Therefore, the State of New Mexico does not currently consider the jaguar as part of its native fauna, and does not manage for the species.

Some Federal agencies and other project proponents that are likely to consult with the Service under section 7 without critical habitat

Federal agencies and projects that would likely go through the section 7 consultation process if no critical habitat is designated include the following:

1. Department of Defense (Fort Huachuca INRMP, facilities development and maintenance).
2. National Park Service (general management plans, fire management plans, border security infrastructure, recreation management, travel management).
3. Natural Resource Conservation Service (wildlife habitat improvements).
4. U.S. Army Corps of Engineers (bridge projects, stream restoration, vegetation management, urban development).
5. U.S. Bureau of Indian Affairs (renewable energy development, road projects, utility development and upgrades).
6. U.S. Bureau of Land Management (fire suppression, fuel-reduction treatments, land and resource management plans, livestock grazing and management plans, recreation, mining permits, nonnative invasive species treatments, and renewable energy development).
7. U.S. Department of Homeland Security (border security infrastructure and operations).
8. U.S. Department of Transportation (highway and bridge construction and maintenance).
9. U.S. Forest Service (fire management plans, fire suppression, fuel-reduction treatments, forest plans, livestock grazing allotment management plans, mining permits, travel management plans).
10. U.S. Fish and Wildlife Service (issuance of section 10 enhancement of survival permits, habitat conservation plans, and safe harbor agreements; National Wildlife Refuge planning; Partners for Fish and Wildlife program projects).

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Service administrative effort for section 7 consultations without critical habitat

From 1995 through mid-2012, we have completed four formal section 7 biological opinions (1997, 1999, 2007, and 2008) and approximately 82 informal consultations for the jaguar, all within Arizona, resulting in an average of five informal (range 1-12) and <1 formal (range 0-1) each year. All of these have addressed effects to more than one species, with the exception of the 1999 biological opinion that only addressed effects to the jaguar. We anticipate one formal consultation on effects to the jaguar (as well as other species) to be completed within 2012 for the proposed 5,000-acre Rosemont Mine. Additional mineral exploration activities are occurring in remote rugged areas that are resulting in informal consultation on effects to the jaguar, with more exploration activities planned for the future. Depending on the results of these explorations and the potential for future mining activities, both formal and informal section 7 consultations could occur to address effects to the jaguar.

What types of project modifications are currently recommended or will likely be recommended by the Service to avoid jeopardy (i.e., the continued existence of the species)?

For actions located on Federal lands, or subject to consultation through a Federal nexus or action (e.g. Federal funds), a jeopardy analysis for the jaguar would look at the magnitude of a project's impacts relevant to the population across the species' entire range. Furthermore, the jeopardy analysis would focus on effects to the species' reproduction, numbers, or distribution, including an analysis of habitat modifications that would limit the ability for transient individuals to move between Mexico and the United States, as well as within and among areas of suitable habitat in the United States. In addition to this, an adverse modification analysis would also focus on a project's impacts to the physical features (primary constituent elements, or PCEs), or other habitat characteristics in areas determined by the Secretary to be essential for the conservation of the species, and analyze impacts to the capability of the critical habitat unit to maintain its conservation role and function for the species.

To date, there have been no consultations that have resulted in a finding of jeopardy for the jaguar. The United States contains a small portion of the broad range of the species, which extends through Central America into South America. However, jaguar habitat within the United States is part of the Northwestern Recovery Unit, which is essential to the conservation of the species (see the 2012 Recovery Outline for the Jaguar); therefore, consideration of the spatial and biological dynamics that allow this unit to function contributes to the conservation of the species as a whole, and inhibiting its function could constitute jeopardy for the species. The role that jaguar habitat in the United States serves is to provide areas to support some transient individuals during dispersal movements by providing patches of habitat (perhaps in some cases with a few resident jaguars), and as areas for cyclic expansion and contraction of the nearest core area and breeding population in the Northwestern Recovery Unit.

It is possible the Service could reach a jeopardy opinion for the jaguar if all areas that are currently unfenced between Mexico and the United States were to be closed using impenetrable (i.e., pedestrian) fencing. In these situations, project modifications could include:

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- Building only vehicle fencing in these areas.
- Using technology-based applications (such as video surveillance) instead of fencing in these areas.
- Minimizing stable nighttime lighting.
- Minimizing vehicles and human presence in the area.

Our past non-jeopardy biological opinions have been issued for actions involving grazing, predator control, border fencing, and border-related tower upgrades and maintenance. Project modifications that have been recommended in these opinions include:

- Properly identifying animals during predator control activities to ensure jaguars were not subject to control actions.
- Employee and landowner education and outreach.
- Obtaining all appropriate permits (Federal, State, or other).
- Maintaining jaguar habitat in major riparian or xero-riparian corridors to prevent fragmentation or blocking of corridors.
- Investigating reports of jaguar observations.

Incremental Analysis

The following discussion describes the regulatory circumstances that are anticipated with critical habitat, as proposed, for the jaguar. Once critical habitat is designated, section 7 of the Endangered Species Act also requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat. The key factor related to the adverse modification is whether, with implementation of the proposed Federal action, the affected critical habitat will continue to have the capability to serve its intended conservation role for the species. From section 3(3) of the Endangered Species Act: "The terms "conserve," "conserving," and "conservation" means to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided under the Endangered Species Act are no longer necessary. Thus, designation of critical habitat helps ensure that proposed project actions will not result in the adverse modification of habitat to the point that the species will not be able achieve recovery, i.e. not able to be removed from the threatened or endangered species list.

What additional Federal agencies or project proponents are likely to consult with the Service under section 7 with designated critical habitat? What kinds of additional activities are likely to undergo consultation with critical habitat?

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The same 10 Federal agencies listed above under the baseline analysis are also anticipated to be the primary agencies that would consult with the Service under section 7 on jaguar critical habitat. We expect the following three scenarios may occur, as further described below: 1) any previously completed section 7 consultations for which project effects are ongoing or still occurring will need to reevaluate their impacts to the PCEs, and, in some cases, reinstate consultation if impacts to jaguar critical habitat were not sufficiently addressed; 2) new consultations will need to consider effects to critical habitat and individual PCEs from new actions occurring in remote, rugged areas, in particular those that potentially could result in severing connectivity within a critical habitat unit or subunit; and 3) some of the Federal agencies listed above, with responsibilities in unoccupied critical habitat subunits 1b, 4b, and 4c, will now consider consultation on jaguar critical habitat, whereas they would not have considered consulting on jaguars in the past due to occupancy status.

As a result of the jaguar critical habitat designation, Federal agencies will need to reevaluate ongoing projects and those that are not yet completed for their effects to PCEs, and, in some cases may need to reinstate previously completed section 7 consultations for actions that only addressed the jaguar under the jeopardy standard (due to its listing as an endangered species) in areas newly proposed as critical habitat. The administrative efforts required for any reevaluation and reinstatement of consultation due to the areas included in the proposed designation of critical habitat would be an incremental effect of the designation. Jaguars have been detected in Subunit 1a, Units 2 and 3, Subunit 4a, and Units 5 and 6 of proposed critical habitat at some point since they were listed, meaning that while these areas may have undergone some section 7 consultation for the jaguar, the fact they are now being proposed as critical habitat will require reevaluation of effects to PCEs for ongoing or not yet completed Federal actions, which then may require reinstating consultation. Of the approximately 82 informal consultations we have completed, we anticipate that perhaps 5-10 percent may be reinstated based on an analysis of the projects' effects to the PCEs (primarily due to increases in human disturbance). Of the four formal consultations we have completed in the past, we anticipate one may be reinstated for consultation based on adverse effects to PCEs.

Any new consultation efforts for proposed Federal actions within designated critical habitat will also require an analysis of their effects to the PCEs and whether or not these effects lead to destruction or adverse modification of critical habitat in the form of severing connectivity with Mexico or within a critical habitat unit. These new consultations would likely consider some effects to jaguar habitat in terms of maintaining connectivity to Mexico, whether or not critical habitat is designated. However, it is unlikely that these consultations would consider effects to all six PCEs; therefore, the administrative efforts to complete this analysis, both from the action agency's and Service's perspectives, would be an incremental effect of the designation. We are aware of one large-scale mining operation (Rosemont Mine) that is proposed in the Santa Rita Mountains in Unit 3, as well as mineral exploration activities in the Patagonia Mountains (also in Unit 3) that may result in future mining operations. Formal consultation on the Rosemont Mine regarding effects to the jaguar (as well as other species) is expected to be completed within the next year; other mining operations will depend on the results of mineral exploration activities. Consultation to determine effects to all six PCEs and potential adverse modification to critical habitat for all of these mining operations would be an incremental effect of the designation.

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Also, there could be additional section 7 consultations within proposed critical habitat subunits that were unoccupied at the time of listing (Subunits 1b, 4b, and 4c). These subunits provide connectivity between currently occupied units and Mexico. We anticipate that a Federal agency may consider consulting in these subunits specifically because of the critical habitat designation; therefore, these consultations would be an incremental effect of the critical habitat designation. We expect that major construction projects (such as new highways, significant widening of existing highways, or construction of large facilities) that could sever connectivity within these critical habitat subunits could constitute adverse modification. The most likely unoccupied subunits in which these activities may occur are 4b and 4c, although we are unaware of any proposed projects at this time.

How much administrative effort will the Service likely expend to address adverse modification in its section 7 consultations with critical habitat? Estimate the difference compared to the baseline and explain how you arrived at it.

We anticipate some increase in overall consultation workload and administrative efforts related to the designation of jaguar critical habitat, including: 1) the potential increase in consultations resulting from unoccupied areas being proposed as critical habitat; 2) reinitiation of consultations that may need to address adverse effects to critical habitat; and 3) the need to address adverse modification to critical habitat in occupied areas in which the jeopardy standard likely would not apply. We expect the majority of this workload will be to address adverse effects to critical habitat that do not constitute adverse modification, with a smaller portion requiring us to address adverse modification.

The amount of increased administrative effort due to proposed critical habitat is difficult to foresee and quantify. When we complete a consultation for the jaguar with critical habitat, each consultation will evaluate whether that project would result in adverse modification. As a result, each formal consultation that "may affect" critical habitat has to consider adverse modification. Activities that may adversely affect the PCEs, but not destroy or adversely modify critical habitat could include large-scale habitat clearing, the construction of facilities, or expansion of linear projects (such as power lines or pipelines) that reduce the amount of habitat available but that do not completely sever essential movement between the United States and Mexico or within a given critical habitat unit. We do not anticipate that any of the approximately 82 informal consultations we have completed, that may be reinitiated (perhaps 5-10 percent), would rise to the level of adverse modification. We also do not anticipate adverse modification would occur based on effects due to the one formal section 7 consultation on the jaguar that may be reinitiated.

In unoccupied subunits of critical habitat, we are unaware of planned projects that could sever connectivity within the unit (such as construction or expansion of a highway); although the chance remains that a project could be proposed that would need to be evaluated for its effects to critical habitat. However, the proposed Rosemont Mine in occupied critical habitat (Unit 3), as well as current mineral exploration activities that may result in future mining operations, could result in adverse modification of critical habitat if these projects are determined to sever connectivity to Mexico or within the critical habitat unit; therefore, administrative efforts would increase to address these possible adverse modification determinations.

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What project proponents are likely to pursue habitat conservation plans (HCPs) under section 10 after the designation of critical habitat?

As a result of this critical habitat revision, it is possible that private landowners or a collection of non-federal entities may pursue creation of a new HCP, or revision of an existing one, although as the majority of the land within the critical habitat designation is federally owned (65 percent), it seems unlikely that this would occur. The Malpai Borderlands Group has an existing HCP (as described in the baseline), which they may choose to modify to include the jaguar. However, the covered activities included in their HCP do not impact the jaguar; therefore, it seems unlikely they would choose to add the species to their HCP. Additionally, Pima County is currently in the process of developing a multi-species HCP, and may consider adding the jaguar to its list of covered species. However, this is unlikely because the Pima County-owned lands, where covered activities are likely to occur, are within unoccupied subunits, and they are not planning on implementing activities, or issuing permits for activities, that would sever connectivity in these areas.

What types of project modifications might the Service make during a section 7 consultation to avoid destruction or adverse modification of critical habitat that are different than those for avoiding jeopardy?

For occupied jaguar critical habitat, proposed actions that would adversely affect the PCEs in the units may or may not constitute jeopardy to the species, depending on the magnitude of the action. The United States contains only a small portion of the range of the jaguar, meaning that reaching a jeopardy opinion for the species is extremely unlikely to occur. The one scenario for which jeopardy to the species might be reached is if impenetrable fencing were to be built in all currently open areas along the entire U.S.-Mexico border in Arizona and New Mexico. This would render habitat in the United States inaccessible to jaguars and would, therefore, impact the ability of the Northwestern Recovery Unit to function and contribute towards recovery. Because this scenario is extremely unlikely to occur, it is difficult to determine the measures we would recommend to avoid jeopardy, except possibly for the four described previously, including: 1) building only vehicle fencing in these areas; 2) using technology-based applications (such as video surveillance) instead of fencing in these areas; 3) minimizing stable nighttime lighting; and 4) minimizing vehicles and human presence in these areas.

However, destruction or adverse modification of critical habitat could occur if the function of one or more critical habitat units is affected by, for example, the construction of impenetrable fencing across a portion of the currently open areas of vegetated, rugged terrain at the U.S.-Mexico border. This could create a situation in which a unit of critical habitat could become inaccessible to jaguars. The loss of one critical habitat unit would not constitute jeopardy to the species, but it could constitute destruction or adverse modification; therefore, any modifications we would recommend in these scenarios would be related to adverse modification of critical habitat, rather than jeopardy of the species.

Additionally, major road construction projects (such as new highways or significant widening of existing highways) or the construction of large facilities (such as large mining operations) could

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constitute adverse modification to jaguar critical habitat in both occupied and unoccupied subunits if connectivity within a critical habitat unit is severed. By themselves, these projects likely would not constitute jeopardy to the species, as connectivity between the United States and Mexico would still be available in other locations; however, if the conservation value of a critical habitat unit is compromised because of such projects, all modifications we recommend in these units and subunits would be related to adverse modification.

Projects that reduce the conservation value of critical habitat by severing connectivity to Mexico or within a critical habitat unit could require project modification to avoid destruction or adverse modification. Possible project modifications could include:

- Creating permeable highways by including wildlife crossings appropriate to jaguars in the project design.
- Re-vegetating and restoring areas of large-scale habitat removal to a condition such that it would provide the PCEs required by the jaguar.
- Modifying or eliminating the presence of stable nighttime lighting.
- Reducing the footprint of large facilities to the maximum extent practicable.
- Minimizing the amount or extent of human presence, vehicles, and/or traffic in a given area.
- Providing conservation measures to restore, enhance, and protect habitat within the critical habitat units.
- Offsetting permanent habitat loss, modification, or fragmentation resulting from agency actions with habitat that is permanently protected, including adequate funding to ensure the habitat is managed permanently for the protection of the species.
- Providing resources to assess the effects of the action on jaguar habitat connectivity and function.

Conclusion

In summary, the incremental effects of the designated critical habitat for the jaguar are likely to include: (1) an increased workload for action agencies and the Service to reevaluate and potentially conduct reintiated consultations for ongoing or not yet completed actions in newly designated areas; (2) completing new consultations for new projects occurring in occupied units and subunits where the Federal action agency may not have previously considered effects to all six PCEs; (3) completing new consultations for projects occurring in unoccupied subunits (1b, 4b, and 4c) where the Federal action agency would not have previously consulted on the species; and (4) possible project modifications to avoid adverse modification of critical habitat in areas where the conservation value of the unit could be compromised to such an extent that connectivity between the United States and Mexico, or within a critical habitat unit, is severed.

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We appreciate the opportunity to provide this information to you. If you have any questions or request clarification of any of the items described here, please contact Marit Alanen at (520) 670-6150 (x234) or Scott Richardson, (x242).

Sincerely,



for Steven L. Spangle
Field Supervisor

cc: Jean Calhoun, Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ

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