

1 Socioeconomics and Environmental Justice

2 Introduction

3 The analysis for social and economic concerns includes a discussion of current social and economic
4 data relevant to the proposed project, including population, housing, financial resources, facilities and
5 services, and quality of life; these elements are considered to help analyze potential impacts from the
6 proposed project to social and/or economic conditions. The connected actions listed in chapter 2 are
7 incorporated into the analysis of socioeconomic and environmental justice direct and indirect impacts
8 where they apply.

9 Changes from the Draft Environmental Impact Statement

10 A number of public concerns pertaining to this section were raised in comments on the DEIS. These
11 concerns pertained to the perceived inadequate analysis of the negative socioeconomic impacts of the
12 proposed project, including property values, amenity values, recreation and regional tourism, impacts
13 to the local astronomy industry, and impacts to environmental justice communities. In response to
14 these comments, the Coronado commissioned an economic research and consulting firm to review
15 and address these concerns in relation to the proposed project (BBC Research and Consulting 2013).
16 Information resulting from the BBC Research and Consulting review is described throughout the
17 document, in both “Affected Environment” (see “Recreation and Tourism”) and “Environmental
18 Consequences,” primarily under “Property Value,” “Recreation and Tourism,” and “Social Benefits of
19 Amenities on the Coronado National Forest.”

20 The Coronado also conducted an internal review of the economic model used in the DEIS.
21 The results of this internal review have been incorporated into this section (see “Analysis
22 Methodology, Assumptions, Uncertain and Unknown Information” in this resource section). Also,
23 numerical data throughout this section have been updated whenever appropriate, based on more
24 recent U.S. Census (Census) numbers and current economic conditions. The analysis of impacts to
25 socioeconomic and environmental justice issues has been updated based primarily on the information
26 from this work. To this end, two new issue factors have been added:

- 27 • Quantitative assessment of economic effect on the astronomy industry has been added to
28 “Issue 11A: Regional Socioeconomics;” and
- 29 • Quantitative assessment of economic effect on amenity-based relocation has been added to
30 “Issue 11B: Rural Landscapes.”

31 The analysis area for social and economic resources has been changed. The DEIS used a 50-mile
32 radius from the mine site as the analysis area. The 50-mile radius extended into five counties (Santa
33 Cruz, Pima, Cochise, Pinal, and Graham). However, only 1 percent of the 50-mile buffer extends into
34 Graham County, and 0.5 percent extends into Pinal County. Additionally, no major towns or places
35 are located within the portions of these two counties that extend into the 50-mile buffer analysis area.
36 Therefore, Graham and Pinal Counties are not included in the FEIS analysis. Since measuring and
37 comparing socioeconomic impacts is more effectively done using complete city and county data, the
38 analysis area was changed to all of Pima, Cochise, and Santa Cruz Counties, rather than limiting it to
39 a 50-mile radius (see “Social and Economic Issues” and figure 111 in this resource section).

1 **Issues, Cause and Effect Relationships of Concern**

2 Residents in the region have expressed concern that development of an open-pit copper mine could
3 impact property values, impact economic activity related to local tourism industry, and change area
4 quality of life and the sense of place currently derived from the Coronado National Forest and
5 recreation opportunities on area public lands. Other concerns expressed include adequacy of the local
6 housing supply for a potential influx of mine and construction workers and financial pressure on local
7 jurisdictions as a result of changes in infrastructure needs (e.g., roads, schools, fire, police) related to
8 mining employment in-migration.

9 One significant issue with two subissues was identified during public scoping concerning
10 socioeconomics and environmental justice.

11 **Issue 11: Impacts on Social and Economic Resources**

12 Mine operation could have both negative and positive socioeconomic impacts that could change over
13 time. The socioeconomic stability of the area could be affected. Residents', business owners', and
14 visitors' expectations of national forests and the historic rural landscape may not be met.

15 ***Issue 11A: Regional Socioeconomics***

16 The mine facilities and operation may result in changes over time to local employment, property
17 values, tax base, tourism revenue, and demand and cost for road maintenance and emergency
18 services. There may be costs to the alternative elements and mitigation measures that influence the
19 present net value of the mine operations and, thus, its economic profile.

20 **Issue 11A Factors for Alternative Comparison**

- 21 1. Change in employment over time
- 22 2. Change in property values over time
- 23 3. Change in tax base per year over time
- 24 4. Change in demand and cost for State road maintenance over time
- 25 5. Change in demand and cost for emergency services over time
- 26 6. Quantitative assessment of change in tourism and recreation revenue over time
- 27 7. Qualitative assessment of economic effect on the astronomy industry

28 ***Issue 11B: Rural Landscapes***

29 The mine operation may not conform to the quality of life expectations as expressed by the forest plan
30 and Federal, State, and local regulations and ordinances. Commenters expressed concerns about
31 modification of rural historic landscapes and local ranching traditions, which are important to local
32 residents and visitors. Commenters also expressed a need to assess impacts on quality of life,
33 including the economic nature of these rural landscapes.

34 **Issue 11B Factors for Alternative Comparison**

- 35 1. Qualitative assessment of the ability to meet rural landscape expectations as expressed by
36 Federal, State, and local plans
- 37 2. Quantitative assessment of economic effects on amenity-based relocation

1 **Other Effects Considered**

2 While not raised as a major issue during scoping, the following concern has also been analyzed in
3 order to provide a complete analysis of socioeconomic impacts and comply with Federal policy:

- 4 • Environmental Justice: impacts to populations protected by Title VI of the Civil Rights Act.

5 **Analysis Methodology, Assumptions,** 6 **Uncertain and Unknown Information**

7 Information in this section was obtained from various sources, including the following:
8 the U.S. Census Bureau, the State of Arizona: Regional Economic Models Incorporated (REMI);
9 Impact Analysis for Planning (IMPLAN); and the Sonoran Institute Economic Profile System
10 database, which uses different sources of information, such as Bureau of Economic Analysis, Bureau
11 of Labor Statistics, and State of Arizona data.

12 The 2010 Census is available for select demographic information and has been incorporated where
13 available. Where it is not available, other Census reports have been used. The different models that
14 were used to estimate potential impacts to employment, employment compensation, and economic
15 output were conducted at different times; thus, the data used reflect modeling that was done between
16 2008 and 2012. In an effort to incorporate all of the modeling results, a range of potential impacts is
17 provided for each economic indicator.

18 The three phases of activity associated with the mine for which socioeconomic impacts can actually
19 be measured encompass premining, active mining, and final reclamation and closure. Impacts to the
20 region after final reclamation and closure would not be estimated, as estimating social and economic
21 impacts beyond this period to which no specific activity is associated is too speculative. Thus, as data
22 are available, the temporal bounds of analysis extends from the present until final closure and
23 reclamation of the mine.

24 **Social and Economic Issues**

25 The analysis for socioeconomic effects evaluates the social and economic effects, both positive and
26 negative, of the premining, active mining, and closure and final reclamation phases of the project.

27 The economic effects of the proposed project, both beneficial and adverse, have been the subject of
28 several reports produced at different times by different parties for different purposes. All of these
29 reports are considered for this analysis in order to provide a range of economic viewpoints. These
30 primary reports made available are as follows:

- 31 • “Economic Impacts of the Rosemont Copper Project on Pima County, Arizona” (Applied
32 Economics 2011). This report was commissioned by Rosemont Copper and the Tucson
33 Regional Economic Opportunities for the purpose of performing an economic impact analysis
34 of the construction and operations in Pima County. Specifically evaluated were the economic
35 impacts that the mine would create through its direct operations, local supplier purchases, and
36 employee spending. The potential impacts of the mine on the value of public lands, the
37 tourism industry, air and water quality, wildlife habitat, astronomical observation conditions,
38 and recreational and cultural resources were not addressed in this report.
- 39 • “Analysis of Economic Costs of the Proposed Rosemont Copper Project” (Power 2010). This
40 report was commissioned by the Mountain Empire Action Alliance for the purpose of

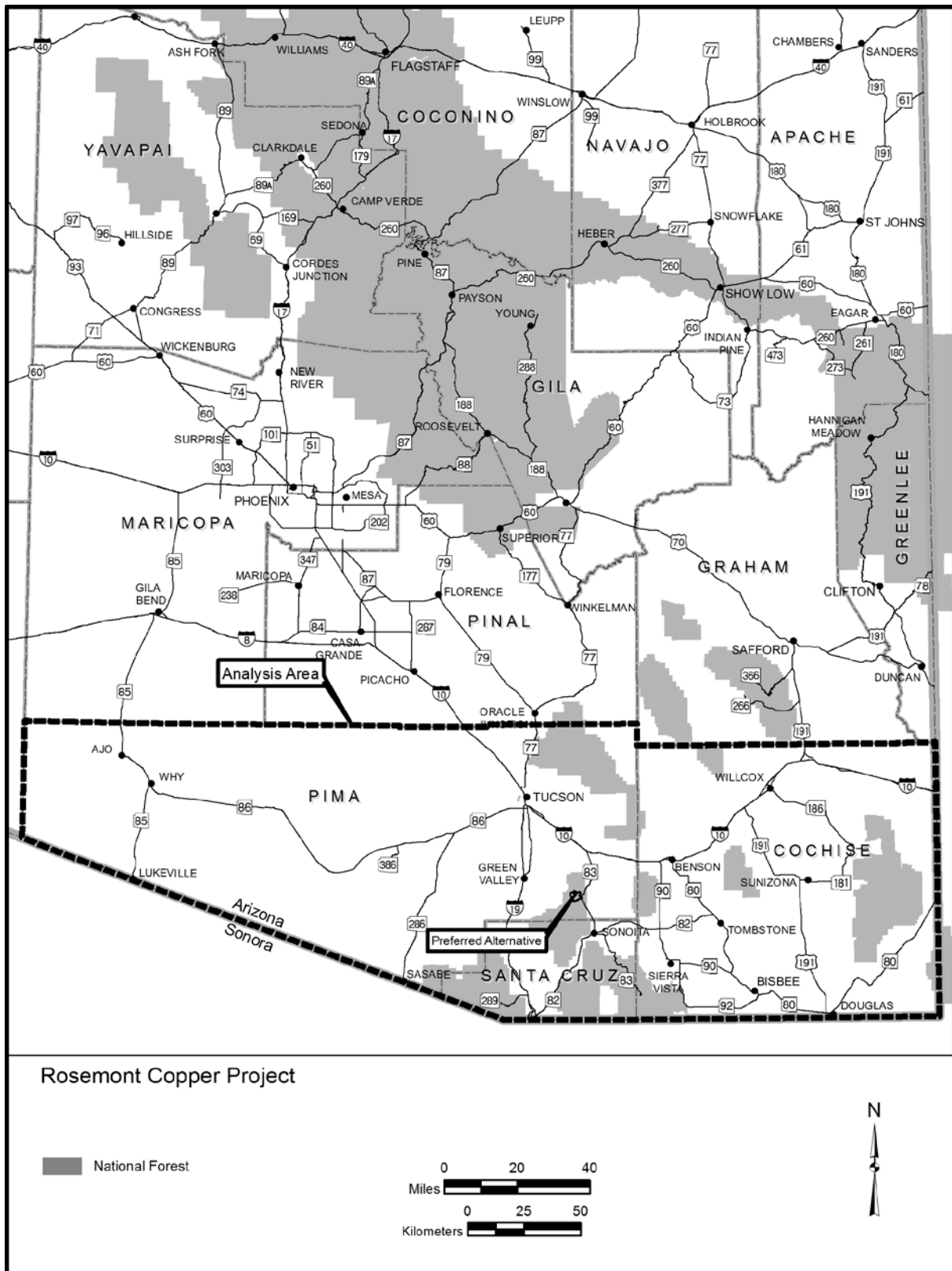
1 conducting an independent study of the economic impacts, specifically addressing the
2 adverse economic impacts the proposed mine would pose to local businesses, the regional
3 economy, and quality of life.

- 4 • “Additional Socioeconomic Evaluations, Rosemont Copper Project Environmental Impact
5 Statement” (BBC Research and Consulting 2013). This report was commissioned by the
6 Coronado to focus on four specific socioeconomic issues: potential impacts of the proposed
7 mine on regional tourism and the tourism related economy; residential and business location
8 decisions (“amenity-based migration”); nearby property values; and the astronomy industry
9 in the area. This report focuses on impacts in the greater Tucson area (Pima, Santa Cruz, and
10 Cochise Counties). Therefore, it provides a broader overview of potential impacts in the
11 region.
- 12 • “Mining’s Potential Economic Impacts in the Santa Rita and Patagonia Mountains Region of
13 Southeastern Arizona” (Marlow 2007). This report was commissioned by the group Save the
14 Scenic Santa Ritas. This report focuses solely on the direct economic impacts associated with
15 the project; indirect impacts are not considered in the report because the authors believe there
16 is a high level of uncertainty with respect to indirect and induced economic effects calculated
17 using input-output models at the county and subcounty level.
- 18 • “Comparison of Economic Impact Results for the Proposed Rosemont Copper Mine” (Gebert
19 n.d. [2011]). This report was prepared internally by the Coronado in response to public
20 concerns over the estimated economic impacts expressed in a study by Applied Economics
21 (2011). The additional analysis was meant to provide an increased understanding of the
22 impacts published in the DEIS.

23 The analysis area for socioeconomics includes the communities most likely to be affected by the
24 proposed project. The geographic boundaries that form the area for socioeconomic analysis have been
25 identified as Pima, Santa Cruz, and Cochise Counties (see figure 111). This area of analysis was
26 selected based on various factors that may influence the location and magnitude of potential
27 socioeconomic impacts, including the following:

- 28 • Communities that may experience direct and/or indirect economic impacts as a result of
29 the proposed mine, either as a result of construction, operation, or closures (e.g., from
30 employment, wages and taxes, changes in tourism, etc.);
- 31 • Anticipated changes in population as a result of in- and out-migration resulting from mine
32 operation and/or employment;
- 33 • The availability and location of existing housing and potential housing and the capacity and
34 condition of existing local services and facilities; and
- 35 • Changes in quality of life for area residents and visitors, including changes in recreation
36 opportunities.

37 This discussion describes the social and economic conditions of these three counties in southern
38 Arizona and, when appropriate data are available, communities near the project area that may be
39 impacted by the project.



1

2 **Figure 111. Analysis area for socioeconomics**

1 The temporal bounds of analysis for analyzing socioeconomics is the life of the mine, and it is guided
2 in part by available data, an assessment of current conditions (without the proposed mine or
3 associated activity), and the phases of activity associated with the proposed mine, including
4 premining, active mining, and closure and final reclamation.

5 The following analysis focuses on the potential effects on socioeconomics. Social and economic
6 impacts are quantified where possible. However, where quantification of impacts is not possible,
7 the analysis includes a qualitative discussion of possible effects. Impacts to social and economic
8 conditions would result from the implementation of any of the action alternatives.

9 The technical reports relied upon for the socioeconomic analysis use slightly different numbers for
10 the different phases of the mine life from the other sections in this FEIS (see below). The mine life is
11 divided into three major phases: premining, active mining, and final reclamation/closure. The other
12 sections of this FEIS apply the following lengths of time to each of these phases: 18 to 24 months for
13 premining, 20 to 25 years for active mining, and 3 years for final reclamation/closure. For the
14 socioeconomic analysis, the lengths of time for each of these phases are as follows: 3 to 4 years for
15 premining, 21 years for active mining, and 3 years for final reclamation/closure.

16 The following assumptions were used for the various technical reports relied upon for the analysis:

- 17 • All dollar figures in this analysis are stated in terms of 2012 dollars unless otherwise noted.
- 18 • Engineering and construction would occur over an approximately 3- to 4-year period, of
19 which 18 to 24 months would involve mine construction during the premining phase.
- 20 • Production during the active mining phase would take place over 21 years. Where estimated,
21 reclamation and closure activities were assumed to be 3 years long.

22 Engineering is a phase that is not reflected in discussions of mine life found elsewhere in this FEIS.
23 Unlike other resource sections, in which resource impacts occur only when ground is disturbed,
24 economic impacts can occur beforehand as well. The engineering phase predates the premining phase
25 by 6 to 18 months and overlaps with the 18- to 24-month premining phase. Other than this difference,
26 the time frames used in the socioeconomic section are consistent with the time frames used elsewhere
27 in the FEIS.

28 **Summary of Effects by Issue Factor by Alternative**

29 The following table summarizes effects by the issue factors (described below) and by alternative
30 (table 205). A full discussion of the effects summarized below can be found in the “Environmental
31 Consequences” part of this resource section.

32

1 Table 205. Summary of effects

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield -McCleary
Issue 11A.1: Change in employment over time	No change from the proposed mine. Changes in employment are expected to be consistent with current and projected trends.	Regional increase in employment: Premining phase Pima County – 594 direct jobs and 443 indirect jobs per year; Three-county analysis area – 768 direct and 453 indirect jobs per year. Active mining and reclamation/closure Pima County – 434 direct jobs and 1,260 indirect jobs per year; Three-county analysis area – 434 direct jobs and 512 indirect jobs per year.	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action
Issue 11A.2: Change in property values over time	No change from the proposed mine. Changes in property values are expected to be consistent with current and projected trends.	Potential decrease in area property values between 4 and 11% within 5 miles of the project area. Potential impacts include more than \$6.4 million in losses to property values.	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action
Issue 11A.3: Change in tax base per year over time	No change from the proposed mine. Changes in tax base are expected to be consistent with current and projected trends.	Regional increase in tax base. \$11 million in construction sales tax during construction. Total direct local and State revenues over the life of the mine are estimated at \$136.7 million.	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action
Issue 11A.4: Change in demand and cost for State road maintenance over time	No change from the proposed mine. Changes in demand and costs for State road maintenance are expected to be consistent with current and projected trends.	Increase in funding needs during operation phase of mine. Partially offset by increased tax dollars from more fuel consumption by heavy trucks.	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action

Chapter 3. Affected Environment and Environmental Consequences

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield -McCleary
Issue 11A.5: Change in demand and cost for emergency services over time	No change from the proposed mine. Changes in demand and cost for emergency services are expected to be consistent with current and projected trends.	Potential change in population is not expected to result in dramatic demands on public services and emergency services costs. However, the increase in overall traffic could lead to more accidents and an increase in demand for emergency services over time.	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action
Issue 11A.6: Quantitative assessment of change in tourism and recreation revenue over time	No change from the proposed mine. Changes in tourism revenue are expected to be consistent with current and projected trends.	Direct effects on nature-based tourism in the greater Tucson area are expected to include an estimated \$1.1 million to \$3.8 million reduction in visitor spending per year. Indirect effects in the greater Tucson area are expected to include an estimated \$511,000 to \$1.7 million reduction in output per year. Estimated 15 to 50% decrease in nature-based tourism from 0 to 10 miles from proposed mine per year.	Direct effects: \$1.0 to \$3.6 million reduction in visitor spending per year. Indirect effects: \$472,600 to \$1.6 million reduction in output per year. 15 to 50% decrease in nature-based tourism from 0 to 10 miles from proposed mine per year.	Direct effects: \$1.4 to \$4.7 million reduction in visitor spending per year. Indirect effects: \$621,900 to \$2.1 million reduction in output per year. 15 to 50% decrease in nature-based tourism from 0 to 10 miles from proposed mine per year.	Direct effects: \$1.6 to \$5.4 million reduction in visitor spending per year. Indirect effects: \$721,500 to \$2.4 million reduction in output per year. 15 to 50% decrease in nature-based tourism from 0 to 10 miles from proposed mine per year.	Direct effects: \$1.6 to \$5.5 million reduction in visitor spending per year. Indirect effects: \$731,400 to \$2.4 million reduction in output per year. 15 to 50% decrease in nature-based tourism from 0 to 10 miles from proposed mine per year.

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield-McCleary
<p>Issue 11A.7: Qualitative assessment of economic effect on the astronomy industry</p>	<p>No change from the proposed mine. Changes in astronomy industry are expected to be consistent with current and projected trends.</p>	<p>Adverse impacts on dark skies could result in an impairment of observatories near the project area, which could result in a decrease in State revenues generated from astronomy, space, and planetary research and tourism. Although the increase in night sky illumination is not expected to be significant, the negative public perception of having a copper mine next to an observatory may impact observatory revenues.</p>	<p>Same as for proposed action</p>	<p>Same as for proposed action</p>	<p>Same as for proposed action</p>	<p>Same as for proposed action</p>
<p>Issue 11B.1: Qualitative assessment of the ability of alternatives to meet rural landscape expectations as expressed by Federal, State, and local plans</p>	<p>No change from the proposed mine, but projected population growth is expected to cause a slow degradation in quality of life by putting additional pressures on the rural landscape and natural amenities of the region.</p>	<p>Potential degradation of area quality of life resulting from altered landscapes.</p>	<p>Same as for proposed action</p>	<p>Same as for proposed action</p>	<p>Same as for proposed action</p>	<p>Same as for proposed action</p>

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield -McCleary
Issue 11B.2: Quantitative assessment of economic effects on amenity-based relocation	No change from mine construction or operation. Rates of amenity migration are expected to continue consistent with current and projected trends.	0.08% decrease in net migration to Santa Cruz County as a percentage of county population. 6 to 33% decrease in the rate of population growth in the Patagonia Census County Division (CCD). However, the decrease in amenity-based migration may be offset by the increase in mine staff relocation. Impacts on amenity migration in Pima County and the greater Tucson area are expected to be negligible owing to the more dynamic nature of the metropolitan economy.	Same as for proposed action	Same as for proposed action, except for a 0.09% decrease in net migration to Santa Cruz County as a percentage of county population, and a 6 to 37% decrease in the rate of population growth in Patagonia CCD.	Same as Barrel Alternative	Same as for proposed action, except for a 0.09% decrease in net migration to Santa Cruz County as a percentage of county population, and a 6 to 38% decrease in the rate of population growth in Patagonia CCD.
Other Effects Considered						
Environmental Justice: Impacts to populations protected by Title VI of the Civil Rights Act	No change (therefore no effect)	Possible disproportionate effects on the Tohono O’odham Nation, as well as on the other consulting tribes, with regard to disturbance to cultural resources.	Same as for proposed action	Same as for proposed action	Same as for proposed action	Same as for proposed action

1 **Affected Environment**
 2 **Relevant Laws, Regulations, Policies, and Plans**
 3 Major legislation, mandates, and guidance directing the evaluation of social and economic impacts as
 4 a result of projects on public lands includes Executive Order 12898, “Federal Actions to Address
 5 Environmental Justice in Minority Populations and Low Income Populations” (1994). See the
 6 “General Management Direction for Environmental Justice on the Coronado National Forest” part of
 7 this resource section for a full discussion of this executive order.

8 ***General Management Direction for***
 9 ***Socioeconomics on the Coronado National Forest***

10 One of the purposes of the forest plan is to be responsive “to changing conditions of land and other
 11 resources and to changing social and economic demands of the American people” (U.S. Forest
 12 Service 1986). Forest Service guidelines for socioeconomic analyses are outlined in the Forest

1 Service “Economic and Social Analysis Handbook” (U.S. Forest Service n.d. [1985]). The handbook
 2 provides guidelines to be used to evaluate socioeconomic impacts that may result from policy,
 3 program, plan, or project decisions on Forest Service lands. FSM 1970.1 directs how economic and
 4 social analyses should be conducted to aid Forest Service decisionmaking.

5 **General Management Direction for**
 6 **Environmental Justice on the Coronado National Forest**

7 Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations
 8 and Low Income Populations,” was signed by President Clinton in 1994. The executive order requires
 9 agencies to advance environmental justice by pursuing fair treatment and meaningful involvement of
 10 minority and low-income populations. Fair treatment means that such groups should not bear a
 11 disproportionately high share of negative environmental consequences from Federal programs,
 12 policies, decisions, or operations. Meaningful involvement means that Federal officials actively
 13 promote opportunities for public participation and that Federal decisions can be materially affected by
 14 participating groups and individuals.

15 **Existing Conditions**

16 The project area is located in southern Pima County, Arizona. Pima County covers approximately
 17 9,184 square miles and includes Federal, State, private, and tribal lands. The Pascua Yaqui and
 18 Tohono O’odham Reservations account for 42.1 percent of the county lands, State of Arizona lands
 19 account for 14.9 percent, Forest Service and BLM lands combined account for 12.1 percent, other
 20 public lands account for 17.1 percent, and the remaining 13.8 percent of lands are private, or
 21 corporate, property (Arizona Department of Commerce 2009b).

22 **Population and Demographics**

23 The following section includes a summary of the total population count, population growth
 24 projections, population densities, migration statistics, gender distribution, and age distribution within
 25 the analysis area.

26 **Arizona**

27 The State of Arizona experienced rapid growth between 1990 and 2010. Between 1990 and 2000, the
 28 population increased by almost 40 percent; and between 2000 and 2010, it increased by an additional
 29 24.6 percent. Arizona is projected to grow by another 50 percent by 2025 (U.S. Census Bureau 2005).
 30 Arizona has an average population density of 56 persons per square mile (U.S. Census Bureau
 31 2012a). Table 206 presents historical, current, and projected population for jurisdictions within the
 32 analysis area.

33 **Pima County**

34 The population of Pima County was 843,746 in 2000, up from 666,957 (26.5 percent) in 1990
 35 (U.S. Census Bureau 2012a). The population of Pima County continued to increase between 2000 and
 36 2010 to 980,263 (a 16.2 percent increase) (U.S. Census Bureau 2012a). Pima County is expected to
 37 have a population of 1,172,515 by 2025, a 19.6 percent increase from 2010, according to the Arizona
 38 Department of Administration (2012b). In 2010, Pima County had a population density of 106.8
 39 persons per square mile and a median age of 37.7 years, compared with a median age of 35.9 years
 40 for the State (U.S. Census Bureau 2000c, 2012a, 2012b).

1 The fastest growing cities from 2000 to 2010 for which data are available in Pima County were
2 Sahuarita (a 679.1 percent increase) and Marana (a 157.9 percent increase). The largest city in 2010
3 was Tucson/South Tucson, with a population of 520,116. Sahuarita, which had a population of 25,259
4 in 2010, is within approximately 15 miles of the proposed mine. Green Valley is also close to the
5 proposed mine (about 15 miles west) and had a population of 21,391 in 2010 (U.S. Census Bureau
6 2012a). The city of Sahuarita had a median age of 34.4 years, while Tucson had a median age of 33
7 years, compared with the State median age of 35.9 years (U.S. Census Bureau 2012b). Other selected
8 age characteristics of the communities within the analysis area are summarized in table 207.

9
10 **Santa Cruz County**

11 The population of Santa Cruz County was 38,381 in 2000, up from 29,885 (29.3 percent) in 1990
12 (U.S. Census Bureau 2012a). The population of Santa Cruz County continued to increase between
13 2000 and 2010, from 38,381 to 47,420 (a 23.5 percent increase) (U.S. Census Bureau 2012a). Santa
14 Cruz County is expected to have a population of 60,080 by 2025, a 26.7 percent increase from 2010,
15 according to the Arizona Department of Administration (2012d). In 2010, Santa Cruz County had a
16 population density of 38.3 persons per square mile and a median age of 35.6 years, compared with a
17 State median age of 35.9 years (U.S. Census Bureau 2012a; 2012b). The fastest growing cities from
18 2000 to 2010 in Santa Cruz County were Rio Rico (82.1 percent), Elgin (47.8 percent), and Tubac
19 (25.5 percent). Rio Rico and Tubac are two of the larger cities in Santa Cruz County that are near the
20 proposed mine site. In 2010, Rio Rico had a population of 18,962; Elgin's population was 161; and
21 Tubac's population was 1,191. Sonoita had a population of 818 in 2010.

22 The largest city in Santa Cruz County in 2010 was Nogales, with a population of 20,837. Sonoita and
23 Elgin are the two communities in the county that are closest to the proposed project (approximately
24 10 miles). There are, however, scattered homesites and unincorporated areas located closer to the
25 proposed project. Sonoita had a median age of 56.8 years in 2010, while Elgin had a median age of
26 52.7, compared with the State median age of 35.9 years. Other cities in the county include Tubac,
27 which had a median age of 62.5 years in 2010, while Rio Rico had a median age of 31.3 years
28 (U.S. Census Bureau 2012a; 2012b). Other selected age characteristics of the communities within the
29 analysis area are summarized in table 207.

30 **Cochise County**

31 The population of Cochise County was 117,755 in 2000, up from 97,624 (20.6 percent) in 1990
32 (U.S. Census Bureau 2012a). The population of Cochise County continued to increase between 2000
33 and 2010 from 117,755 to 131,346 (an 11.5 percent increase) (U.S. Census Bureau 2012a). Cochise
34 County is expected to have a population of 150,247 by 2025, a 14.4 percent increase from 2010,
35 according to the Arizona Department of Administration (2012c). In 2010, Cochise County had a
36 population density of 21.1 persons per square mile and a median age of 39.7 years, compared with a
37 median age of 35.9 years for the State (U.S. Census Bureau 2012a; 2012b).

38 Sierra Vista was the largest city in the county in 2010, with a population of 43,888. No cities in
39 Cochise County are within 20 miles of the proposed project. There are, however, scattered homesites
40 and unincorporated areas that have been developed closer to the proposed project. The city of Sierra
41 Vista has a median age of 33.1 years, which is somewhat lower than the State median age of 35.9
42 years (U.S. Census Bureau 2012a; 2012b). Other selected age characteristics of the communities
43 within the analysis area are summarized in table 204.

Table 206. Comparative historical and projected populations for the analysis area and the United States

Location	1990 Population*	2000 Population*	2010 [†] Population*	1990 to 2000 Percent Change	2000 to 2010 Percent Change	2015 Projected Population	2020 Projected Population	2025 Projected Population	2010 to 2025 Percent Change
United States*	248,709,873	281,421,906	308,745,538	13.2	9.7	322,365,000	341,387,000	357,452,000	15.7
Arizona	3,665,228	5,130,632	6,392,017	40.0	24.6	6,777,534	7,485,163	8,168,354	27.8
Counties									
Cochise	97,624	117,755	131,346	20.6	11.5	134,166	142,398	150,247	14.4
Pima	666,957	843,746	980,263	26.5	16.2	1,022,079	1,100,021	1,172,515	19.6
Santa Cruz	29,885	38,381	47,420	29.3	23.5	50,903	55,708	60,080	26.7
Communities									
Benson	3,824	4,711	5,105	23.2	8.3	4,795	4,818	4,838	-5.2
Casas Adobes	NA	54,011	66,795	NA	19.1	NA	NA	NA	NA
Catalina	4,864	7,025	7,569	44.4	7.7	NA	NA	NA	NA
Catalina Foothills	NA	53,794	50,796	NA	-5.6	NA	NA	NA	NA
Corona de Tucson	NA	813	5,675	NA	598	NA	NA	NA	NA
Drexel Heights	NA	23,849	27,749	NA	16.4	NA	NA	NA	NA
Elgin	NA	309	161	NA	47.8	558	636	705	337.8
Green Valley	13,231	17,283	21,391	30.6	23.7	NA	NA	NA	NA
Huachuca	1,782	1,751	1,853	1.7	5.8	1,981	2,043	2,098	13.2
Marana	2,187	13,556	34,961	519.8	157.9	60,809	72,915	82,252	135.2
Nogales	19,489	20,878	20,837	7.1	7.1	23,858	24,783	25,617	22.9
Oro Valley	6,670	29,700	41,011	345.3	38.1	50,222	54,134	57,493	40.1
Pascua Yaqui Reservation (Pima County)	2,412	3,315	3,484	4.4	5.1	NA	NA	NA	NA
Patagonia	888	881	913	4.3	3.6	1,003	1,041	1,075	17.7
Rio Rico	NA	10,413	18,962	NA	82.1	23,301	27,303	30,908	62.9
Sahuarita	NA	3,242	25,259	NA	679.1	57,367	71,479	78,754	211.7
Sierra Vista	32,983	37,775	43,888	14.5	16.2	55,010	59,674	63,720	45.1
Sonoita	NA	826	818	NA	-0.09	1,314	1,465	1,601	95.7
St. David	1,468	1,744	1,882	18.8	NA	2,028	2,104	2,171	15.4
Three Points	NA	5,273	5,581	NA	5.8	NA	NA	NA	NA

Location	1990 Population*	2000 Population*	2010† Population*	1990 to 2000 Percent Change	2000 to 2010 Percent Change	2015 Projected Population	2020 Projected Population	2025 Projected Population	2010 to 2025 Percent Change
Tohono O'odham Reservation (Pima County)	NA	9,545	9,059	NA	-5.0	NA	NA	NA	NA
Tubac	NA	949	1,191	NA	25.5	1,301	1,411	1,509	26.7
Tucson/South Tucson	410,483	492,189	520,116	19.9	5.7	602,329	630,414	654,539	26.2
Tucson Estates	2,662	9,755	12,192	265.2	24.9	NA	NA	NA	NA
Vail	NA	2,484	10,208	NA	31.1	NA	NA	NA	NA
Whetstone	1,289	2,354	2,617	5.0	11.1	3,449	3,746	4,003	52.9

Note:

NA: Data not available.

* Arizona Department of Administration (2012b).

† U.S. Census Bureau (2000d; 2010i; 2012b).

Table 207. Selected age, household, and housing characteristics, 2010

	Median Age	Age 65 Years and over	Percent Female	Percent Male	Number of Households	Average Household Size	Number of Housing Units	Number of Vacant Housing Units	Housing Vacancy Rate	Median Home Value
Arizona	35.9	13.8%	50.3%	49.7%	2,380,990	2.63	2,844,526	463,536	16.3%	\$215,000
Pima County	37.7	15.4%	50.9%	49.1%	388,660	2.46	440,909	52,249	11.9%	\$190,500
Santa Cruz County	35.6	13.1%	52.4%	47.6%	15,437	3.05	18,010	2,573	14.3%	\$156,400
Cochise County	39.7	17.3%	49.0%	51.0%	50,865	2.46	59,041	8,176	13.8%	\$157,300
Sahuarita	34.4	14.7%	51.2%	48.8%	9,020	2.79	10,615	1,595	15.0%	\$249,700
Sierra Vista	33.1	14.6%	49.1%	50.9%	17,059	2.39	18,742	1,683	9.0%	\$207,000
Tucson	33.0	11.9%	50.5%	49.5%	205,390	2.43	229,762	24,372	10.6%	\$171,200
South Tucson	32.1	10.8%	47.5%	52.5%	1,827	2.93	2,137	310	14.5%	\$90,000
Rio Rico	31.3	7.6%	51.1%	48.9%	5,625	3.37	6,356	731	11.5%	\$155,600
Tubac	62.5	42.5%	52.4%	47.6%	630	1.89	1,067	437	41.0%	\$361,100
Elgin	52.7	14.3%	48.1%	51.9%	69	2.33	85	16	18.8%	\$283,300
Sonoita	56.8	32.3%	50.4%	49.6%	379	2.16	462	83	18.0%	\$343,500

Sources: U.S. Census Bureau (2010h; 2012b).

1 **Housing**

2 The following sections characterize the existing condition of housing, property values, and property
3 values as they relate to forest resources in the analysis area based on U.S. Census Bureau data.

4 ***Pima County***

5 In 2010 Pima County had 440,909 housing units, of which 52,468 (11.9 percent) units were vacant
6 (U.S. Census Bureau 2012b). The median home value in 2010 was \$198,300 (U.S. Census Bureau
7 2010h).

8 As of 2010, the cities of Tucson and South Tucson had a total of 231,899 housing units, with 24,682
9 (10.6 percent) vacant (U.S. Census Bureau 2012b). Tucson's median home value in 2010 was
10 \$171,200, which was below the county median value. South Tucson's median home value was less
11 than one-half of the county's, at \$90,000 (U.S. Census Bureau 2010h).

12 Sahuarita had 10,615 total housing units in 2010; of these, 1,595 (15 percent) were vacant.
13 The median home price in 2010 was \$249,700, more than 20 percent above the county median value
14 (U.S. Census Bureau 2010h, 2012b).

15 ***Santa Cruz County***

16 In 2010, Santa Cruz County had 18,010 housing units, with 2,575 units (14.3 percent) vacant (U.S.
17 Census Bureau 2012b). The median home value in 2010 was \$148,200 (U.S. Census Bureau 2010c).
18 As of 2010, Rio Rico had 6,356 housing units, with 731 (11.5 percent) of them vacant (U.S. Census
19 Bureau 2012b). The median home value in 2010 was \$155,600, slightly higher than the county
20 median (U.S. Census Bureau 2010h). The communities of Tubac, Elgin, and Sonoita had 1,067, 85,
21 and 462 housing units, respectively, with vacancy rates of 41.0, 18.8, and 18.0 percent, respectively
22 (U.S. Census Bureau 2012b). The median home value in 2010 for Elgin was \$283,300. The median
23 home value in 2010 for Sonoita was \$343,500. The U.S. Census Bureau does not have a median home
24 value for Tubac in 2010, but it is estimated that 50 percent of homes in Tubac were valued between
25 \$300,000 and \$999,999 (U.S. Census Bureau 2010h).

26 ***Cochise County***

27 In 2010, Cochise County had 59,041 housing units, of which 8,176 (13.8 percent) units were vacant
28 (U.S. Census Bureau 2012b). The median home value in 2010 was \$154,900 (U.S. Census Bureau
29 2010h). As of 2010, the city of Sierra Vista had a total of 18,742 housing units, of which 1,683 units
30 (9.0 percent) were vacant (U.S. Census Bureau 2012b). The median home value in 2010 was
31 \$207,000 (U.S. Census Bureau 2010h).

32 **Property Values**

33 Based on 2000 and 2010 U.S. Census Bureau (2000b; 2010h) data, the average median property value
34 of owner-occupied units in the three-county analysis area was \$99,167 in 2000 and \$167,133 in 2010;
35 there was an increase of 68.5 percent over the 10-year period. In 2000 and 2010, the median property
36 value of owner-occupied units was below the State and national averages. Cochise County
37 experienced the most significant increase (75.6 percent) in the median property value of owner-
38 occupied housing.

In terms of owner-occupied units, there was a 50.9 percent increase in the number of units in the three-county area between 2000 and 2010, compared with a 52.3 percent increase in Arizona and a 36.8 percent national increase. Housing growth during this period was substantial and on track with overall growth in the State. Cochise County experienced the most significant change (an increase of 80.4 percent) in the number of owner-occupied housing units. Table 208 summarizes the number of owner-occupied housing units and median property values in the analysis area for the years 2000 and 2010.

The average full-cash value is used to identify property values for all parcels of land within buffers of 0.5, 1, 2, 5, and 10 miles of the footprint of the project area. The average value of the 115 parcels of land in the 0.5-mile buffer is \$199,663; the average value of 163 parcels of land within 1 mile is \$232,645; the average value of 333 parcels within 2 miles is \$205,476; and the average value of 1,048 parcels within 5 miles is \$212,730. The number of parcels of land owned by the Federal Government, Rosemont Copper, the State of Arizona, and other private entities is summarized in table 209. Within 0.5 and 1 mile, 99.13 and 91.41 percent, respectively, of the parcels of land are owned by Rosemont Copper or the Federal Government (the Coronado). However, within 10 miles, less than 5 percent of properties are owned by Rosemont Copper or the Federal Government (see table 209).

Table 208. Number of owner-occupied housing units and median property values for the analysis area

Location	2000 No. of Owner-Occupied Housing Units	2000 Median Value	2010 No. of Owner-Occupied Housing Units	2010 Median Value	2000 to 2010 No. of Units Percent Change	2000 to 2010 Value Percent Change
Cochise	19,237	\$88,200	34,711	\$154,900	80.4%	75.6%
Pima	169,297	\$114,600	248,970	\$198,300	47.1%	73.0%
Santa Cruz	6,420	\$94,700	10,428	\$148,200	62.4%	56.5%
Arizona	1,032,103	\$121,300	1,571,687	\$215,000	52.3%	77.2%
United States	55,212,108	\$119,600	75,557,656	\$188,400	36.8%	57.5%

Sources: U.S. Census Bureau (2000a; 2010d; 2010g; 2010h; 2012b).

Note: No. = Number.

Table 209. Summary of property values within 10 miles of the project area

Distance from Project Area (miles)	No. of Parcels	Average Value*	No. of Parcels Owned by Rosemont Copper	No. of Parcels Owned by Federal Government	No. of Parcels Owned by the State of Arizona	No. of Parcels Privately Owned (other than Rosemont Copper)
0.5	115	\$199,663	81	33	0	1
1	163	\$232,645	98	51	1	13
2	333	\$205,476	159	99	10	65
5	1,046	\$212,730	183	226	60	579
10	10,593	\$178,112	183	296	226	9,888

Note: No. = Number.

* Value based on assessor data provided on February 8, 2010.

1 **Property Value and Forest Resources**

2 As discussed later in the “Social Benefits of Amenities on the Coronado National Forest” part of this
 3 resource section, environmental amenities associated with the Coronado National Forest contribute to
 4 the region’s identity, as well as area quality of life. Specific to this discussion, these same amenity
 5 characteristics, along with a variety of other characteristics (location, area land and housing prices,
 6 area wages, number of bedrooms, bathrooms, etc.), can also influence where people live (migration)
 7 and property values (Hand et al. 2008b).

8 Research by Hand et al. (2008b) indicates that “people make regional housing and labor market
 9 decisions based in part on the availability of forest resources, as well as other environmental
 10 measures.” That is, population movement and migration into environmentally desirable areas, like the
 11 analysis area, can be explained by the presence of, and density of, forest resources and associated
 12 environmental amenities. Additionally, in the Southwest, housing prices are higher based on overall
 13 proximity and access to forest resources: “forest area in a household’s own geographic area is
 14 associated with higher housing prices” (Hand et al. 2008b).

15 Although research indicates that proximity to forest resources and the density of those resources can
 16 influence where people choose to live and how much people are willing to pay for housing, the
 17 specific characteristics of the forest amenities that are influential are unknown. As Hand et al. (2008a)
 18 ask, “Is it open space, recreation opportunities, or wildlife habitat that is attractive to people, of which
 19 forest area may simply be a proxy? Or is it the higher altitudes and varied topography associated with
 20 many forest areas in the Southwest that are important?”

21 Whatever the specific characteristics are, analysis of property values in the environmental
 22 consequences discussion later in this section assumes that people value proximity to the forest and its
 23 resources and that the existence of an open-pit copper mine could result in negative impacts on values
 24 to neighboring properties.

25 **Employment**

26 Both labor force and employment increased throughout the analysis area between 2000 and 2011
 27 (table 210). Labor force statistics reflect employment by residence, unlike employment by sector
 28 statistics, which reflect employment by work location. Arizona’s labor force increased by 21 percent
 29 between 2000 and 2011, while Pima County’s labor force increased by 13.8 percent, Cochise
 30 County’s by 26.4 percent, and Santa Cruz County’s by 24.8 percent in the same period.

31 **Table 210. Labor force summary, 2000 and 2011**

Location	2000 Labor Force	2011 Labor Force	2000 Employed	2011 Employed	2000 Unemployed	2011 Unemployed	2000 Unemployment Rate (Percent)	2011 Unemployment Rate (Percent)
Arizona	2,505,306	3,049,049	2,404,916	2,761,984	100,390	287,066	4.0	9.4
Pima County	409,019	465,613	393,716	426,406	15,303	39,207	3.7	8.4
Santa Cruz County	14,735	18,390	13,508	15,238	1,227	3,152	8.3	17.1
Cochise County	48,557	61,397	46,353	55,992	2,204	5,405	4.5	8.8

32 Source: Arizona Department of Administration (2013).

1 The unemployment rate for Pima and Cochise Counties was very similar to the rate for the State as a
 2 whole, but Santa Cruz County had a much higher unemployment rate than the State for both years
 3 identified.

4 Table 211 summarizes major employers in the analysis area by county. Government provides the
 5 greatest share of employment in Pima County, with six of the 12 largest employers. Raytheon and
 6 Wal Mart represent the largest private sector employers in Pima County. Cochise and Santa Cruz
 7 Counties also have a large number of government employers, including Homeland Security/U.S.
 8 Border Patrol, the U.S. military (Fort Huachuca), and school districts.

9 **Table 211. Major employers by county, 2008**

Employer	Sector
Pima County	
Raytheon Missile Systems	Technology
University of Arizona	Education
State of Arizona	Government
Davis Monthan Air Force Base	Government
Tucson Unified School District	Education
Wal Mart Stores	Trade
Pima County	Government
Freeport-McMoRan Copper and Gold	Mining
City of Tucson	Government
Carondolet Health Network	Health Services
Tohono O’odham Nation	Government
Santa Cruz County	
Canchola Foods Company	Retail
Carondolet Holy Cross Hospital	Health Services
Immigration and Naturalization Service, Nogales	Government
City of Nogales	Government
District 35 Public Schools, Tubac	Education
Nogales Unified School District	Education
Santa Cruz County	Government
Wal Mart, Nogales	Trade
United Musical Instruments, Nogales	Manufacturing
U.S. Customs Service, Nogales	Government
Cochise County	
Fort Huachuca	Government
Sierra Vista School District	Education
Cochise County	Government
Sierra Vista Regional Health Center	Health Services
Arizona Department of Corrections, Douglas	Government
Aegis, Sierra Vista	Customer Support Center
Douglas Unified School District	Education
Douglas Border Patrol Station	Government
City of Sierra Vista	Government
Walmart, Douglas/Sierra Vista	Trade

10 Sources: Arizona Daily Star (2010); Arizona Department of Commerce (2009a; 2009b; 2009c).

1 **Pima County**

2 In 2010, State and local government was the largest employment sector in Pima County, at
3 13 percent, as shown in table 212. Retail trade accounted for 10 percent of total employment in the
4 county, with health care and social assistance at 13 percent. The fastest growing employment sectors
5 between 2001 and 2010 were finance and insurance (67 percent increase), educational services (60
6 percent increase), Federal civilian government (45 percent increase), and health care and social
7 assistance (39 percent increase).

8 **Santa Cruz County**

9 In terms of employment by industry in 2010, retail trade accounted for 16 percent of county
10 employment, while State and local government represented 13 percent; these two sectors provided the
11 greatest share of employment in Santa Cruz County. Government as a whole represented 22 percent
12 of all employment in the county. The fastest growing employment sectors between 2001 and 2010
13 were finance and insurance (134 percent increase), information (84 percent increase), Federal civilian
14 government (49 percent increase), educational services (45 percent increase), and real estate
15 (34 percent increase).

16 **Cochise County**

17 In 2010, government as a whole was the largest employment sector in Cochise County, at
18 30.9 percent, as shown in table 212. Military was at 9.6 percent, which reflects the presence of Fort
19 Huachuca. Retail trade (at 10.6 percent) and State and local government (at 11.9 percent) are the other
20 sectors with employment greater than 10 percent of the total for the county. Cochise County is the
21 only one of the three counties in the analysis area that had an increase in farm employment from 2001
22 to 2010. It was also a significant increase, at 9 percent, compared with losses in the other two counties
23 and the State as a whole. The fastest growing employment sectors between 2001 and 2010 were
24 management of companies and enterprises (248 percent increase); mining (210 percent increase);
25 educational services (149 percent increase); professional, scientific, and technical services (98 percent
26 increase); and finance and insurance (50 percent increase).

27 **Mine Related Employment**

28 In terms of employment by industry in 2010, mining accounted for 16,919 jobs in Arizona, 3,031 in
29 Pima County, and 239 in Cochise County. Between 2000 and 2010, mining related employment
30 increased by 31 percent for Arizona, by 21 percent for Pima County, and by 214 percent for Cochise
31 County. Mining accounted for less than 1 percent of total employment for the three counties analyzed.

32 **Tourism and Recreation Related Employment**

33 The Travel Management Economic Contribution Application data, which are produced by the Forest
34 Service, estimate the local and regional economic contribution of expenditures associated with current
35 levels of recreation activity on national forest roads and trails. The National Visitor Use Monitoring
36 survey generates use and expenditure data by recreation activity; this information allows for the
37 estimation of the local economic contribution of different types of recreation activities, based on
38 whether the recreationists stayed for 1 day or overnight. The Travel Management Economic
39 Contribution Application organizes and analyzes information from the National Visitor Use
40 Monitoring survey, as well as from Minnesota IMPLAN Group.

41

1 **Table 212. Employment by industry, 2001 and 2010**

Total Employment by Industry	2001 (Arizona)	2010 (Arizona)	Percent Change (Arizona)	Percent of 2010 Total (Arizona)	2001 (Pima County)	2010 (Pima County)	Percent Change (Pima County)	Percent of 2010 Total (Pima County)	2001 (Santa Cruz County)	2010 (Santa Cruz County)	Percent Change (Santa Cruz County)	Percent of 2010 Total (Santa Cruz County)	2001 (Cochise County)	2010 (Cochise County)	Percent Change (Cochise County)	Percent of 2010 Total (Cochise County)
Total employment	2,823,452	3,201,494	13%	–	439,795	481,183	9%	–	15,731	17,955	14%	–	51,397	58,618	14%	–
Farm employment	22,274	26,355	18%	1%	1,192	1,073	–10%	0%	242	193	–20%	1%	1,997	2,170	9%	4%
Nonfarm employment	2,801,178	3,175,139	13%	99%	438,603	480,110	9%	100%	15,489	17,762	15%	99%	49,400	56,448	14%	96%
Private employment	2,403,969	2,726,457	13%	85%	357,822	394,195	10%	82%	12,166	13,780	13%	77%	32,661	38,320	17%	65%
Forestry, fishing	18,058	15,312	–15%	0%	410	417	2%	0%	(D)	(D)	NA	NA	(D)	(D)	NA	NA
Mining	12,852	16,919	32%	1%	2,484	3,031	22%	1%	(D)	(D)	NA	NA	77	239	210%	0%
Utilities	11,230	12,467	11%	0%	1,565	2,107	35%	0%	60	(D)	NA	NA	502	562	12%	1%
Construction	213,716	161,883	–24%	5%	28,870	22,643	–23%	5%	691	530	–23%	3%	2,982	2,484	–17%	4%
Manufacturing	210,741	160,984	–24%	5%	34,793	26,296	–24%	5%	977	613	–37%	3%	1,156	892	–23%	2%
Wholesale trade	104,906	109,258	4%	3%	8,610	9,852	14%	2%	1,689	1,807	7%	10%	615	687	12%	1%
Retail trade	323,264	358,012	11%	11%	48,079	50,320	5%	10%	2,477	2,927	18%	16%	6,077	6,223	2%	11%
Transportation and warehousing	81,053	88,241	9%	3%	8,838	9,305	5%	2%	1,329	(D)	NA	NA	844	907	7%	2%
Information	62,224	47,421	–24%	1%	9,249	6,060	–34%	1%	104	191	84%	1%	622	785	26%	1%
Finance and insurance	150,846	205,327	36%	6%	14,340	23,914	67%	5%	249	583	134%	3%	971	1,458	50%	2%
Real estate and rental and leasing	121,833	189,512	56%	6%	19,110	24,896	30%	5%	622	832	34%	5%	(D)	(D)	NA	NA
Professional, scientific, and technical services	164,395	205,234	25%	6%	26,089	33,422	28%	7%	480	(D)	NA	NA	2,556	5,054	98%	9%
Management of companies and enterprises	22,944	31,002	35%	1%	2,834	3,135	11%	1%	(D)	(D)	NA	NA	124	432	248%	1%
Administrative and waste services	233,782	253,264	8%	8%	31,711	34,673	9%	7%	(D)	1029	NA	6%	2,300	2,730	19%	5%
Educational services	31,963	66,694	109%	2%	4,737	7,577	60%	2%	94	136	45%	1%	296	736	149%	1%
Health care and social assistance	227,925	339,562	49%	11%	45,216	62,789	39%	13%	637	784	23%	4%	4,096	4,788	17%	8%
Arts, entertainment, and recreation	53,279	67,329	26%	2%	10,466	11,172	7%	2%	240	206	–14%	1%	737	908	23%	2%
Accommodation and food services	212,938	237,074	11%	7%	34,828	36,089	4%	8%	1,160	1,225	6%	7%	3,913	4,174	7%	7%
Other services, except public administration	146,020	160,962	10%	5%	25,593	26,497	4%	6%	791	755	–5%	4%	3,055	2,863	–1%	5%
Government and government enterprises	397,209	448,682	12%	14%	80,781	85,915	6%	18%	3,323	3,982	20%	22%	16,739	18,128	8%	31%
Federal civilian	47,034	60,007	12%	2%	8,823	12,754	45%	3%	1,068	1,596	49%	9%	4,238	5,553	31%	9%
Military	33,032	34,887	–36%	1%	7,810	8,654	11%	2%	88	103	17%	1%	5,610	5,613	0%	10%
State and local	317,143	353,788	31%	11%	64,148	64,507	1%	13%	2,167	2,283	5%	13%	6,891	6,962	1%	12%

2 Source: Bureau of Economic Analysis (n.d. [2012]).

3 Notes:

4 (D) = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

5 NA = Data not available.

6

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2

1 According to the Travel Management Economic Contribution Application (U.S. Forest Service 2009),
 2 area employment (employment in Pima, Santa Cruz, and Cochise Counties) totals 538,376. Modeling
 3 done for the Travel Management Economic Contribution Application estimates that recreation on the
 4 Coronado National Forest is responsible for approximately 0.15 percent (or 799 jobs) of area
 5 employment. Table 213 shows the contribution to the local economy, by industry, from the Coronado
 6 National Forest. Although recreation activities specific to the Coronado National Forest contribute to
 7 the local economy in terms of employment, they do not account for substantial employment numbers
 8 in the three-county analysis area.

9 **Table 213. Current role of the Coronado National Forest’s recreation related contributions to**
 10 **the area economy (employment and labor income)**

Industry	Area Totals* Employment (jobs)	Forest Service Related Employment (jobs)	Area Totals Labor Income (millions of dollars)	Forest Service Related Labor Income (millions of dollars)
Agriculture	2,936	7	\$67	\$0.180
Mining	2,359	1	\$294	\$0.086
Utilities	2,659	1	\$262	\$0.130
Construction	34,100	4	\$1,598	\$0.194
Manufacturing	25,256	20	\$2,114	\$0.948
Wholesale trade	13,010	48	\$737	\$2.726
Transportation and warehousing	61,385	22	\$1,821	\$0.855
Retail trade	11,350	67	\$530	\$1.914
Information	10,172	7	\$504	\$0.278
Finance and insurance	19,913	8	\$859	\$0.401
Real estate and rental and leasing	19,450	12	\$569	\$0.354
Professional, scientific, and tech services	36,942	17	\$2,385	\$0.972
Management of companies	3,145	4	\$159	\$0.204
Administration, waste management, and remedial services	35,705	44	\$1,014	\$1.956
Educational services	6,186	8	\$169	\$0.242
Health care and social assistance	61,628	35	\$2,776	\$1.597
Arts, entertainment, and recreation	9,554	196	\$183	\$4.004
Accommodation and food services	40,215	244	\$785	\$4.899
Other services	31,053	30	\$733	\$0.849
Government	111,356	23	\$7,133	\$1.304
Total	538,376	799	\$24,691	\$24.092
Forest Service as Percentage of Total	-	0.15%		0.10%

11 * These numbers differ slightly from total county employment described in table 209. The Travel Management Economic
 12 Contribution Application uses Minnesota IMPLAN Group data to calculate employment, which is based on Covered
 13 Employment and Wages (formerly known as ES202) data, Regional Economic Information System, and County Business
 14 Patterns; no one data set provides enough information to create a complete Minnesota IMPLAN Group database.

1 **Income Characteristics**

2 ***Pima County***

3 As shown in table 214, the median household income for Pima County of \$45,521 was 9.8 percent
4 lower than the State's median household income of \$50,448 in 2010. Tucson and South Tucson were
5 below the median household income of the county, and Sahuarita was well above the county figure.

6 ***Santa Cruz County***

7 Per capita income for Santa Cruz County was \$16,209 in 2010. As shown in table 214, the median
8 household income for Santa Cruz County of \$36,519 was 27.6 percent lower than the State's median
9 household income of \$50,448.

10 Tubac, Rio Rico, Elgin, and Sonoita were well above the median household income of the county in
11 2010. This would indicate that households scattered outside those urban areas would have relatively
12 lower median household incomes.

13 ***Cochise County***

14 Per capita income for Cochise County was \$23,010 in 2010. As shown in table 214, the median
15 household income for Cochise County of \$44,876 in 2010 was 11 percent lower than the State's
16 median household income of \$50,448. Sierra Vista was somewhat higher than the county median
17 household income.

18 **Table 214. Personal and household income characteristics, 2010**

Location	Per Capita Personal Income	Median Household Income	Median Family Income	Mean Retirement Income
Arizona	\$25,680	\$50,448	\$59,840	\$22,890
Pima County	\$25,063	\$45,521	\$57,377	23,886
Tucson	\$20,243	\$37,025	\$47,348	\$19,591
South Tucson	\$8,761	\$18,830	\$21,053	\$9,872
Sahuarita Town	\$28,962	\$73,827	\$79,085	\$27,565
Green Valley CDP	\$34,643	\$44,558	\$57,612	\$29,423
Santa Cruz County	\$16,209	\$36,519	\$40,933	\$25,152
Rio Rico CDP*	\$15,436	\$43,805	\$44,379	\$24,987
Tubac CDP*	\$40,397	\$63,471	\$90,163	\$56,088
Elgin CDP*	\$34,959	\$69,197	\$69,167	NA
Cochise County	\$23,010	\$44,876	\$53,077	\$24,339
Sierra Vista City	\$27,341	\$54,059	\$62,101	\$25,024
Sonoita CDP*	\$29,990	\$61,250	\$65,402	\$23,982

19 Source: U.S. Census Bureau (2010e).

20 Notes:

21 CDP = Census-designated place.

22 NA = not available.

23 ***Recreation Related Labor Income***

24 According to the Travel Management Economic Contribution Application, area labor income totals
25 \$24.7 billion. In terms of recreation contributions to the area economy, approximately 0.10 percent

(or \$24.1 million) of labor income in Pima, Santa Cruz, and Cochise Counties is directly attributable to recreation activities on the Coronado National Forest (see table 213) (U.S. Forest Service 2009). In terms of Coronado National Forest related recreation, labor income contributions to area employment are not substantial at the county level.

Economic Output by Industry

The following profile uses data compiled by Minnesota IMPLAN Group (Version 3.0), from sources such as the Bureau of Economic Analysis, U.S. Census Bureau, and Bureau of Labor Statistics (Applied Economics 2011; Gebert n.d. [2011]).

Industry output for the analysis area is characterized by the value of industry production. These are annual production estimates (in producer prices) for the year of the data set. For manufacturers, this would be sales ± change in inventory; for service sectors, production equals sales; and for retail and wholesale trade, output equals gross profit margin and not gross sales. Economic output is presented in 2008 dollar terms and rounded to the nearest thousand.

Tables 215, 216, and 217 present a summary of the top 20 industry sectors (shaded in gray) that contribute to the economic output of each county. In 2008, the largest contributors to output in Pima County included missile and space vehicle manufacturing (6.76 percent of the county total) and real estate establishments such as brokers, agents, realtors, etc. (4.63 percent). The largest contributors to output in Santa Cruz County included wholesale trade businesses (17.29 percent of the county total) and real estate establishments (3.73 percent). The largest contributors to output in Cochise County included electric power generation (3.82 percent of the county total) and computer programming services (2.76 percent). Only Pima County included mining (copper, nickel, lead, and/or zinc) in the top 20 industries for the county.

Table 215. Industry output in 2008 for Pima County—top 20 industries in county

Industry	Pima County	Three-County Total	Percentage of Three-County Total
Guided missile and space vehicle manufacturing	\$3,865,522,432	\$3,865,522,432	100%
Real estate establishments	\$2,650,526,464	\$2,815,569,792	94.1%
Offices of physicians, dentists, and other health practitioners	\$1,852,135,680	\$1,990,390,884	93.1%
Food services and drinking places	\$1,662,258,560	\$1,869,266,148	88.9%
Wholesale trade businesses	\$1,619,845,632	\$2,019,530,200	80.2%
Private hospitals	\$1,599,200,384	\$1,742,038,992	91.8%
Mining copper, nickel, lead, and zinc	\$1,291,225,856	\$1,331,081,256	97.0%
Construction of new nonresidential commercial and health care structures	\$1,281,559,424	\$1,431,663,026	89.5%
Securities, commodity contracts, investments, and related activities	\$1,116,370,176	\$1,128,074,627	99.0%
Architectural, engineering, and related services	\$944,738,752	\$1,001,354,364	94.3%
Construction of new residential permanent site single- and multi-family structures	\$765,629,312	\$853,922,227	89.7%
Electric power generation, transmission, and distribution	\$774,964,416	\$1,018,403,847	76.1%
Monetary authorities and depository credit intermediation activities	\$750,676,032	\$813,684,814	92.3%
Construction of other new nonresidential structures	\$730,151,488	\$815,763,292	89.5%

Industry	Pima County	Three-County Total	Percentage of Three-County Total
Medical and diagnostic labs and outpatient and other ambulatory care services	\$712,055,104	\$780,239,246	91.3%
Semiconductor and related device manufacturing	\$704,470,336	\$704,470,336	100%
Retail stores – food and beverage	\$676,453,056	\$787,194,996	85.9%
Software publishers	\$628,325,312	\$637,670,479	98.5%
Business support services	\$566,655,552	\$665,754,510	85.1%
Retail stores – motor vehicle and parts	\$552,308,864	\$619,244,202	89.2%
Telecommunications	\$458,066,688	\$640,157,240	71.6%
Retail stores – general merchandise	\$453,992,544	\$592,406,280	76.6%
Other state and local government enterprises	\$451,660,896	\$611,786,792	73.8%
Hotels and motels, including casino hotels	\$414,977,920	\$463,835,774	89.5%
Management, scientific, and technical consulting services	\$411,560,288	\$536,656,654	76.7%
Aircraft manufacturing	\$391,535,936	\$460,328,600	85.1%
Transport by truck	\$334,022,464	\$403,073,254	82.9%
Custom computer programming services	\$280,961,952	\$458,732,430	61.2%
Retail stores – building material and garden supply	\$257,752,928	\$313,888,200	82.1%
Retail stores – clothing and clothing accessories	\$207,584,592	\$253,353,276	81.9%
Retail stores – gasoline stations	\$198,992,272	\$307,995,476	64.6%
Automotive equipment rental and leasing	\$179,215,344	\$239,775,924	74.7%
Ready-mix concrete manufacturing	\$144,748,976	\$214,014,207	67.6%
Scenic and sightseeing transportation and support activities for transportation	\$118,395,064	\$158,216,661	74.8%
Cable and other subscription programming	\$64,255,768	\$98,832,356	65.0%
Warehousing and storage	\$15,616,372	\$37,162,294	42.0%
Fertilizer manufacturing	\$0	\$84,356,872	0%
County Total	\$57,198,691,255	\$65,432,467,993	

1 Source: Minnesota IMPLAN Group (2008).

2 Note: Shaded sectors rank in the top 20 for the county.

3 **Table 216. Industry output in 2008 for Santa Cruz County—top 20 industries in county**

Industry	Santa Cruz County	Three-County Total	Percentage of Three-County Total
Wholesale trade businesses	\$332,643,424	\$2,019,530,200	16.5%
Other state and local government enterprises	\$82,035,888	\$611,786,792	13.4%
Real estate establishments	\$71,774,256	\$2,815,569,792	2.5%
Retail stores – general merchandise	\$55,298,328	\$592,406,280	9.3%
Food services and drinking places	\$44,028,292	\$1,869,266,148	2.4%
Retail stores – food and beverage	\$36,846,116	\$787,194,996	4.7%
Transport by truck	\$36,788,632	\$403,073,254	9.1%
Cable and other subscription programming	\$34,576,588	\$98,832,356	35.0%
Automotive equipment rental and leasing	\$33,981,548	\$239,775,924	14.2%
Retail stores – clothing and clothing accessories	\$25,941,616	\$253,353,276	10.2%
Construction of new nonresidential commercial and health care structures	\$25,809,554	\$1,431,663,026	1.8%
Scenic and sightseeing transportation and support activities for transportation	\$25,286,994	\$158,216,661	16.0%

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Industry	Santa Cruz County	Three-County Total	Percentage of Three-County Total
Offices of physicians, dentists, and other health practitioners	\$25,776,444	\$1,990,390,884	1.3%
Retail stores – gasoline stations	\$24,463,052	\$307,995,476	7.9%
Management, scientific, and technical consulting services	\$21,309,406	\$536,656,654	4.0%
Hotels and motels, including casino hotels	\$21,128,012	\$463,835,774	4.6%
Monetary authorities and depository credit intermediation activities	\$20,862,966	\$813,684,814	2.6%
Retail stores – building material and garden supply	\$20,489,232	\$313,888,200	6.5%
Warehousing and storage	\$19,148,372	\$37,162,294	51.5%
Retail stores – motor vehicle and parts	\$18,479,166	\$619,244,202	3.0%
Business support services	\$18,060,294	\$665,754,510	2.7%
Construction of new residential permanent site single- and multi-family structures	\$15,515,803	\$853,922,227	1.8%
Construction of other new nonresidential structures	\$14,592,972	\$815,763,292	1.8%
Telecommunications	\$13,838,104	\$640,157,240	2.2%
Securities, commodity contracts, investments, and related activities	\$6,434,259	\$1,128,074,627	0.6%
Medical and diagnostic labs and outpatient and other ambulatory care services	\$6,200,458	\$780,239,246	0.8%
Architectural, engineering, and related services	\$4,019,868	\$1,001,354,364	0.4%
Custom computer programming services	\$3,890,366	\$458,732,430	0.8%
Ready-mix concrete manufacturing	\$2,526,719	\$214,014,207	1.2%
Electric power generation, transmission, and distribution	\$2,371,847	\$1,018,403,847	0.2%
Mining copper, nickel, lead, and zinc	\$0	\$1,331,081,256	0%
Fertilizer manufacturing	\$0	\$84,356,872	0%
Semiconductor and related device manufacturing	\$0	\$704,470,336	0%
Aircraft manufacturing	\$0	\$460,328,600	0%
Guided missile and space vehicle manufacturing	\$0	\$3,865,522,432	0%
Software publishers	\$0	\$637,670,479	0%
Private hospitals	\$0	\$1,742,038,992	0%
County Total	\$1,924,342,608	\$65,432,467,993	

1 Source: Minnesota IMPLAN Group (2008).

2 Note: Shaded sectors rank in the top 20 for the county.

3 **Table 217. Industry output in 2008 for Cochise County—top 20 industries in county**

Industry	Cochise County	Three-County Total	Percentage of Three-County Total
Electric power generation, transmission, and distribution	\$241,067,584	\$1,018,403,847	23.7%
Custom computer programming services	\$173,880,112	\$458,732,430	37.9%
Telecommunications	\$168,252,448	\$640,157,240	26.3%
Food services and drinking places	\$162,979,296	\$1,869,266,148	8.7%
Private hospitals	\$142,838,608	\$1,742,038,992	8.2%
Construction of new nonresidential commercial and health care structures	\$124,294,048	\$1,431,663,026	8.7%

Industry	Cochise County	Three-County Total	Percentage of Three-County Total
Offices of physicians, dentists, and other health practitioners	\$112,478,760	\$1,990,390,884	5.7%
Management, scientific, and technical consulting services	\$103,786,960	\$536,656,654	19.3%
Real estate establishments	\$93,269,072	\$2,815,569,792	3.3%
Retail stores – gasoline stations	\$84,540,152	\$307,995,476	27.4%
Fertilizer manufacturing	\$84,356,872	\$84,356,872	100%
Retail stores – general merchandise	\$83,115,408	\$592,406,280	14.0%
Business support services	\$81,038,664	\$665,754,510	12.2%
Other state and local government enterprises	\$78,090,008	\$611,786,792	12.8%
Retail stores – food and beverage	\$73,895,824	\$787,194,996	9.4%
Construction of new residential permanent site single- and multi-family structures	\$72,777,112	\$853,922,227	8.5%
Construction of other new nonresidential structures	\$71,018,832	\$815,763,292	8.7%
Aircraft manufacturing	\$68,792,664	\$460,328,600	14.9%
Wholesale trade businesses	\$67,041,144	\$2,019,530,200	3.3%
Ready-mix concrete manufacturing	\$66,738,512	\$214,014,207	31.2%
Medical and diagnostic labs and outpatient and other ambulatory care services	\$61,983,684	\$780,239,246	7.9%
Architectural, engineering, and related services	\$52,595,744	\$1,001,354,364	5.3%
Retail stores – motor vehicle and parts	\$48,456,172	\$619,244,202	7.8%
Monetary authorities and depository credit intermediation activities	\$42,145,816	\$813,684,814	5.2%
Mining copper, nickel, lead, and zinc	\$39,855,400	\$1,331,081,256	3.0%
Retail stores – building material and garden supply	\$35,646,040	\$313,888,200	11.4%
Transport by truck	\$32,262,158	\$403,073,254	8.0%
Hotels and motels, including casino hotels	\$27,729,842	\$463,835,774	6.0%
Automotive equipment rental and leasing	\$26,579,032	\$239,775,924	11.1%
Retail stores – clothing and clothing accessories	\$19,827,068	\$253,353,276	7.8%
Scenic and sightseeing transportation and support activities for transportation	\$14,534,603	\$158,216,661	9.2%
Software publishers	\$9,345,167	\$637,670,479	1.5%
Securities, commodity contracts, investments, and related activities	\$5,270,192	\$1,128,074,627	0.5%
Warehousing and storage	\$2,397,550	\$37,162,294	6.5%
Semiconductor and related device manufacturing	\$0	\$704,470,336	0%
Guided missile and space vehicle manufacturing	\$0	\$3,865,522,432	0%
Cable and other subscription programming	\$0	\$98,832,356	0%
County Total	\$6,309,434,130	\$65,432,467,993	-

1 Source: Minnesota IMPLAN Group (2008).

2 Note: Shaded sectors rank in the top 20 for the county.

3 **Taxes and Revenues**

4 Arizona ranks 28th in the Business Tax Climate Index in the context of corporate taxes, individual
5 income taxes, sales taxes, unemployment insurance taxes, and taxes on residential and commercial
6 property (The Tax Foundation 2010). In comparison, California ranks 47th, Nevada 3rd, New Mexico
7 23rd, Utah 17th, and Colorado 13th. Arizona has a tax climate that neither encourages nor

discourages new business expansion or startups. The State does have luxury, estate, personal, and corporate income taxes. Only those revenues that are clearly and concisely reported by the State or Federal government (i.e., property taxes, sales tax, payment in lieu of taxes, etc.) were considered for the analysis. Revenue information was gathered for the county level.

Real Estate/Property Tax

State property tax in Arizona, collected by county treasurers, is based on property value (ad valorem). Property tax is calculated from two different bases: full cash value (market value) and limited value (i.e., statutorily-controlled value). Taxes calculated on the limited value, called primary taxes, are added to those derived from the full cash value, or secondary taxes, to produce the total annual tax bill. Property is also classified according to its value (i.e., residential, commercial, agricultural, etc.) (Arizona Department of Revenue 2011).

In general, revenue from primary property tax collections helps fund State and local government budgets in terms of local government operating budgets and school and fire districts. Counties can use their allocation of property taxes to fund superior court systems, sheriff’s departments, transportation projects, and emergency services.

In Arizona, the ratio of assessed valuation (percentage of market value) is 10 percent on residential properties and 20 percent on commercial properties (Arizona Capital Times and Arizona Tax Research Association 2010). In comparison, Nevada’s ratio of assessed valuation on residential properties is 35 percent and California’s is 100 percent. Arizona’s average primary property tax in 2010 was \$6.32 per \$100 and increased to \$7.28 per \$100 in 2011. Its average secondary property tax in 2010 was \$3.35 per \$100 and increased to \$3.67 per \$100 in 2011 (Arizona Department of Revenue 2011).

In 2011, statewide primary and secondary property tax levies generated almost \$6.7 billion of revenue; of the \$6.7 billion, Pima County \$1.13 billion, Santa Cruz County \$44.7 million, and Cochise County collected \$109.9 million. Primary and secondary tax levies for 2011 are summarized in table 218 (Arizona Department of Revenue 2011).

Table 218. Primary and secondary property tax levies in 2011

Jurisdiction	Net Assessed Valuation	Primary Tax Levy	Secondary Tax Levy	Primary Rate	Secondary Rate
Arizona	\$60,900,480,130	\$4,433,059,593	\$2,261,647,427	7.28	3.67
Pima County	\$8,310,120,212	\$775,179,344	\$359,719,127	9	4.26
Santa Cruz County	\$382,619,719	\$31,292,030	\$13,379,450	8	3.35
Cochise County	\$1,049,827,355	\$90,984,956	\$18,953,702	9	1.74

Source: Arizona Department of Revenue (2011).

Transaction Privilege and Severance Taxes

Sales taxes apply to the retail sale of personal property or services within the State. Arizona levies a 6.6 percent general sales (transaction privilege) tax on consumers, which is just above the national average of 5.4 percent. Cochise County imposes an additional 0.5 percent general sales tax, and Santa Cruz County has an additional 1 percent general sales tax. Individual cities or communities within each county can also levy an additional sales tax. It is important to note that Arizona does not charge sales tax on food purchased at retail outlets for home consumption, such as food purchased at grocery

1 stores. As discussed in the “Lodging Tax” part of this resource section below, some communities
2 assess a bed or lodging tax in addition to the sales taxes.

3 In Arizona, a severance tax is imposed in lieu of a transaction privilege tax on mining metalliferous
4 minerals. The severance rates are 2.5 percent on mining metalliferous minerals.

5 All three counties in the analysis area, as well as the State itself, have seen an overall decrease in sales
6 and severance tax revenue between fiscal year 2006 to 2007 and fiscal year 2010 to 2011. Santa Cruz
7 County had the largest decrease in distributed tax revenue (27 percent), while Pima and Cochise
8 Counties decreased at a lower rate (20.6 percent and 20.2 percent, respectively), somewhat below the
9 State rate of 23.8 percent for the same period (Arizona Department of Revenue 2011). However, the
10 three counties and the State actually received more sales and severance tax revenue in fiscal year
11 2010 to 2011 than they did in the previous fiscal year. State sales and severance tax distribution is
12 summarized in table 219.

13 **Table 219. Transaction privilege and severance tax distribution to counties**

Location (county)	FY 2003 to 2004*	FY 2004 to 2005*	FY 2005 to 2006*	FY 2006 to 2007*	FY 2007 to 2008*	FY 2008 to 2009*	FY 2009 to 2010*	FY 2010 to 2011*
Pima	\$82.6	\$90.3	\$102.6	\$106.9	\$104.1	\$90.4	\$84.8	\$88.6
Santa Cruz	\$3.6	\$3.9	\$4.6	\$4.9	\$4.7	\$4.1	\$3.7	\$3.9
Cochise	\$10.1	\$10.9	\$12.3	\$13.1	\$12.5	\$11.3	\$10.6	\$10.9
State Total	\$551.8	\$609.6	\$705.8	\$748.7	\$724.4	\$627.2	\$578.5	\$604.8

14 Source: Arizona Department of Revenue (2011).

15 * Millions of dollars.

16 **Federal and Mineral Lease Royalties**

17 A mineral royalty is the amount of money the owner of the mineral resource receives as a payment or
18 royalty from the mineral producer. Fifty percent of Federal mineral royalties are returned to the State,
19 and a portion of that is then distributed to counties and cities. Arizona received \$266,834 as its share
20 of lease payments made on Federal lands in the State for fiscal year 2008, \$252,681 in 2009, \$26,249
21 in 2010, and \$12,112 in 2011 (U.S. Department of Interior n.d. [2013]). In comparison, Wyoming,
22 which often has the highest lease payments of any State, received \$220,668,950 for fiscal year 2008,
23 \$957,232,075 in 2009, \$886,871,351 in 2010, and \$971,498,012 in 2011 (U.S. Department of Interior
24 n.d. [2013]). States receiving larger payments have significant oil and gas production or coal
25 production on Federal lands. Arizona’s oil and coal are produced largely from Native American
26 reservations, so the only revenues the State receives currently are largely from the leasing of Federal
27 lands.

28 Hardrock mining does not pay royalties on the use of Federal lands, in accordance with the Mining
29 Act of 1872. Instead, royalties are based on the value of production and by-products. If the proposed
30 mining plan is approved, royalties would be calculated at 3 percent of the net smelter returns.
31 The royalty would be calculated and paid at the end of an annual period. Federal royalties are
32 distributed by the State of Arizona and are used to fund roads, public education, higher education, and
33 other public services.

Economic Diversity (Shannon-Weaver Diversity Index)

The Shannon-Weaver Diversity Index can measure the economic diversity of the analysis area. This index evaluates the extent to which the economic activity of a region is distributed between a number of industries in the region. In general, more diverse economies will have larger multipliers because more inputs will be provided locally. The Shannon-Weaver Diversity Index is determined by Minnesota IMPLAN Group by calculating the number of industries in the region against how well distributed employment is throughout all of regional industries. The Shannon-Weaver Diversity Index ranges from 0 to 1. An index of 1 would be “perfect” diversity, whereas as output and employment become concentrated in fewer industries, the index would be closer to 0. The higher the diversity index, the more stable the economy is assumed to be. The index for each county is presented in table 220.

Table 220. Shannon-Weaver Diversity Index for each county in the analysis area

County	Index
Pima	0.70068
Santa Cruz	0.60946
Cochise	0.64168

Source: Minnesota IMPLAN Group (2008).

Pima County has the highest diversity index (0.70), while Santa Cruz County has the lowest index at 0.61. It is important to note that all counties in the analysis area have a Shannon-Weaver Diversity Index greater than 0.50, which indicates that the regional economies are relatively diverse. The greater the diversity in the region, the more resilient the economy is in the face of change because the economy is more stable.

Recreation and Tourism

In 2010, 6.8 million visitors traveled to the Tucson and southern Arizona region (Pima, Santa Cruz, and Cochise Counties). Visitors to the region spent approximately \$2.6 billion and directly supported more than 27,000 jobs (Arizona Office of Tourism 2011). Towns and cities throughout southern Arizona profit economically from expenditures made by visitors to the Coronado National Forest. The majority of visits are to the Santa Catalina Ranger District, which is the portion of the forest nearest Tucson. The natural amenities of the region and strong visitor participation in outdoor recreation activities indicate that nature-based tourism is an important component of the travel industry in southern Arizona. Tourists visit the remote and rural areas of these counties for nature-based activities such as skiing, hiking, camping, mountain biking, wildlife viewing, scenic viewing, amateur astronomy, hunting, fishing, and off-highway vehicle use. The region is a year-round destination for tourists; however, winter tourism is a particularly important component of the regional economy.

Recreation and tourism are important contributors to the economic stability of the area; economic benefits are derived not only from direct spending on food, gas, lodging, etc., but also from sales tax generated from visitor spending. Local and sales tax revenue are extremely important in rural areas because tourism often forms a larger proportion of the economic activity in these areas, and special excise taxes on tourists and visitors (i.e., from food, lodging, auto rentals, etc.) are primarily paid by visitors rather than residents (Arizona Office of Tourism 2011).

1 In 1998, the National Visitor Use Monitoring project was implemented to respond to the need to
 2 better understand the use of, importance of, and satisfaction with NFS recreation opportunities.
 3 In 2008, the Forest Service compiled the visitor use monitoring results for surveys conducted in 2007
 4 on the Coronado National Forest. A total of 3,572 visitors participated in the surveys. The purpose of
 5 the survey was to assist Congress, Forest Service leaders, and program managers in making sound
 6 decisions that best serve the public and protect valuable natural resources by providing scientific,
 7 reliable information about the type, quantity, quality, and location of recreation use on public lands
 8 (U.S. Forest Service 2008).

9 According to the results of the Forest Service surveys, the Coronado National Forest received an
 10 estimated 2.4 million visits in 2007 (U.S. Forest Service 2008). Of the visitors contacted during the
 11 surveys, 85 percent indicated they were visiting the area primarily for recreation purposes. Relaxing
 12 (45.9 percent); viewing natural features (64.8 percent); viewing wildlife, birds, and/or fish
 13 (65.9 percent); and hiking or walking (75.6 percent) were listed as the primary reasons participants
 14 visited the Coronado National Forest. Driving for pleasure (23.7 percent), visiting a nature center
 15 (17.2 percent), and nature study (15.7 percent) were cited in the study as the remaining recreational
 16 uses that provide employment and revenue to local economies (U.S. Forest Service 2008). See the
 17 “Recreation and Wilderness” resource section in chapter 3 for more detailed information about
 18 recreation uses of the Coronado National Forest.

19 Off-highway vehicle use, camping (both dispersed and developed), hunting, and fishing stimulate the
 20 regional economy through direct local expenditures on motorized vehicles, trailers, equipment and
 21 accessories, food, gas, lodging, and insurance and maintenance costs (Arizona State Parks 2003).
 22 Off-highway vehicle users alone spend an estimated \$3.1 billion (Silberman n.d. [2003]-b) to
 23 \$4 billion annually (Arizona State Parks 2003) in Arizona. According to Silberman (n.d. [2003]-b),
 24 off-highway vehicle expenditures in the three-county area in 2002 totaled an estimated \$450 million
 25 (table 221). Local spending on food, gas, lodging, and souvenirs also indirectly benefits the region by
 26 supporting wages and income in the local economy, as well as contributing local and state tax dollar
 27 revenue.

28 **Table 221. Off-highway vehicle expenditures in the analysis area and in Arizona, 2002**

Location	Trip	Equipment	Vehicles	Total
Pima County	\$71,672,219	\$139,449,312	\$112,492,355	\$323,613,886
Santa Cruz County	\$20,795,765	\$5,567,760	\$935,409	\$27,298,934
Cochise County	\$27,670,716	\$32,653,623	\$38,146,809	\$98,471,148
Three-County Total	\$120,138,700	\$177,670,695	\$151,574,573	\$449,383,968
Arizona	\$842,316,226	\$1,178,148,417	\$1,035,243,712	\$3,055,708,355

29 Source: Silberman (n.d. [2003]-b).

30 Off-highway vehicle use, hunting, and fishing are interrelated; visitors and recreationists often use
 31 off-highway vehicles for big-game retrieval and access to remote areas for fishing. According to a
 32 national study on the economic importance of hunting (International Association of Fish and Wildlife
 33 Agencies 2002), hunters spend an average of \$1,896 annually per hunter. Annual hunting
 34 expenditures in Arizona are an estimated \$126 million (Silberman n.d. [2003]-a). Expenditures
 35 include hunting gear, such as guns and ammunition, hunting tags and permits, processing, and
 36 taxidermy costs, as well as in the sectors noted above, such as gas, food, and lodging. Silberman
 37 (n.d. [2003]-a) estimated that 2001 expenditures on fishing and hunting were \$84,832,296 and

1 \$26,158,896, respectively; total expenditures in the three-county analysis area reached about \$111
 2 million (table 222).

3 **Table 222. Hunting and fishing expenditures in the analysis area and in Arizona, 2001**

Location	Fishing	Hunting	Total
Pima County	\$66,941,072	\$17,560,929	\$84,502,001
Santa Cruz County	\$11,146,242	\$2,714,881	\$13,861,123
Cochise County	\$6,744,982	\$5,883,086	\$12,628,068
Three-County Total	\$84,832,296	\$26,158,896	\$110,991,192
Arizona	\$831,493,493	\$126,628,825	\$958,122,318

4 Source: Silberman (n.d. [2003]-a).

5 In terms of economic output related to tourism and recreation, sectors included in the broader
 6 category of tourism for this analysis include hunting and trapping; fishing; food and beverage stores
 7 and drinking locales; gasoline stations; clothing, sporting goods, and general merchandise stores;
 8 lodging; travel arrangement and reservation services; and transportation (transit/ground passenger and
 9 scenic/sightseeing). It is important to note that not all economic activity in tourism related industries
 10 can be attributed to tourist spending. Only a portion of sales in hotels, restaurants, and other sectors
 11 are actual tourist sales, since non-tourists such as local residents and business travelers spend money
 12 in these sectors as well. Using national tourism impact ratios (table 223) for each sector, actual tourist
 13 spending related industry output for the region is estimated (table 224). These ratios can be applied to
 14 industry output. Using these ratios, for example, industry output for the “hunting and trapping” sector
 15 was \$1.69 million in the three-county analysis area in 2008 (Minnesota IMPLAN Group 2008); using
 16 the tourism impact ratio for this sector (20 percent), the portion of industry output attributed to actual
 17 tourist spending is \$337,508.

18 **Table 223. National tourism impact ratios**

Sector	Ratio
Hunting and trapping	20.00%
Transit and ground passenger transportation	23.00%
Scenic and sightseeing transportation	3.00%
Motor vehicle and parts dealers	17.00%
Food and beverage stores	4.00%
Health and personal care stores	3.00%
Gasoline stations	4.00%
Clothing and clothing accessories stores	4.00%
Sporting goods; hobby, book, and music stores	4.00%
General merchandise stores	4.00%
Miscellaneous store retailers	4.00%
Machinery and equipment rental and leasing	11.00%
Services to buildings and dwellings	3.00%
Other amusement; gambling and recreation	20.00%
Hotels and motels, including casino hotels	81.00%
Other accommodations	81.00%
Food services and drinking places	17.00%
Automotive repair and maintenance, except car	3.00%

19 Source: Stynes (2001).

Table 224. Tourism related sectors for three-county area: Industry output using Minnesota IMPLAN Group and adjusted using tourism impact ratios

Industry	Pima	Santa Cruz	Cochise	Total
Hunting and trapping	\$0	\$76,208	\$261,300	\$337,508
Fishing	\$387,770	\$0	\$0	\$387,770
Transit and ground passenger transportation	\$25,597,550	\$1,597,535	\$1,433,108	\$28,628,192
Scenic and sightseeing transportation	\$3,551,852	\$758,610	\$436,038	\$4,746,500
Motor vehicle and parts dealers	\$93,892,507	\$3,141,458	\$8,237,549	\$105,271,514
Food and beverage stores	\$27,058,122	\$1,473,845	\$2,955,833	\$31,487,800
Health and personal care stores	\$6,677,009	\$269,133	\$382,774	\$7,328,916
Gasoline stations	\$7,959,691	\$978,522	\$3,381,606	\$12,319,819
Clothing and clothing accessories stores	\$8,303,384	\$1,037,665	\$793,083	\$10,134,131
Sporting goods; hobby, book, and music stores	\$5,145,143	\$187,938	\$332,923	\$5,666,004
General merchandise stores	\$18,159,702	\$2,211,933	\$3,324,616	\$23,696,251
Miscellaneous store retailers	\$9,767,416	\$461,494	\$774,261	\$11,003,171
Automotive equipment rental and leasing	\$19,713,688	\$3,737,970	\$2,923,694	\$26,375,352
Travel arrangement and reservation services	\$3,878,560	\$5,872	\$129,814	\$4,014,245
Amusement parks, arcades, and gambling industries	\$42,612,774	\$1,656,322	\$2,851,902	\$47,120,999
Hotels and motels, including casino hotels	\$336,132,115	\$17,113,690	\$22,461,172	\$375,706,977
Other accommodations	\$19,690,706	\$1,508,865	\$8,074,706	\$29,274,277
Food services and drinking places	\$282,583,955	\$7,484,810	\$27,706,480	\$317,775,245
Auto repair and maintenance (except car washes)	\$12,418,165	\$426,230	\$1,245,319	\$14,089,714

Source: Minnesota IMPLAN Group (2008).

According to Minnesota IMPLAN Group results adjusted using tourism impact ratios, industry output for tourism sectors in the three-county analysis area (in 2008) was \$1.05 billion, or 1.61 percent of the region's output. Of the three-county analysis area, tourism sectors in Pima County generated the most output, at \$923 million, Cochise County fell in the middle, at \$87 million, and Santa Cruz was last, at \$44 million. Although total regional output for sectors associated with tourism was less than 2 percent of the total regional output, it is still an important component of the economic stability of the region.

The proportion of visitors drawn to southern Arizona specifically for natural amenities is not a clearly defined segment, given the available travel and tourism data. The purpose of travel for overall Arizona visitors in 2010 was visiting friends and relatives (43 percent), business (17 percent), touring (14 percent), outdoor recreation (9 percent), and other (17 percent) (Arizona Office of Tourism 2011). Using these data as a baseline, it is estimated that approximately 25 percent of all visitors are drawn to the area for its natural amenities. This estimate includes visitors whose primary reason for travel was outdoor recreation or touring and assumes a small portion of "other" to be motivated by natural amenities. Applying this percentage to visits and visitor spending in Tucson and southern Arizona indicates that approximately 1.7 million overnight visitors, \$649 million in direct spending (\$684 million in 2012 dollars), and 6,872 direct jobs in Pima, Santa Cruz, and Cochise Counties may be attributable to nature-based tourism.

In order to quantify the economic impact of nature-based tourism in communities near the proposed mine site (Sonoita, Patagonia, and Elgin), a methodology was applied that uses business survey results discussed later in the "Social Benefits of Amenities on the Coronado National Forest" part of

1 this resource section. Based on these surveys, it is roughly estimated that natural amenities are a
 2 crucial motivation for approximately two-thirds of visitors to the area. According to the 2011 survey,
 3 approximately 275 employees in Sonoita, Patagonia, and Elgin are directly supported by visitor
 4 spending. Assuming that two-thirds of the visitors are drawn to the area by natural amenities, 183
 5 employees are directly supported by nature-based tourism to these communities. This represents 11
 6 percent of all travel related jobs throughout Santa Cruz County as a whole and an estimated \$26
 7 million in direct visitor spending (\$32.4 million in 2012 dollars). Table 225 displays visitor spending
 8 and travel related jobs in Tucson and Southern Arizona and in the Patagonia Census County Division.
 9 All spending estimates have been adjusted for inflation and are shown in 2012 dollars.

10 **Table 225. Nature-based travel**

	All Visitors	Nature-Based Visitors	
Tucson and Southern Arizona			
Visitors (million)	6.8	1.70	25% of all visitors
Visitor spending (millions of \$)	2,733	683	25% of all visitors
Jobs	27,856	6,965	25% of all visitors
Patagonia Census County Division			
Visitor spending (millions of \$)	41.0	27.2	67% of all visitors
Jobs	275	183	67% of all visitors

11 Sources: Arizona Office of Tourism (2011); BBC Research and Consulting (2013).

12 Notes:

13 Number of visitors is not estimated at the county (or subcounty) level.

14 Total visitor spending for the Patagonia Census County Division is based on the proportion of Santa Cruz County travel
 15 related jobs in the Patagonia Census County Division.

16 In Santa Cruz County, visitor spending was \$235 million and travel related employment was 1,660 jobs in 2010.

17 ***Astronomy and Dark Skies***

18 As discussed in the previous section, amateur astronomy is one of the many recreation opportunities
 19 on the Coronado National Forest. In addition to recreational astronomy, there are numerous
 20 observatories throughout the State used for planetary and space science research. Specifically, there
 21 are two observatories located within 15 miles of the proposed Rosemont Copper site: the Jarnac
 22 Observatory and the Fred Lawrence Whipple Observatory (Whipple Observatory). While there are
 23 numerous large and small observatories in southern Arizona, the Whipple Observatory has been the
 24 primary focus of concern regarding potential effects on the astronomy related economy, as it is the
 25 largest field installation of the Smithsonian Institution Astrophysical Observatory and is located less
 26 than 12 miles from the site of the proposed mine. The observatories hire professionals, staff, and
 27 students and thus have direct impacts on Arizona’s local economy. Indirect employment contributions
 28 to the economy are also generated via the purchase of equipment, utilities, office supplies, and
 29 consumption by both employees of the observatories and those employees in businesses that supply
 30 good and services (Arizona Arts Sciences and Technology Academy 2007).

31 In fiscal year 2006, the total dollar impact (sales or output) in Arizona that was attributed to the
 32 State’s planetary and science research was estimated to be \$252.8 million. The total contribution
 33 includes \$138.6 million in earnings and \$12 million in tax revenues. During the same year, Arizona’s
 34 observatories and related research organizations spent a total of \$135.4 million on operations,

1 including wages and salaries. Capital investment/construction related expenditures totaled
2 \$28.2 million. Of the \$164.2 million in expenditures for fiscal year 2006, \$69.3 million was spent
3 in Arizona (Arizona Arts Sciences and Technology Academy 2007). The observatories and related
4 facilities received 200,805 visitors in fiscal year 2006, and 22 percent of the 194,137 public visitors
5 were from outside Arizona. According to the Arizona Arts, Sciences, and Technology Academy
6 (2007), the total cumulative investment of astronomy, space, and planetary sciences equaled \$1.199
7 billion in fiscal year 2006.

8 The Whipple Observatory spends approximately \$13.4 million in Arizona each year for wages,
9 salaries, and other operating costs. Compared with the statewide figures from the Arizona Arts,
10 Sciences, and Technology Academy study (updated for inflation since 2007), this figure represents
11 about 11 percent of the total expenditures in Arizona by major Arizona observatories. The observatory
12 also spends about \$4.4 million per year on purchases of capital equipment. The exact proportion of
13 these expenditures that are spent within Arizona is not known, but based on the statewide average
14 proportions from the Arizona Arts, Sciences, and Technology Academy study, it is estimated that the
15 Whipple Observatory spends about \$2.0 million per year for capital purchases within Arizona. This
16 figure represents about 15 percent of the total annual capital expenditures in Arizona by major
17 Arizona observatories. The observatory directly employs about 112 people (including individuals
18 with offices at the University of Arizona), though 30 of these people are based in Cambridge,
19 Massachusetts. The 82 direct Whipple Observatory employees in Arizona represent about 5 percent of
20 the total direct employment in Arizona by major Arizona observatories. Finally, the Whipple
21 Observatory receives about 10,000 or more visitors per year. This figure includes approximately
22 3,800 visiting days by scientists who spend the night in the dormitory on top of the mountain,
23 3,000 tourist visitor days to take the half-day bus tour to the top of the mountain, and more than 3,000
24 visitor days per year by people who only come to the visitor center located below the mountain top
25 observatory. This visitation estimate also corresponds to about 5 percent of total visitation to major
26 Arizona observatories, though the proportion of scientific visitor days at the observatory is
27 considerably greater than average.

28 Table 226 applies the estimated shares of the statewide direct economic stimulus provided by the
29 astronomy industry attributable to observatories and other facilities in the socioeconomic study area
30 (including the shares specific to the Whipple Observatory) to the overall economic impact estimates
31 developed in the Arizona Arts, Sciences, and Technology Academy study. Dollar values from the
32 Arizona Arts, Sciences, and Technology Academy study were updated for inflation to 2012 dollars
33 (Bureau of Labor Statistics 2012). This provides an approximate estimate of the annual economic
34 contribution in Arizona from the three-county analysis area's astronomical facilities and related work
35 at the University of Arizona and the economic contribution specific to the Whipple Observatory,
36 based on the approach and definitions used in the statewide study. The observatory's estimated share
37 of the statewide economic impact attributable to operations was reduced from the 11 percent
38 proportion of statewide operations expenditures (described in the previous paragraph) because it has a
39 smaller share of statewide direct astronomy employees and spends more of its operating budget on
40 purchases of goods and services, which have a slightly smaller multiplier in the Arizona Arts,
41 Sciences, and Technology Academy study. Based on this approach, the estimated annual total
42 economic contribution in Arizona from observatories and related research at the University of Arizona
43 includes more than 2,200 jobs and \$195 million in economic output. The contribution from the
44 Whipple Observatory's operating and capital expenditures and the expenditures of its scientific and
45 tourist visitors is estimated at approximately 325 jobs and \$29 million in annual economic output.

Table 226. Estimated annual economic impact of the Whipple Observatory in Arizona (dollars in millions)

Economic Stimulus	Estimated Total Economic Impact in Arizona*							
	AASTA Arizona		Estimated Shares		Analysis Area		Whipple Observatory	
	Jobs	Dollars [†]	Analysis Area	Whipple Observatory	Jobs	Dollars	Jobs	Dollars
Operations expenditures	2,905	\$239.9	67%	10%	1,946	\$160.8	291	\$24.0
Capital expenditures	137	\$21.5	67%	15%	92	\$14.5	21	\$3.3
Visitor expenditures	286	\$29.6	67%	5%	192	\$19.8	14	\$1.5
Total	3,328	\$291.2	–	–	2,230	\$195.1	325	\$28.8

Note: AASTA = Arizona Arts, Sciences, and Technology Academy.

* Includes indirect and induced (multiplier) effects.

† AASTA dollar estimates updated for inflation since 2006; all dollar estimates reported in 2012 dollars (Bureau of Labor Statistics 2012).

Quality of Life Conditions

Public Facilities and Services

The analysis area has a diverse population, economy, housing, land use, and natural features that are supported by an infrastructure of facilities and services. County and community profile information was primarily obtained from State and community Web sites, particularly from County and Community Profiles compiled by the Arizona Department of Commerce (2009a; 2009b; 2009c).

All three counties in the analysis area provide typical county government services, including a county assessor, county attorney, county commissioners, treasurer, road department, planning, landfill, emergency services, sheriff, search and rescue, parks and recreation, and libraries. The larger incorporated jurisdictions, such as Tucson and Sahuarita, provide similar municipal services, including administration, public works, police, fire, and parks and recreation services. Each county also has educational and health care facilities.

Transportation and Road Maintenance

As discussed in the “Transportation/Access” resource section of chapter 3, SR 83, a designated State Scenic Route, would provide the primary access route connecting the Rosemont Copper Mine with I-10 to Tucson. Access to the mine facilities is proposed to come from a newly developed road that would pass along the northern boundary of the site and connect with SR 83.

Because SR 83 is a state highway, ADOT oversees maintenance. Funding amounts for road maintenance along SR 83 have not been consistent since 2001. Over the past decade, funding for SR 83 improvements has ranged from \$550,000 in 2005 to \$9.4 million in 2010 (table 227).

See the “Transportation/Access” section of chapter 3 for a full discussion of potential changes in traffic patterns, and see the “Public Health and Safety” section for a full discussion of related resource issues.

1 **Table 227. ADOT programmed funding for SR 83 improvements, 2001 to 2010**

Fiscal Year	Funding	Percent Change from Previous Year
2001	\$1,675,000	–
2003	\$1,600,000	–4.48%
2004	\$4,692,000	193.25%
2005	\$550,000	–88.28%
2010	\$9,390,000	1,607.27%

2 **Community Values and Social Trends**

3 The Coronado National Forest has an important link to its neighbors because of the significant
4 amount of forest lands in the region. The social environment of the surrounding communities for
5 many years has been in transition from traditional extractive associations with natural resources
6 (i.e., grazing, ranching, agriculture, and mining) to more tourism- and amenity-based economies and
7 lifestyles. Although these traditional economic activities have changed, the lifestyles associated with
8 them continue to be important. Values and beliefs associated with recreation also link residents to
9 national forest lands and resources; these same natural amenities attract retirees and others to the area.

10 The local economy near the proposed mine and in rural areas of Pima, Santa Cruz, and Cochise
11 Counties is typical of the changing economy of the West as people move to these rural areas to live,
12 work, and recreate. Many people moving into these areas make these choices based on quality of life
13 considerations, along with environmental amenities such as clean air and water and recreation
14 opportunities (Russell and Adams-Russell 2005). The influx of new residents to an amenity-rich area
15 stimulates the existing economy through increased demand for products and services. Therefore,
16 communities in the area, such as Sonoita and Elgin, benefit from proximity to public lands.

17 Common social trends in the western United States include rapidly growing urban populations,
18 increased concern over loss of open space, increasingly transformed landscapes, continued and
19 increasing loss of biodiversity, increased pressures for uses of all types (in particular, strong trends in
20 recreation uses, such as hiking, biking, off-highway vehicle and sport utility vehicle use, camping,
21 picnicking, etc.), rising pressures for preservation and conservation, and increased feelings of loss
22 associated with public and private lands, including lost access to public lands and recreation.

23 Although economic conditions are changing in the communities surrounding the Coronado National
24 Forest, forest resources continue to be perceived as being linked to local economic well-being.
25 The scenic resources (including SR 83), climate, dark skies, and outdoor opportunities in the region
26 often attract retirees and those looking for second homes. Some residents in the surrounding
27 communities perceive forest lands as being critical to their economy by providing hunting, fishing,
28 wildlife, and recreation trails, as well as being a direct link to the local tourism industry.

29 Increased growth in southern Arizona exerts environmental pressures on surrounding areas as
30 development moves closer to public lands. As growth continues and development increases, the
31 demand for access to and use of open space and recreation areas will also increase. In addition, urban
32 residents from other areas of Arizona may have limited knowledge and connection to the Coronado
33 National Forest and, therefore, have a different valuation of the forest.

34 In 2005, a report was prepared for the Forest Service titled “Values, Attitudes and Beliefs toward
35 National Forest System Lands: The Coronado National Forest,” which revealed important
36 information about the relationship between neighbors and users of the forests. The document

1 identifies values, attitudes, and beliefs about forest resources and their management for the Coronado
2 National Forest (Russell and Adams-Russell 2005).

3 The values, attitudes, and beliefs study revealed that residents near the Coronado National Forest
4 continue to value their proximity and access to the forest. There is also a great deal of local public
5 interest in the Coronado National Forest and its natural resources (Russell and Adams-Russell 2005).
6 The public perception is that the Coronado National Forest is a “recreation forest,” that is, the
7 Coronado National Forest is important to the public because of the recreation opportunities.
8 The public perceives the Coronado National Forest to be vulnerable to the effects of population
9 growth pressures, illegal border crossing and smuggling activity along the United States/Mexico
10 border, and changes to the lifestyle and values associated with ranching and agriculture.

11 Access to the Coronado National Forest, especially for urban populations, is both a valued asset and
12 desired future. National forests that continue to be accessible without fees or undue restrictions are
13 valued as contributing to recreation opportunities and enhancing the overall quality of life in the
14 region. Some participants in the values, attitudes, and beliefs study expressed a desire for the Forest
15 Service to manage the unique ecological characteristics of the Coronado National Forest, considered
16 “sky islands,” and recognized that communities adjacent to these sky islands have a unique
17 socioeconomic relationship with the Coronado National Forest. Hunting, birding, and off-road riding
18 are identified as important recreation uses of the Coronado National Forest (Russell and Adams-
19 Russell 2005).

20 In total, 1,999 visitors were contacted on the Coronado National Forest during the sample year.
21 The survey showed that recreation is a priority for users on the Coronado National Forest. Nearly
22 one-half (48 percent) of respondents indicated they lived within 25 miles of their Coronado National
23 Forest destination; 69.5 percent lived within 50 miles. The top five primary activities identified by
24 respondents were hiking or walking (52.6 percent); viewing natural features/scenery (11.2 percent);
25 driving for pleasure (5.9 percent); relaxing (5.3 percent); and camping in developed sites (3.5 percent)
26 (U.S. Forest Service 2008).

27 ***Social Benefits of Amenities on the Coronado National Forest***

28 Environmental amenities associated with the Coronado National Forest contribute to the region’s
29 identity, as well as its quality of life. As previously discussed, regional population growth has brought
30 significant changes in the local and regional quality of life over the past two decades; extensive
31 population growth has driven increased demand on forest resources. The region is shifting from a
32 solely commodity-based lifestyle toward a more recreation- and tourism-based way of life.

33 Communities adjacent to Coronado National Forest lands have a strong sense of place tied to the
34 forest, specifically to the recreational opportunities of the forest. Environmental amenities that attract
35 tourists are also appealing to area residents. People often live in areas surrounding forest lands
36 specifically to use the forest as their backyard and to enjoy the benefits of reduced noise and light
37 pollution, unobstructed natural views, and easy access to forest lands. Lee and Driver (1999)
38 identified four major types of benefits derived from recreation participation: personal, social and
39 community, economic, and environmental.

40 As discussed above, people are drawn to the Coronado National Forest because of the unique ecology,
41 scenery, scenic driving, relaxing, and hiking and camping opportunities. Landscape appearance and
42 scenery can be important public land amenities, not just as recreation opportunity settings, but also as

1 elements of the region’s identity. Regional economic development is also increasingly dependent on
 2 the environmental and ecological amenities associated with the Coronado National Forest
 3 specifically, and public lands generally. Factors such as clean air and water quality, scenery and
 4 natural landscape, open space, dark skies, and the number of recreation opportunities can be
 5 economic assets themselves for local economies.

6 A 2004 study concluded that counties with protected public lands (or those in close proximity to
 7 public lands) have the fastest economic growth (Rasker et al. 2004). A 2007 study found that the
 8 economies of Pima County, Santa Cruz County, and the Patagonia Census County Division exemplify
 9 this changing economy of the West (Marlow 2007). Data show that Pima County’s economy is
 10 diverse with a strong professional services sector. Trends in Santa Cruz County were similar but
 11 exhibited more growth in government sources of income. The eastern portion of Santa Cruz County
 12 (Patagonia Census County Division) contains only 7 percent of the county population and has a
 13 somewhat different demographic and economic profile than the rest of the county. The Patagonia
 14 Census County Division has a population that is older (median age of 55, compared with 34) and
 15 more highly educated (38 percent of those 25 years old and older with a bachelor’s degree or higher,
 16 compared with 11 percent) (U.S. Census Bureau 2010a, 2010e) than the Nogales Census County
 17 Division, which constitutes the remainder of Santa Cruz County (U.S. Census Bureau 2010a, 2010e).
 18 The economy of the Patagonia Census County Division is also more dependent on the educational,
 19 health, and social services; professional services industries; and nonlabor sources of income (U.S.
 20 Census Bureau 2010e). These data suggest that the Patagonia Census County Division is more likely
 21 to reflect amenity migration than the remainder of the county.

22 **Environmental Justice**

23 Consideration of environmental justice issues is mandated by Executive Order 12898, which was
 24 published on February 11, 1994. This executive order requires that all Federal agencies incorporate
 25 environmental justice into their mission by “identifying and addressing . . . disproportionately high
 26 and adverse human health or environmental effects of [their] programs, policies and activities on
 27 minority and low-income populations in the United States.”

28 The goal of the executive order is to ensure the following:

- 29 • That all people are treated fairly with respect to the development and enforcement of
 30 protective environmental laws, regulations, and policies; and
- 31 • That potentially affected community residents are meaningfully involved in the decisions that
 32 would affect their environment and/or their health.

33 The EPA defines a community with potential environmental justice populations as one that has a
 34 greater percentage of minority or low-income populations than an identified reference community.
 35 The standard for identifying minority populations is either: (1) the minority population of the affected
 36 area exceeds 50 percent; or (2) the minority population percentage of the affected area is
 37 “meaningfully greater” than the minority population percentage in the general population or other
 38 appropriate unit of geographic analysis, such as a reference community (Council on Environmental
 39 Quality 1997). The EPA has not specified what percentage of the population can be characterized as
 40 “meaningfully greater” in order to define an environmental justice population. For the purposes of
 41 this analysis, it is assumed that if the affected area’s minority and/or poverty status population is 50
 42 percent or greater than the reference community, there is likely an environmental justice population of
 43 concern. The analysis area for environmental justice concerns extends beyond the socioeconomics

1 analysis area to include all of Pima, Cochise, and Santa Cruz Counties, as well as the consulting tribes
2 who reside outside these counties. Because of the large size of this analysis area, the reference
3 community is considered the State of Arizona.

4 There are two components to addressing income as it relates to environmental justice: “low income”
5 and “below poverty level.” A low-income population is defined by the U.S. Department of Housing
6 and Urban Development as 80 percent of the median family income for the designated area. The low-
7 income designation is subject to adjustment for areas with unusually high or low incomes or housing
8 costs. Families and persons are classified by the U.S. Census Bureau as “below poverty level” if their
9 total family income or unrelated individual income was less than the poverty threshold specified for
10 the applicable family size, age of householder, and number of related children under 18 who are
11 present. For persons not in families, poverty status is determined by their income in relation to the
12 appropriate poverty threshold. Thus, two unrelated individuals living together may not have the same
13 poverty status. In 2010, the U.S. Census Bureau defined poverty level thresholds for individuals and a
14 family of four as income levels below \$11,139 and \$22,314, respectively (U.S. Census Bureau
15 2012c).

16 For the purposes of this analysis, a community is considered an environmental justice community if
17 the total number of individuals living below poverty level, as defined by the U.S. Census Bureau, is
18 50 percent or more of the community or 50 percent greater than the reference community (State of
19 Arizona) percentage.

20 ***Minority and/or Low-Income Populations in the Analysis Area***

21 **Minority Populations**

22 Table 228 summarizes relevant data regarding minority populations for the analysis area in 2010.
23 Using the criteria presented above, where a minority population exceeds 50 percent or a minority
24 population is 50 percent greater than the reference community (the State of Arizona), there are three
25 locations in the analysis area where the minority population of the affected area exceeds 50 percent,
26 based on 2000 and 2010 U.S. Census Bureau data: Santa Cruz County, the Pascua Yaqui Tribe, and
27 the Tohono O’odham Nation (see table 228). The Santa Cruz County Hispanic population totals
28 82.8 percent of the total population, which exceeds the 50 percent threshold by 32.8 percent.
29 The Hispanic populations of South Tucson and Rio Rico also exceed the 50 percent threshold, at 78.5
30 and 85.3 percent, respectively.

31 The Pascua Yaqui Tribe and the Tohono O’odham Nation minority populations are more than
32 50 percent greater than the reference community, with 90.6 and 90.1 percent, respectively, of the
33 population identifying itself as American Indian.

34 ***Low Income***

35 Table 214 summarizes median family incomes for the analysis area. The 2010 U.S. Census showed
36 Arizona’s median family income as being \$59,840; therefore, the low income level threshold for
37 family income would be \$47,872 (80 percent of median family income). Santa Cruz County had a
38 median family income of \$40,933, which is 68.4 percent of the State’s median income. Therefore,
39 Santa Cruz County is classified as a low-income area for the purposes of this study. Tucson was
40 slightly below the threshold, with a median family income of \$47,348, while South Tucson was
41 significantly below the low income level, with a median family income at \$21,053, or 35.2 percent of
42 the State’s median family income.

Table 228. Minority populations in the analysis area, 2010

Location	Total Population	Caucasian Alone (Number)	Caucasian Alone (Percent)	Black or African American Alone (Number)	Black or African American Alone (Percent)	American Indian and Alaska Native Alone (Number)	American Indian and Alaska Native Alone (Percent)	Asian Alone (Number)	Asian Alone (Percent)	Native Hawaiian or Pacific Islander (Number)	Native Hawaiian or Pacific Islander (Percent)	Other Race (Number)	Other Race (Percent)	Hispanic or Latino Origin (of any race) (Number)	Hispanic or Latino Origin (of any race) (Percent)
Arizona	6,392,017	4,667,121	73.0	259,008	4.1	296,529	4.6	176,695	2.8	12,648	0.2	761,716	11.9	1,895,149	29.6
Pima County	980,263	728,751	74.3	34,674	3.5	32,605	3.3	25,731	2.6	1,624	0.2	120,639	12.3	338,802	34.6
Tucson	520,116	362,649	69.7	26,000	5.0	14,154	2.7	14,920	2.9	1,147	0.2	79,239	15.2	216,308	41.6
South Tucson	5,652	2,559	45.3	171	3.0	605	10.7	44	0.8	6	0.1	2,043	36.1	4,435	78.5
Sahuarita Town	25,259	20,280	80.3	742	2.9	334	1.3	499	2.0	31	0.1	2,309	9.1	8,077	32.0
Green Valley CDP	21,391	20,710	96.8	92	0.4	66	0.3	149	0.7	9	0.0	218	1.0	1,049	4.9
Cochise County	131,346	103,085	78.5	5,465	4.2	1,589	1.2	2,525	1.9	418	0.3	12,989	9.9	42,543	32.4
Sierra Vista City	43,888	32,695	74.5	3,951	9.0	467	1.1	1,781	4.1	269	0.6	2,210	5.0	8,527	19.4
Santa Cruz County	47,420	34,835	73.5	179	0.4	328	0.7	255	0.5	15	0.0	10,855	22.9	39,273	82.8
Rio Rico CDP	18,962	13,472	71.0	75	0.4	121	0.6	94	0.5	10	0.1	4,846	25.6	16,179	85.3
Tubac CDP	1,191	1,082	90.8	5	0.4	7	0.6	7	0.6	0	0.0	77	6.5	246	20.7
Elgin CDP	161	147	91.3	2	1.2	0	0.0	2	1.2	0	0.0	9	5.6	23	14.3
Sonoita CDP	818	755	92.3	3	0.4	10	1.2	9	1.1	0	0.0	30	3.7	120	14.7

Location	Total Population	Caucasian Alone (Number)	Caucasian Alone (Percent)	Black or African American Alone (Number)	Black or African American Alone (Percent)	American Indian and Alaska Native Alone (Number)	American Indian and Alaska Native Alone (Percent)	Asian Alone (Number)	Asian Alone (Percent)	Native Hawaiian or Pacific Islander (Number)	Native Hawaiian or Pacific Islander (Percent)	Other Race (Number)	Other Race (Percent)	Hispanic or Latino Origin (of any race) (Number)	Hispanic or Latino Origin (of any race) (Percent)
Pascua Yaqui (Pima County)	3484	106	3.0	7	0.2	3,154	90.5	8	0.2	0	0	139	4.0	818	23.5
Tohono O'odham (Pima County)	9,059	400	4.4	28	0.3	8,062	89.0	23	0.3	6	0.1	410	4.5	868	9.6

Source: U.S. Census Bureau (2012b).

Note:

CDP = Census Designated Place.

1 Table 229 identifies counties, communities, and tribes below the poverty or low income level and
 2 provides a comparison of those figures with the State. While there are no counties in the
 3 socioeconomic analysis area that exceed the State’s poverty level by 50 percent, the percentage of
 4 families living below the poverty level in Santa Cruz County (20.6 percent) is almost 50 percent
 5 greater than that of Arizona (10.9 percent). Santa Cruz County is also defined as low income because
 6 its median family income is below 80 percent of the State’s median family income (\$47,872).
 7 The percentage of families living below the poverty level in South Tucson (39.5 percent) is also
 8 50 percent greater than that of the State. In Pima County, the percentage of both families and
 9 individuals in the Pascua Yaqui tribe (30.8 percent of individuals and 24.3 percent of families) and
 10 the Tohono O’odham Nation (48.2 percent of individuals and 43.3percent of families) is 50 percent
 11 greater than the reference community (15.3 percent of individuals and 10.9 percent of families).
 12 Therefore, the Pascua Yaqui Tribe and the Tohono O’odham Nation meet the low-income and/or
 13 poverty criteria for identification as an environmental justice community.

14 In summary, communities that meet the criteria for identification as an environmental justice
 15 community because of minority populations or families living below poverty level include the Pascua
 16 Yaqui Tribe, the Tohono O’odham Nation, South Tucson, and the Hispanic populations of Santa Cruz
 17 County, South Tucson, and Rio Rico.

18 **Table 229. Poverty and low income statistics for the analysis area, 2010**

Location	Persons/Percent Below Poverty Level (estimates)	Families/Percent Below Poverty Level (estimates)	Median Family Income/Above or Below State Low Income Level (estimates)
Arizona	934,877 / 15.3	168,111 / 10.9	\$59,840 / NA
Pima County	154,259 / 16.4	26,587 / 11.2	\$57,377 / above
Tucson	110,785 / 21.3	17,656 / 15.2	\$47,348 / below
South Tucson	3,029 / 53.6	457 / 39.5	\$21,053 / below
Sahuarita Town	1,339 / 5.3	335 / 4.7	\$79,085 / above
Green Valley CDP	1,283 / 6.0	196 / 2.7	\$57,612 / above
Cochise County	19,351 / 15.7	3,958 / 11.8	\$53,077 / above
Sierra Vista	3,906 / 8.9	747 / 6.7	\$62,101 / above
Santa Cruz County	11,519 / 25.2	1,916 / 20.6	\$40,933 / below
Rio Rico	4,134 / 21.8	808 / 17.0	\$44,379 / below
Tubac	102 / 8.6	0 / 0	\$90,163 / above
Elgin	0 / 0	0 / 0	\$69,167 / above
Sonoita CDP	103 / 12.6	38 / 14.3	\$65,402 / above
Pascua Yaqui (Pima County)*	2,692 / 30.8	470 / 24.3	\$32,047 / below
Tohono O’odham (Pima County)*	5,980 / 48.2	1,045 / 43.3	\$26,480 / below

19 Source: U.S. Census Bureau (2010b; 2010c; 2010e; 2010f).

20 Note: CDP = Census Designated Place.

21 * Numbers include those who identified themselves as a member of the Tribes, as well as those who identified themselves
 22 as a member of the Tribes as well as one or more other groups. Tribal poverty levels were estimated using total population
 23 numbers that include tribal members living both on and off the reservations within Pima County. Thus, they reflect different
 24 total population numbers than those presented in tables 207 and 228, which include only tribal members living on the
 25 reservations within Pima County.

1 **Environmental Consequences**

2 **Direct and Indirect Effects of Each Alternative**

3 ***No Action Alternative***

4 Under the no action alternative, the mine would not be developed, and existing socioeconomic
5 conditions and trends would continue, as described in the “Affected Environment” part of this
6 resource section.

7 **Population and Demographics**

8 There would be no change to population as a result of mine construction or operation. However,
9 current population trends are expected to result in a 14.4 percent increase in Cochise County,
10 19.6 percent increase in Pima County, and 26.7 percent increase in Santa Cruz County population by
11 the year 2025 (Arizona Department of Commerce 2009c).

12 **Housing**

13 There would be no change to demands on housing needs or housing conditions as a result of mine
14 construction or operation. However, the projected increase in population in Cochise, Pima, and Santa
15 Cruz Counties by the year 2025 would create an increase in housing demands.

16 **Employment**

17 There would be no change to employment as a result of mine construction, operation, or reclamation
18 activities. Changes in employment levels are expected to be consistent with current and projected
19 economic trends in the area. From 2007 to 2010, total employment in Cochise County decreased by
20 approximately 3.3 percent, by approximately 7.3 percent in Pima County, and by approximately
21 3.7 percent in Santa Cruz County (Bureau of Economic Analysis n.d. [2012]). However, in the short
22 term, employment in the Tucson metropolitan statistical area is projected to increase by
23 1.4 percent in 2013 (Arizona Department of Administration 2012a).

24 **Income Characteristics**

25 There would be no change to income characteristics as a result of mine construction or operation.
26 Changes to income characteristics are expected to be consistent with the current and projected
27 economic trends in the area. From 2007 to 2010, the per capita personal income level in Pima County
28 increased by approximately 1.1 percent, by approximately 5.3 percent in Santa Cruz County, and by
29 approximately 12.7 percent in Cochise County (Bureau of Economic Analysis n.d. [2012]).

30 **Spending Activity**

31 There would be no change (increase) to spending activity and output as a result of mine construction
32 or operation. Changes in spending activity are expected to be consistent with current and projected
33 economic trends in the area.

34 **Taxes and Revenues**

35 There would be no change (increase) in tax or revenue figures as a result of mine construction and
36 operation. Changes to taxes and revenues are expected to be consistent with current and projected
37 economic trends in the area.

1 **Property Value**

2 There would be no change to property values, other than fluctuations in value consistent with current
3 and projected trends. Properties within the analysis area surrounding the mine would not experience
4 an additional impact on price fluctuations due to mine construction or operation.

5 **Recreation and Tourism**

6 There would be no displacement of recreation activities or change in recreation opportunities in the
7 project area (mine footprint) due to mine construction or operation. Recreation and tourism activity is
8 expected to increase with the projected population growth in the area.

9 **Astronomy and Dark Skies**

10 There would be no increase in light pollution or dust in the project area as a result of mine
11 construction or operation. Existing lighting from sources near the project area such as the Imerys
12 quarry are expected to continue at existing levels. Thus, there would be no impacts to the astronomy
13 industry or dark skies from the proposed mine. Increased development associated with the projected
14 increase in population would result in more night lighting, but adherence to the Pima County Lighting
15 Code is expected to keep these changes within acceptable levels.

16 **Quality of Life Conditions**

17 In terms of quality of life, specifically community values and social trends, as well as the social
18 benefits of amenities on Coronado National Forest, there would be no change in the natural amenities
19 and environmental quality that area residents treasure as a result of mine construction or operation.
20 While there would be no impacts to quality of life from the proposed mine, as population increases in
21 the region it will experience additional pressures on its natural amenities and a slow degradation of its
22 rural, undeveloped landscapes.

23 **Environmental Justice**

24 Under the no action alternative, adverse impacts to the potential environmental justice populations
25 would not occur because the current land use would remain unchanged and opportunities for
26 disproportionate adverse impacts would be not exist.

27 ***Impacts Common to All Action Alternatives***

28 Under all action alternatives, the mine and associated facilities would be constructed. In terms of
29 impacts to socioeconomics, changes (if any) to employment, property value, taxes and revenues, road
30 maintenance and emergency services costs, tourism, quality of life, and environmental justice are
31 expected to be similar for all action alternatives. Differences between these alternatives are not
32 expected to result in large differences in socioeconomic impacts.

33 The economic impacts of the premining, active mining, final reclamation, and closure phases of the
34 project were estimated by using regional economic modeling, or more specifically, by using IMPLAN
35 (Applied Economics 2011; Gebert n.d. [2011]). For the socioeconomics analysis, the number of years
36 in each of the mine phases varies somewhat from the number of years used for the other resource
37 sections in this chapter. This variance is due to the length of mine phases used in the various
38 economic models. The main difference between the mine phases in this section and other sections is
39 that engineering and construction are included in the premining phase for this section, whereas the
40 other sections only include construction. Including engineering increases the accuracy and reliability
41 of the socioeconomic analysis. These types of regional economic modeling are standard approaches

1 to measuring the production and consumption linkages in an economy between households,
2 industries, and institutions (such as government), thus providing an estimate of the ripple effects in an
3 economy associated with a direct stimulus or investment. The multipliers of IMPLAN measure these
4 downstream or ripple impacts.

5 As previously discussed, Pima, Santa Cruz, and Cochise Counties were selected as the socioeconomic
6 impact analysis area. The Applied Economics report focuses solely on impacts to Pima County, while
7 the Forest Service's IMPLAN report estimates impacts to the entire three-county analysis area. Thus,
8 when describing the potential economic impacts of the proposed mine as estimated in the IMPLAN
9 models, numbers for both Pima County and the three-county analysis area are often used in this EIS.

10 Implementation of the action alternatives and development of the proposed Rosemont Copper Mine
11 facilities could have direct and indirect impacts to the three-county analysis area in terms of
12 employment, government revenues, personal income, business sales, and quality of life. The potential
13 impacts are detailed below.

14 **Population and Demographics**

15 *Premining*

16 It is anticipated that most of the construction workforce would be drawn from the local workforce
17 (three-county area). These workers are expected to commute to the project area from their residences,
18 rather than relocate. Construction employees often commute up to 2 hours from their homes (Gilmore
19 et al. 1982).

20 Project construction would occur over an approximately 18- to 24-month period, creating an
21 estimated annual average of 594 direct jobs in Pima County and an estimated annual average of
22 1,221 direct and indirect jobs in the three-county analysis area (Applied Economics 2011; Gebert n.d.
23 [2011]). It is assumed that the majority of the construction employees hired for the direct jobs would
24 draw from the local workforce in the greater Tucson and Green Valley areas; however, some
25 employees may relocate from other areas. Accurately predicting the number of employees that may
26 relocate is not possible, since relocation is a decision that would likely be based upon myriad
27 personal factors. Employees who relocate to the region would either relocate to the region
28 temporarily or permanently, including staying in hotels/motels, apartments, or purchasing a home.
29 Even if the majority of the employees hired during the premining phase relocated to the analysis area,
30 this would have a minimal effect on population, since Tucson and the Green Valley area have a
31 combined population of approximately 541,507 and the largest number of direct employees for the
32 premining phase is estimated to be 768 employees per year (representing a 0.1 percent increase in the
33 population of Tucson and Green Valley). Further, because of the considerable loss of construction
34 jobs in surrounding communities in recent years as a result of the current economic recession, there is
35 a significant pool of unemployed skilled construction labor in the region. Consequently, workers
36 hired to construct the project would likely be drawn from the existing workforce and not from a
37 migratory workforce from outside the Tucson metropolitan statistical area.

38 *Active Mining, Final Reclamation, and Closure*

39 Active mining, final reclamation, and closure would create an annual average of 434 direct jobs in the
40 three-county analysis area (Applied Economics 2011; Gebert n.d. [2011]).

41 As with the premining phase, it is assumed that the majority of employees hired for these mine phases
42 would be drawn from the local workforce in the greater Tucson and Green Valley area; however,
43 some employees may relocate from other areas. Employees relocating for mine operations jobs would

1 need to possess specialty skills and would likely relocate to the region permanently. Tucson and the
 2 larger Pima County area would likely receive these residents. Even if the majority of the employees
 3 hired during the active mining, final reclamation, and closure phases relocated to the analysis area,
 4 this would have a minimal effect on population, since Tucson and the Green Valley areas have a
 5 combined population of approximately 541,507 and the average number of direct annual employees
 6 for mine operations is estimated to be 434 (representing a 0.08 percent increase in the population of
 7 Tucson and Green Valley).

8 **Housing**

9 *Premining*

10 As previously noted, research indicates that construction workers are willing to commute up to
 11 2 hours one way for a job (an average of 73 miles and maximum of 115 miles one way) (Gilmore et
 12 al. 1982). As a result, most of the workers would be coming from the Tucson area and its suburbs,
 13 approximately 30 miles north of the project area.

14 The 2010 Census estimates that in 2010, 11.9 percent of housing units were vacant in Pima County,
 15 14.3 percent of housing units were vacant in Santa Cruz County, and 13.8 percent of the housing units
 16 in Cochise County were vacant (U.S. Census Bureau 2010h). Considering the significant number of
 17 vacant housing units in the analysis area, and with the majority of the construction workforce
 18 expected to commute to the project area rather than relocate, little or no transient housing would be
 19 required in the project area or in the communities closest to the project area. As a result, there would
 20 be minimal demands on the local housing supply. Even if most of the employees did relocate to the
 21 area, the impact on housing is still expected to be minimal, given the level of vacant housing in the
 22 analysis area and the fact that the relocating employees would represent an estimated 0.1 percent
 23 increase in the population of Tucson and Green Valley.

24 *Active Mining, Final Reclamation, and Closure*

25 Operation of the project is expected to have very little impact to the availability of housing because
 26 the number of workers needed for the operation of the mine and mill (average annual employment is
 27 434 workers) and the resulting population changes (an estimated 0.08 percent increase in the
 28 population of Tucson and the Green Valley area if most or all employees relocated) would be far
 29 below the number of vacant housing units in Pima, Santa Cruz, and Cochise Counties (more than
 30 60,000 units). Tucson alone had more than 24,000 vacant units (U.S. Census Bureau 2010h). As a
 31 result, there would be minimal demands on the local housing supply during the operational phase of
 32 the mine. In-migration would result in beneficial long-term impacts to the local housing supply; an
 33 increase in population would help offset local housing vacancies, which are estimated to range from
 34 11.9 to 14.3 percent.

35 **Employment**

36 *Premining*

37 Premining, which includes engineering and construction, would provide an annual average of 594
 38 direct jobs and 443 indirect jobs in Pima County; 768 direct and 453 indirect jobs in the three-county
 39 analysis area (Applied Economics 2011; Gebert n.d. [2011]). Indirect jobs include local vendors from
 40 whom Rosemont Copper would make purchases and local retail stores and establishments where
 41 Rosemont Copper employees would shop.

42 Construction employment is expected to draw from the local workforce in the greater Tucson and
 43 Green Valley areas; however, some people may also come from the Sonoita area and other

1 communities to the south. This would result in a direct increase in employment in area communities
2 and would include skilled and unskilled labor. It is expected that some of the construction jobs would
3 require specialty skills that may not be filled by the local workforce. Thus, some employees may
4 relocate temporarily or move to the area permanently to fill jobs that require specialty skills.

5 The construction industry in Arizona, including Pima County and the greater Tucson and Green
6 Valley areas, has been particularly affected by the nation's recent economic downturn and the State's
7 weak housing market. As a result, there is a substantial workforce available in this region to
8 accommodate construction needs of the project. For example, construction employment in the Tucson
9 metropolitan statistical area fell by 21.5 percent between 2008 and 2009, with another projected drop
10 of 2 percent between 2009 and 2010 (Arizona Department of Commerce 2009b). Similarly, the
11 Tucson metropolitan statistical area unemployment rate rose from 5.6 percent in 2008 to
12 9.4 percent in 2010 before falling to 8.4 percent in 2011 (Arizona Department of Administration
13 2012a). In 2011, the unemployment rate in Pima County was 8.4 percent (39,207 people), Santa Cruz
14 County's unemployment rate was 17.1 percent (3,152 people), and Cochise County's unemployment
15 rate was 8.8 percent (5,405 people). The unemployment rate for the State of Arizona in 2011 was 9.5
16 percent (287,628 people), and the national unemployment rate for 2011 was 8.9 percent (Arizona
17 Department of Administration 2012a; Bureau of Labor Statistics 2012). These unemployment
18 numbers indicate that a considerable workforce is seeking jobs and is available in the region to fulfill
19 the estimated 1,037 to 1,221 annual jobs for the proposed project (Applied Economics 2011; Gebert
20 n.d. [2011]).

21 The construction workforce for the project would be expected to be filled by the available labor
22 supply; as such, construction employment resulting from the development of the project would be a
23 beneficial short-term impact to individuals in nearby communities seeking employment because the
24 project would provide new construction jobs to an area that has recently endured high rates of
25 unemployment.

26 Indirect and induced impacts during the construction phase of the project would result in an estimated
27 annual average of 443 indirect and induced jobs in Pima County and 453 jobs in the three-county
28 analysis area. Indirect impacts result from directly impacted industries purchasing supplies and
29 materials from other industries. Induced impacts occur when employees of the directly and indirectly
30 affected industries spend the wages they receive. Because of the large number of workers involved in
31 this type of construction, the project would result in significant potential for increasing consumer
32 spending in the county during this phase (Applied Economics 2011). However, the indirect and
33 induced jobs created during the construction and operation phases are often relatively low-wage jobs
34 such as fast-food workers or convenience store clerks. Recreation related employment is not expected
35 to change to a measurable degree; the number of jobs and associated labor income (approximately
36 800 jobs attributed to recreation on the Coronado National Forest within the three-county analysis
37 area) are not expected to change during mine construction.

38 *Active Mining, Final Reclamation, and Closure*

39 The operations of Rosemont Copper Mine would create an estimated annual average of 434 direct
40 jobs and 1,260 indirect/induced jobs in Pima County (Applied Economics 2011); and 434 direct jobs
41 and 512 indirect/induced jobs in the three-county analysis area (Gebert n.d. [2011]). Note that the
42 discrepancy in these numbers is due to different analytical techniques and assumptions. Indirect
43 impacts are the result of the multiplier effect calculated through IMPLAN, and they capture "ripple"
44 effects of supplier and consumer businesses and their employees throughout Pima County. Indirect
45 impacts result from directly impacted industries purchasing supplies and materials from other

1 industries. Induced impacts occur when employees of the directly and indirectly affected industries
2 spend the wages they receive.

3 Based on staffing information provided in the preliminary MPO (WestLand Resources Inc. 2007),
4 9 percent of employment would be general and administrative positions, 62 percent would be for
5 mine operations, 21 percent would be for mill operations, and 8 percent would be for solvent
6 extraction operations. Additionally, “the vast majority of the skilled mining personnel needed for the
7 Rosemont Project are available in the greater Tucson area” (WestLand Resources Inc. 2007).

8 Mine operations would include hourly employees and salaried employees. Salaried employees would
9 include mine engineers, geologists, and shift supervisors. Hourly employees would include shovel
10 operators, haul truck drivers, drill operators, and additional mine operations support such as
11 maintenance. In general, the number of pit operations employees per shift would range from 148 to
12 181 people. With four rotating crews working 12-hour shifts, mining crews would average about
13 37 to 45 people for each shift (WestLand Resources Inc. 2007).

14 Mill operations would have 17 salaried employees and 79 hourly employees. Salaried employees
15 would include mill administration staff, shift supervisors, and maintenance supervisors. Hourly
16 staffing requirements would be 220 employees in year one of preproduction and would approach and
17 remain at 300 hourly employees through year 10 of production. After year 15, there would be an
18 average of 180 employees until the end of mine life (M3 Engineering and Technology Corporation
19 2012).

20 The operational workforce for the mine would be expected to be filled primarily by the available
21 labor supply in Pima County and the greater Tucson area (WestLand Resources Inc. 2007).
22 Construction employment resulting from the development of the mine would be a beneficial short-
23 term impact to individuals in nearby communities seeking employment because the project would
24 provide new construction jobs to an area that has recently endured high rates of unemployment.

25 It should be noted that the total number of direct mining jobs under the proposed action would
26 represent a small percentage of the total employment in the counties where the mining employees
27 would most likely reside. A report completed by Power in 2010 indicates that the total direct mining
28 jobs (approximately 400) represent a 1 in 1,500 (0.07 percent) job increase within Pima, Santa Cruz,
29 and Cochise Counties (Power 2010). Further, a study by the Sonoran Institute states that if 90 percent
30 of the Rosemont Copper employees lived in Pima and Santa Cruz Counties, they would account for
31 0.08 percent of the total employment of the counties combined (when using the combined 2005
32 employment total of 503,563) (Marlow 2007). It should also be noted that the mining industry, like
33 many industries, is affected by market forces such as supply, demand, and the rising and falling prices
34 of mineral commodities. Thus, the estimated number of jobs created by the proposed mine may
35 fluctuate as a result of changes in the market.

36 **Income Characteristics**

37 ***Premining***

38 Premining impacts in Pima County would precipitate an estimated direct labor income increase of
39 \$31 million per year and an estimated \$17.5 million per year in indirect labor income (Applied
40 Economics 2011). For Pima, Cochise, and Santa Cruz Counties combined, premining is estimated to
41 provide a direct labor income increase of \$41.2 million per year and \$18.2 million per year in indirect
42 labor income (Gebert n.d. [2011]).

1 ***Active Mining, Final Reclamation, and Closure***

2 Labor income, which includes employee wages and benefits, is estimated to be \$29 million in Pima
3 County for direct labor income and \$57 million for indirect labor income during the active mining
4 phase (Applied Economics 2011). In Pima, Santa Cruz, and Cochise Counties combined, the labor
5 income during the active mining phase is estimated to be \$29 million per year in direct labor income
6 and \$55 million per year in indirect labor income (Gebert n.d. [2011]). A range of wages would be
7 expected among those employed by the mine, from the lower wages of a general laborer to the higher
8 wages of the project management staff and technical advisors. According to Rosemont Copper, the
9 average annual income for a Rosemont Copper employee would be approximately \$60,000.

10 Overall, the average annual payroll of Rosemont Copper employees would add minimally to the total
11 wages and salary in Pima and Santa Cruz Counties (Marlow 2007). When using an average of \$20
12 million in annual payroll, approximately 80 percent is actually “take home” pay, and the other
13 20 percent goes toward workers’ compensation, health insurance, unemployment, and Social Security.
14 Thus, approximately \$16 million would flow into the local economies where employees reside
15 (primarily in the Tucson area, with smaller portions in Santa Cruz and Pima Counties). If 90 percent
16 of the Rosemont Copper employees live in Pima and Santa Cruz Counties, it is estimated that \$14.7
17 million in wages and salaries would flow into the local economies, representing approximately 0.1
18 percent of the total wages and salaries paid in the two counties combined (\$14.03 billion) in 2005
19 (Marlow 2007).

20 **Spending Activity**

21 ***Premining***

22 Construction of the proposed mine and facilities would create positive, temporary impacts to the local
23 economy. Benefits associated with the premining period would result in a total capital investment of
24 approximately \$897.2 million (Applied Economics 2011).

25 This figure includes approximately \$369.3 million in local construction spending, including labor,
26 materials, subcontractors, engineering and project management, and equipment rentals, which would
27 create direct economic impacts in Pima County (Applied Economics 2011). The total economic
28 impact on Pima County during the construction period is estimated to be approximately \$585.2
29 million (Applied Economics 2011).

30 ***Active Mining, Final Reclamation, and Closure***

31 **Employee Spending** – The proposed mine would result in an estimated annual average of 434 direct
32 jobs in the three-county analysis area throughout these phases, including mine workers, process
33 workers, and general administrative employees. Employee purchases in the local economy have an
34 estimated impact of \$21.7 million to \$29.2 million on the county each year of active mining. This
35 would reflect a total project impact of approximately \$576.3 million for local Pima County
36 businesses (Applied Economics 2011).

37 **Vendor Spending** – During active mining, the Rosemont Copper Project is projected to make
38 between \$90 million and \$158.1 million in purchases per year from local vendors. Local vendors,
39 in turn, support jobs and payrolls in Pima County. Local vendor purchases would generate \$127.1
40 million to \$225.2 million annually, or up to approximately \$3.6 billion over the life of the project.
41 This activity would support an estimated 770 to 1,500 jobs per year over the life of the mine (Applied
42 Economics 2011).

1 ***Taxes and Revenues***

2 **Direct Revenue Impacts** — The Rosemont Copper Project would generate direct tax revenues to
 3 State and local governments. Annual property taxes paid by the company are estimated at \$3.5
 4 million per year. Rosemont Copper is also subject to severance taxes in Arizona at an average of
 5 \$2.8 million per year. Because of the shared distribution of severance taxes throughout the State
 6 (80 percent to the State general fund and 20 percent to counties and municipalities), the portion of
 7 severance taxes paid to Pima and Santa Cruz Counties and municipalities would only equate to a
 8 portion of the total severance taxes generated as a result of the mine (Marlow 2007).

9 Total direct revenues for State and local government over the life of the mine are estimated at
 10 \$136.7 million (\$6.3 million per year) (Applied Economics 2011). Revenue is based on copper being
 11 valued at \$1.85 per pound (Applied Economics 2011). The proposed mine could also generate an
 12 estimated \$11 million in one-time construction sales tax during the premining period (Applied
 13 Economics 2011).

14 **Indirect Revenue Impacts** — In addition to direct revenues, the direct and indirect employees
 15 supported by the project would yield an average of \$4.7 million per year over the life of the project.
 16 This would be a total of approximately \$107.6 million for State and local governments over the life of
 17 the mine (Applied Economics 2011).

18 ***Property Value***

19 Measuring the social costs of mining is challenging because of the absence of quantitative values for
 20 social conditions. Estimating changes in property values is one approach to measuring social changes,
 21 as it reflects changes in structural attributes of homes and neighborhood quality. To date, there has
 22 been limited research completed on open-pit mining operations, especially in the southwestern United
 23 States. In order to assess potential impacts to property values, other open-pit mining studies and
 24 reported impacts from industrial sites (such as demolition dumps, waste sites, hazardous
 25 manufacturing facilities, freight facilities, etc.), landfills, and large-scale feed operations are
 26 discussed in the analysis of the proposed mine's potential impacts.

27 There is a consensus among economists regarding the general factors that explain the market price of
 28 a property. Hedonic valuation is a method of explaining demand or prices for a particular good
 29 (e.g., a housing unit) by attaching estimates of value to each of its component characteristics
 30 (e.g., size of structure, age, quality of construction). Hedonic valuation is commonly used in real
 31 estate economics and consumer price index calculations. Hedonic studies are complex and have
 32 limitations. Many factors may contribute to the perceived value of any individual property, and not all
 33 of these factors can be measured. Despite limitations, hedonic analysis provides an established and
 34 practicable basis for estimating potential effects of externalities on real estate values.

35 Although the empirical literature includes many hedonic valuation studies spanning the past several
 36 decades, very few studies have focused specifically on the impact of surface mining on surrounding
 37 property values. The previous hedonic property value study most relevant to the proposed Rosemont
 38 Copper Mine is a 1996 analysis based on the traditional approach of evaluating the sales values of
 39 individual properties. "Air Quality and View Degradations due to Copper Mining and Milling:
 40 Preliminary Analysis and Cost Estimates for Green Valley, Arizona" (Green Valley study) was
 41 published in "Nonrenewable Resources" in 1996 (Kim and Harris 1996). For the purposes of
 42 evaluating the potential effects of the Rosemont Copper Mine on nearby property values, there are
 43 several advantages in using the information from the Green Valley study. The study focuses

1 specifically on property value effects associated with copper mining and is based on another
2 community in Pima County, on the other side of the Santa Rita Mountains.

3 One important limitation of the Green Valley study is that the analysis was based on real-estate
4 transactions over a relatively short (4-month) period. Only 20 properties in Green Valley were sold
5 during that period, resulting in an unusually small sample for a hedonic property value study.
6 However, the hedonic models based on those transactions have relatively strong statistical properties,
7 and the estimated effects of proximity to the copper mines are consistently significant from a
8 statistical standpoint.

9 The Green Valley study is now more than 15 years old, and the typical values of residential property
10 in Green Valley may be quite different from typical property values in proximity to the proposed
11 Rosemont Copper Mine. Consequently, the most useful information from the Green Valley study for
12 the purposes of this analysis is the estimated percent change in residential property values at varying
13 distances from the copper mines, rather than the absolute dollar impacts described in the study.
14 The Green Valley study found that, relative to a home situated 10 miles or more from the copper mine
15 tailings banks, homes in closer proximity were decreased in value, as shown below:

- 16 • Within 1 mile of tailings banks: -11 percent
- 17 • 1 to 2 miles from tailings banks: -9 percent
- 18 • 2 to 5 miles from tailings banks: -4 percent

19 These percentages have been used to estimate potential impacts on property values for property in
20 close proximity to the proposed Rosemont Copper Mine.

21 **Premining** — In general, construction activities associated with the mine are expected to have effects
22 similar to those of operations. By changing the land use from an undeveloped setting with a
23 recreation focus to an industrial one, changes in property values would likely begin as local residents
24 and visitors anticipate the mine development and when changes to the landscape resulting from the
25 mine development become apparent.

26 **Active Mining, Final Reclamation, and Closure** — As discussed in the “Community Values and
27 Social Trends” part of this resource section, a shift from a rural, undeveloped landscape to a more
28 industrialized landscape would negatively impact local residents who are seeking a rural residential
29 community and, thus, could impact area property values.

30 The existence of an open-pit copper mine could result in negative impacts on values to neighboring
31 properties from traffic, noise, degraded air quality, congestion, loss of natural open space, and
32 alteration or obstruction of views (Kim and Harris 1996). The Green Valley study found that both
33 dust pollution and viewshed degradation decreased property values “significantly.” More specifically,
34 the impact of dust pollution on property values was determined to be greater than that caused by
35 viewshed degradation. The average property value decrease attributable to both of these factors was
36 estimated to be \$18,000 (in 1992 dollars) (Kim and Harris 1996). This would equate to approximately
37 \$29,400 in 2012. Although these values may not be directly applicable to impacts from the Rosemont
38 Copper Project, the study highlights the potential for decreases in property values for homes in the
39 vicinity of the mine that would experience dust pollution and viewshed degradation.

40 Further research indicates that the effect of industrial site presence on housing prices is only
41 experienced within relatively short distances of the site. Houses within 0.15 mile of an industrial site

1 are predicted to sell at 14.9 percent less than houses located at least 1.4 miles from an industrial site.
 2 Residential properties located greater than 0.6 mile from an industrial site were found to have no
 3 discernible change in property values (de Vor and H.L.F. de Groot 2009). Impacts to residential
 4 property values vary considerably, depending on the location, amenities, housing markets, and size of
 5 the industrial site, etc.

6 The Pima County Assessor’s data indicate there are 163 parcels located within a 1-mile radius from
 7 the center of the proposed mine. Most of these parcels are owned by Rosemont Copper or the Federal
 8 Government (the Coronado); one parcel is owned by the State of Arizona (ASLD); and 11 parcels are
 9 privately owned. There are 170 parcels located between 1 and 2 miles of the center of the proposed
 10 mine, including 54 privately owned parcels. From 2 to 5 miles of the center of the proposed mine,
 11 there is a much larger number of privately owned properties (511) and properties owned by the State
 12 of Arizona (50).

13 Potential effects on property values within 5 miles of the proposed mine were estimated based on the
 14 percentage effects/distance relationship identified from the Green Valley study and the current
 15 property value data for the Rosemont Copper Mine area. These calculations were performed for
 16 privately owned lands and for lands owned by the State of Arizona. The ASLD sometimes sells some
 17 of the lands it controls for residential development and more often leases lands for commercial or
 18 other purposes. Property value impacts were not calculated for federally owned lands managed by the
 19 Coronado to avoid double counting the impacts on these lands based on the tourism and recreation
 20 related effects described in the following resource section. Also, lands owned by Rosemont Copper
 21 would be transformed into income-producing properties, so the impact on those property values was
 22 not calculated.

23 Table 230 summarizes the projected overall impact on property values in proximity of the proposed
 24 mine. In aggregate, the best estimate based on available information is that development of the mine
 25 would reduce the value of privately owned properties within 5 miles by approximately \$3.2 million,
 26 or a little less than 5 percent of their current value. Properties within 1 mile would be the most
 27 affected (11 percent decrease in value), followed by those between 1 and 2 miles of the mine
 28 (9 percent decrease in value). The proposed mine could have a comparable \$3.2 million effect on the
 29 value of lands owned by the State of Arizona should the ASLD seek to sell those lands for residential
 30 development. The value of leasing the State lands for other purposes, such as commercial
 31 development, could also be affected if the mine is developed, but there is no information available to
 32 estimate the magnitude of impacts to lease values (which would likely primarily depend on the types
 33 of use involved in the leases).

34 **Table 230. Projected impact on property values within 5 miles of proposed mine**

Ownership	Total \$	Number	Average \$	Percent Change
State of Arizona	-\$3,241,843	60	-\$54,031	-4.6%
Private Ownership	-\$3,220,515	576	-\$5,574	-4.8%
Total	-\$6,469,112	639	-\$10,124	-4.7%

35 Source: BBC Research and Consulting (2013).

36 These estimates of potential effects on property values should be considered order of magnitude, best
 37 estimates based on relatively limited information. Unlike the results of an original hedonic property
 38 value study of the area (after mining has commenced), which would use data from actual market
 39 transactions to retrospectively estimate effects on property values, these estimates are based on

1 transferring the estimated percent impacts from the Green Valley study to the properties surrounding
2 the proposed project area. While the actual effects on property values could be considerably larger or
3 considerably smaller than these estimates, there is sufficient information from both the Green Valley
4 study and other previous hedonic property value studies to conclude that adverse effects on the value
5 of nearby residential properties are likely if the mine is developed.

6 The Green Valley study does not provide any information regarding effects on the values of more
7 distant properties. This does not rule out the possibility that values of properties farther from the
8 mine, such as homes or ranches in the Sonoita or Patagonia areas, could also be affected if the
9 proposed mine is developed. The potential reduction in amenity-based migration, discussed
10 previously in this resource section, would tend to reduce demand for housing in the area. That effect
11 could, however, potentially be offset by new demand for housing from workers associated with the
12 proposed mine, since an indefinite number of employees may relocate to the area.

13 It should also be noted that the potential impacts on property values described above primarily reflect
14 the possible decrease in the scenic qualities of the properties and possible effects from windborne
15 dust emanating from the proposed mine. There is also the potential that the proposed mine might
16 affect nearby groundwater wells that supply water to properties in the area (see the “Groundwater
17 Quantity” resource section of chapter 3). If the proposed mine were to result in the loss of water
18 supply to some of the properties that were not mitigated through participation in one of the Well
19 Owners Agreements, they would likely suffer additional decreases in value that could be greater than
20 the effects described in the preceding analysis.

21 Previous research on nonrenewable energy development and property values has shown that declines
22 in property values surrounding oil and gas drilling activities tended to rebound during initial phases
23 of operation. Communities adjacent to oil and gas drilling activities in western Colorado reportedly
24 endured a decline in property values upon announcement of drilling and during the initial stages of
25 extraction. However, property values rebounded, at least partly, once production was underway
26 (U.S. Department of Energy and Bureau of Land Management 2010). It is uncertain whether
27 decreases in well water were figured into the property value impacts analysis in this previous
28 research. Property values would be less likely to rebound if domestic wells that supply the residential
29 homes were impacted over the long term. Therefore, if any of the residences within the 5-mile radius
30 of the project area experienced a drawdown of their wells that would require modifications to wells to
31 ensure water availability and these modifications were not mitigated through participation in one of
32 the Well Owners Agreements, it is unlikely that property values would rebound throughout the life of
33 the mine.

34 Based on the potential effects on property values, the potential reduction in annual property tax
35 revenues to local governments is estimated to be a little less than \$44,000. Table 231 summarizes the
36 analysis of potential effects on property tax revenues.

37 As discussed previously, if the proposed mine were to result in the loss of water supply to some of the
38 properties within the 5-mile radius that were not mitigated, there would likely be additional
39 reductions in property values and in corresponding property tax revenues for local governments.

40

1 **Table 231. Projected effects on annual property tax revenues within 5 miles of proposed mine**

Metric	0 to 1 Mile	1 to 2 Miles	2 to 5 Miles	Total
Property value	\$3,134,516	\$5,838,028	\$58,757,388	\$67,729,932
Assessed value	\$322,238	\$662,793	\$7,560,443	\$8,545,585
Tax rate*	11.00%	11.00%	11.00%	11.00%
Annual tax revenue	\$35,446	\$72,907	\$831,661	\$940,014
Potential impact [†]	-11%	-9%	-4%	NA
Potential tax effect	-\$3,899	-\$6,562	-\$33,266	-\$43,727

2 Source: BBC Research and Consulting (2013).

3 Note: NA = Not available.

4 * Based on review of Pima County Assessor's information for several tax areas within the 5-mile radius.

5 † Based on prior hedonic valuation studies, as discussed in preceding narrative.

6 Property values do have the potential to increase under conditions of moderate population growth and
7 housing demand. In studies where expansion of the local employment occurred as a result of a new
8 industrial facility operation, a positive impact on property values was found to be associated with an
9 increase in the demand for local housing (U.S. Department of Energy and Bureau of Land
10 Management 2010). Analysis of the impacts of an open-pit gold mine in New Zealand indicated that
11 that there could be a positive impact to property values from increased area employment
12 opportunities (Gamby and Reid 2005). Additionally, research by Hand et al. (2008a; 2008b) indicates
13 that proximity to forest resources positively influences property value. However, the operation of the
14 copper mine would have little impact on housing demand, based on the existing housing vacancy
15 rates and the small number of workers anticipated to relocate to the area.

16 ***Recreation and Tourism***

17 The Coronado received numerous comments on the socioeconomic analysis contained in the DEIS.
18 One of the primary criticisms levied was the lack of analysis of the potential negative economic
19 effects of the proposed mine, particularly on recreation and tourism, the astronomy industry, and
20 quality of life. The analyses contained in this section reflect an effort to quantify these negative
21 economic impacts. However, it should be noted that these analyses are fundamentally different from
22 other economic analyses presented previously, such as income, tax revenue, and employment.
23 Decisions concerning recreation, tourism, and quality of life are based on highly personal, subjective
24 judgments. For instance, whereas a long-time resident of the area may find the presence of a mine
25 highly undesirable because he or she personally recalls the area as it was before the mine and prefers
26 the area in an undeveloped condition, a temporary visitor to the area might not find anything
27 abnormal or undesirable about the presence of the mine but in many cases would simply take the
28 presence of the mine for granted. As another example, a person raised in a mining community might
29 find relocating and living in a community in the vicinity of a mine to be desirable, whereas others
30 find rural landscapes and available undeveloped forest lands to be desirable for relocation. Negative
31 economic analyses are not often undertaken in the course of preparing NEPA documentation because
32 of the inherent difficulty in predicting the vagaries of human nature and subjective preference.
33 Therefore, while the negative economic effects presented are based on the best available techniques,
34 with all assumptions explicitly noted, they carry with them a high level of uncertainty.

35 **Premining** — Area public lands are seen as important economic assets that support local and
36 regional economic stability. The Coronado provides key environmental amenities that are important
37 contributors to the recreation and tourism identity of the analysis area. Construction traffic, visual

1 changes, and increased noise and dust may affect recreationists (see the “Recreation and Wilderness”
2 resource section of chapter 3), and they may choose to stop recreating in the region. However, placing
3 a number on the amount of visitors who would choose not to come to the area as a result of the mine
4 would be speculative.

5 The extent to which visitor use and associated spending (i.e., off-highway vehicle use (see table 224),
6 hunting and fishing (see table 225), or overall tourism industry output (see table 226)) would be
7 displaced by the open-pit copper mine is difficult to predict and quantify (Marlow 2007).

8 As reflected in the tables noted above, visitor spending contributes a substantial amount of money to
9 the local economy on an annual basis. The total direct economic impacts from the tourism and
10 outdoor recreation in Pima and Santa Cruz Counties totaled \$2.95 billion in 2006. As a general
11 comparison, if the proposed project displaced 1 percent of the tourism and outdoor recreation, the
12 economic losses may be greater than the annual payroll of the proposed project during operations
13 (Marlow 2007).

14 Tourism related output is based on visitor use and trip expenditures by recreationists and other
15 visitors. As discussed in the “Recreation and Wilderness” resource section, the public would be
16 displaced from between 4,890 and 7,316 acres of recreational lands over the life of the mine,
17 depending on which alternative is selected (the proposed action would affect approximately 4,890
18 acres of recreational lands).

19 **Active Mining, Final Reclamation, and Closure** — In the analysis area, particularly in the
20 communities of Sonoita, Elgin, and Patagonia, there are numerous tourist destinations that rely almost
21 exclusively on the area’s natural amenities; these include guest ranches, motels, and numerous
22 wineries and bed-and-breakfast inns. These local destinations enjoy proximity to open spaces, scenic
23 landscapes, and access to the Coronado National Forest for hiking, biking, etc.

24 As discussed in the “Recreation and Wilderness” resource section, area recreationists would be
25 displaced from the project footprint for the life of the project. In addition to a direct loss of recreation
26 opportunities, recreationists could be directly impacted as a result of the diminished recreation setting
27 and loss of scenic landscapes, as well as noise and dust from equipment operation. Recreationists and
28 area users are expected to avoid the mine and areas that are impacted visually or otherwise; however,
29 they are not expected to stop recreating in the area altogether. As indicated in the “Recreation and
30 Tourism – Premining” part of this resource section, predicting how many recreationists or tourists
31 would be displaced by the proposed action is not possible. But even the slightest decrease (1 percent)
32 in recreation activity in the area may result in annual economic losses greater than the annual
33 operative payroll for the proposed project (Marlow 2007).

34 Three studies conducted in Colorado suggest that a perceived degradation of the scenic quality of the
35 landscape may result in a 15 to 50 percent net reduction in tourist visits and in corresponding tourist
36 spending (Gunnison County (Orens and Seidl 2004), Routt County ((Ellingson et al. 2006), and
37 Chaffee County (Cline and Seidl 2008)). This range of estimated contingent behavioral response was
38 applied to the baseline, nature-based tourism economic data described previously to project potential
39 effects on tourism and the tourism related economy for both the Patagonia Census County Division
40 and the greater Tucson area. Because mine development and mine tailings may be more unappealing
41 to tourists than the residential and commercial development scenarios explored in the Colorado
42 studies, it is likely that the impacts would tend toward the upper end of the range from those studies.

1 For the Patagonia Census County Division, the principal concern is the proposed mine’s effect on
 2 travel and tourism via SR 83, since the mine would generally not be visible from the tourism-based
 3 communities of Sonoita, Patagonia, or Elgin. Although the mine would only be visible from portions
 4 of SR 83 (between 3.4 and 4.9 miles out of the 25 total miles from I-10 to Sonoita), the mine would
 5 be clearly visible from some of the most scenic stretches of the highway (refer to the “Visual
 6 Resources” resource section in this chapter for more information). Moreover, apart from a decrease in
 7 the scenic quality of the road, tourists would also have to contend with truck traffic associated with
 8 mining activities. With these considerations in mind, it is reasonable to anticipate a 15 to 50 percent
 9 reduction in tourist travel to the Patagonia Census County Division tourist communities via SR 83
 10 based on the Colorado studies described previously.

11 However, traffic count data indicate that SR 83 accounts for approximately 50 percent of travel to and
 12 from Sonoita, with SR 82 accounting for the remainder (Arizona Department of Transportation
 13 2010). Assuming that tourist travel to Sonoita, Patagonia, and Elgin via SR 82 would not be affected
 14 by the mine, the estimated overall impact on nature-based tourism and tourist related economic
 15 activity is represented by the following equation: $(-15\% \text{ to } -50\%) \times 50\% = -7.5\% \text{ to } -25\%$. This
 16 would result in a potential loss of 14 to 46 jobs and an annual decrease in visitor spending of \$2.0
 17 million to \$6.8 million. This potential reduction in visitor spending corresponds to an annual direct
 18 impact on economic output in Santa Cruz County of between \$1.0 million and \$3.3 million. It should
 19 be noted that output reflects the value of industry production and is less than visitor spending because
 20 output for retail sectors only reflects the retail margin (not including the value for manufacturing and
 21 wholesale trade, which primarily occurs outside the analysis area), whereas visitor spending reflects
 22 the total retail price. The annual direct impacts to visitor spending and travel related employment in
 23 the Patagonia Census County Division are displayed in table 232.

24 **Table 232. Annual direct impacts to tourism in the Patagonia Census County Division**

Existing Conditions		
	Visitor Spending (millions of \$)	Jobs
All tourism	41	275
Nature-based tourism	27.2	183
Potential Impacts		
	Spending Reduction (millions of \$)	Job Reduction
All alternatives	2.0 to 6.8	14 to 46
Impact as a percentage of nature-based tourism	7.5 to 25%	7.5 to 25%
Impact as a percentage of all tourism	5 to 17%	5 to 17%

25 Source: BBC Research and Consulting (2013).

26 Note: These impacts represent changes in tourist activity among overnight visitors and day trip visitors.

27 The secondary (indirect and induced) effects were estimated at the county level using IMPLAN,
 28 input-output software originally developed for the Forest Service. The model was constructed by
 29 applying the reduction in visitor spending (shown in table 232) to the 2010 “visitor spending by
 30 commodity purchased” distribution for Santa Cruz County, as reported in the 2011 Dean Runyan
 31 Associates travel impacts report. Based on this IMPLAN analysis, the combined indirect and induced
 32 effects of the reduction in nature-based visitor spending would result in an additional reduction of

1 three to 11 jobs and an additional \$369,000 to \$1.13 million reduction in economic output for Santa
2 Cruz County as a whole (BBC Research and Consulting 2013; Minnesota IMPLAN Group 2008).

3 Combining direct and secondary economic impacts, potential annual total economic losses in Santa
4 Cruz County from reduced tourism activity are estimated at between 17 and 57 jobs and at between
5 \$1.4 million and \$4.4 million in economic output.

6 For the greater Tucson area, the annual direct economic contribution of nature-based tourism was
7 estimated to be approximately \$683.4 million and 6,800 jobs. For purposes of this analysis, it is
8 assumed that all of the nature-based tourism can be attributed to the public lands within a 60-mile
9 radius of Tucson and that the relative contribution of those lands to overall nature-based tourism in
10 the greater Tucson area can be apportioned among these lands based on annual visitation to each area.

11 For example, the Nogales Ranger District of the Coronado National Forest (where the proposed mine
12 would be located) accounts for approximately 6.1 percent of all recreation visits to public lands in the
13 greater Tucson area. Consequently, we attribute 6.1 percent of the overall economic contribution from
14 nature-based tourism in the area, or approximately \$41.8 million per year in direct economic output
15 and 419 jobs, to the existence and quality of the lands in the Nogales Ranger District. The analysis in
16 the “Visual Resources” section in chapter 3 indicates that the mine would be visible from
17 approximately 13,700 acres out of the 352,300 acres (or 4 percent of the land area) within the
18 Nogales Ranger District under the proposed action. Applying this proportion to the estimated
19 contribution of the Nogales Ranger District to nature-based tourism in the Tucson area, it is estimated
20 that the proportion of the Nogales Ranger District from which the mine would be visible (4 percent)
21 accounts for approximately \$1.6 million in direct economic output from tourism and about 16 jobs.

22 Based on the contingent tourist behavior estimates discussed earlier, the aesthetic changes associated
23 with development of the mine could reduce the contribution of public lands such as the Nogales
24 Ranger District to nature-based tourism by between 15 and 50 percent. However, this impact is likely
25 to diminish as distance from the mine increases. A linear decrease with approximate distance was
26 assumed, such that the effect on lands within a 10- to 20-mile radius from the mine (midpoint
27 distance 15 miles) is one-third of the effect within a 10-mile distance (midpoint distance 5 miles).
28 The effect within a 20- to 30-mile radius (midpoint distance 25 miles) would be one-fifth of the effect
29 within the 10-mile radius. Thus, the potential range of impacts would be as follows:

- 30 • 0 to 10 miles: 15 to 50 percent reduction within viewshed
- 31 • 11 to 20 miles: 5 to 17 percent reduction within viewshed
- 32 • 21 to 30 miles: 3 to 10 percent reduction within viewshed
- 33 • Beyond 30 miles: No quantifiable effect

34 In the Nogales Ranger District, 13,400 acres within the viewshed of the mine under the proposed
35 action are less than 10 miles from the mine, and the remaining 300 acres within the viewshed are
36 between 11 and 20 miles of the mine. Based on the tourist response outlined above, development of
37 the mine could reduce the economic contribution of the Nogales Ranger District to nature-based
38 tourism in the greater Tucson area by between \$240,700 and \$803,800 per year (and between 2 and 8
39 jobs) under the proposed action.

40 The same methodology was applied to all of the public lands in the greater Tucson area that would be
41 within the viewshed of the proposed mine under each of the alternatives developed for the FEIS.
42 Apart from the Nogales Ranger District, other public lands where views were projected to potentially

1 impact tourism include the Santa Catalina Ranger District, Las Cienegas National Conservation Area,
 2 and Saguaro National Park. Overall, the potential direct economic effects on nature-based tourism
 3 visitor spending in the greater Tucson area were estimated at between \$1.0 million and \$5.5 million
 4 per year. This corresponds to an annual impact on regional economic output of between \$791,500 and
 5 \$4.1 million, again excluding the wholesale cost of retail goods. The direct employment effects were
 6 estimated at between 11 and 55 jobs. These estimates reflect the range of impacts on visitor spending
 7 across all five alternatives, as shown in table 233. The results for the alternatives differ based on their
 8 varying viewsheds, or the different areas and distances from which tailings or other mine activity
 9 could be seen under each alternative. It should be noted that the visual resources impact analysis in
 10 the FEIS does not predict major visual impacts from many of the viewpoints within the viewshed of
 11 the proposed mine. Thus, the potential impact that aesthetic changes would have on nature-based
 12 tourism has a high level of uncertainty, which accounts for the wide range in impacts described here.

13 **Table 233. Direct impacts to nature-based tourism, greater Tucson area**

Existing Conditions				
	Greater Tucson Overnight Visitors	Visitor Spending (millions of \$)	Jobs	
All tourism	6,800,000	2,733	27,310	
Nature-based tourism	1,700,000	683	6,828	
Potential Impacts				
	Visitation Reduction	Spending Reduction (millions of \$)	Job Reduction	Percent Impact on Nature-Based Tourism
Proposed action	2,843 to 9,509	1.1 to 3.8	11 to 38	0.2 to 0.6%
Phased Tailings	2,630 to 8,793	1.0 to 3.6	11 to 35	0.2 to 0.5%
Barrel	3,461 to 11,568	1.4 to 4.7	14 to 46	0.2 to 0.7%
Barrel Trail	4,015 to 13,415	1.6 to 5.4	16 to 54	0.2 to 0.8%
Scholefield-McCleary	4,070 to 13,600	1.6 to 5.5	16 to 55	0.2 to 0.8%

14 Source: BBC Research and Consulting (2013).

15 Notes:

16 Additional details regarding these impacts are shown in appendix A.

17 These impacts represent changes in tourist activity among overnight visitors.

18 The secondary (indirect and induced) effects for each alternative were estimated using an IMPLAN
 19 model for a combined analysis area of Pima, Santa Cruz, and Cochise Counties. Again, the analysis
 20 applied the reduction in visitor spending (shown in table 232) to the 2010 “visitor spending by
 21 commodity purchased” distribution for the three-county area as reported in the 2011 Dean Runyan
 22 Associates travel impacts report. The results of this IMPLAN analysis are displayed in table 234
 23 (BBC Research and Consulting 2013; Minnesota IMPLAN Group 2008).

24 The indirect and induced effects of the decline in nature-based travel in the greater Tucson area
 25 suggest an additional employment reduction of four to 22 jobs and an additional output reduction of
 26 \$472,600 to \$2.4 million. Combining direct and secondary economic impacts, potential annual total
 27 economic losses in the greater Tucson area from reduced tourism activity are estimated at between 15
 28 and 77 jobs and at between \$1.2 million and \$6.5 million in economic output. The distribution of
 29 these impacts among individual communities within the three-county area is unknown.

1 **Table 234. Secondary effects of reduction in nature-based tourism, greater Tucson area**

	Job Reduction	Output Reduction
Proposed action	5 to 15	\$510,946 to \$1,708,739
Phased Tailings	4 to 14	\$472,599 to \$1,580,228
Barrel	5 to 19	\$621,937 to \$2,078,885
Barrel Trail	6 to 22	\$721,469 to \$2,410,730
Scholefield-McCleary	6 to 22	\$731,404 to \$2,443,922

2 Sources: IMPLAN (2008); BBC Research and Consulting (2013).

3 Notes:

4 Output reflects the value of tourism industry production. Output is less than visitor spending because output for retail sectors
 5 only reflects the retail margin (not including the value for manufacturing and wholesale trade, much of which occurs outside
 6 the study area), whereas visitor spending reflects the total retail price.

7 Although area communities rely on proximity to the Coronado National Forest and associated
 8 environmental amenities and operation of the mine would result in displaced recreationists at the
 9 mine footprint during premining and active mining phases, numerous additional recreation
 10 opportunities exist in the region that tourists and recreationists are expected to visit. However, under
 11 the action alternatives, it is estimated that tourism numbers in the greater Tucson could potentially be
 12 reduced by 2,843 to 13,600 visits per year as a result of mine construction, operation, and
 13 reclamation.

14 ***Astronomy and Dark Skies***

15 According to the “Dark Skies” analysis, there could be adverse impacts to dark sky visibility at the
 16 Whipple and Jarnac Observatories as a result of light pollution and dust emissions emanating from
 17 the mine. The equipment’s ability to locate and track fainter targets, which are often the ones of
 18 greatest interest for astronomical research, diminishes with increasing light levels. New and more
 19 sensitive instruments and longer exposures (which increase operating costs), can be required to
 20 maintain effective observations. Adverse impacts to these world-class astronomy research facilities
 21 could have long-term, adverse impacts on the economic contributions of the astronomy, planetary,
 22 and space sciences. As indicated in the “Astronomy and Dark Skies” affected environment part of this
 23 resource section, the total economic impact (sales and output) of the research operations totaled
 24 \$252.8 million dollars in fiscal year 2006. The total economic contributions are distributed between
 25 30 observatories and related technology facilities, according to the Arizona Arts, Sciences, and
 26 Technology Academy (2007) report. Should the adverse impacts from the proposed mining
 27 construction and operation cause impairments or render the Whipple and/or Jarnac Observatories
 28 inoperable, the overall economic contributions to the State could decrease accordingly.

29 From an economic standpoint, the perceptual issues associated with increasing light pollution (and/or
 30 closer proximity to development) may be just as important, at least in the short term. Major
 31 observatories like the Whipple Observatory compete on an international scale for funds from Federal
 32 agencies, academic institutions, and other sources. These facilities also compete to attract academic
 33 researchers, who come from all over the globe. Major competitors include observatories in Hawaii
 34 and in Chile, which has recently declared astronomy a “strategic area” and taken strong policy
 35 measures to prevent activities such as mining, geothermal, and water development to maintain
 36 pristine conditions for local observatories (Feder 2012).

37 The perception of the light glow from the mine could have an unknown effect on its ability to
 38 compete for grants. There has been extensive growth and economic development in Pima County

1 since the observatory was established in the late 1960s. However, a recent study at Kitt Peak has
 2 demonstrated that the lighting ordinances adopted by Tucson and Pima County have been very
 3 effective at decoupling the relationship between development and additional light pollution.
 4 Nighttime illumination at Kitt Peak in 2009/2010 appears to be quite comparable to the level of
 5 illumination experienced 20 years ago and is less than the level of illumination measured 10 years
 6 ago (Neugent and Massey 2011).

7 During 2012, a revised lighting plan for the proposed mine was developed by Monrad Engineering
 8 (Monrad et al. 2012). The revised plan replaced the originally proposed low-pressure sodium lights
 9 and high-pressure sodium lights with two varieties of LED lights, which modeling shows would
 10 produce a significantly lower amount of illumination than the original lighting plan (Dark Sky
 11 Partners LLC 2012). More detailed discussion of this modeling and the potential impacts on night
 12 skies can be found in the “Dark Skies” resource section in this chapter.

13 The night sky modeling and analysis was reviewed by representatives from the Whipple Observatory.
 14 The Whipple Observatory representatives noted that the new lighting plan was a substantial
 15 improvement from the original plan in terms of its impact on the observatory (Garrett 2012).
 16 The increases in illumination under the revised lighting plan generally do not appear to be very
 17 significant from observatory’s perspective, though the observatory representatives noted that any
 18 increase in illumination reduces the effectiveness of observatory’s equipment and potentially
 19 increases costs due to both larger aperture requirements and longer exposure requirements. Additional
 20 dust from the mine may also increase costs due to more frequent cleaning and recoating requirements.

21 The greater concern, however, is the perception associated with the development of a copper mine in
 22 close proximity to the observatory. As noted earlier, the Whipple Observatory competes for funding
 23 and researchers with other major observatories in the United States and abroad. Even if the perceptual
 24 impact diminishes over time because of continuing, successful operations like the Whipple
 25 Observatory, losing funding opportunities in the short term would mean that the observatory’s
 26 equipment would be, at least incrementally, less competitive with the observatories that obtain
 27 funding for new equipment during that time period.

28 Overall, though the incremental impact of the proposed mine lighting on the Whipple Observatory
 29 may not be large, development of the mine would likely increase the risks that the observatory faces
 30 as it seeks to remain competitive. Representatives from the observatory noted that other observatories
 31 that have failed in the past have generally died from “a thousand small cuts,” rather than from a
 32 single event that rendered them noncompetitive and eventually obsolete. It is the possibility that the
 33 cumulative impact from development of the mine, coupled with ongoing population growth and
 34 development in the area, continuing reductions in public funding for scientific purposes, and other
 35 factors that may arise in the future, could tip the balance away from the Whipple Observatory that
 36 poses the greatest concern for the observatory. These risks cannot be reliably quantified.

37 **Quality of Life Conditions**

38 ***Public Facilities and Services***

39 **Premining** — As previously discussed, the majority of the construction workforce is expected to
 40 come from communities within the analysis area. Because of the number of housing vacancies in the
 41 analysis area, there would be adequate housing available for employees who may relocate. Because
 42 the majority of the construction workforce is expected to come from the local workforce, construction
 43 of the mine is not expected to result in an increased demand for public services.

1 **Active Mining, Final Reclamation, and Closure** — As with the premining phase, a majority of the
2 mine operation workforce is assumed to come from communities within the analysis area. Because of
3 the number of housing vacancies in the analysis area and the proximity to the Tucson metropolitan
4 statistical area, there would be adequate housing available for employees who may relocate. Because
5 the majority of the mine operations workforce is expected to come from communities within the
6 analysis area, mine operation is not expected to result in a major increase in demand for public
7 services.

8 The long-term operation of the copper mine has the potential to impact domestic wells in the
9 residential neighborhood along Singing Valley Road west of SR 83 and Hilton Ranch Road east of
10 SR 83, and in the vicinity of the Rosemont Copper water supply wells in Sahuarita. Groundwater
11 drawdowns are likely in these areas, and water availability could be impacted. See the “Groundwater
12 Quantity” resource section for more details on impacts to water quantity. If impacted, there would
13 likely be an increase in domestic and agricultural water pumping costs, although effects may be
14 mitigated if the well owner enrolled in the well owner protection program implemented by Rosemont
15 Copper. No impacts associated with contamination of groundwater resources are expected.
16 The potential impacts could produce economic and social costs. From a social perspective, without an
17 adequate water supply, local residents may experience uncertainty and discomfort in their current
18 quality of life.

19 ***Transportation and Road Maintenance***

20 **Premining** — As stated in the “Transportation/Access” resource section, all action alternatives would
21 increase the heavy-truck traffic, commercial deliveries, and daily commuter trips on SR 83 during the
22 construction phase. The increase in traffic from general population growth and mine related traffic
23 would result in a lower level of service during construction, which means that commute times would
24 be longer. However, all sections along SR 83 and the four analyzed intersections would remain at
25 acceptable levels of service. During construction, an average of 6.2 heavy trucks transporting
26 equipment and construction materials would occur each weekday. Thus, local residents who use SR
27 83 would experience more construction related traffic and longer commute times. Other roads in the
28 analysis area would not experience decreases in level of service.

29 **Active Mining, Final Reclamation, and Closure** — Mine operation is expected to increase traffic
30 along SR 83, particularly truck traffic. In general, passenger cars are considered to have no
31 measurable impact to the service life of pavement or asphalt. Thus, traffic changes that could impact
32 road maintenance are expected to come from haul traffic from the mine.

33 Experiments conducted by the American Association of State Highway and Transportation Officials
34 (Federal Highway Administration 2011) have shown that heavily loaded trucks can do much more
35 damage to road surface than a normal passenger car on a paved surface. As indicated in the
36 “Transportation/Access” resource section, truck traffic would increase throughout the life of the
37 project from materials deliveries to the mine site and copper concentrate and/or cathode deliveries.
38 Material deliveries to the mine site would primarily originate from the Tucson area using I-10 and
39 SR 83. Copper concentrate and/or cathode deliveries could use a variety of routes to reach smelters in
40 Mexico or the Port of Tucson, depending on the location of the buyer. However, the majority of the
41 increase in truck traffic would most likely occur on SR 83 between the mine site and I-10. This
42 increase in heavily loaded trucks would likely increase maintenance needs along SR 83, according to
43 previous experience. However, as stated in the “Transportation/Access” resource section, baseline
44 conditions of SR 83 are not currently known, and damages resulting from the proposed action would
45 be difficult to quantify because of the lack of baseline data.

1 Funding for maintenance costs on the section of SR 83 from milepost 46 north to I-10 required a total
2 of \$106,408.63 from October 2004 through October 2007. With increases in traffic, and specifically
3 heavy-truck traffic, on this section of roadway throughout the life of the proposed project,
4 maintenance costs would likely increase (Marlow 2007). Fuel taxes that are paid on every gallon of
5 fuel that goes into the haul trucks provides funding for maintenance of State roads.

6 ADOT oversees road maintenance and provides funding for maintenance on all State highways.
7 ADOT would be responsible for evaluating when maintenance would be required and determining
8 how that maintenance would be funded. ADOT has determined that additional roadway work would
9 be necessary in order to accommodate the identified increase in type and volume of traffic.
10 The additional roadway work includes a 3-inch asphaltic concrete pavement overlay, guardrail height
11 modification to accommodate the overlay, and new pavement striping and signing—all to be
12 accomplished between approximately the primary access road intersection and the interchange at
13 I-10. Such features are designed to enhance roadway safety and address any traffic problems that the
14 intersection may cause.

15 The fuel tax generated in the State of Arizona is disbursed to ADOT and funds road maintenance.
16 The Arizona tax on gasoline is \$0.18 per gallon for motor vehicle fuel and \$0.26 per gallon for heavy
17 trucks, vehicles over 26,000 pounds, and those that have two or more axles (Arizona Department of
18 Transportation 2011). Over the life of the project, the increases in project related vehicle traffic would
19 result in an increase in fuel purchases. The increase in fuel tax generated as a result of the proposed
20 project would lead to increased tax revenues and funding for road maintenance projects.

21 Further, ADOT would require Rosemont Copper to complete an encroachment permit as they tie their
22 access road into SR 83. Rosemont Copper would be required to make highway improvements
23 associated with approval and issuance of the encroachment permit. These include funding an asphalt
24 overlay from the junction of the primary access road to I-10, restriping, raising guard rails and signed
25 to accommodate the new pavement height, and paving three existing pullouts for school bus use.
26 These improvements would reduce the need for publicly funded road maintenance or fuel tax funded
27 maintenance for a period of time.

28 In addition to road maintenance costs, other societal costs of motor vehicle transportation could be
29 incurred as a result of the proposed project. While employees commuting to and from work would
30 generate direct expenses such as fuel, maintenance, insurance, and vehicle registration fees, increases
31 in driving, in general, increase costs to society as a whole. These could include accidents, parking,
32 waste disposal, air pollution (health costs, trees, and crops), increase in CO₂, traffic noise, and barrier
33 effects on pedestrians and bicycles (Marlow 2007). These societal costs, estimated at \$0.36 per mile,
34 would amount to approximately \$456,000 per year, considering that estimated weekly trips (including
35 delivery trucks and employee commutes) on SR 83 between the I-10 junction and the mine site would
36 total approximately 1,267,969 vehicle miles traveled (Marlow 2007). See the “Transportation/
37 Access” section of this chapter for more details on the proposed mine’s potential impacts on traffic;
38 and the “Air Quality and Climate Change;” “Noise;” “Recreation and Wilderness;” and “Public
39 Health and Safety” resource sections of this chapter for further information on the impact of
40 increased traffic on these resources.

41 ***Community Values and Social Trends***

42 **Premining** — As previously discussed, residents and area communities have physical and emotional
43 connections to lands on the Coronado National Forest and other public lands. People value proximity
44 and access to the forest because of the recreation opportunities and natural amenities, which enhance

1 overall quality of life. Approximately 63 percent of the lands that surround the Tucson metropolitan
2 area are public lands, and it is these lands that provide a foundation for the area’s recreation and
3 visitor economy and shape how local residents identify with the landscape. The public investment in
4 the public lands that define the area is currently valued at \$2.3 billion (Power 2010). Changes to the
5 public lands that attract visitors and provide for an attractive quality of life for local residents would
6 have the potential to decrease the public investment value of the lands as well as the sense of place
7 that these public lands provide to residents and visitors.

8 Residences closest to the proposed mine would likely experience impacts to their current quality of
9 life. Increases in heavy-truck traffic, changes in noise levels, and changes to the landscape may
10 change the rural ambience of the area. During the premining phase, traffic would increase along SR
11 83, which could result in longer commute times for residents traveling to or from area communities
12 (i.e., Patagonia, Elgin, and Sonoita). However, levels of service are expected to remain at acceptable
13 levels (see the “Transportation/Access” resource section in this chapter for more information).

14 Additionally, noise levels for the maximum construction scenario are expected to be less than
15 40 dBA at all residential receptor locations during the construction phase, which is below the selected
16 threshold of 65 dBA (see the “Noise” resource section in this chapter for detailed information on
17 receptor locations and analysis results). Noise from maximum surface blasting during construction is
18 not expected to exceed the selected threshold for residential receptors but is expected to exceed the
19 selected threshold at almost all recreational locations where noise levels were modeled.

20 From a visual perspective, construction activity would cause short-term impacts to the landscape,
21 including dust, ground surface disturbances that would remove vegetation, remove or disturb topsoil,
22 and expose rock and/or underlying soil. Construction would also include initial development of the
23 pit, construction of numerous mine buildings, access roads, maintenance road, transmission lines,
24 water line, and other infrastructure (see the “Visual Resources” resource section). These changes may
25 contribute to an overall change in the sense of place for members in nearby communities.
26 The changes in the viewshed, from an undeveloped setting to an industrial facilities setting, have the
27 potential to decrease the scenic quality of the area and adversely impact residents and visitors who
28 value the undeveloped setting and the rural residential community.

29 Recreation experiences can contribute to a person’s overall quality of life and/or shape identity and
30 self-perceptions. Individuals seeking solitude and a primitive recreation experience may be negatively
31 impacted by both the views and noise created by construction activities.

32 **Active Mining, Final Reclamation, and Closure** — As with the premining phase, communities
33 closest to the proposed mine would likely experience impacts to their current quality of life. Over the
34 life of the mine, traffic would increase along SR 83 as ore is hauled from the site and supplies are
35 hauled to, and employees travel to, the site (see the “Transportation/Access” resource section).
36 The amount of truck traffic would increase during production, compared with the premining phase of
37 the mine, as a result of the number of copper concentrate and/or cathode shipments and trucks
38 carrying supplies to the mine. Similar to impacts during premining, these changes in traffic patterns
39 could result in longer commute times for residents traveling to or from area communities
40 (i.e., Patagonia, Elgin, and Sonoita). However, levels of service are expected to remain at acceptable
41 levels. Additionally, many area residents and tourists treasure the experience of traveling through the
42 landscape on SR 83 and have expressed concern that additional mine traffic would impact enjoyment
43 of this scenic route (refer to the “Recreation and Wilderness” and “Visual Resources” resource
44 sections in this chapter for further information).

1 Mine operations are expected to cause long-term potential impacts to the landscape from the growing,
 2 rising, and laterally extending waste rock and tailings, along with the expanding, visible portions of
 3 the open pit and pit face. There would also be impacts to the landscape from mine infrastructure, such
 4 as the processing plant, access road, and transmission line towers. The change to the visual landscape
 5 would remain for the life of the project. The “Visual Resources” resource section of this chapter
 6 contains more detailed information on the proposed mine’s potential impact to the landscape.

7 Noise levels during mine operations would increase ambient noise levels but are not expected to
 8 impact any residential receptors above the selected thresholds. However, recreational users would
 9 experience noise levels from blasting and from equipment operation that would exceed the selected
 10 threshold of 40 dBA. Noise levels would be particularly noticeable in the areas near the mine’s
 11 perimeter fence and in dispersed camping locations along forest roads immediately surrounding the
 12 project. Similarly, negative changes to ambient noise levels (see the “Noise” resource section) and
 13 visual resources (see the “Visual Resources” resource section) are expected during mine operation, as
 14 described above for the premining phase. However, more so than during the construction phase,
 15 changes in traffic, noise, dust, and visual quality during mine operation could change community
 16 well-being and sense of place, particularly for those communities closest to the mine, such as Sonoita,
 17 Elgin, Patagonia, Sahuarita, and Corona de Tucson.

18 The amount of vehicle truck traffic would decrease during production and postproduction, compared
 19 with the construction phase of the mine. The change to the visual landscape would remain in
 20 perpetuity, although visual impacts may soften somewhat as vegetation becomes reestablished.
 21 Operation of the mine may result in a change in an individuals’ identification with the area, as the
 22 mine would change the existing land use from one they have historically identified with to an
 23 industrialized land use. The long-term operation of the mine could lead to a change in the nearby
 24 communities’ self-perception, from identifying with an area that is rural and moderately developed to
 25 identifying with a place shaped by industry and mining.

26 Residents move to the region because of the rural, undeveloped landscape, and a shift from this
 27 landscape expectation to a more industrialized landscape would negatively impact local residents who
 28 are seeking a rural residential community. Additionally, individuals seeking solitude and a primitive
 29 recreation experience would be negatively impacted by the views and noise from mine operation.
 30 A real or perceived decline in local environmental quality would likely impact community values and
 31 well-being and could also reduce the demand for living in or visiting the area.

32 *Social and Economic Benefits of Amenities* 33 *on the Coronado National Forest*

34 **Premining** — People are drawn to the region to live, work, and play because of the region’s natural
 35 amenities; a real or perceived decline in local environmental quality would likely impact community
 36 values and well-being. Thus, construction activities, as discussed above in the “Community Values
 37 and Social Trends” part of this resource section, would likely result in a negative impact to the social
 38 benefits people derive from the Coronado National Forest’s natural amenities.

39 **Active Mining, Final Reclamation, and Closure** — Similarly, operation of the mine, as discussed
 40 above in the “Community Values and Social Trends” part of this resource section, would likely result
 41 in a negative impact to the social benefits people derive from the forest’s natural amenities.
 42 The industrial nature of the long-term operation may adversely impact those residents of, and visitors
 43 to, the area who have previously identified with the area as an undeveloped, rural landscape. Those
 44 members of the community who have an adverse reaction to a change in their perceived quality of

1 life may choose to move from the area. People who are seeking to relocate to a rural community, such
 2 as Sonoita or Elgin, may not be attracted to the area and could choose to live elsewhere.

3 The proposed Rosemont Copper Mine would have a footprint ranging from 6,073 to 8,889 acres,
 4 most of which would be on publicly owned land primarily in the Coronado National Forest. This loss
 5 of federally owned land available for public use and recreation could adversely impact amenity
 6 migration to the area. Whether or not there could be further negative impacts to amenity migration
 7 because these lands are not only being lost to public use and recreation but also converted into a
 8 surface mine, cannot be determined, based on a 2011 Forest Service analysis (Cordell et al. 2011).

9 Table 235 applies the model from the 2011 Forest Service study to the changes in natural amenities
 10 that would occur under each alternative. Since the Forest Service study was based on rural counties,
 11 the following analysis is limited to Santa Cruz County. Potential impacts to the Patagonia Census
 12 County Division and the greater Tucson metropolitan statistical area are discussed qualitatively.

13 **Table 235. Potential impacts to net migration in Santa Cruz County by alternative**

	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield-McCleary
Acreage of the proposed Rosemont Copper Mine					
Total acres	6,177	6,073	6,990	6,994	8,889
Private land (acres)	1,183	1,183	1,184	1,184	1,573
NFS land (acres)	4,994	4,890	5,806	5,810	7,316
Change in net migration					
Change due to loss in federally owned lands	-38	-37	-43	-43	-44
Change as a percentage of county population	-0.08%	-0.08%	-0.09%	-0.09%	-0.09%

14 Sources: Cordell et al. (2011); Forest Service (2011).

15 Notes:

16 The total population of Santa Cruz County was 47,420 in 2010.

17 The mine site is in Pima County, so no landscape variables (forest, range, mountains, etc.) are expected to change in Santa
 18 Cruz County.

19 Based on the Forest Service model, domestic migration to Santa Cruz County could decline by
 20 38 people per year under the proposed action or by up to 44 people per year under the Scholefield-
 21 McCleary Alternative. This represents less than one-tenth of 1 percent of the county's current
 22 population under all alternatives. A proportional impact in the Patagonia Census County Division
 23 would suggest a decline in domestic migration of 2.5 to 3 people per year. As discussed previously,
 24 the Patagonia Census County Division is more likely to experience amenity migration than the
 25 remainder of the county. For the same reasons, it is also more likely to be adversely impacted by a
 26 decline in amenity migration to the county. To provide a worst-case estimate for the impact to the
 27 Patagonia Census County Division, a scenario was considered in which the countywide change in net
 28 domestic migration occurs entirely within the Patagonia Census County Division. If the entire change
 29 in net domestic migration in Santa Cruz County occurred in the Patagonia Census County Division,
 30 domestic migration would decline by 37 to 44 people per year, which represents 1.2 to 1.4 percent of
 31 the current Census County Division population.

1 This model suggests that over the life of the mine (including construction, operation, and
 2 reclamation), net domestic migration in Santa Cruz County could decrease by approximately 925 to
 3 1,100 persons. The proportional impact to the Patagonia Census County Division would be a 63- to
 4 75-person decrease to net domestic migration. Using population projections from the Arizona Office
 5 of Employment and Population Statistics, these potential impacts to overall population growth in
 6 Santa Cruz County and the Patagonia Census County Division were estimated between 2010 and
 7 2035. Table 236 displays these results, along with a maximum impact estimate for Patagonia Census
 8 County Division that assumes that all Santa Cruz County impacts would occur within the Patagonia
 9 Census County Division.

10 Overall, the potential impact to amenity migration in Santa Cruz County and the Patagonia Census
 11 County Division could slow population growth but is not projected to result in population decline.
 12 In Santa Cruz County, population increase could be reduced from the projected 58 to 56 percent if the
 13 mine is approved. In the Patagonia Census County Division, the proportional impact suggests that the
 14 future population increase could be reduced from 52 to 50 percent over the life of the mine. If the
 15 entire change in net domestic migration in Santa Cruz County occurred in the Patagonia Census
 16 County Division, the population increase could be reduced to as little as 23 percent under the
 17 proposed action or to 18 percent under the Scholefield-McCleary Alternative. The specification of the
 18 Forest Service model used to estimate the amenity-based migration effects implies that these effects
 19 would continue to build over time, even after the end of active mining.

20 **Table 236. Projected population increase, 2010 to 2035**

	Santa Cruz County	Patagonia Census County Division (proportional impact)	Patagonia Census County Division (maximum impact)
No action	58%	52%	52%
Proposed action	56%	50%	23%
Phased Tailings	56%	50%	23%
Barrel	56%	50%	19%
Barrel Trail	56%	50%	19%
Scholefield-McCleary	56%	50%	18%

21 Sources: Arizona Department of Administration (2012a); BBC Research and Consulting (2013); U.S. Census Bureau
 22 (2010i).

23 Note: The most recent population projections available were forecasted in 2006.

24 The estimated impact to migration decisions would also have economic implications for the
 25 Patagonia Census County Division and Santa Cruz County. Any form of population decline (or lost
 26 opportunity for population growth) would result in a corresponding decrease in demand for products
 27 and services. The induced effects of the change in household spending resulting from the change in
 28 net migration were analyzed using an IMPLAN model for Santa Cruz County. An annual reduction in
 29 new residents of 37 to 44 people would result in an annual reduction of total personal income within
 30 the county of \$927,000 to \$1.1 million, based on the per capita income of Santa Cruz County of
 31 \$25,056 (Bureau of Economic Analysis n.d. [2012]). Based on the Forest Service model of net
 32 amenity-based migration, these annual reductions would accumulate over time, so that the effects
 33 after 10 years (for example) would be 10 times the incremental annual effects. The economic impact

of these reductions in population growth and corresponding reductions in local demand for household goods and services is displayed in table 237 in terms of employment and output.¹

Table 237. Induced effects of changes in net migration in Santa Cruz County

	Employment Reduction	Output Reduction (millions of dollars)
Year 1	5 to 6	\$0.54 to \$0.59
Year 15	76 to 84	\$8.05 to \$8.86
Year 25	127 to 140	\$13.42 to \$14.77

Sources: BBC Research and Consulting (2013); Minnesota IMPLAN Group (2008).

Notes:

The change in income was assumed to occur in households with an income of \$35,000 to \$50,000 since the median household income of Santa Cruz County is \$36,519 (U.S. Census Bureau 2010e).

Year 1 is first year of the premining phase period, year 15 is mid-point of projected active mining phase, and year 25 is near the end of projected active mining.

Although the Forest Service model cannot be applied to Pima County, which is considered a metropolitan county, impacts anticipated on amenity migration to the greater Tucson area are expected to be negligible. In general, the economies of metropolitan areas are more dynamic and factors influencing domestic net migration more varied than in rural counties. Even if the analysis considered an application of the Forest Service model to Pima County, the impacts would likely be limited: the public land variable is measured as acres per capita, so the impact to Pima County (population 980,263) would be much smaller than the impact to Santa Cruz County; Pima County would lose a small portion of forest and/or rangeland as a result of the mine footprint, but this impact would also be small, relative to the overall population.

This discussion of the potential effects on residential and business location decisions should be considered as a reference point, not a definitive conclusion. Migration trends are subject to a number of other factors that were not considered in the model, including interdependencies of counties, substantial economic shifts in employment (such as the recent recession), changing preferences of migrants, etc. In addition, the model used in this analysis is not specific to southern Arizona, nor was it specifically designed to address land use changes from recreation to mining. As such, the model may over- or underestimate the actual impact of the proposed Rosemont Copper Mine. It should also be noted that this analysis is based only on amenity-based migration and does not consider the possible effects of people relocating to the area for employment at the proposed mine or for employment in support of the proposed mine. Such relocations may offset the loss in amenity-based migration.

Environmental Justice

As described earlier in the “Environmental Justice” affected environment part of this section, there are three communities who have the potential to be disproportionately impacted by the proposed action and action alternatives. These potential environmental justice communities are the Pascua Yaqui Tribe, the Tohono O’odham Nation, and the Hispanic population of Santa Cruz County. Santa Cruz County lies approximately 8 miles south of the project area, and the Pascua Yaqui Tribe is located in Pima County approximately 20 miles northeast of the project area and south of Tucson.

¹ Output is the value of industry production. In most sectors, output is equivalent to gross receipts; in the retail sector, output reflects the retail margin.

1 The Tohono O’odham Nation is located in Pima, Pinal, and Maricopa Counties, and the main
 2 reservation is located approximately 45 miles northwest of the project area.

3 Under all action alternatives, impacts to environmental justice communities would be largely the
 4 same because the physical construction and long-term operation of the copper mine would create an
 5 opportunity that could induce disproportionately high and adverse impacts on human health and/or
 6 the environmental conditions of minority populations. For detailed differences between alternatives
 7 by resource, see the respective resource analyses in the “Environmental Consequences” parts of each
 8 resource section.

9 For many resources, potential adverse impacts resulting from the copper mine would be specific to
 10 the project area and would not affect potential environmental justice communities. These resources
 11 are geology, livestock grazing, paleontology, soils, dark skies, and vegetation. Resources that may be
 12 subject to adverse impacts as a result of the copper mine and that may have subsequent adverse
 13 impacts to environmental justice communities are as follows: air, biological resources, climate,
 14 cultural resources, land use, noise, recreation, transportation, visual, and water resources.
 15 Consideration regarding whether the action alternatives would result in a disproportionate impact to
 16 environmental justice communities was given to these resources, and a rationale has been provided in
 17 table 238.

18 **Table 238. Potential environmental justice impacts common to all action alternatives**

Resources	Adverse Impact/ Rationale	Disproportionate Impact—Rationale
Air	Yes	No—The potential effects on air quality due to emissions from the proposed action, Phased Tailings, and Barrel Alternatives, in conjunction with nearby source emissions, are expected to result in predicted concentrations in Class I and II areas that are in compliance with the NAAQS limits and would therefore not disproportionately impact environmental justice communities. Under the Barrel Trail and Scholefield-McCleary Alternatives, PM _{2.5} , PM ₁₀ , and NO ₂ NAAQS standards would be exceeded at the perimeter fenceline but would dissipate prior to the Santa Cruz County border. Further, prevailing winds predominantly blow from west to east. Ambient air quality impacts would then be highest at the eastern and western perimeters of the project area.
Climate	Yes	No—Impacts would not be localized to environmental justice communities but would apply to the region as a whole.
Cultural	Yes	Yes—Potential disturbance of ancestral villages, human remains, sacred sites, and traditional resource collecting areas within the project area would adversely impact members of the consulting tribes.
Dark Skies	Yes	No—Impacts would not be localized to environmental justice communities but would apply to the region as a whole.
Geology	No—Impacts limited to project area	No impacts.
Hazardous Materials	No—Materials would be managed in accordance with laws and regulations within project area and transported to appropriate disposal sites	No impacts.
Land Use	Yes	No—Impacts would entail limited land uses within the project area.
Livestock Grazing	No—Impacts limited to project area	No impacts.

Chapter 3. Affected Environment and Environmental Consequences

Resources	Adverse Impact/ Rationale	Disproportionate Impact—Rationale
Noise	Yes	No—Impacts from noise would not be experienced by environmental justice communities because the communities identified are not within audible range of the project area. Noise from traffic along SR 83 did not exceed unacceptable thresholds at monitoring site in Pima County, and impacts would be expected to be similar in Santa Cruz County.
Paleontology	No—Impacts limited to project area	No impacts.
Recreation	Yes	No—Loss of acres for dispersed recreation would not be limited to environmental justice communities.
Socioeconomics	Yes	No—Increases in tax revenues from the proposed project could result in beneficial economic impacts. The proposed project could result in an increase in direct and indirect employment opportunities for members of environmental justice communities, thus having a beneficial impact on the environmental justice communities. Adverse impacts to quality of life and community values would be experienced not only by environmental justice communities but by other nonenvironmental justice communities living in close proximity to the project area and perhaps to a larger degree than the environmental justice communities living farther from the project area.
Soils	No—Impacts limited to project area	No impacts.
Transportation	Yes	No—Increases in traffic would be concentrated along SR 83 but would not reach an unacceptable level in Pima and Santa Cruz Counties. Further, increases in traffic along SR 83 are not likely to impact tribal communities, who live northwest of the transportation routes.
Vegetation	No—Impacts limited to project area	No impacts.
Visual	Yes	No—Project would not be directly visible from environmental justice communities.
Water Quality	No—Water quality impacts would meet standards	No impacts.
Water Quantity	Yes	No—Wells that would experience drawdowns greater than 10 feet would not disproportionately affect environmental justice communities. East side domestic wells would not extend past the Pima County line into Santa Cruz County. West side wells would not extend to the environmental justice communities to the northwest.
Wilderness	No—Impacts would be felt by all individuals who visit special designation areas and would not be specific to environmental justice communities	No impacts.
Wildlife	No—Loss of wildlife habitat and movement corridors not directly connected to environmental justice communities because they are not dependent on wildlife	No impacts.

1

2

1 The Tohono O’odham Nation expressed concerns about the proposed mine’s potential impacts to the
2 Tribe’s rights under the United Nations Declaration on the Rights of Indigenous Peoples (United
3 Nations Permanent Forum on Indigenous Issues 2007). In particular, the Tribe was concerned with
4 Article 8(1), which is the right of indigenous peoples not to be subjected to forced assimilation or the
5 destruction of their culture; Article 8(2)(a), which ensures that the United Nations member States will
6 provide effective mechanisms for prevention of, and redress for, any action that has the aim or effect
7 of depriving indigenous peoples of their integrity as distinct peoples, or of their cultural values or
8 ethnic identities; and Article 11(1), which is the right of indigenous peoples to practice and revitalize
9 cultural traditions and customs, including maintaining their archaeological and historical sites.
10 The Forest Service is under an obligation to adhere to United States laws, regulations, and policies
11 that protect cultural resources and the rights of Native Americans, such as the National Historic
12 Preservation Act of 1966 (16 U.S.C. 470 et seq.); Archaeological and Historic Preservation Act of
13 1974 (16 U.S.C. 469); American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996–1996a);
14 Native American Graves Protection and Repatriation Act of 1990 (23 U.S.C. 3001 et seq.); as well as
15 other applicable laws, regulations, and policies discussed in the “Cultural Resources” resource section
16 of this chapter.

17 As indicated in table 238, the only resource anticipated to have disproportionate adverse impacts on
18 an environmental justice community is cultural resources. The “Cultural Resources” resource section
19 indicates that during consultation with Native American Tribes, the Tohono O’odham Nation
20 (an environmental justice community because of low-income and minority percentages) and other
21 tribes expressed concern over the potential disturbance of ancestral villages, human remains, sacred
22 sites, and traditional resource collecting areas that are located in all of the action alternatives.
23 The tribes also expressed concern over issues relating to water, air, wildlife, vegetation, scenery, and
24 other resources they consider integral to their heritage. Although the physical boundaries of the
25 Tohono O’odham Nation reservation are not within the Rosemont Copper project area boundaries,
26 disturbance of the sites would result in a disproportionate impact to the Tohono O’odham Nation,
27 given their historical connection to the land. The potential impacts to archaeological and cultural sites
28 are directly related to the concerns that the Tohono O’odham Nation expressed regarding the United
29 Nations Declaration on the Rights of Indigenous Peoples and the potential impacts to the Tohono
30 O’odham Nation’s cultural identity and religious practices. Compliance with existing laws and
31 regulations, including Section 106 of the National Historic Preservation Act and the Native American
32 Graves Protection and Repatriation Act, may alleviate some of the adverse impacts to the Tohono
33 O’odham Nation, to the point where the impacts would no longer be disproportionate to the
34 community. However, given the known presence of ancestral villages, human remains, sacred sites,
35 and traditional resource collecting areas and the expression that disturbance would cause spiritual
36 harm to the earth and to the people present now and in the future, it is unlikely that compliance and/or
37 compensatory mitigation would substantially relieve the disproportionality of the impacts to the
38 Tohono O’odham Nation. These effects would also apply to the other consulting tribes with interests
39 in the project area (see the “Consultation with Tribal Governments” part of the “Cultural Resources”
40 section).

41 **Cumulative Effects**

42 As outlined in the introduction to chapter 3, cumulative impacts of past and present actions are
43 identified and analyzed in the “Affected Environment” part of each resource section, including for
44 “Socioeconomics and Environmental Justice.” This cumulative effects discussion addresses the
45 cumulative impacts of the action alternatives and any applicable reasonably foreseeable actions as

1 identified on the Coronado ID team’s list of reasonably foreseeable future actions, provided in the
2 introduction to chapter 3.

3 The following reasonably foreseeable actions from that list were determined to contribute to a
4 cumulative impact to socioeconomic resources:

- 5 • The BLM proposes to approve an MPO to expand the Andrada Mine limestone quarry in the
6 Davidson Canyon drainage system north and northeast of the Santa Rita Mountains.
7 The Andrada Mine is located approximately 4 miles from the Tucson, Arizona, city limits
8 and 1 mile from the Vail, Arizona, city limits. This would potentially increase the number of
9 mining jobs within the analysis area, as well as contribute to natural resources impacts that
10 could affect tourism and amenity-based migration. These potential impacts would add
11 cumulatively to the potential socioeconomic impacts of the proposed Rosemont Copper
12 Mine.
- 13 • In late 2009, Freeport-McMoRan bought 8,900 acres of the long-closed Twin Buttes Mine
14 site, near Sahuarita. Required permits for reopening the mine have not been issued to date,
15 but it is reasonable to assume that this mine could be reopened at some point in the future.
16 As it is another mining operation, this would have the same cumulative impacts as the
17 limestone quarries expansion, which is discussed above. However, the impacts would likely
18 be of a different magnitude because of the size of the proposed mining operation.
- 19 • The Forest Service proposes to approve an MPO for minerals exploration drilling on the
20 Helix Margarita property for a maximum of 1 year. This property is located in Santa Cruz
21 County, Arizona, about 75 miles south of Tucson. This would have the same cumulative
22 impacts as the limestone quarries expansion, discussed above. However, the impacts would
23 likely be of a smaller magnitude, as these exploration activities are generally small-scale,
24 temporary actions and are not typically visually evident.
- 25 • The Forest Service proposes to approve an MPO for Arizona Minerals Inc. for minerals
26 exploration (referred to as Hermosa minerals exploration) on the Sierra Vista Ranger District,
27 approximately 6 miles southeast of Patagonia, Arizona. The proposal involves drilling for
28 core samples and water monitoring wells. Drilling would occur for a maximum of 2 years,
29 with monitoring to continue for up to 10 years. This would have the same cumulative impacts
30 as the Heliz Margarita exploration activities, which are discussed above.
- 31 • The Forest Service proposes to approve an MPO for Regal Resources for minerals
32 exploration drilling of five holes to obtain evidence of mineralization over a 2-acre area for a
33 maximum of 1 year. This would have the same cumulative impacts as the Heliz Margarita
34 exploration activities discussed above.
- 35 • The Forest Service proposes to approve two MPOs for the Moore and Moore No. 4 Placer
36 Mine and the Dice No. 8 Placer Mine, both located 2 miles southwest of
37 Washington/Duquesne, Arizona. Actions for each project would include trenching and
38 washing of excavated material in a 1- to 2-acre area for a maximum of 1 year. This would
39 have the same cumulative impacts as the Heliz Margarita exploration activities, which are
40 discussed above.
- 41 • The Forest Service proposes to approve an MPO for Javelina Minerals Exploration for
42 mineral exploration drilling of eight holes in an area located approximately 3 miles southeast
43 of Patagonia, Arizona. Activities would occur for a maximum of 1 year. This would have the
44 same cumulative impacts as the Heliz Margarita exploration activities, which are discussed
45 above.

- 1 • The Forest Service proposes to approve an MPO to OZ Exploration Proprietary Ltd. for
2 mineral exploration drilling in the East Paymaster and Guajolote Flats areas in the Patagonia
3 Mountains. Activities would occur for a maximum of 1 year. This would have the same
4 cumulative impacts as the Heliz Margarita exploration activities, which are discussed above.
- 5 • The former Oracle Ridge Mine, located on private property within the Santa Catalina Ranger
6 District, is an inactive, small-scale underground copper mine in the permitting and detail
7 design stage for resuming operations. The proposed mine operation would use the same
8 surface footprint as previous operations to the extent possible. As it is another mining
9 operation, this would have the same cumulative impacts as the limestone quarries expansion
10 discussed above. However, the magnitude of the impacts would likely be smaller due to the
11 fact that the proposed mine operation would, to the extent possible, use the same surface
12 footprint as the previous operations.
- 13 • The Forest Service proposes to issue a special-use permit to Oracle Ridge Mining, LLC,
14 authorizing the use of NFSRs, a parking area, and a utility corridor during operation of the
15 existing Oracle Ridge Mine, which is located on private land. As it is another mining
16 operation, this would have the same cumulative impacts as the limestone quarries expansion
17 discussed above. However, the magnitude of the impacts would likely be smaller because the
18 mine operation is an existing operation located on private land, and the action would
19 authorize use of forest roads, a parking area, and a utility corridor.
- 20 • The Forest Service proposes to add, decommission, close, or change the designation of roads
21 in the NFSR database and prohibit off-road motorized travel for dispersed camping in certain
22 areas on the Nogales Ranger District. This would reduce the number of areas available for
23 off-road motorized travel within the analysis area, which could reduce the number of people
24 visiting the analysis area for off-road motorized recreation. This would impact revenues
25 associated with tourism and recreation in the analysis area, adding cumulatively to the
26 potential impacts to nature-based tourism caused by the proposed Rosemont Copper Mine.
- 27 • Development of the Farmers Investment Company property within the Town of Sahuarita's
28 jurisdiction over the next 40 to 50+ years for residential and commercial mixed use is
29 proposed, along with the enhancement of more than 12 miles of the Santa Cruz River in both
30 the town of Sahuarita and Pima County. This would create employment opportunities as well
31 as increase the housing on the market within the analysis area. An increase in employment
32 opportunities would add cumulatively to the employment opportunities projected for the
33 proposed Rosemont Copper Mine. The majority of the employees for the proposed Rosemont
34 Copper Mine are expected to come from the local workforce, but the increased housing from
35 the aforementioned development could potentially provide housing to employees of the
36 proposed mine who choose to relocate to the area.
- 37 • Rancho Sahuarita is a proposed 3,048-acre planned community located within the Town of
38 Sahuarita's jurisdiction adjacent to the northwestern portions of the Sahuarita Farms
39 property. The plan allows for 11,680 residential dwelling units, or 3.8 residents per acre.
40 The plan also includes about 1,000 acres of mixed-use and/or other non-residential land uses.
41 This would add cumulatively to the population if people choose to relocate to Rancho
42 Sahuarita from outside the three-county analysis area. However, since the majority of
43 employees at the proposed Rosemont Copper Mine are expected to come from the local
44 workforce, the cumulative effects are not expected to be substantial.
- 45 • Quail Creek is a proposed 1,700-acre master-planned retirement community located northeast
46 of Sahuarita Farms' southernmost specific plan parcel. The community is within the Town of
47 Sahuarita's jurisdiction and is entitled for approximately 5,000 housing units and a limited

1 amount of nonresidential uses adjacent to Old Nogales Highway. This would have the same
2 cumulative impacts as the Rancho Sahuarita community discussed above. However, the
3 magnitude of the potential impacts would likely be smaller because of the smaller size of the
4 community.

- 5 • Madera Highlands is a proposed 920-acre community located within the Town of Sahuarita's
6 jurisdiction. The plan allows for approximately 3,500 units, or approximately 3.8 residents
7 per acre. It is located adjacent to the eastern boundary of Sahuarita Farms' southernmost
8 development parcel. This would have the same cumulative impacts as the Rancho Sahuarita
9 and Quail Creek communities discussed above. However, the magnitude of the potential
10 impacts would likely be smaller because of the smaller size of the community.

11 Cumulatively, these foreseeable actions would contribute to the direct and indirect socioeconomic
12 impacts described earlier. Mineral exploration and development and new commercial and residential
13 land development would produce additional jobs but could also result in negative impacts to tourism-
14 and amenity-based economies in local areas because of the effects that the developments would have
15 on the natural landscape and rural setting. As housing becomes more available and people move into
16 new developments, demands for resources and services would continue to grow. Quality of life could
17 be both positively and negatively affected, depending on proximity to these actions and intangible
18 personal values.

19 ***Climate Change***

20 Climate change may indirectly affect socioeconomic conditions in the region by affecting the quality
21 of recreation and visual resources. Because of the expected lower precipitation, warmer temperatures,
22 and more frequent drought cycles, revegetation may be slower or less successful, as well as there
23 being more bare soil and rock visible on the waste rock and tailings facilities, postmine plant site, and
24 other areas allotted for revegetation (Karl et al. 2009; U.S. Environmental Protection Agency 2012).
25 This would increase impacts to both recreation and visual quality settings because revegetation is
26 critical to reducing mine impacts. Thus, nature-based tourism in the region may be affected. Also,
27 higher frequency of heavy rains and flooding may cause damage to slopes and revegetated areas,
28 which would increase impacts to recreation and visual quality settings further, potentially impacting
29 nature-based tourism. The lower precipitation, warmer temperatures, and more frequent drought
30 cycles may also have an adverse impact on quality of life in the region.

31 **Mitigation Effectiveness for Socioeconomics**

32 Mitigation for air quality, plants and animals, reclamation, recreation, transportation, and visual
33 resources, as well as other offsite mitigation, is intended to mitigate the effects on each of these
34 resources, but they also have the indirect effect of minimizing impacts to socioeconomics in terms of
35 quality of life. See appendix B for a full list of measures designed to reduce or eliminate
36 environmental effects and the "Mitigation Effectiveness" discussion in all resource sections in this
37 chapter for further information regarding the effects of these mitigation measures.

38 ***Mitigation and Monitoring – Forest Service***

39 The highlighted mitigations in this table represent mitigations and monitoring that are directly related
40 to the issue factors for socioeconomics.

- 1 • **Implementation of an outdoor lighting plan that would reduce potential impacts from**
 2 **artificial night lighting.** This mitigation involves following Rosemont Copper’s outdoor
 3 lighting mitigation plan (Monrad et al. 2012) during construction and operation of the mine.
 4 Compared with the initial MPO, this lighting mitigation plan would reduce potential impacts
 5 from artificial night lighting to commercial and recreational astronomy.
- 6 • **Hazardous materials containment and management.** This mitigation involves handling,
 7 storage, use, and communication information about hazardous materials, in accordance with
 8 laws and regulations. This mitigation would reduce potential impacts to human health and
 9 environmental risks (such as impacts to surface and groundwater quality) from transportation,
 10 use, and storage of hazardous materials and thus would avoid some level of potential demand
 11 and cost for emergency services.
- 12 • **Maintain material safety data sheets in accordance with 30 CFR 47.** This mitigation
 13 involves maintaining material safety data sheets onsite and providing this information to
 14 emergency service providers. Regulations require material safety data sheets be available to
 15 workers and that notification of potential hazards be provided to site visitors. Access to
 16 material data safety sheets would also be provided to appropriate emergency response
 17 departments and hospitals. This would reduce impacts to worker and public health and safety
 18 in the case of exposure, by allowing appropriate treatment to be implemented more rapidly,
 19 and thus reduce the potential cost of emergency services.
- 20 • **Preparation of emergency response and contingency plans, including a fire plan.** This
 21 mitigation requires Rosemont Copper to coordinate with Emergency Medical Services
 22 providers and local fire districts in development of emergency response and contingency
 23 planning. Pre-emergency planning and coordination with Emergency Medical Services
 24 providers and local fire districts would be expected to reduce response time and improve
 25 services of Emergency Medical Services.

26 ***Mitigation and Monitoring – Other Regulatory and Permitting Agencies***

- 27 • **ADOT activities to mitigate impacts of increased traffic on SR 83.** This mitigation
 28 consists of Rosemont Copper providing funding to ADOT to implement activities to reduce
 29 impacts resulting from increased traffic on SR 83. ADOT has indicated that the activities it
 30 plans to implement include: 3-inch pavement overlay from I-10 to the intersection of the
 31 primary access road; striping; raising guardrails and signs to match new pavement height;
 32 and paving 3 existing bus pullouts for school bus use. Rosemont Copper and ADOT are
 33 currently negotiating the amount of funding that would be provided. This mitigation would
 34 offset the cost of this road maintenance work that would otherwise be borne by the taxpayer.

35 ***Conclusion of Mitigation Effectiveness***

36 The mitigation measure described above would be effective for reducing but not eliminating impacts
 37 to dark skies, which would in turn reduce the socioeconomic impacts to the astronomy industry,
 38 amenity-based relocation, and quality of life. The other mitigation measures described above would
 39 be effective at reducing but not eliminating socioeconomic impacts on emergency and community
 40 services and infrastructure.

1 **Mitigation Effectiveness for Environmental Justice**

2 ***Mitigation and Monitoring – Forest Service***

3 The following mitigation measures were developed during the National Historic Preservation Act
4 Section 106 consultation process with the intent of reducing or compensating for impacts to cultural
5 sites and areas of importance to Native American tribes.

- 6 • **Archaeological data recovery on sites that would be adversely affected.** This involves
7 excavation and recovery at cultural sites that would be directly impacted.
- 8 • **Respectful and appropriate treatment of human remains that would be disturbed by
9 the project.** This involves removal of human remains from sites that would be directly
10 impacted.
- 11 • **Curation of archaeological collections in accordance with 36 CFR 79 and the HPTP.**
12 This involves storage and interpretation of artifacts that are removed from sites that would
13 be directly impacted.
- 14 • **Monitoring and treatment of inadvertent discoveries.** This involves procedures in the
15 event of discovery during project activities of previously unknown archaeological sites.
- 16 • **Limiting of ground-disturbing activity between the perimeter fence and security fence.**
17 Ground-disturbing activities between the perimeter and security fences would be approved
18 in advance by the Forest Service (anticipated to be limited to construction of compliance
19 wells, stormwater drainage facilities, and the perimeter fence and active road
20 decommissioning). Monitors would be present for all ground-disturbing work. Cultural
21 material discovered during monitoring would be dealt with in accordance with the discovery
22 plan in the HPTP. Active road decommissioning would be discussed with the Forest
23 Archaeologist prior to implementation to coordinate areas necessary to avoid due to cultural
24 sites.
- 25 • **Cultural resources protection training.** This requires Rosemont Copper to provide
26 appropriate training to their employees regarding identification, avoidance and protection of
27 cultural sites, and other topics.
- 28 • **Project proponent would allow tribal members access, upon 5 days' advance request,
29 to the project area for cultural practices.** Requirement to allow reasonable access to the
30 project area for tribal members.
- 31 • **Project proponent would organize tribal members field visits to potentially affected
32 springs.** This measure requires knowledge of culturally important spring locations and
33 providing tribal members access to conduct desired ceremonies or plant collections.
- 34 • **Transplanting of critical plant resources and inclusion of species within revegetation
35 mixture.** This involves incorporating culturally important plants into the revegetation efforts
36 described in the final reclamation and closure plan.
- 37 • **Interpretation of the results of the cultural resources investigations for Tribal
38 members, the Hispanic community, and the public.** This involves compiling and
39 interpreting the results of cultural investigations in a manner that is accessible and
40 understandable to the public.
- 41 • **Stabilization of previously excavated historic properties between the security and
42 perimeter fences.** This would include bringing in clean fill to fill the trenches and other
43 excavations left open at sites excavated during the ANAMAX project. All restoration work
44 would be monitored in accordance with the reclamation plan in the HPTP.

1 ***Mitigation and Monitoring – Rosemont Copper***

- 2 • **Conservation lands used for tribal practices.** This involves using conservation lands
3 required through the Section 7 and 404(b)(1) permitting processes to offset losses to tribal
4 members.

5 ***Conclusion of Mitigation Effectiveness***

6 While the mitigation measures that apply to environmental justice would help to partially reduce or
7 compensate for impacts, they would not modify the finding of disproportionate adverse impacts on
8 the Tohono O’odham Nation. Significant disturbance of ancestral villages, human remains, sacred
9 sites, and traditional resource collecting areas would remain, regardless of which action alternative is
10 implemented.

11
12