

## APPENDIX 11: ASARCO Rock Creek Project: Grizzly Bear Mortality Risk Assessment

This assessment is based on the coefficients of mortality risk developed in the interagency cumulative effects analysis process (USFWS et.al. 1988: Table 5 - pg. 17). The interagency grizzly bear group determined that human activities are additive (cumulative) when applied to the risk of bear mortality (USFWS et.al. 1990:pg. 12). Using this assumption the following simple risk assessment was developed.

Mortality risk is the result of potential bear/human encounters. The places these encounters can occur are on roads, trails, at use points (i.e. campgrounds), and dispersed across the forest (i.e. ATV use). With the exception of vehicle caused mortality, the other risks are associated with firearms. Hunting activity results in a higher risk, therefore the mortality coefficients are higher when hunting is present. Food sources that attract bears are also a major factor in causing bear/human encounters that most often end in a bear mortality, therefore coefficients are higher when attractants are present.

Taking the above factors into account the assessment includes the following steps:

1. Within the analysis area (BMUs impacted by ASARCO - BMUs 4, 5 & 6) - determine the existing activities and their intensity (high or low), if hunting is present or not at activity site, and presence or absence of attractants at each site .
2. Assign the appropriate mortality coefficients (high or low).
3. Multiply mortality coefficients by the number of activities. .
4. Add resulting index coefficients for all features to determine cumulative risk index (Tables 1A & B).
5. Repeat process for changed conditions under each project alternative as appropriate (Tables 2-5).
6. Determine percent change (due to ASARGO) from pre-existing condition (Table 1B). Formula is: (Alt.X Index minus Alt. 1 index) divided by Alt. 1 Index.

This is not an absolute measure of risk but a method of comparison between alternatives, and a relative index of change in risk from a designated starting point.

### Mortality Risk Summary

Alternative	Mortality Risk Index	% Change from Alt. 1
1	163.0	0
2	164.9	+ 1.2
3	164.9	+ 1.2
4	164.5	+ 0.9
5	163.4	+ 0.2

± indicates direction of change in mortality risk index

% change = (Alt X MRI - Alt 1 MRI) / Alt 1 MRI (MRI = Mortality Risk Index)

### References

- U.S. Fish and Wildlife Service et. al. 1988. Cumulative Effects Analysis Process for the Selkirk/Cabinet-Yaak Grizzly Bear Ecosystems 1988. USDI USFWS Boise, ID. 32 pp.
- U.S. Fish and Wildlife Service et. al. 1990. CEM - A Model for Assessing Effects on Grizzly Bears. 24 pp.

Table 1A : Existing Condition (1998)

Feature	Activity (Attractant) **	Mortality Coefficients		Number of Activities		Mortality Risk Index ****
		High	Low	High	Low	
Linear - Open Roads *	Hunting (NP)	0.4	0.2	0	27	5.4
Linear - Open Roads *	Non-hunting (NP)	0.2	0.1	0	0	0.0
Linear - Trails	Hunting (NP)	0.2	0.1	0	11	1.1
	Non-hunting (NP)	0.1	0.1	0	0	0.0
Point ***	Hunting (P)	1.0	0.8	146	2	147.6
	Hunting (NP)	0.4	0.2	0	6	1.2
	Non-hunting (NP)	0.2	0.1	3	3	0.9
	Non-hunting (P)	0.8	0.6	1	0	0.8
Dispersed	Hunting (NP)	0.5	0.3	0	3	0.9
Linear - Closed Roads *	Hunting (NP)	0.2	0.1	0	22	2.2
	Non-hunting (NP)	0.1	0.1	0	17	1.7
MRI =						161.0

\*\* linear features in 10 mile segments (USFWS 1988 pg 17). Each segment = 1 activity

\*\*\* Attractant: P = present NP = not present

\*\*\*\* points are associated with human made or related features

Mortality Risk Index = sum of (Mortality coefficients times Number of activities by high and low use levels).

MRI = Mortality Risk Index

Activities included in existing condition are shown in Appendix A.

Table 1B : Pre-ASARCO Rock Creek Condition (1999) = Alt. 1

Feature	Activity (Attractant) **	Mortality Coefficients		Number of Activities		Mortality Risk Index ****
		High	Low	High	Low	
Linear - Open Roads *	Hunting (NP)	0.4	0.2	4	27	7.0
Linear - Open Roads *	Non-hunting (NP)	0.2	0.1	0	0	0.0
Linear - Trails	Hunting (NP)	0.2	0.1	0	11	1.1
	Non-hunting (NP)	0.1	0.1	0	0	0.0
Point ***	Hunting (P)	1.0	0.8	146	2	147.6
	Hunting (NP)	0.4	0.2	0	6	1.2
	Non-hunting (NP)	0.2	0.1	6	3	1.5
	Non-hunting (P)	0.8	0.6	1	0	0.8
Dispersed	Hunting (NP)	0.5	0.3	0	3	0.9
Linear - Closed Roads *	Hunting (NP)	0.2	0.1	0	20	2.0
	Non-hunting (NP)	0.1	0.1	0	17	1.7
MRI =						163.0

\*\* linear features in 10 mile segments (USFWS 1988 pg 17). Each segment = 1 activity

\*\*\* Attractant: P = present NP = not present

\*\*\*\* points are associated with human made or related features

Mortality Risk index = sum of (Mortality coefficients times Number of activities by high and low use levels).

MRI = Mortality Risk Index

Assumes Noranda active

- Linear roads: # miles divided by 10 = # activities (any distance above multiples of 10 = 1 more activity)
  - Open High use roads = 34.03 mi (Hunting) and 0 miles (non-hunting)
  - Open Low use roads = 265.6 miles (hunting) and 0 miles (non-hunting)
  - Closed High use roads = 0 miles. (hunting) and 0 miles (non-hunting)
  - Closed Low use roads = 196.36 miles (hunting) and 164.5 miles (non-hunting)
- Linear trails: Same as existing condition.
- Points: Existing conditions plus:
  - Mill site, tailing impoundment complex, Libby creek vent adit (non-hunting : attractant not present - high use)
- Dispersed: Same as existing conditions

Table 2 : Alternative # 2 Condition

Feature	Activity (Attractant) **	Mortality Coefficients		Number of Activities		Mortality Risk Index ****
		High	Low	High	Low	
Linear - Open Roads *	Hunting (NP)	0.4	0.2	5	27	7.4
Linear - Open Roads *	Non-hunting (NP)	0.2	0.1	1	0	0.2
Linear - Trails	Hunting (NP)	0.2	0.1	1	10	1.2
	Non-hunting (NP)	0.1	0.1	0	0	0.0
Point ***	Hunting (P)	1.0	0.8	146	2	147.6
	Hunting (NP)	0.4	0.2	0	6	1.2
	Non-hunting (NP)	0.2	0.1	8	0	1.9
	Non-hunting (P)	0.8	0.6	1	0	0.8
Dispersed	Hunting (NP)	0.5	0.3	0	3	0.9
Linear - Closed Roads *	Hunting (NP)	0.2	0.1	0	20	2.0
	Non-hunting (NP)	0.1	0.1	0	17	1.7
MRI =						164.9

\*\* linear features in 10 mile segments (USFWS 1988 pg 17) Each segment = 1 activity  
 \*\*\* Attractant: P = present NP = not present  
 points are associated with human made or related features  
 \*\*\*\* Mortality Risk Index = sum of (Mortality coefficients times Number of activities by high and low use levels).

Activities included in Alternative # 2 condition are:

- Linear roads: # miles divided by 10 = # activities (any distance above multiples of 10 = 1 more activity)
  - Open High use roads = 49.47 mi (Hunting) and 5.25 miles (non-hunting)
  - Open Low use roads = 265.6 miles (hunting) and 0 miles (non-hunting)
  - Closed High use roads = 0 miles. (hunting) and 0 miles (non-hunting)
  - Closed Low use roads = 196.7 miles (hunting) and 164.7 miles (non-hunting)

Linear trails: Same as existing condition except: EF Rock Creek Trail becomes high use.

- Points: Existing conditions plus:
  - Mill site, tailing impoundment, exploration adit, evaluation support facility, water treatment facility (non-hunting : attractant not present - high use)

Dispersed: Same as existing conditions with:

No Proposed mitigation to put legal closure on the 3 potential use areas identified in existing condition.

Table 3 : Alternative # 3 Condition

Feature	Activity (Attractant) **	Mortality Coefficients		Number of Activities		Mortality Risk Index ****
		High	Low	High	Low	
Linear - Open Roads *	Hunting (NP)	0.4	0.2	5	27	7.4
Linear - Open Roads *	Non-hunting (NP)	0.2	0.1	1	0	0.2
Linear - Trails	Hunting (NP)	0.2	0.1	1	10	1.2
	Non-hunting (NP)	0.1	0.1	0	0	0.0
Point ***	Hunting (P)	1.0	0.8	146	2	147.6
	Hunting (NP)	0.4	0.2	0	6	1.2
	Non-hunting (NP)	0.2	0.1	8	3	1.9
	Non-hunting (P)	0.8	0.6	1	0	0.8
Dispersed	Hunting (NP)	0.5	0.3	0	3	0.9
Linear - Closed Roads *	Hunting (NP)	0.2	0.1	0	20	2.0
	Non-hunting (NP)	0.1	0.1	0	17	1.7
MRI =						164.9

linear features in 10 mile segments (USFWS 1988 pg 17) Each segment = 1 activity

\*\* Attractant: P = present NP = not present

\*\*\* points are associated with human made or related features

\*\*\*\* Mortality Risk Index = sum of (Mortality coefficients times Number of activities by high and low use levels).

Activities included in Alternative # 3 condition are:

- Linear roads: # miles divided by 10 = # activities (any distance above multiples of 10 = 1 more activity)
  - Open High use roads = 48.1 mi (Hunting) and 4.33 miles (non-hunting)
  - Open Low use roads = 265.6 miles (hunting) and 0 miles (non-hunting)
  - Closed High use roads = 0 miles. (hunting) and 0 miles (non-hunting)
  - Closed Low use roads = 199.63 miles (hunting) and 166.6 miles (non-hunting)
- Linear trails: # miles divided by 10 = # activities (any distance above multiples of 10 = 1 more activity)
  - Same as existing conditions except: EF Rock Creek Trail becomes high use.
- Points: Private residences in sections 11 and 26 (hunting: attractant present)
  - Existing conditions plus:
  - Mill site, tailing impoundment, exploration adit, evaluation support facility, water treatment facility (non-hunting : attractant not present - high use)
- Dispersed: Same as existing condition as there are NO proposed mitigation to put legal closure on the 3 potential use areas identified in existing condition.

Table 4 : Alternative # 4 Condition

Feature	Activity (Attractant) **	Mortality Coefficients		Number of Activities		Mortality Risk Index ****
		High	Low	High	Low	
Linear - Open Roads *	Hunting (NP)	0.4	0.2	4	27	7.0
Linear - Open Roads *	Non-hunting (NP)	0.2	0.1	1	0	0.2
Linear - Trails	Hunting (NP)	0.2	0.1	1	10	1.2
	Non-hunting (NP)	0.1	0.1	0	0	0.0
Point ***	Hunting (P)	1.0	0.8	146	2	147.6
	Hunting (NP)	0.4	0.2	0	6	1.2
	Non-hunting (NP)	0.2	0.1	8	3	1.9
	Non-hunting (P)	0.8	0.6	1	0	0.8
Dispersed	Hunting (NP)	0.5	0.3	0	3	0.9
Linear - Closed Roads *	Hunting (NP)	0.2	0.1	0	20	2.0
	Non-hunting (NP)	0.1	0.1	0	17	1.7
MRI =						164.5

\*\* linear features in 10 mile segments (USFWS 1988 pg 17). Each segment = 1 activity  
 \*\*\* Attractant: P = present NP = not present  
 points are associated with human made or related features  
 \*\*\*\* Mortality Risk Index = sum of (Mortality coefficients times Number of activities by high and low use levels).

Activities included in Alternative # 4 condition are:

Linear roads: # miles divided by 10 = # activities (any distance above multiples of 10 = 1 more activity)  
 Open High use roads = 31.73 mi (Hunting) and 4.34 miles (non-hunting)  
 Open Low use roads = 265.6 miles (hunting) and 0 miles (non-hunting)  
 Closed High use roads = 0 miles. (hunting) and 0 miles (non-hunting)  
 Closed Low use roads = 199.8 miles (hunting) and 164.42 miles (non-hunting)

Linear trails: # miles divided by 10 = # activities (any distance above multiples of 10 = 1 more activity)  
 Same as existing conditions except:  
 EF Rock Creek Trail becomes high use.

Points: Private residences in sections 11 and 26 (hunting: attractant present)  
 Existing conditions plus:  
 Mill site, tailing impoundment, exploration adit, evaluation support facility, water treatment facility  
 (non-hunting : attractant not present - high use)

Dispersed: Same as existing condition as there are NO proposed mitigation to put legal closure on the 3 potential use areas identified in existing condition,

Table 5 : Alternative # 5 Condition

Feature	Activity (Attractant) **	Mortality Coefficients		Number of Activities		Mortality Risk Index ****
		High	Low	High	Low	
Linear - Open Roads *	Hunting (NP)	0.4	0.2	4	27	7.0
Linear - Open Roads *	Non-hunting (NP)	0.2	0.1	1	0	0.2
Linear - Trails	Hunting (NP)	0.2	0.1	1	10	1.2
	Non-hunting (NP)	0.1	0.1	0	0	0.0
Point ***	Hunting (P)	1.0	0.8	146	2	147.6
	Hunting (NP)	0.4	0.2	0	6	1.2
	Non-hunting (NP)	0.2	0.1	7	3	1.7
	Non-hunting (P)	0.8	0.6	1	0	0.8
Dispersed	Hunting (NP)	0.5	0.3	0	0	0.0
Linear - Closed Roads *	Hunting (NP)	0.2	0.1	0	20	2.0
	Non-hunting (NP)	0.1	0.1	0	17	1.7
MRI =						163.4

\*\* linear features in 10 mile segments (USFWS 1988pg 17). Each segment = 1 activity

\*\*\* Attractant: P = present NP =not present

points are associated with human made or related features

\*\*\*\* Mortality Risk Index = sum of (Mortality coefficients times Number of activities by high and low use levels).

Activities included in Alternative # 5 condition are:

- Linear roads: # miles divided by 10 = # activities (any distance above multiples of 10 = 1 more activity)
  - Open High use roads = 38.69 mi (Hunting) and 3.82 iniles (non-hunting)
  - Open Low use roads = 256.6 miles (hunting) and 0 miles (non-hunting)
  - Closed High use roads = 0 miles. (hunting) and 0 miles (non-hunting)
  - Closed Low use roads = 199.82miles (hunting) and 164.42 miles (non-hunting)

Linear trails: # miles divided by 10 = # activities (any distance above multiples of 10 = 1 more activity)  
 Same as existing conditions except:  
 EF Rock Creek Trail becomes high use.

Points: Existing conditions plus:  
 Mill site & evaluation support facility combined, tailing impoundment, exploration adit, , water treatment facility (non-hunting : attractant not present - high use)

Dispersed: No dispersed sites as there is proposed mitigation to put legal closure on the 3 potential. use areas identified in existing condition.

## Appendix A

### Existing Conditions: Mortality Risk Raw Data by BMU

Feature	BMU 4	BMU 5	BMU 6	Cumulative
Linear: Open road miles with hunting and no attractant	High use - 0 Low Use - 133.02	High use - 0 Low use - 89.08	High use - 0 Low use - 43.5	High Use - 0 Low Use - 265.6/10 = 27
Linear: Open road miles non-hunting and no attractant	High use - 0 Low Use - 0	High use - 0 Low Use - 0	High use - 0 Low Use - 0	High use - 0 Low Use - 0
Linear: Trail miles with hunting and no attractant	High use - 0 Low Use - 49.7	High use - 0 Low Use - 32.1	High use - 0 Low use - 28.1	High use - 0 Low use - 109.9/10 = 11
Linear: Trail miles non-hunting and no attractant	High use - 0 Low Use - 0	High use - 0 Low Use - 0	High use - 0 Low use - 0	High use - 0 Low use - 0
Point: with hunting and attractant	High use - 133 Residences: (Bull R. = 56) Hwy 200 = 77) Low Use - 0	High use - 1 Residence: (T26R32S11) Low Use - 1 Summer cabin: (T27R31S11)	High use - 12 Residence: (T26R32S26) (Hwy 200 = 11) Low use - 1 Summer Cabin: (T27R30S22)	High use - 146 Low use - 2
Point: with hunting and no attractant	High use - 0 Low Use - 1 (Rock Lake site)	High use - 0 Low Use - 1 (Engle lake site)	High use - 0 Low use - 4 (Geiger Lake site -2) (Bramlet lake site) (Wanless lake site)	High use - 0 Low use - 6
Point: non-hunting and no attractant	High use - 2 (Bull R. CG) (MSHD shop) Low Use - 2 (Big Eddy CG) (Noxon Senior C.)	High use - 1 (Howard Lake CG) Low Use - 0	High use - 0 Low use - 1 (Lake Cr. CG)	High use - 3 Low use - 3
Point: non-hunting with attractant	High use - 1 (Noxon dump) Low Use - 0	High use - 0 Low use - 0	High use - 0 Low Use - 0	High use - 1 Low use - 0
Dispersed: hunting and no attractant	High use - 0 Low Use - 1 (rd # 2280, 2281 area)	High use - 0 Low Use - 0	High use - 0 Low use - 2 (rd # 14641 area) (rd # 2210,2287,2288 area)	High use - 0 Low use - 3
Linear: closed road miles hunting and no attractant	High use - 0 Low Use - 52.1	High use - 0 Low Use - 91.42	High use - 0 Low use - 74.7	High use - 0 Low use - 218.22/10 = 22
Linear: closed road miles non-hunting and no attractant	High use - 0 Low Use - 94.14	High use - 0 Low Use - 57.12	High use - 0 Low use - 15.32	High use - 0 Low use - 166.58/10 = 17

CG = campground

MSHD = Montana State Highway Department

- High = use level defined in appendix 4 of USFWS 1988.
- Low = use level defined in appendix 4 of USFWS 1988.

- Hunting: IGBC codes (2, 3, 4) (5, 6, 7, 8) (Roads: restricted, barriered, open ) (Trails: open motorized, open non-motorized, restricted, high use non-motorized)

Non-hunting: IGBC code 1 (impassable); ASARCO properties with facilities present

## APPENDIX 12

### ASARCO Rock Creek Project: Grizzly Bear Analysis - Corridor Constriction: Recreation Use Levels

#### INTRODUCTION

The possible constriction of the north to south movement corridor for grizzly bears on the Rock creek side of the east Cabinet mountains is a result of two potential activities. The first is the direct effect of construction and operation of the proposed Rock creek mine. This part of the impacts is discussed in the report titled "Asarco Rock Creek Mine: Grizzly Bear Movement Corridor Constriction Analysis".

The second is the indirect effect of potential increased recreational use of the Rock Lake trail that goes up the east fork of Rock creek. The consequences of superimposing high recreational activity on productive grizzly bear habitat include both direct mortality and reduced habitat effectiveness. Mattson et al. (in press) presents results that show mortality risk to females is 5 times higher than males due to developments and roads. This is believed to be a consequence of habituation to predictable high density human presence.

Reduced habitat effectiveness, due to human activity is well documented. Schleyer et al. (1984) demonstrated that disturbances from nonmotorized recreational activity caused immediate and rapid displacement. Disturbances also resulted in bears using less suitable habitat. Haroldson and Mattson (1985) reported that the spatial-temporal level of human use was a significant factor in determining the level of a bear response to accumulated backcountry use. Bear responses were greater in open or more productive habitats. They also show that the greater the recreational use the longer the displacement effects last. McLelan and Shackleton (1989) observed greater responses to off-trail hikers than any other disturbance (bears fleeing greater than 1 Km in both open and forested habitat). Mace and Waller (1996) demonstrated that grizzly bears minimize their interaction with recreationists by spatially avoiding high use areas. Kasworm (1990) also shows that grizzly bears are displaced from habitat near trails. He does, however indicate that grizzly bear avoidance of habitat near trails is at least partially related to habitat availability (primarily shrubfields, snowchutes and graminoid park habitats). These components make up less than 10% of the habitat in the corridor and very little is available near the Rock Lake trail.

#### EXISTING SITUATION

To determine the indirect effects of recreational use, a baseline level of use was first established. An analysis of existing recreational use on the East Fork Rock Creek trail was conducted with the data collected on trail registration cards by the Cabinet Ranger District. Data was available for two time periods: 1990-92 and 1995-1997. Data from known special use permittees (guides) was also included for 1991, 1995-1997).

The data was summarized by grizzly bear seasons of use (Table 1). The seasons used were: spring (Den emergence, about 4/1, to 6/15); summer (6/16 to 9/15) and fall (9/16 to den entrance, about 11/15). This provides a bear year of 229 days. Analysis also looked at levels of use to three destination points (Rock Creek Meadows, Rock Lake, and Areas beyond Rock Lake in the Cabinet Mountain Wilderness) (Table 2).

Table 1: Existing Recreational Use Levels (registration cards)(6 year average 1990-92 & 1995-97)

Year	Season	Days Used in Bear Year	Total People	No. Parties	Ave. Party Size	Total Trip Days	Ave. Days per Trip
Ave.	Spring	10	34	11	3.1	15	1.4
	Summer	54	179	55	3.3	103	1.9
	Fall	6	20	8	2.5	11	1.4
	Bear Yr.	70	233	74	3.1	129	1.7

\*Based on actual days trail used, not entire bear year.

Table 2: Existing Use Pattern - Party Destinations

Season	Meadows	Rock Lake	Beyond Rock Lake
Spring	9 (14%)	53 (84%)	1 (2%)
Summer	59 (16%)	281 (76%)	28 (8%)
Fall	13 (27%)	33 (67%)	3 (6%)
Bear Year	81 (17%)	367 (76%)	32 (7%)

Evidence from electronic trail counters (Table 3- 1992 data) indicates that actual use level is likely higher than indicated by the registered use level. A wilderness guard note from 1990 tends to support this possibility. The guard reported 30 unregistered trail users (number of parties unknown) over a 10 day period in August. The trail registration card data for the same period indicated only 18 trail users (6 parties).

Table 3: Existing Recreational Use Levels - Number of People per day (electronic counters & registration cards)

Year	Monitored Period	Electronic Counts per day <sup>1/</sup>	Registration Card Counts (actual days) <sup>2/</sup>	Registration Card Counts (bear year) <sup>3/</sup>
1990		-	1.5	0.7
1991		-	2.6	0.6
1992	7/16-11/2	4.0	2.8	1.0
1993	6/10-10/14	6.3	-	-
1994	5/31-9/26	6.3	-	-
1995		-	3.2	1.2
1996		-	4.6	1.8
1997		-	3.6	1.4

<sup>1/</sup> Three years of automatic trail counter information are available in the Cabinet Ranger District's recreation files. The counter was located approximately one-half mile up the trail from the gated trailhead. **The data is the count of people numbers, not parties. The use levels show the average daily total passing through the counter. The number does include return trips, which means the actual number of people per day could be half the average shown. The number of parties per day can not be determined from this data.**

<sup>2/</sup> The number of people per day is based on actual number of bear year days that had recreational parties in the area. Column 3 of Table 1 is the seasonal averages.

3/ The number of people per day is based on the bear season (229 days).

The cumulative effects models use the number of "parties" per day (USDA FS et.al. 1988) or week (USDI USFWS et.al. 1990) as the measure of human activity and associated disturbance levels (see use level definitions at end of this report). The current average use level over the entire bear year is considered low (Table 4).

Table 4: Use Levels - Parties per day or week (based on registration card data)

Period	Number Parties per day <sup>1/</sup>	Number Parties per week <sup>2/</sup>
1990-92	0.8 <sup>3/</sup>	5.7
1995-97	1.2	8.2
Average	1.0	7.1

1/ Number of parties per day based on actual use days.

2/ Number of parties per week based on actual use days divided by 7.

3/ Actual use would be 1.0 per day, Average is less because of length of trip. Parties staying more than a day are still counted as only one party.

While data summarized in Table 4 would indicate a low level of use, this information is incomplete. As noted above actual use is very likely to be higher than indicated by the registration card data. Use levels could be between 50% and 400% higher than determined by registrations. This means the number of parties could be between 1.5 and 4 parties per day.

## EFFECTS ANALYSIS

The Supplemental Draft Environmental Impact Statement for the ASARCO Rock Creek Mine Project documents the assumptions and resulting changes in population numbers in the impacted counties (Sanders & Lincoln in Montana, and Bonner in Idaho) (SDEIS chapter 4: Socioeconomic section). Table 5 summarizes the projected changes for the Montana counties.

Table 5: Expected Settlement of Immigrating Construction, Operation and Secondary Workers

County	Workers		Population *	
	Construction	Operation	Construction	Operation
Sanders	125	59	261	155
Lincoln	19	7	39	20
MT Total	144	66	300	175

Assumes the average family size is 2.6 persons (75% of workers are mamed with 1.2 children).  
(based on SDEIS socioeconomic analysis - chapter 4)

The Social Assessment for the Kootenai National Forest (1995) demonstrates that residents of both Sanders and Lincoln county use the Rock Creek area for huckleberry picking, fishing, hunting, hiking, scenic driving, and wilderness access. The Social Assessment also shows the percentage of Kootenai National forest users that participate in various recreation activities (pg 14-15). Applying these percentages against the projected increases shown in Table 5 provides an estimate of the increased use on the Kootenai National Forest, a portion of which will occur in the East Fork Rock Creek area. Table 6 depicts the potential changes in use, based on immigrant employees and their families. These figures do not include the estimated 50 to 100 families (160 people -SDEIS: based on Troy mine pattern documented by Wenner, 1992) that would move to the area seeking employment but be unsuccessful.

A portion of them would remain in the area and further increase the numbers shown in Table 6. In addition the improved access (paved two lane road to the mill site) is likely to encourage additional use of the area. This source of increase is not projected in this analysis.

Table 6: Projected Increases in Recreation Activities due to ASARCO Rock Creek Project

Recreation Activity	Worker Increase *	Population Increase *
Fishing 1.	17	46
Hunting 2.	25	67
Wilderness Use 3.	32	86
Hiking 4.	35	93
Scenic Driving 5.	65	172

Assuming that a portion of each activity group uses the EF Rock Creek area, and because actual percentages of KNF users that use Rock creek are not known, and because people generally participate in more than one activity, the average percentage of the six users groups was calculated (44.3%) and applied to the population increase from Table 5 (175 people) to project the worst case situation for increased people activity in the area. The resulting average recreational population increase is an estimated 78 people. Only 59 of these people would be expected to use the trail, all 78 of them would use Forest road 150A to the trail head. These people could use the Rock Lake trail as individuals or as groups. If they used the trail as individuals there would be 59 "parties". However past use has tended to be family oriented so the group scenario is more likely. Assuming the average party size equals the average family size (2.6 persons per ASARCO DEIS), then the number of additional parties using the area would be 23 ( $59 / 2.6 = 22.7$ ). This would be a 31% increase over the 6 year average of 74 parties per year (Table 1). Based on past use patterns (Table 2), about 17% (4 parties) would stop at the meadows, 76% (17 parties) would continue to Rock Lake, and 7% (2 parties) would go beyond Rock Lake.

To answer the question of "Is there a potential for human bear conflict?" Wayne Kasworm (USFWS) provided a summary analysis of bear location data for the corridor and the East Fork of Rock Creek (see attached letter). Kasworm's summary clearly shows grizzly bears using the area during all seasons. He also indicates use of both timber and non-timber habitat components, with higher use levels in the latter.

While the human population (and thus the corresponding recreation level) in Sanders and Lincoln counties are projected to increase, even without the ASARCO Rock Creek mine project; with the project the increase occurs sooner and then lasts over a longer period (life of mine). This extended period of increased recreational use results in a longer bear displacement time (Haroldson and Mattson 1985).

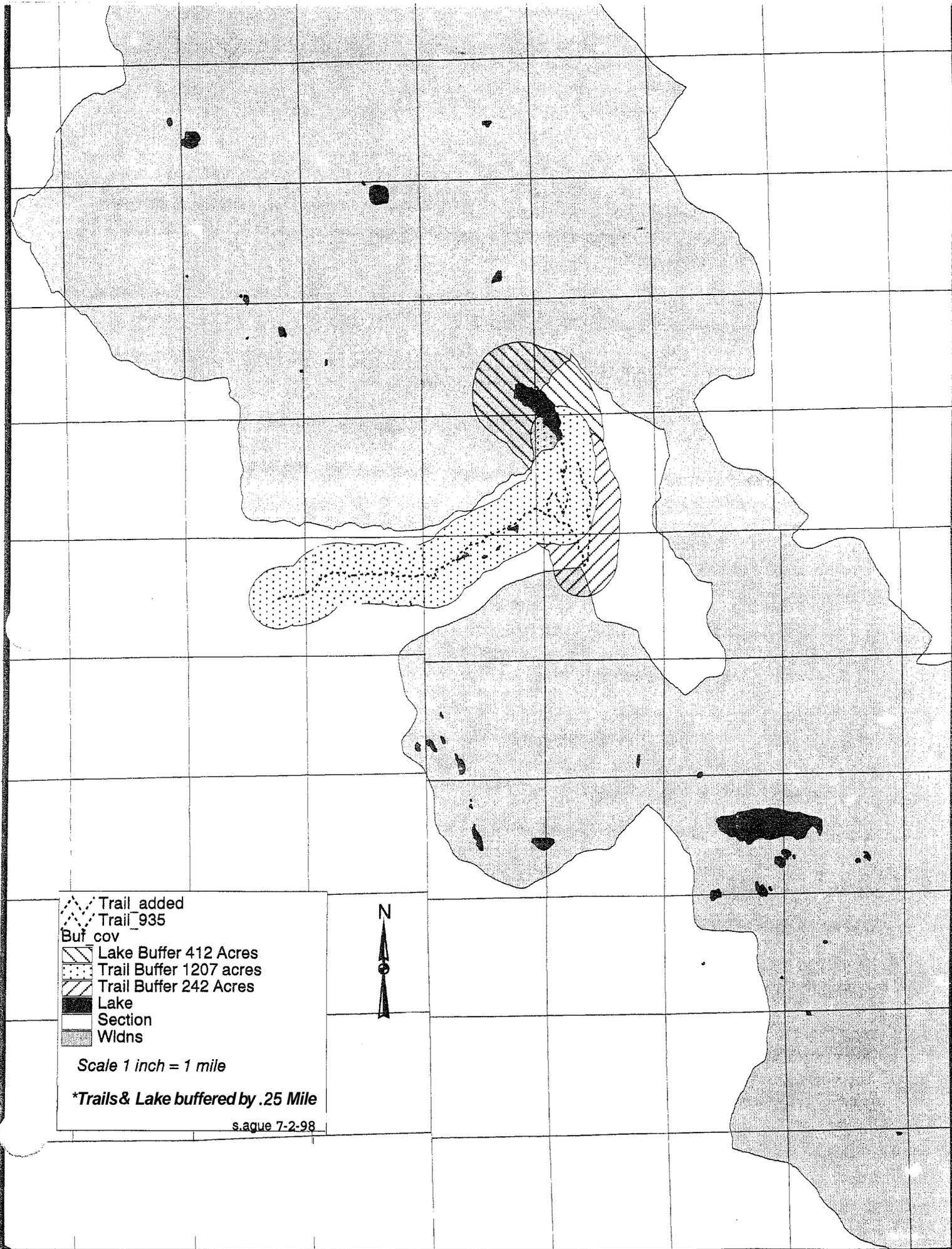
Whether or not the indirect effects of the mine results in a need to provide mitigation depends on what assumption is made concerning the actual existing use levels (range of 1.5-4 parties per day). At the lower level a 31% increase results in an estimated 2 parties per day which is still in the low level as

defined in the cumulative effects model, where no mitigation would be needed. At the higher level the projected increase would give an estimated 5 parties per day, but the use level would already be above the "threshold" of 3, resulting in no additional impacts on grizzly bears and their habitat use. Since the use level is unknown, but believed to be near the "threshold", the concept of proportional mitigation is being applied. Mace (1996) and Haroldson et al. (1985) both suggest that bear response is proportional to human use levels (e.g. as people numbers increase, displacement effects on bears increase accordingly).

The assumption is that the increase in recreational use resulting from the mine employees would cause the loss of a proportional amount of habitat. The Cumulative Effects Analysis Process (USDA et al. 1988, Zone of Influence and Disturbance Coefficients table) indicates a negative change in disturbance coefficient (from 1.0 down to 0.8) and an increase in the zone of influence. Applying the cumulative effects model zone of influence (0.25 mile)(USDI et al. 1990, Zone of Influence and Disturbance Coefficients table) to the trail system results in 1,619 acres affected by recreational use (see attached map). The projected new disturbance coefficient results in a 20% reduction in habitat usability. Minimum compensation would be needed for 100 acres (.2 x 1619 acres x .31 (proportional increase in recreational use levels) - influence area of trail to Rock Lake and area around rock lake that receive highest use levels. Old road/trail to ridge line receives low use levels so influence area of 149 acres not included).

To further answer the question of whether or not these potential impacts from increased recreational activity may contribute cumulatively to a narrowing of the north to south movement corridor for grizzly bear, bear movements across existing fracture zones (linear area of human activity that bisects grizzly bear habitat) was examined. Fracture zones can have a high, moderate or low level of human activity. In general, the higher level of human activity the less likely a bear is to cross the zone. In addition to the potential new fracture zone at the EF Rock Creek trail, fracture zones exist in two locations within the southern part of the Cabinets. They are the Vermilion river road (FDR 154) and the Swamp creek power line road (FDR 2220). Kasworm's telemetry data shows that 2 of 3 native bears crossed FDR 154 and 3 of 3 crossed FDR 2220 and the EF Rock Creek trail (with existing recreation use levels) (Wayne Kasworm, USFWS, personal communication 7-13-98). In years of low food availability bears tend to travel further and take greater risks of exposure and it is not known if the crossings took place during a low food availability year. On a relative scale the identified zones would classify as high for FDR 154 (due to yearlong motorized use) moderate for FDR 2220 (due to restricted motorized use), and low for EF Rock Creek trail (due to non-motorized use). Based on the limited telemetry data of bears crossing the "high" and "moderate" fracture zones, it is likely that they would also cross the "low" fracture zone at the EF Rock Creek Trail. However, this does not say that bears will not be impacted. While fragmentation (loss of genetic interchange) may not occur, individual bear behavior and movement patterns are likely to be changed, although perhaps in a minor way. Complete avoidance of the EF Rock creek drainage is not likely.

In addition, the potential changes may increase mortality risk associated with bear/human encounters. The simple fact that there would be more people in the area increases the chance of a bear/human encounter. As the number of encounters increases, the potential for a bear fatality would increase, especially for female bears (Mattson et al.). The level of increased risk is unknown as information on the number of recreationists carrying firearms (primary mortality risk factor) is not available, However a relative risk index has been determined and is shown in the report titled; "ASARCO Rock Creek Project: Grizzly Bear Mortality Risk Assessment".



-  Trail added
-  Trail\_935
-  Buf cov
-  Lake Buffer 412 Acres
-  Trail Buffer 1207 acres
-  Trail Buffer 242 Acres
-  Lake
-  Section
-  Widns



Scale 1 inch = 1 mile

**\*Trails & Lake buffered by .25 Mile**

s.ague 7-2-98

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- USDI U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Forest Service, Idaho Department of Fish and Game, Washington Department of Wildlife, Montana Department of Fish Wildlife, Wyoming Game and Fish Department, and Parks, National Park Service. 1990. CEM - A Model for Assessing Effects on Grizzly Bears. 24 pp.

Use Level Definitions:

The "Cumulative Effects Analysis Process for the Selkirk/Cabinet-Yaak Grizzly Bear Ecosystems" (1988) defines non-motorized linear high and low use (pg 28) as follows:

High-use: trails having > 3 parties/day. Party = group of 1-15 people.

Low-use: trails having < 3 persons or parties per day

The "CEM - A Model for Assessing Effects on Grizzly Bears" (1990) defines non-motorized linear high and low use (pg 9) as follows:

High intensity - receiving an average of 20 or more parties per week

Low intensity - receiving an average of less than 20 parties per week



# United States Department of the Interior



## FISH AND WILDLIFE SERVICE

Grizzly Bear Recover! Coordinator  
NS 312, University of Montana  
Missoula, Montana 59812

IS REPLY REFER TO

TO: Wayne Johnson, KNF

FROM: Wayne Kasworm, U.S. Fish and Wildlife Service, 475 Fish Hatchery Road,  
Libby, MT 59923 (406) 293-4161 FAX (406) 293-6338

SUBJECT: Grizzly Bear Information for ASARCO Mitigation

DATE: 19 March 1998

In response to your request for information regarding grizzly bear habitat use within the Asarco Corridor boundary you provided and the East Fork of Rock Creek, I have developed the following summaries. First you requested information regarding elevation of grizzly bear radio locations by season (Tables 1 and 3) and habitat use in timber and nontimber components by season (Tables 2 and 4). Also attached is a map of locations within the boundary provided. Seasons were defined as: Spring = Den emergence to 6/15, Summer = 6/16 - 9/15, Autumn = 9/16 - Den entry.

Table 1. Seasonal use of elevation (meters) by radio collared grizzly bears in the Asarco corridor, 1983-95.

Elevation (m)	Spring	Summer	Autumn	Den	Annual
Mean	1521	1697	1779	7915	1690
N	27	154	35	1	217
95% CI	1422-1620	1666-1729	1714-1844	N/A	1661-1718
Range	1030-1954	1230-2205	1285-2123	NIA	1030-2205

Table 2. Seasonal use frequency of timbered and nontimbered habitat by radio collared grizzly bears in the Asarco corridor, 1983-95. Seasonal percents in parentheses.

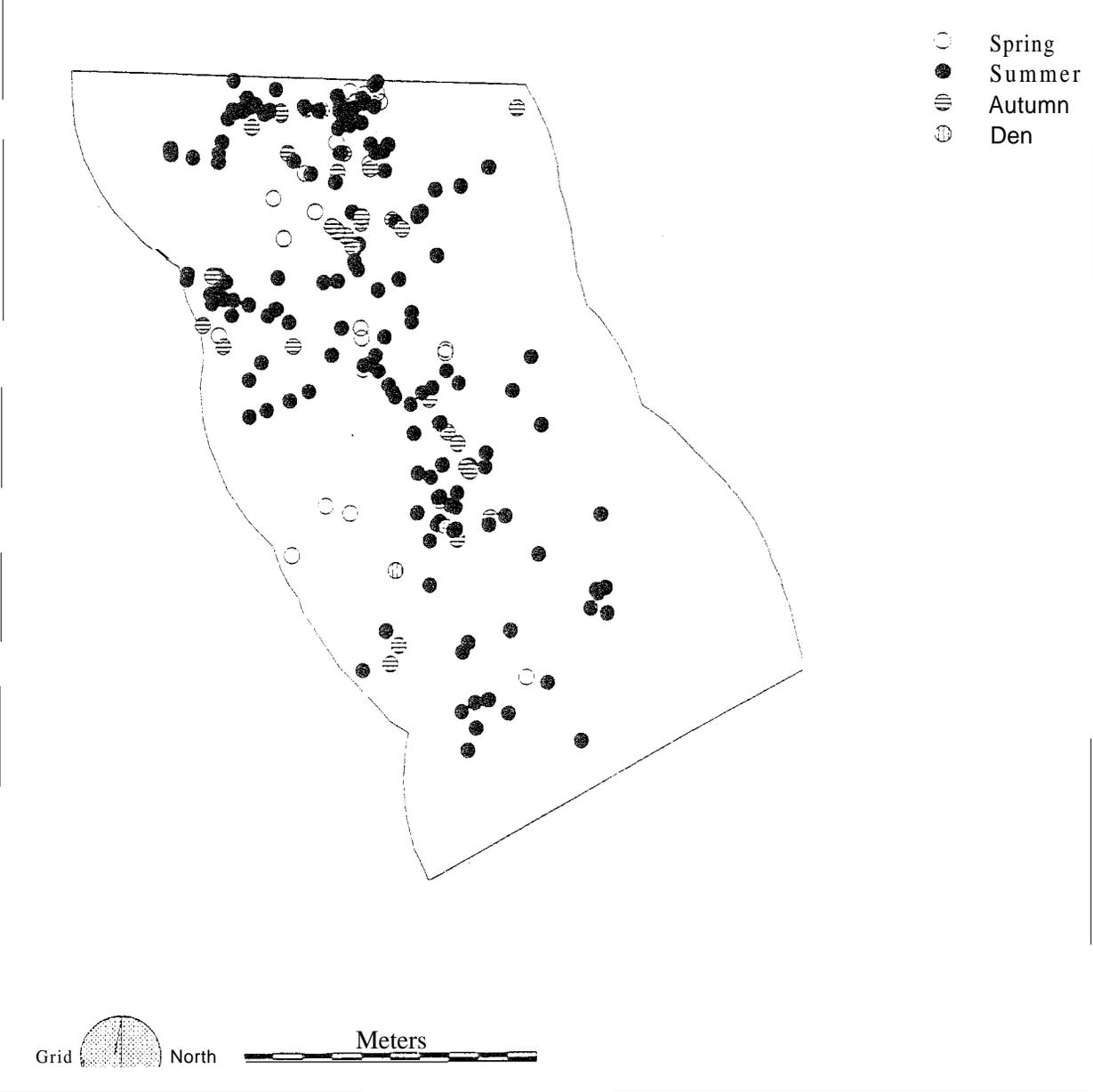
Habitat	Spring	Summer	Autumn	Den	Annual
Timber	8 (30)	57 (37)	17 (49)	0	82 (38)
Nontimber	19 (70)	97 (63)	18 (51)	1 (100)	135 (62)

Table 3. Seasonal use of elevation (meters) by radio collared grizzly bears in the East Fork of Rock Creek, 1983-95.

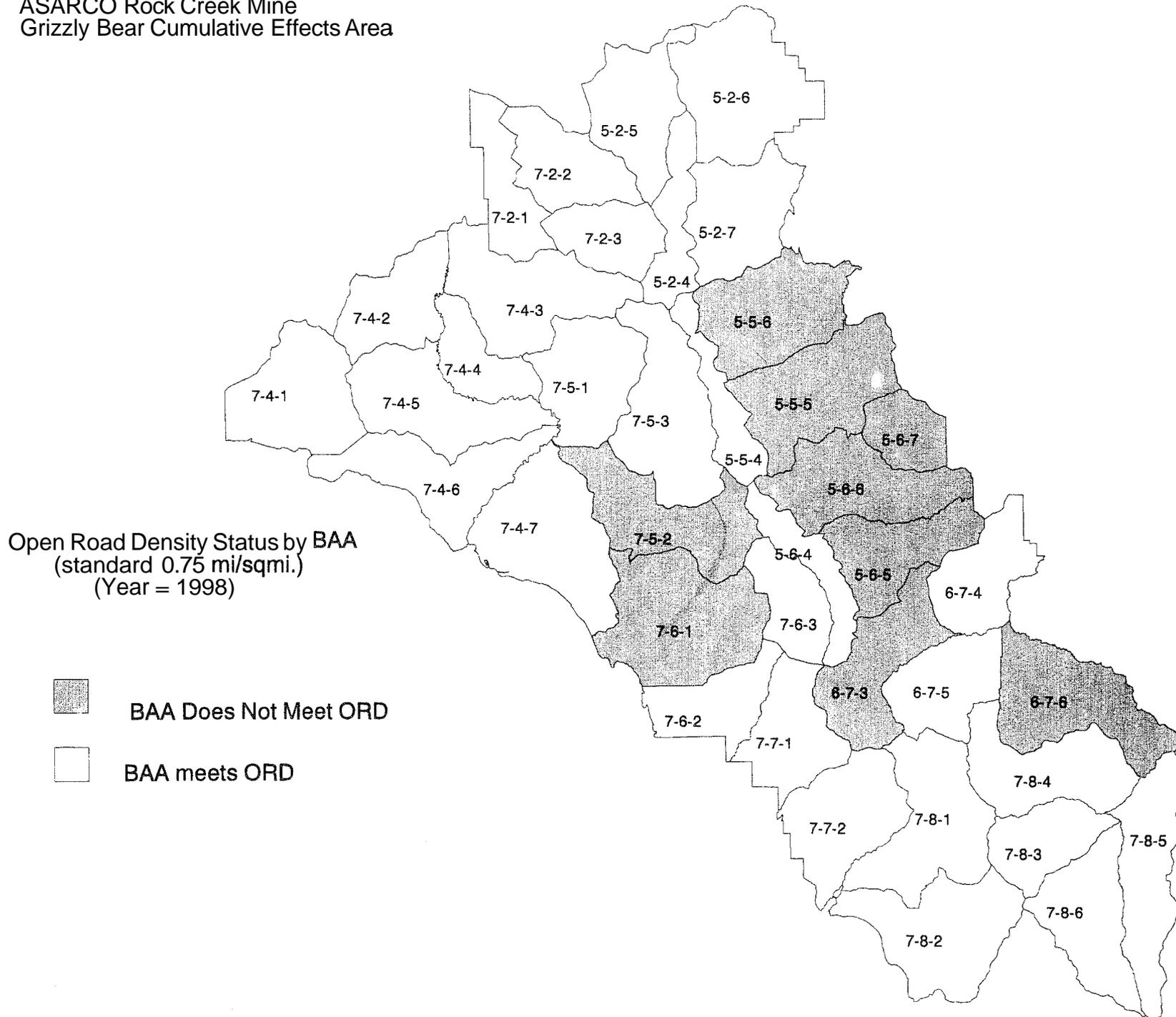
Elevation (m)	Spring	Summer	Autumn	Den	Annual
Mean	1342	1756	1844	1915	1701
N	4	17	2	1	24
95% CI	912-1772	1647-1864	986-2701	N/A	1589-1811
Range	1030-1676	1400-2205	1776-1911	N/A	1030-2205

Table 4. Seasonal use frequency of timbered and nontimbered habitat by radio collared grizzly bears in the East Fork of Rock Creek, 1983-95. Seasonal percents in parentheses.

Habitat	Spring	Summer	Autumn	Den	Annual
Timber	2 (50)	2 (11)	2 (100)	0	6 (25)
Nontimber	2 (50)	15 (89)	0	1 (100)	18 (75)



ASARCO Rock Creek Mine  
Grizzly Bear Cumulative Effects Area

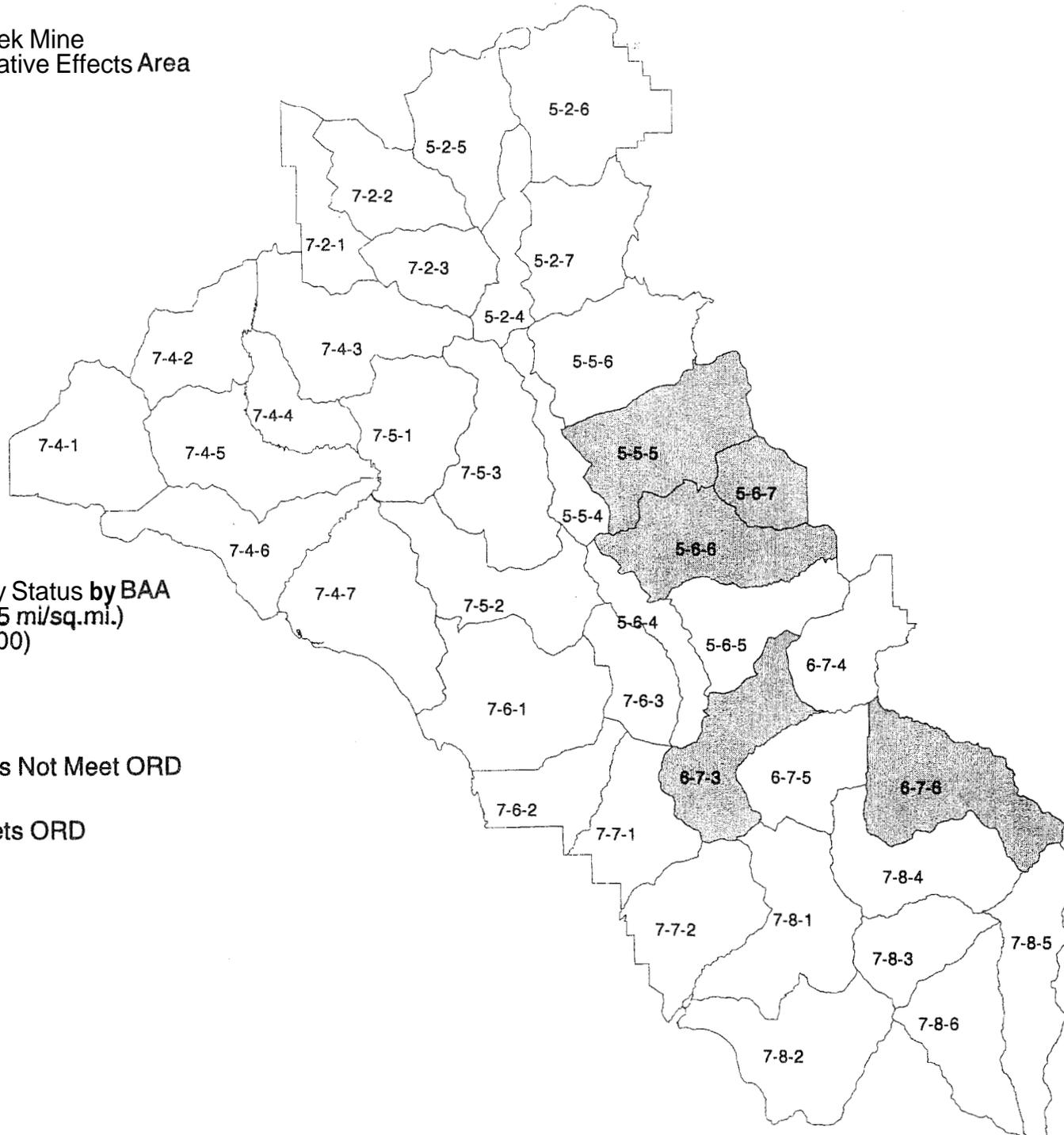


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ASARCO Rock Creek Mine  
Grizzly Bear Cumulative Effects Area

Open Road Density Status by BAA  
(Standard = 0.75 mi/sq.mi.)  
(Year = 2000)

-  BAA Does Not Meet ORD
-  BAA Meets ORD

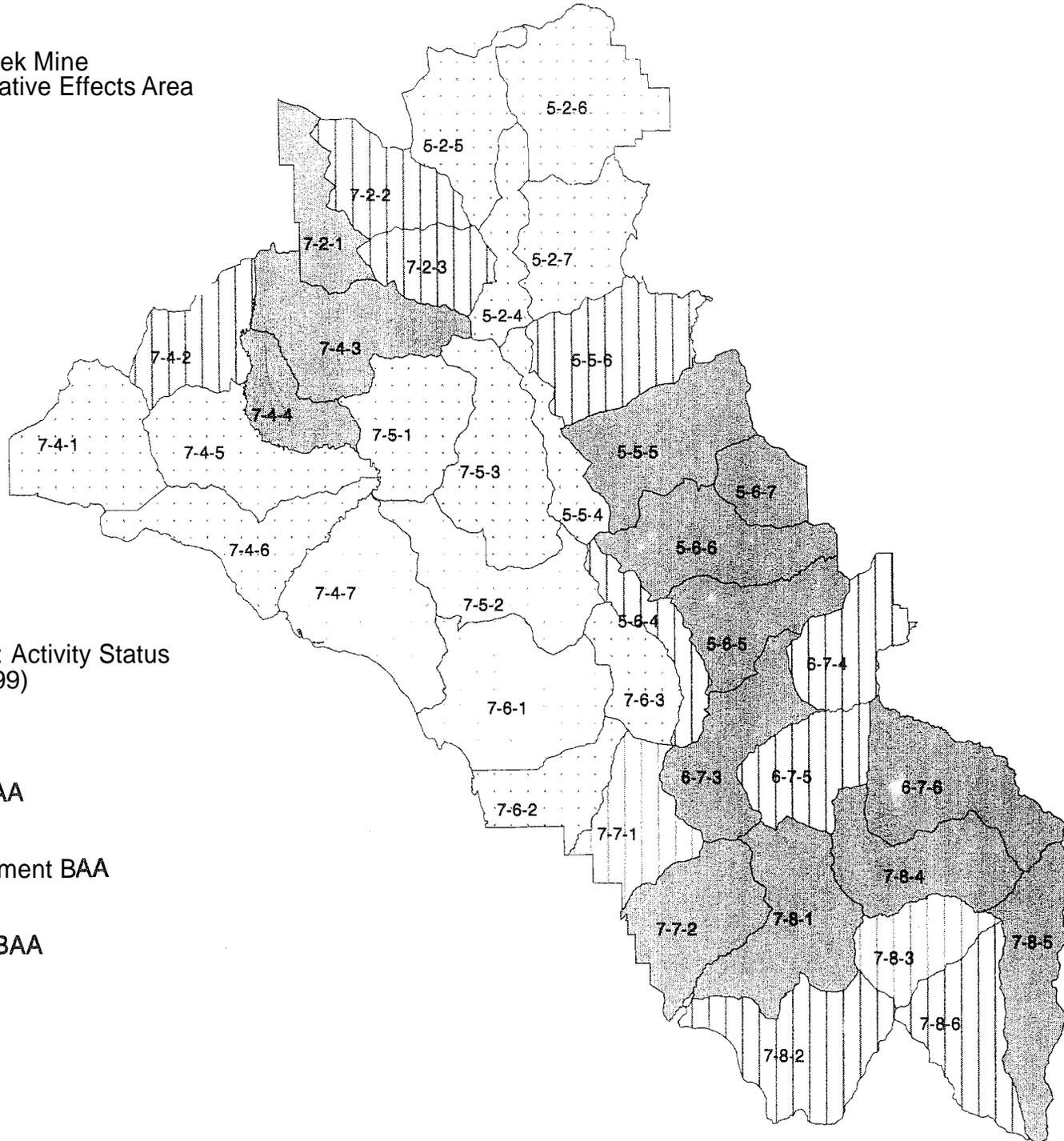


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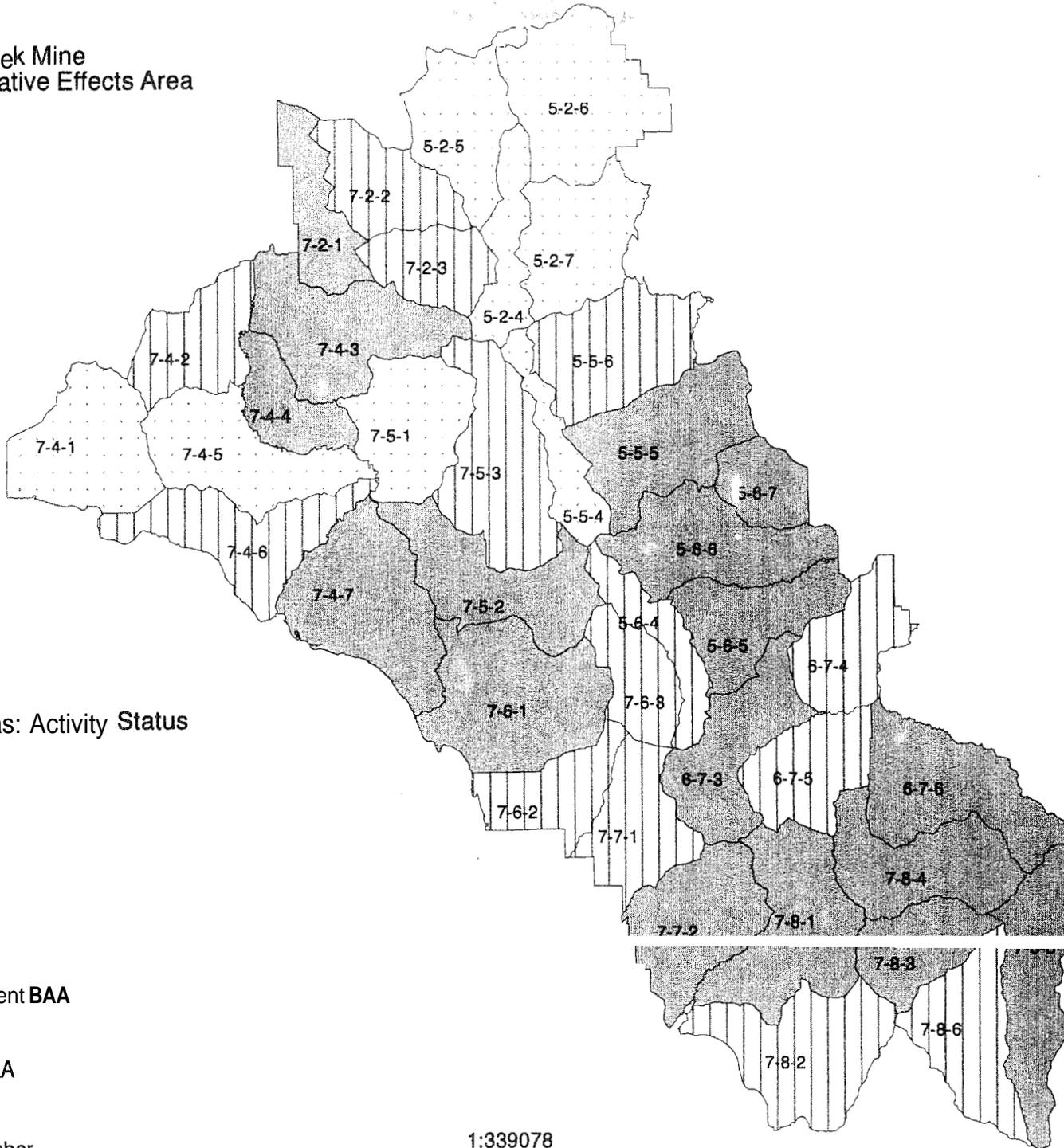
ASARCO Rock Creek Mine  
Grizzly Bear Cumulative Effects Area

Bear Analysis Area: Activity Status  
(Year = 1999)

-  Active BAA
-  Displacement BAA
-  Inactive BAA



ASARCQ Rock Creek Mine  
Grizzly Bear Cumulative Effects Area



Bear Analysis Areas: Activity Status  
(Year = 1998)

-  Active **BAA**
-  Displacement **BAA**
-  Inactive **BAA**

7-6-1 RAA Number

1:339078

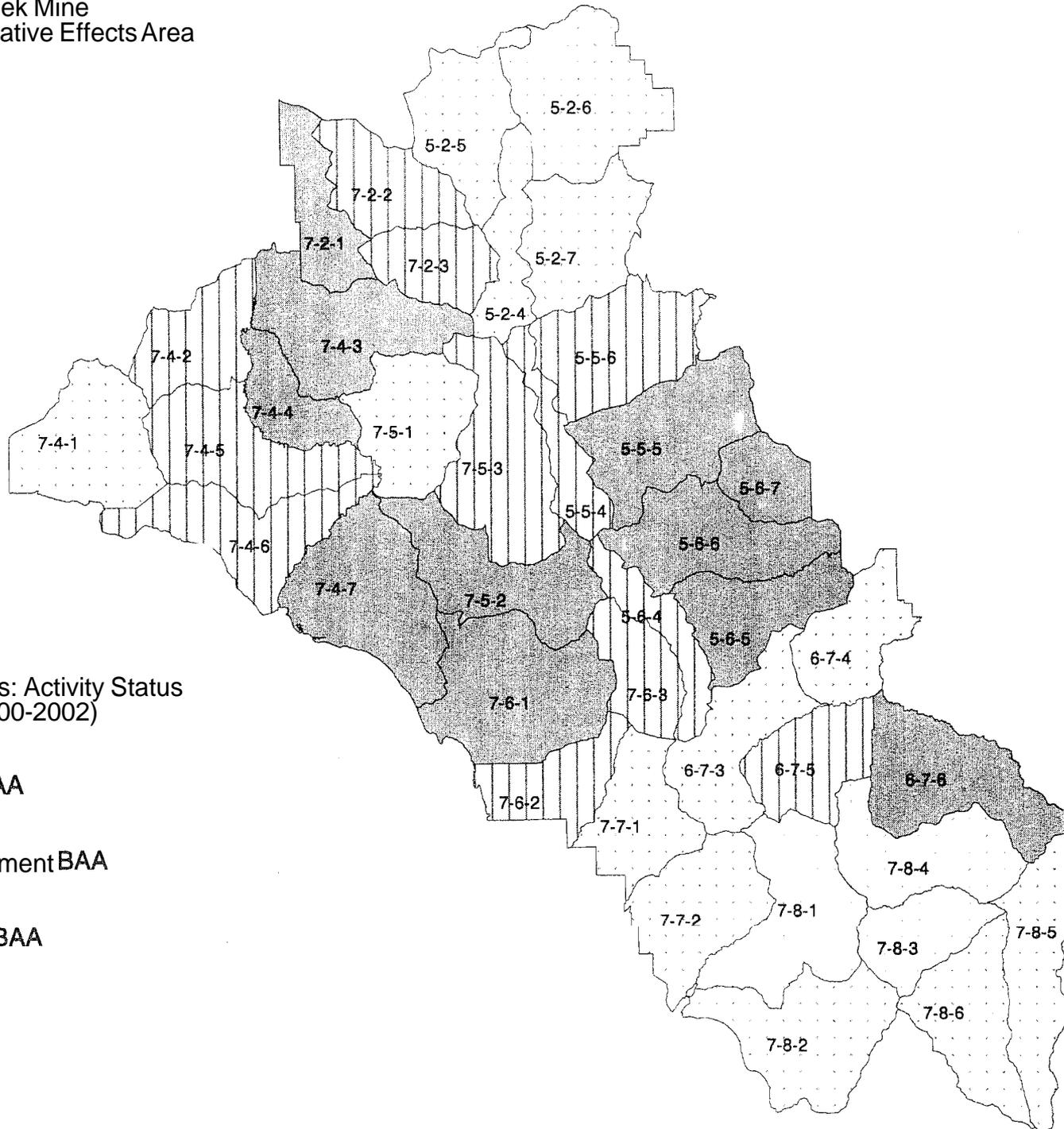


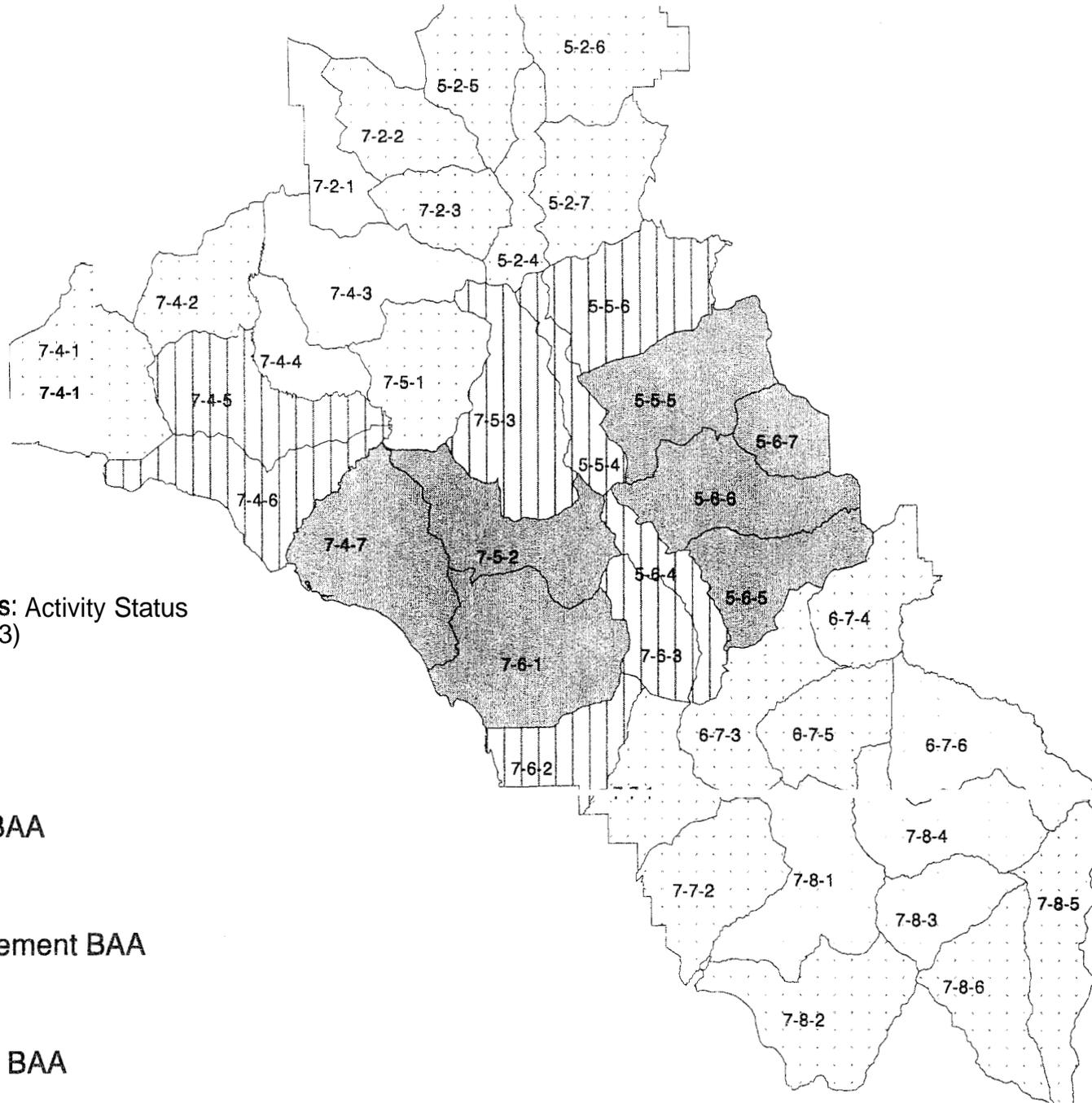
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ASARCO Rock Creek Mine  
Grizzly Bear Cumulative Effects Area

Bear Analysis Areas: Activity Status  
(Year = 2000-2002)

-  Active BAA
-  Displacement BAA
-  Inactive BAA





Bear Analysis Areas: Activity Status  
(Year = 2003)

-  Active BAA
-  Displacement BAA
-  Inactive BAA



7/98  
wj