



ECONOMIC ANALYSIS OF
CRITICAL HABITAT
DESIGNATION FOR THE
SIERRA NEVADA BIGHORN
SHEEP

Final Economic Analysis | May 20, 2008

prepared for:

U.S. Fish and Wildlife Service

4401 N. Fairfax Drive

Arlington, VA 22203

prepared by:

Industrial Economics, Incorporated

2067 Massachusetts Avenue

Cambridge, MA 02140

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EXECUTIVE SUMMARY

1. The purpose of this report is to identify and analyze the potential economic impacts associated with the proposed critical habitat designation for the Sierra Nevada bighorn sheep (*Ovis Canadensis sierrae*) (hereafter, "bighorn sheep"). This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service (Service).
2. On July 25, 2007, the Service published a proposed rule to designate critical habitat for the Sierra Nevada bighorn sheep.¹ The twelve proposed critical habitat units, located in California's Mono, Inyo, Tuolumne, Fresno, and Tulare counties, are primarily Federal lands (99 percent). The Los Angeles Department of Water and Power owns 165 acres. The rest of the land (1,005 acres) is privately owned and is spread across four units. Five of the twelve units were unoccupied at the time of listing: Convict Creek (unit 3); Taboose Creek (unit 5), Big Arroyo (unit 9), Laurel Creek (unit 11) and Olancha Peak (unit 12). Appendix B provides detailed maps of the proposed critical habitat units.
3. The Key Findings highlighted below and in Exhibit ES-1 summarize the results of the economic analysis. Detailed pre-designation, post-designation baseline, and post-designation incremental impacts are presented by unit in Exhibit ES-2 through Exhibit ES-4. Exhibits ES-2, ES-3 and ES-4 show impacts that are the same for several units. For the pre and post designation baseline impacts, this results from dividing the yearly California Department of Fish and Game's Sierra Nevada Bighorn Sheep Recovery Program budget across each proposed critical habitat unit equally. For the post-designation incremental impacts, this pattern is the result of section 7 consultations that cover multiple proposed critical habitat units.
4. The units are ranked by the magnitude of post-designation baseline impacts in Exhibit ES-5, and by the magnitude of post-designation incremental impacts in Exhibit ES-6. The activities considered in the study are ranked by post-designation baseline impacts in Exhibit ES-7 and by post-designation incremental impacts in Exhibit ES-8. Exhibit ES-9 provides an overview of the location of all of the proposed critical habitat units. Exhibits ES-10 and ES-11 provide a geographic presentation of the magnitude and composition of impacts by unit and location for post-designation baseline and post-designation incremental impacts, respectively. Appendix C presents detailed pre-designation baseline, post-designation baseline, and post-designation incremental impacts by unit for each activity.

¹ U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants: Designation of Habitat for the Sierra Nevada Bighorn Sheep and Proposed Taxonomic Revision; Proposed Rule, 72 FR 142, July 25, 2007.

KEY FINDINGS

Post-designation Baseline Impacts: This draft economic analysis estimates potential post-designation baseline impacts associated with bighorn sheep conservation efforts in the study area of \$27.4 million (undiscounted) over the next 20 years. The present value of these impacts, assuming a three percent discount rate, is \$21.0 million (\$1.41 million on an annualized basis), or \$15.5 million assuming a seven percent discount rate (\$1.46 million annualized).

Incremental Impacts: Post-designation Incremental impacts reflect the cost of conducting section 7 consultations. No project modifications due to critical habitat designation can be predicted at this time. Post-designation incremental impacts are forecast to be \$149,000 (undiscounted) over the next 20 years. The present value of the incremental impacts, assuming a three percent discount rate, is \$120,000 (\$8,080 on an annualized basis), or \$94,900 assuming a seven percent discount rate (\$8,960 annualized).

Quantified Post-Designation Baseline Impacts: Impacts to habitat management comprise the greatest percentage of total undiscounted costs (54.0%). Grazing is the second largest category of activity impacts with 45.6% of total costs. Recreation activities make up less than one percent of baseline post-designation impacts. Unoccupied units are predicted to have post-designation baseline impacts because they are in areas where pre-designation policies will be pursued. Because the unoccupied units were specified in the species recovery plan following listing, pre-designation baseline conservation efforts have already been planned for these units. Details for the post-designation baseline activities follows:

- **Habitat Management:** Habitat management costs are estimated to be \$14.8 million over the next 20 years (undiscounted), and primarily reflect expenditures by the California Department of Fish and Game on the Bighorn Sheep Recovery Program. These expenditures begin in seven units and are expected to expand to all units as the bighorn sheep population increases. Anticipated costs from controlled burns and conservation efforts for mining impacts are also included in these estimates. Mining: Habitat management actions are forecast to conserve the bighorn sheep during anticipated mining at the Pine Creek Tungsten Mine. These impacts are estimated to be a total of \$143,500 (undiscounted), divided over 20 years.
- **Grazing:** Potential impacts to grazing activities are estimated to be \$12.5 million over the next 20 years (undiscounted). These impacts are primarily concentrated in the Mount Warren Unit (Unit 1), though there are some impacts in Mount Gibbs (Unit 2) and Wheeler Ridge (Unit 4). These impacts are primarily forgone forage values due to discontinuing or reducing domestic sheep grazing in grazing allotments. There are also several bighorn sheep related conservation efforts that impose additional costs on sheep ranchers in the Mount Warren unit. These forecast impacts are continuations of pre-designation policies.
- **Recreation:** Potential impacts to recreation are estimated to be \$90,400 over the next 20 years (undiscounted). All forecast post-designation recreation impacts are due to expected section 7 consultations. Additional project modifications related to recreation cannot be predicted at this time.

Quantified Post-Designation Incremental Impacts: There are no forecast project modifications attributable to critical habitat designation. Expected post-designation incremental impacts are limited to addressing adverse modification in post-designation section 7 consultations. That is, most post-designation project modifications continue pre-designation policies. Thus, most of the impacts expected to result from these consultations are limited to the cost of considering the potential for adverse modification to critical habitat in the consultations themselves. Expected consultations on grazing comprise the greatest percentage of total post-designation incremental impacts constituting 65.5% of total undiscounted costs. Recreation oriented consultations have the second largest impacts representing 20% of total undiscounted costs. Expected habitat management activities constitute 14.7% of undiscounted post-designation incremental impacts. Specifics on the post-designation incremental impacts follow:

- **Grazing:** Post-designation incremental impacts from grazing consultations are estimated to be \$97,600 over the next 20 years (undiscounted). These impacts are due to predicted yearly formal section 7 consultations between Humboldt-Toiyabe National Forest, the Service, and FIM Corporation, the permit holder of domestic sheep grazing allotments in proximity to the proposed critical habitat in the Mount Warren unit (Unit 1).
- **Recreation:** Post-designation incremental impacts from recreation consultations are estimated to be \$29,800 over the next 20 years (undiscounted). The Mount Warren unit (Unit 1) constitutes \$25,400 of these anticipated impacts. The Mount Warren impacts are from anticipated section 7 consultations by Humboldt-Toiyabe National Forest on recreation and resort permitting issues.
- **Habitat Management:** Habitat Management costs are estimated to be \$21,900 over the next 20 years (undiscounted). The majority of the incremental costs stem from three formal consultations that the Service expects in regards to resummptions of operations at the Pine Creek mine in Unit 4. Approximately \$7,250 of these impacts are due to predicted consultations by Inyo National Forest concerning controlled burns of standing timber within proposed critical habitat.

Critical Habitat Unit with Highest Impacts: The Mount Warren Unit (Unit 1) has the highest post-designation baseline and post-designation incremental impacts. The Mount Warren Unit has forecasted post-designation baseline impacts of \$11.2 million over the next 20 years (undiscounted); this constitutes about 41% of the total impacts, regardless of the discount rate used. The Mount Warren Unit has forecasted post-designation incremental impacts of \$124,000 (undiscounted), which constitutes approximately 83% of the total post-designation incremental impacts regardless of the discount rate used. For post-designation baseline impacts the conservation efforts and grazing allotment restrictions required for domestic sheep grazing are concentrated primarily in the Mount Warren Unit. The highest number of consultations per unit are expected to occur (related to grazing) in the Mount Warren Unit.

Uncertainty Concerning Impacts to Pre-Designation Mining: Information requests concerning pre-designation mine remediation impacts have been sent to the mine owner, but no data have been received to date (this information could increase the estimates of pre-designation impacts for this unit).

Uncertainty Concerning Impacts to Recreation: At this time, no recreation restrictions can be forecast by the Service or any public agency involved in management of bighorn sheep habitat. The estimated impacts are limited to the costs of section 7 consultations.

EXHIBIT ES-1 SUMMARY OF IMPACTS (2008 - 2027), 2007\$

IMPACT	UNDISCOUNTED	3% DISCOUNT RATE	7% DISCOUNT RATE
Total Post-Designation Baseline Impacts	\$27.4 million	\$21.0 million	\$15.5 million
Annualized	-	\$1.41 million	\$1.46 million
Total Post-designation Incremental Impacts	\$149,000	\$120,000	\$94,900
Annualized	-	\$8,080	\$8,960

5. This analysis describes economic impacts of bighorn sheep conservation efforts associated with the following categories of activity: 1) grazing; 2) habitat management, and 3) recreation. Administrative costs of consultations under section 7 of the Endangered Species Act (the Act) are incorporated into each chapter corresponding to the activity that the consultation is based on.
6. The units are ranked by the magnitude of post-designation baseline impacts in Exhibit ES-5.² The three units with the highest post-designation baseline impacts, in decreasing order, are Mount Warren (Unit 1), Mount Gibbs (Unit 2), and Wheeler Ridge (Unit 4). These three units comprise about 63 percent of all of the total costs of the study.
7. The units can be ranked by the magnitude of post-designation incremental impacts, as shown in Exhibit ES-6.² The two units with the highest post-designation incremental impacts, in decreasing order, are Mount Warren (Unit 1) and Wheeler Ridge (Unit 4). These two units constitute about 94 percent of the total potential costs of the proposed designation costs in this study.
8. Exhibit ES-7 provides post-designation baseline impacts by activity, undiscounted, and at three and seven percent discount rates. For these estimates, habitat management activities consistently have the highest costs (regardless of the discount rate), comprising approximately 54 percent of the estimated totals across all activities. Grazing has the next largest impact with 45.6 percent (for undiscounted estimates) of the estimated total across all activities. The remaining 0.4 percent of impact costs is attributed to recreation.
9. Exhibit ES-8 provides post-designation incremental impacts by activity, undiscounted, and at three and seven percent discount rates. For these estimates, grazing has the highest costs, comprising between 58 to 66 percent of estimated totals across all activities, depending on the discount rate. Recreation constitutes 20 to 22 percent of the remaining post-designation incremental costs, depending on the discount rates. The rest of the post-designation incremental impacts, between 14 and 19 percent, are due to habitat management related activities.

² Rank orderings of present values discounted at three and seven percent do not change the rankings and do not appreciably change the cost shares of each unit for either post-designation baseline impacts or post-designation incremental impacts.

10. Exhibit ES-9 provides an overview of the proposed critical habitat units in relation to their location in California and their topography. Exhibit ES-10 provides a geographic display of the post-designation baseline impacts by activity for each critical habitat unit. Exhibit ES-11 provides a geographic display of the post-designation incremental impacts by activity for each critical habitat unit.

POTENTIAL UNCERTAINTY IN THE ANALYSIS

11. There have been two consultations with a former mining company concerning remediation around the inactive Pine Creek Tungsten mine. Information requests concerning the costs of the pre-designation remediation efforts have been sent to the mine owner, but no data have been received to date. This information could increase the estimates of pre-designation impacts for the Wheeler Ridge Unit (unit 4).

EXHIBIT ES-2 PRE-DESIGNATION IMPACTS TO ALL ACTIVITIES BY UNIT

UNIT	UNDISCOUNTED	PRESENT VALUE 3%	PRESENT VALUE 7%
1 Mount Warren	\$5,250,000	\$6,000,000	\$7,180,000
2 Mount Gibbs	\$1,820,000	\$2,060,000	\$2,410,000
3 Convict Creek	\$0	\$0	\$0
4 Wheeler Ridge	\$996,000	\$1,140,000	\$1,360,000
5 Taboose Creek	\$0	\$0	\$0
6 Sawmill Canyon	\$792,000	\$907,000	\$1,090,000
7 Mount Baxter	\$792,000	\$907,000	\$1,090,000
8 Mount Williamson	\$792,000	\$907,000	\$1,090,000
9 Big Arroyo	\$0	\$0	\$0
10 Mount Langley	\$787,000	\$901,000	\$1,080,000
11 Laurel Creek	\$0	\$0	\$0
12 Olancha Peak	\$0	\$0	\$0
Total Costs	\$11,200,000	\$12,800,000	\$15,300,000

Note: Totals may not sum due to rounding.

The pre-designation baseline impacts are the same for several units. This results from dividing the yearly California Department of Fish and Game's Bighorn Sheep Recovery Program budget across occupied proposed critical habitat unit equally. This budget is \$725,000 per year and the program is administered across the bighorn sheep habitat.

EXHIBIT ES-3 POST-DESIGNATION BASELINE IMPACTS TO ALL ACTIVITIES BY UNIT

UNIT	UNDISCOUNTED ¹	PRESENT VALUE 3%	PRESENT VALUE 7%	ANNUALIZED 3%	ANNUALIZED 7%
1 Mount Warren	\$11,200,000	\$8,620,000	\$6,410,000	\$579,000	\$605,000
2 Mount Gibbs	\$4,030,000	\$3,110,000	\$2,320,000	\$209,000	\$219,000
3 Convict Creek	\$342,000	\$223,000	\$134,000	\$15,000	\$12,700
4 Wheeler Ridge	\$2,020,000	\$1,580,000	\$1,200,000	\$106,000	\$113,000
5 Taboose Creek	\$585,000	\$386,000	\$232,000	\$27,000	\$21,900
6 Sawmill Canyon	\$1,460,000	\$1,140,000	\$864,000	\$76,700	\$81,500
7 Mount Baxter	\$1,460,000	\$1,140,000	\$864,000	\$76,700	\$81,500
8 Mount Williamson	\$1,460,000	\$1,140,000	\$864,000	\$76,700	\$81,500
9 Big Arroyo	\$813,000	\$559,000	\$353,000	\$37,600	\$33,300
10 Mount Langley	\$1,460,000	\$1,140,000	\$864,000	\$76,700	\$81,500
11 Laurel Creek	\$1,100,000	\$806,000	\$553,000	\$54,200	\$52,200
12 Olancha Peak	\$1,460,000	\$1,140,000	\$864,000	\$76,700	\$81,500
Total Costs	\$27,400,000	\$21,000,000	\$15,500,000	\$1,410,000	\$1,460,000

Note: Totals may not sum due to rounding.

The post-designation baseline impacts are the same for several units. This results from dividing the yearly California Department of Fish and Game's Bighorn Sheep Recovery Program budget across each proposed critical habitat units equally. This budget is \$725,000 per year and the program is administered across the entire bighorn sheep habitat.

EXHIBIT ES-4 POST-DESIGNATION INCREMENTAL IMPACTS TO ALL ACTIVITIES BY UNIT

UNIT	UNDISCOUNTED	PRESENT VALUE 3%	PRESENT VALUE 7%	ANNUALIZED 3%	ANNUALIZED 7%
1 Mount Warren	\$124,000	\$97,400	\$74,300	\$6,540	\$7,010
2 Mount Gibbs	\$3,110	\$2,070	\$1,270	\$139	\$120
3 Convict Creek	\$725	\$523	\$357	\$35	\$34
4 Wheeler Ridge	\$15,400	\$15,200	\$15,000	\$1,020	\$1,420
5 Taboose Creek	\$1,120	\$908	\$728	\$61	\$69
6 Sawmill Canyon	\$1,120	\$908	\$728	\$61	\$69
7 Mount Baxter	\$1,120	\$908	\$728	\$61	\$69
8 Mount Williamson	\$1,120	\$908	\$728	\$61	\$69
9 Big Arroyo	\$0	\$0	\$0	\$0	\$0
10 Mount Langley	\$725	\$523	\$357	\$35	\$34
11 Laurel Creek	\$0	\$0	\$0	\$0	\$0
12 Olancha Peak	\$1,120	\$908	\$728	\$61	\$69
Total Costs	\$149,000	\$120,000	\$94,900	\$8,080	\$8,960

Note: Totals may not sum due to rounding.

The post designation incremental impacts are the same for several units. This results from consultations that affect several proposed critical habitat units. These impacts are divided evenly across these units.

**EXHIBIT ES-5 UNITS RANKED BY LEVEL OF POST-DESIGNATION BASELINE IMPACT
(UNDISCOUNTED)**

RANK	UNIT NUMBER AND NAME	ESTIMATED IMPACTS (UNDISCOUNTED)	PERCENT OF TOTAL IMPACTS
1	1. Mount Warren	\$11,200,000	40.88%
2	2. Mount Gibbs	\$4,030,000	14.71%
3	4. Wheeler Ridge	\$2,020,000	7.37%
4	6. Sawmill Canyon	\$1,460,000	5.33%
5	7. Mount Baxter	\$1,460,000	5.33%
6	8. Mount Williamson	\$1,460,000	5.33%
7	10. Mount Langley	\$1,460,000	5.33%
8	12. Olancho Peak	\$1,460,000	5.33%
9	11. Laurel Creek	\$1,100,000	4.01%
10	9. Big Arroyo	\$813,000	2.97%
11	5. Taboose Creek	\$585,000	2.14%
12	3. Convict Creek	\$342,000	1.25%
Total		\$27,400,000	100.0%

Note: Totals may not sum due to rounding.

**EXHIBIT ES-6 UNITS RANKED BY LEVEL OF POST-DESIGNATION INCREMENTAL IMPACT
(UNDISCOUNTED)**

RANK	UNIT NUMBER AND NAME	ESTIMATED IMPACTS (UNDISCOUNTED)	PERCENT OF TOTAL IMPACTS
1	1. Mount Warren	\$124,000	83.22%
2	4. Wheeler Ridge	\$15,400	10.34%
3	2. Mount Gibbs	\$3,110	2.09%
4	5. Taboose Creek	\$1,120	0.75%
5	6. Sawmill Canyon	\$1,120	0.75%
6	7. Mount Baxter	\$1,120	0.75%
7	8. Mount Williamson	\$1,120	0.75%
8	12. Olancho Peak	\$1,120	0.75%
9	3. Convict Creek	\$725	0.49%
10	10. Mount Langley	\$725	0.49%
11	9. Big Arroyo	\$0	0.00%
12	11. Laurel Creek	\$0	0.00%
Total		\$149,000	100.0%

Note: Totals may not sum due to rounding.

EXHIBIT ES-7 ACTIVITIES RANKED BY LEVEL OF POST-DESIGNATION BASELINE IMPACT

ACTIVITY	UNDISCOUNTED		DISCOUNTED AT THREE PERCENT		DISCOUNTED AT SEVEN PERCENT	
	ESTIMATED IMPACTS	PERCENT OF TOTAL	ESTIMATED IMPACTS	PERCENT OF TOTAL	ESTIMATED IMPACTS	PERCENT OF TOTAL
Habitat Management ¹	\$14,800,000	54.0%	\$11,300,000	53.8%	\$8,350,000	53.9%
Grazing	\$12,500,000	45.6%	\$9,600,000	45.7%	\$7,110,000	45.9%
Recreation	\$90,400	0.3%	\$77,600	0.4%	\$65,100	0.4%
Total	\$27,400,000	100.0 %	\$21,000,000	100.0 %	\$15,500,000	100.0 %

Note: Totals may not sum due to rounding.

¹ Includes \$267,000 (undiscounted) for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

EXHIBIT ES-8 ACTIVITIES RANKED BY LEVEL OF POST-DESIGNATION INCREMENTAL IMPACT

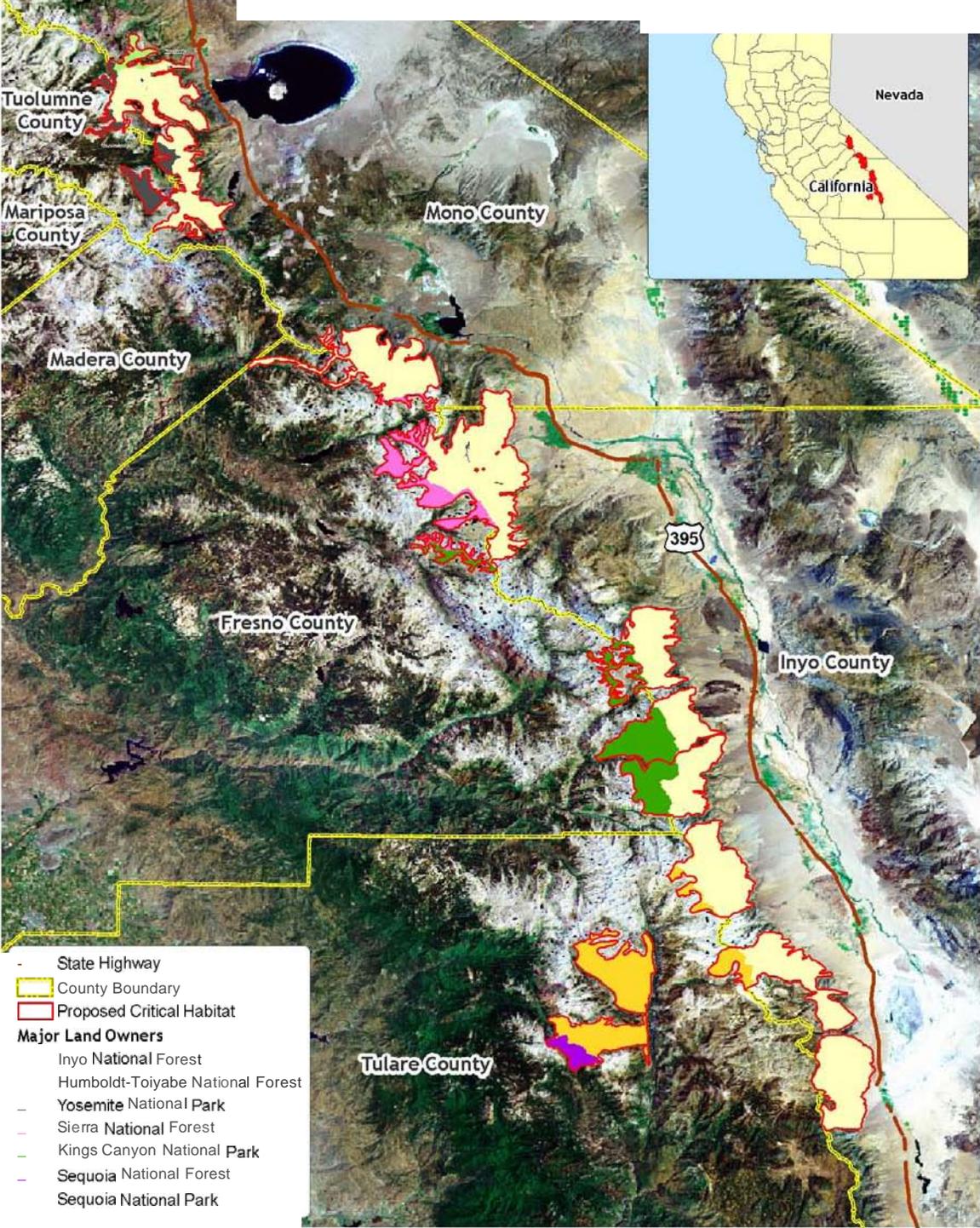
ACTIVITY	UNDISCOUNTED		DISCOUNTED AT THREE PERCENT		DISCOUNTED AT SEVEN PERCENT	
	ESTIMATED IMPACTS	PERCENT OF TOTAL	ESTIMATED IMPACTS	PERCENT OF TOTAL	ESTIMATED IMPACTS	PERCENT OF TOTAL
Grazing	\$97,600	65.5%	\$74,800	62.3%	\$55,300	58.3%
Recreation	\$29,800	20.0%	\$25,500	21.3%	\$21,400	22.6%
Habitat Management ¹	\$21,900	14.7%	\$19,900	16.6%	\$18,200	19.2%
Total	\$149,000	100.0 %	\$120,000	100.0 %	\$94,900	100.0 %

Note: Totals may not sum due to rounding.

¹ Includes \$14,600 (undiscounted) for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

EXHIBIT ES-9 OVERVIEW OF PROPOSED CRITICAL HABITAT UNITS

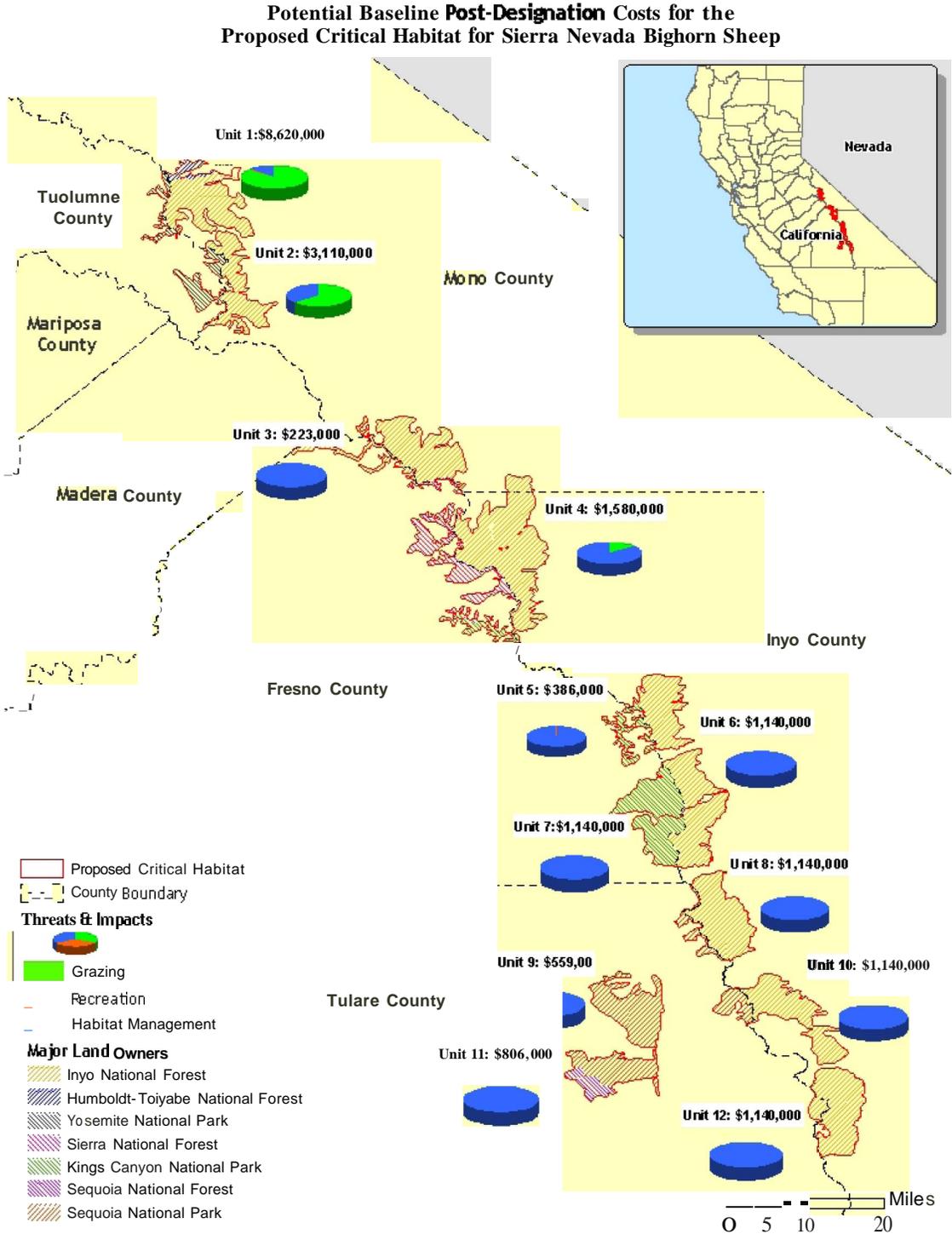
Major Land Owners of Proposed Critical Habitat for Sierra Nevada Bighorn Sheep



Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA

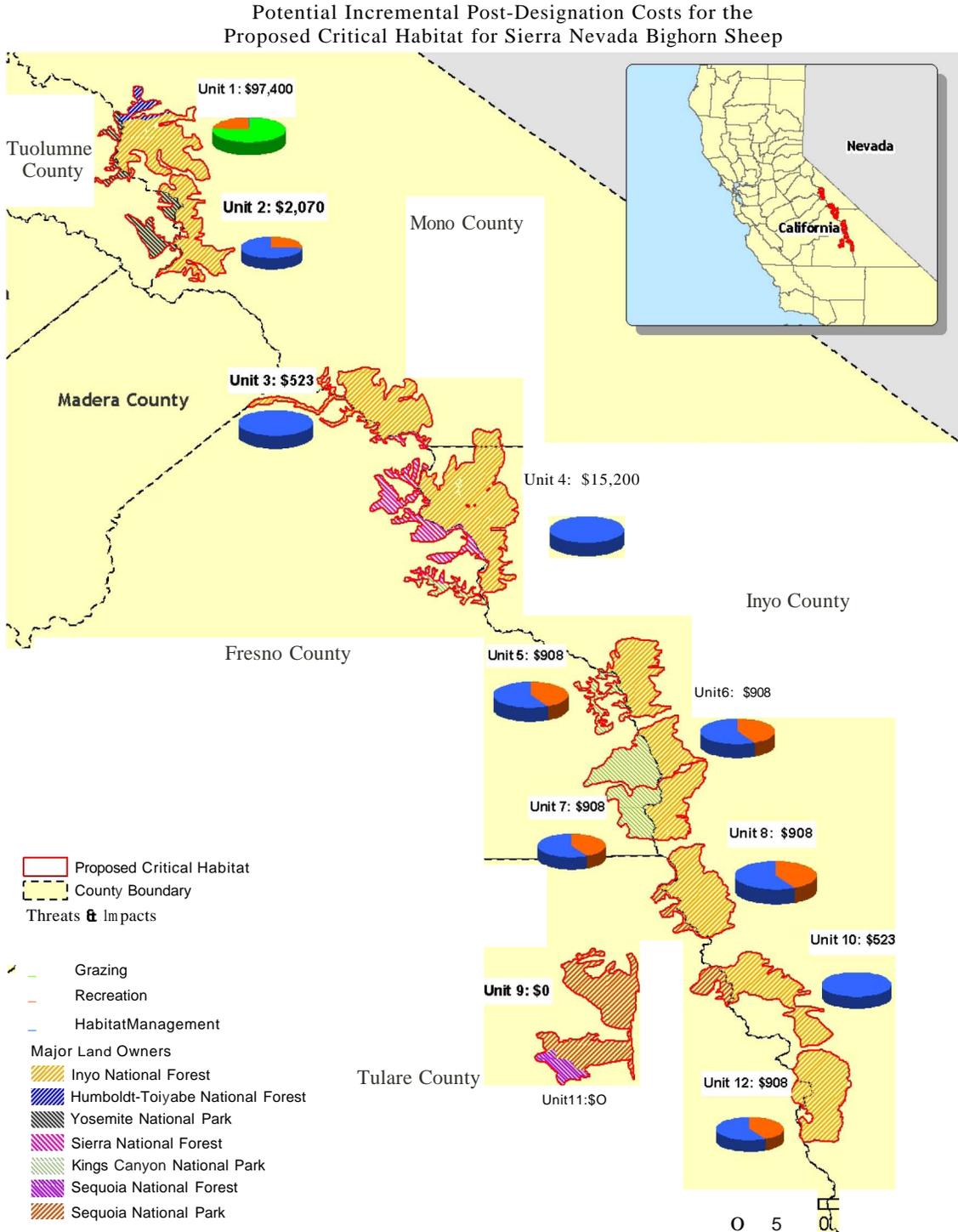


EXHIBIT ES-10 PROPOSED CRITICAL HABITAT UNITS AND POST-DESIGNATION BASELINE ACTIVITY IMPACTS (DISCOUNTED AT 3 PERCENT)



Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA

EXHIBIT ES-11 PROPOSED CRITICAL HABITAT UNITS AND POST-DESIGNATION INCREMENTAL ACTIVITY IMPACTS (DISCOUNTED AT 3 PERCENT)



Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



CHAPTER 1 | FRAMEWORK FOR THE ANALYSIS

1. The purpose of this report is to estimate the economic impact of actions taken to protect the federally listed Sierra Nevada bighorn sheep (*Ovis Canadensis sierrae*) (hereafter, "bighorn sheep") and its habitat. This analysis examines the impacts of restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the areas considered for critical habitat designation. This analysis employs "without critical habitat" and "with critical habitat" scenarios. The "without critical habitat" scenario represents the baseline for the analysis, considering protections already accorded the bighorn sheep; for example, under the Federal listing and other Federal, State, and local regulations. The "with critical habitat" scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts are those not expected to occur absent the designation of critical habitat for the bighorn sheep. The analysis looks retrospectively at baseline impacts incurred since the species was listed, and forecasts both baseline and incremental impacts likely to occur after the proposed critical habitat is finalized.
2. This information is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.³ In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).⁴
3. This section describes the framework for the analysis. First, it provides background on the framework applied. It then describes general categories of economic effects that may be associated with species conservation, including a discussion of both efficiency and distributional effects. Next, this section discusses the analytic framework and scope of the analysis, including the link between existing and critical habitat-related protection efforts and economic impacts, and the consideration of benefits. It then presents the information sources relied upon in the analysis and the structure of the report.

³ 16 U.S.C. '1533(b)(2).

⁴ Executive Order 12866, Regulatory Planning and Review, September 30, 1993; Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001; 5. U.S.C. "601 et seq; and Pub Law No. 104-121.

1.1 BACKGROUND

4. The U.S. Office of Management and Budget's (OMB) guidelines for conducting economic analysis of regulations direct Federal agencies to measure the costs of a regulatory action against a baseline, which it defines as the "best assessment of the way the world would look absent the proposed action."⁵ In other words, the baseline includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat. Impacts that are incremental to that baseline (i.e., occurring over and above existing constraints) are attributable to the proposed regulation. Significant debate has occurred regarding whether assessing the impacts of the Service's proposed regulations using this baseline approach is appropriate in the context of critical habitat designations.

5. In 2001, the U.S. Tenth Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable coextensively to other causes.⁶ Specifically, the court stated,

“The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase. Although 50 C.F.R. 402.02 is not at issue here, the regulation's definition of the jeopardy standard as fully encompassing the adverse modification standard renders any purported economic analysis done utilizing the baseline approach virtually meaningless. We are compelled by the canons of statutory interpretation to give some effect to the congressional directive that economic impacts be considered at the time of critical habitat designation.... Because economic analysis done using the FWS's baseline model is rendered essentially without meaning by 50 C.F.R. § 402.02, we conclude Congress intended that the FWS conduct a full analysis of all of the economic impacts of a critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes. Thus, we hold the baseline approach to economic analysis is not in accord with the language or intent of the ESA.”⁷

6. Since that decision, however, courts in other cases have held that an incremental analysis of impacts stemming solely from the critical habitat rulemaking is proper.⁸ For example, in the March 2006 court order ruling that the August 2004 critical habitat rule for the Peirson's milk-vetch was arbitrary and capricious, the United States District Court for the Northern District of California stated,

⁵ OMB, "Circular A-4," September 17, 2003.

⁶ *New Mexico Cattle Growers Assn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

⁷ *New Mexico Cattle Growers Assn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

⁸ *Cape Hatteras Access Preservation Alliance v. Department of Interior*, 344 F. Supp. 2d 108 (D.D.C.); *CBD v. BLM*, 422 F. Supp. 2d 1115 (N.D. Cal. 2006).

“The Court is not persuaded by the reasoning of *New Mexico Cattle Growers*, and instead agrees with the reasoning and holding of *Cape Hatteras Access Preservation Alliance v. U.S. Dep’t of the Interior*, 344 F. Supp 2d 108 (D.D.C. 2004). That case also involved a challenge to the Service’s baseline approach and the court held that the baseline approach was both consistent with the language and purpose of the ESA and that it was a reasonable method for assessing the actual costs of a particular critical habitat designation *Id* at 130. ‘To find the true cost of a designation, the world with the designation must be compared to the world without it.’”⁹

7. In order to address the divergent opinions of the courts and provide the most complete information to decision-makers, this economic analysis reports both:
 - a. the baseline impacts of bighorn sheep conservation from protections afforded the species absent critical habitat designation; and
 - b. the estimated incremental impacts precipitated specifically by the designation of critical habitat for the species.

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

8. Incremental effects of critical habitat designation are determined using the Service's December 9, 2004 interim guidance on “Application of the ‘Destruction or Adverse Modification’ Standard Under Section 7(a)(2) of the Endangered Species Act” and information from the Service regarding what potential consultations and project modifications would be imposed as a result of critical habitat designation over and above those associated with the listing.¹⁰ The following section describes the methods employed to identify baseline and incremental impacts of bighorn sheep conservation.

1.2 CATEGORIES OF POTENTIAL ECONOMIC EFFECTS OF SPECIES CONSERVATION

9. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the bighorn sheep and its habitat (hereinafter referred to collectively as “bighorn sheep conservation efforts”). Economic efficiency effects generally reflect “opportunity costs” associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities that can take place on a parcel of land are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly,

⁹ Center for Biological Diversity et al, Plaintiffs, v. Bureau of Land Management et. al, Defendants and American Sand Association, et al, Defendant Intervenors. Order re: Cross Motions for Summary Judgment. Case 3:03-cv-02509 Document 174 Filed 03/14/2006. Pages 44-45.

¹⁰ Director, U.S. Fish and Wildlife Service, Memorandum to Regional Directors and Manager of the California-Nevada Operations Office, Subject: Application of the “Destruction or Adverse Modification” Standard under Section 7(a)(2) of the Endangered Species Act, dated December 9, 2004.

the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of bighorn sheep conservation efforts.

10. This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of species conservation efforts unduly burden a particular group or economic sector. For example, while conservation efforts may have a relatively small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts. The differences between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

1.2.1 EFFICIENCY EFFECTS

11. At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect bighorn sheep habitat, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.¹¹
12. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal land manager, such as the U.S. Forest Service, may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.
13. Where habitat protection efforts are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency

¹¹ For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see: Gramlich, Edward M., A Guide to Benefit-Cost Analysis (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, Guidelines for Preparing Economic Analyses, EPA 240-R-00-003, September 2000, available at <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

(i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the market.

14. This analysis begins by measuring impacts associated with efforts undertaken to protect bighorn sheep and its habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the cost of conservation efforts is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets.

1.2.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

15. Measurements of changes in economic efficiency focus on the net impact of conservation efforts, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.¹² This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

¹² U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

Calculating Present Value and Annualized Impacts

For each land use activity, this analysis presents economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of the economic impacts of past or future impacts to present value terms requires the following: a) past or projected future impacts of species conservation efforts; and b) the specific years in which these impacts have been or are expected to be incurred. With these data, the present value of the past or future stream of impacts (PV_c) of bighorn sheep conservation efforts from year t to T is measured in 2008 dollars according to the following standard formula:^a

$$PV_c = \sum_{t=t_0}^{t=T} \frac{C_t}{(1+r)^{t-2008}}$$

C_t = cost of species conservation efforts in year t

r = discount rate^b

When a higher discount rate is used to calculate the present value for the same economic impacts, the total will decrease. A higher discount rate results in impacts in the future being valued less than with a lower discount rate. The opposite is true when discounting is applied to past costs. This practice is called compounding, and results in larger totals because past impacts are valued more with higher discount rates.

Impacts of conservation efforts for each land use activity in each unit are also expressed as annualized values (i.e., the series of equal annual costs over some defined time period that have the same present value as estimated total impacts). Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). This analysis employs a forecast period of 20 years, 2008 through 2027. Annualized impacts of future bighorn sheep conservation efforts (APV_c) are calculated using the following standard formula:

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

N = number of years in the forecast period

^a To derive the present value of pre-designation conservation efforts for this analysis, t is 2000 and T is 2007; to derive the present value of post-designation conservation efforts, t is 2008 and T is 2027.

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

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

16. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the Regulatory Flexibility Act, might be affected by future species conservation efforts.¹³ In addition, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation efforts on the energy industry and its customers.¹⁴

Regional Economic Effects

17. Regional economic impact analysis can provide an assessment of the potential localized effects of conservation efforts. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that represent the relationship between a change in one sector of the economy (e.g., expenditures by recreators) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreators). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.
18. The use of regional input/output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.
19. Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

¹³ 5 U.S.C. ' 601 et seq.

¹⁴ Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001.

1.3 ANALYTIC FRAMEWORK AND SCOPE OF THE ANALYSIS

20. This analysis identifies those economic activities most likely to threaten the listed species and its habitat and, where possible, quantifies the economic impact to avoid, minimize, or mitigate such threats within the boundaries of the study area. This section provides a description of the methodology used to separately identify baseline impacts and incremental impacts stemming from the proposed designation of critical habitat for the bighorn sheep. This evaluation of impacts in a "with critical habitat designation" versus a "without critical habitat designation" framework effectively measures the net change in economic activity associated with the proposed rulemaking.

1.3.1 IDENTIFYING BASELINE IMPACTS

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

22. Baseline impacts include sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections to the extent that they are expected to occur absent the designation of critical habitat for the species.

- Section 7 of the Act, absent critical habitat designation, requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species. The portion of the administrative costs of consultations under the jeopardy standard, along with the impacts of project modifications resulting from consideration of this standard, are considered baseline impacts.¹⁵ Baseline administrative costs of section 7 consultation are summarized in Exhibit 1-2.
- Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, or collect, or to attempt to engage in any such conduct."¹⁶ The economic impacts associated with this section manifest themselves in sections 7 and 10.

¹⁵ The Service notes, however, that a recent Ninth Circuit judicial opinion, *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, has invalidated the Service's regulation defining destruction or adverse modification of critical habitat. The Service is currently reviewing the decision to determine what effect it (and to a limited extent *Center for Biological Diversity v. Bureau of Land Management* (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

¹⁶ 16 U.S.C. 1532.

- Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.¹⁷ The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. The development and implementation of HCPs is considered a baseline protection for the species and habitat unless the HCP is determined to be precipitated because of the designation of critical habitat, or the designation influences stipulated conservation efforts under HCPs.

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

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

1.3.2 IDENTIFYING INCREMENTAL IMPACTS

24. This analysis separately quantifies the incremental impacts of this rulemaking. The focus of the incremental analysis is to determine the impacts on land uses and activities from the designation of critical habitat that are above and beyond those impacts due to existing required or voluntary conservation efforts being undertaken due to other Federal, State, and local regulations or guidelines.
25. When critical habitat is designated, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (in addition to considering whether the actions are likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations, and the additional impacts of implementing project modifications resulting from the protection of critical habitat are the direct compliance costs of designating critical habitat. These costs are not in the baseline, and are considered incremental impacts of the rulemaking.
26. Exhibit 1-1 depicts the decision analysis regarding whether an impact should be considered incremental. The following sections describe this decision tree in detail.

¹⁷ U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.

EXHIBIT 1-1 IDENTIFYING INCREMENTAL IMPACTS OF CRITICAL HABITAT DESIGNATION

Identify economic activities taking place that threaten critical habitat.

Is there a Federal nexus?

No

Consider potential for indirect effects.

Yes

Would the action agency have consulted absent critical habitat?

No

Include all administrative costs and project modifications resulting from the consultation.

Yes

Will the outcome of the consultation be different as a result of critical habitat designation?

Yes

No

Include incremental changes in project modifications in addition to administrative costs of addressing adverse modification in the consultation.

Include only administrative costs of addressing adverse modification in the consultation.

Consider the potential for indirect effects.

27. Incremental impacts may be the direct compliance costs associated with additional effort for forecast consultations, reinitiated consultations, new consultations occurring specifically because of the designation, and additional project modifications that would not have been required under the jeopardy standard. Additionally, incremental impacts may include indirect impacts resulting from reaction to the potential designation of critical habitat (e.g., developing habitat conservation plans (HCPs) specifically to avoid designation of critical habitat), triggering of additional requirements under State or local laws intended to protect sensitive habitat, and uncertainty and perceptual effects on markets.

Direct Impacts

28. The direct, incremental impacts of critical habitat designation stem from the consideration of the potential for destruction or adverse modification of critical habitat during section 7 consultations. The two categories of direct, incremental impacts of critical habitat designation are: 1) the administrative costs of conducting section 7 consultation; and 2) implementation of any project modifications requested by the Service through section 7 consultation to avoid, minimize, or mitigate potential destruction or adverse modification of critical habitat.

Administrative Section 7 Consultation Costs

29. Parties involved in section 7 consultations include the Service, a Federal "action agency," and in some cases, a private entity involved in the project or land use activity. The action agency (i.e., the Federal nexus necessitating the consultation) serves as the liaison with the Service. While consultations are required for activities that involve a Federal nexus and may jeopardize the continued existence of the species regardless of whether critical habitat is designated, the designation may increase the effort for consultations in the case that the project or activity in question may adversely modify critical habitat. Administrative efforts for consultation may therefore result in both baseline and incremental impacts.
30. In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:
1. **Additional effort to address adverse modification in a new consultation**
- New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the listing issues. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.
 2. **Re-initiation of consultation to address adverse modification -**
Consultations that have already been completed on a project or activity may require re-initiation to address critical habitat. In this case, the costs of re-initiating the consultation, including all associated administrative and

project modification costs are considered incremental impacts of the designation.

3. **Incremental consultation resulting entirely from critical habitat designation** - Critical habitat designation may trigger additional consultations that may not occur absent the designation (e.g., for an activity for which adverse modification may be an issue, while jeopardy is not, or consultations resulting from the new information about the potential presence of the species provided by the designation). Such consultations may, for example, be triggered in critical habitat areas that are not occupied by the species. All associated administrative and project modification costs of incremental consultations are considered incremental impacts of the designation.

31. The administrative costs of these consultations vary depending on the specifics of the project. One way to address this variability is to show a range of possible costs of consultation as it may not be possible to predict the outcome of each future consultation in terms of level of effort. Review of consultation records and discussions with Service field offices resulted in the estimated range of administrative costs of consultation employed in this analysis.
32. Exhibit 1-2 provides estimated consultation costs representing effort required for all types of consultation, including those that considered both adverse modification and jeopardy. To estimate the fractions of the total administrative consultation costs that are baseline and incremental, the following assumptions were applied.
- For the costs of a consultation that only considers jeopardy or only adverse modification (i.e., an incremental consultation only occurring because of the designation of critical habitat) are attributed wholly to the baseline or to critical habitat, respectively.
 - Incremental costs of the re-initiation of a consultation because of the critical habitat designation are assumed to be approximately half the cost of the original consultation that considered only jeopardy. This assumes that re-initiations are less time-consuming as the groundwork for the project has already been considered in terms of its effect on the species.
 - Efficiencies exist with considering both jeopardy and adverse modification at the same time (e.g., in staff time saved for project review and report writing), and therefore incremental administrative costs of considering adverse modification in consultations that will already be required to consider jeopardy result in the least incremental effort of these three consultation categories, roughly half that of a re-initiation.

Importantly, the estimated costs represent the midpoint of a potential range of impacts to account for variability regarding levels of effort of specific consultations.¹⁸

EXHIBIT 1-2 RANGE OF ADMINISTRATIVE CONSULTATION COSTS, 2007\$

BASELINE ADMINISTRATIVE COSTS OF CONSULTATION (\$2007)

CONSULTATION TYPE	SERVICE	FEDERAL AGENCY	THIRD PARTY	BIOLOGICAL ASSESSMENT	TOTAL COSTS
CONSULTATION CONSIDERING ONLY JEOPARDY (NO CONSIDERATION OF CRITICAL HABITAT DESIGNATION)					
Technical Assistance	\$530	n/a	\$1,050	n/a	\$1,500
Informal	\$2,300	\$2,900	\$2,050	\$2,000	\$9,500
Formal	\$5,150	\$5,800	\$3,500	\$4,800	\$19,500
Programmatic	\$15,500	\$13,000	n/a	\$5,600	\$34,100
EFFORT TO ADDRESS JEOPARDY IN A NEW CONSULTATION THAT CONSIDERS BOTH JEOPARDY AND ADVERSE MODIFICATION					
Technical Assistance	\$398	n/a	\$788	n/a	\$1,130
Informal	\$1,730	\$2,180	\$1,540	\$1,500	\$7,130
Formal	\$3,860	\$4,350	\$2,630	\$3,600	\$14,600
Programmatic	\$11,600	\$9,710	n/a	\$4,200	\$25,500

INCREMENTAL ADMINISTRATIVE COSTS OF CONSULTATION (\$2007)

CONSULTATION TYPE	SERVICE	FEDERAL AGENCY	THIRD PARTY	BIOLOGICAL ASSESSMENT	TOTAL COSTS
INCREMENTAL CONSULTATION RESULTING ENTIRELY FROM CRITICAL HABITAT DESIGNATION					
Technical Assistance	\$530	n/a	\$1,050	n/a	\$1,500
Informal	\$2,300	\$2,900	\$2,050	\$2,000	\$9,500
Formal	\$5,150	\$5,800	\$3,500	\$4,800	\$19,500
Programmatic	\$15,500	\$13,000	n/a	\$5,600	\$34,100
RE-INITIATION OF CONSULTATION TO ADDRESS ADVERSE MODIFICATION					
Technical Assistance	\$265	n/a	\$525	n/a	\$750
Informal	\$1,150	\$1,450	\$1,030	\$1,000	\$4,750
Formal	\$2,580	\$2,900	\$1,750	\$2,400	\$9,750
Programmatic	\$7,750	\$6,480	n/a	\$2,800	\$17,000
ADDITIONAL EFFORT TO ADDRESS ADVERSE MODIFICATION IN A NEW CONSULTATION					
Technical Assistance	\$133	n/a	\$263	n/a	\$375
Informal	\$575	\$725	\$513	\$500	\$2,380
Formal	\$1,290	\$1,450	\$875	\$1,200	\$4,880
Programmatic	\$3,880	\$3,240	n/a	\$1,400	\$8,510

Source: IEC analysis of full administrative costs is based on data from the Federal Government Schedule Rates, Office of Personnel Management, 2007, and a review of consultation records from several Service field offices across the country conducted in 2002.

Notes:

1. Totals may not sum due to rounding.
2. Estimates reflect average hourly time required by staff.

¹⁸ Absent specific information on the probability that a consultation will be closer to the low or high end of the range, presenting the midpoint effectively assumes there is an even distribution of the consultation falling at any given point on the spectrum between the low-end cost and high-end cost.

Section 7 Project Modification Impacts

33. Section 7 consultation considering critical habitat may also result in additional project modification recommendations specifically addressing potential destruction or adverse modification of critical habitat. For forecast consultations considering jeopardy and adverse modification, and for re-initiations of past consultations to consider critical habitat, the economic impacts of project modifications undertaken to avoid, minimize, or mitigate adverse modification are considered incremental impacts of critical habitat designation. For consultations that are forecast to occur specifically because of the designation (incremental consultations), impacts of all associated project modifications are assumed to be incremental impacts of the designation. This is summarized below.
1. **Additional effort to address adverse modification in a new consultation** - Only project modifications associated solely with avoiding, compensating for, or mitigating adverse modification are considered incremental.
 2. **Re-initiation of consultation to address adverse modification** - Only project modifications associated solely with avoiding, compensating for, or mitigating adverse modification are considered incremental.
 3. **Incremental consultation resulting entirely from critical habitat designation** - Impacts of all project modifications are considered incremental.

Indirect Impacts

34. The designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to the provisions of section 7 under the Act. Indirect impacts are those unintended changes in economic behavior that may occur outside of the Act, through other Federal, State, or local actions, that are caused by the designation of critical habitat. This section identifies common types of indirect impacts that may be associated with the designation of critical habitat. Importantly, these types of impacts are not always considered incremental. In the case that these types of conservation efforts and economic effects are expected to occur regardless of critical habitat designation, they are appropriately considered baseline impacts in this analysis.

Habitat Conservation Plans

35. HCPs intend to counterbalance potential harmful effects that a proposed activity may have on a species, while allowing the otherwise lawful activity to proceed. As such, the purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. Thus, HCPs are developed to ensure compliance with section 9 of the Act and to meet the requirements of section 10 of the Act.
36. HCPs are not required or necessarily recommended by a critical habitat designation. Some landowners, however, may voluntarily complete a HCP in response to the prospect of having their land designated as critical habitat. In this case, the effort involved in

creating the HCP and undertaking associated conservation actions are considered an incremental effect of designation.

Other State and Local Laws

37. Under certain circumstances, critical habitat designation may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation.
38. The California Environmental Quality Act (CEQA), for example, requires that lead agencies, public agencies responsible for project approval, consider the environmental effects of proposed projects that are considered discretionary in nature and not categorically or statutorily exempt. In some instances, critical habitat designation may trigger CEQA-related requirements. This is most likely to occur in areas where the critical habitat designation provides clearer information on the importance of particular areas as habitat for a listed species. In addition, applicants who were “categorically exempt” from preparing an Environmental Impact Report under CEQA may no longer be exempt once critical habitat is designated. In cases where the designation triggers the CEQA significance test or results in a reduction of categorically exempt activities, associated impacts are considered to be an indirect, incremental effect of the designation. Since the predominant amount of land proposed for designation in the proposed rule for the bighorn sheep is Federal, and since there are no State permitting processes for activities in the proposed critical habitat, there are no anticipated CEQA impacts for the bighorn sheep.

Additional Indirect Impacts

39. In addition to the indirect effects of compliance with other laws or triggered by the designation, project proponents, land managers and landowners may face additional indirect impacts, including the following:
- **Time Delays** - Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the need to reinitiate the section 7 consultation process and/or compliance with other laws triggered by the designation. To the extent that delays result from the designation, they are considered indirect, incremental impacts of the designation.
 - **Regulatory Uncertainty** - The Service conducts each section 7 consultation on a case-by-case basis and issues a biological opinion on formal consultations based on species-specific and site-specific information. As a result, government agencies and affiliated private parties who consult with the Service under section 7 may face uncertainty concerning whether project modifications will be recommended by the Service and what the nature of these modifications will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. Where information suggests that this type of regulatory uncertainty

stemming from the designation may affect a project or economic behavior, associated impacts are considered indirect, incremental impacts of the designation.

- **Stigma** - In some cases, the public may perceive that critical habitat designation may result in limitations on private property uses above and beyond those associated with anticipated project modifications and regulatory uncertainty described above. Public attitudes about the limits or restrictions that critical habitat may impose can cause real economic effects to property owners, regardless of whether such limits are actually imposed. All else equal, a property that is designated as critical habitat may have a lower market value than an identical property that is not within the boundaries of critical habitat due to perceived limitations or restrictions. As the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets may decrease. To the extent that potential stigma effects on markets are probable and identifiable, these impacts are considered indirect, incremental impacts of the designation.

1.3.3 BENEFITS

40. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.¹⁹ OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.²⁰
41. In the context of critical habitat, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.²¹ Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.
42. Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions

¹⁹ Executive Order 12866, Regulatory Planning and Review, September 30, 1993.

²⁰ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

²¹ *Ibid.*

undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

43. It is often difficult to evaluate the ancillary benefits of critical habitat designation. To the extent that the ancillary benefits of the rulemaking may be captured by the market through an identifiable shift in resource allocation, they are factored into the overall economic impact assessment in this report. For example, if habitat preserves are created to protect a species, the value of existing residential property adjacent to those preserves may increase, resulting in a measurable positive impact. Where data are available, this analysis attempts to capture the *net* economic impact (i.e., the increased regulatory burden less any discernable offsetting market gains), of species conservation efforts imposed on regulated entities and the regional economy.

1.3.4 GEOGRAPHIC SCOPE OF THE ANALYSIS

44. The geographic scope of the analysis includes areas proposed for final critical habitat according to section 4(b)(2) of the Act, collectively referred to as the "study area" for the purposes of this analysis. The analysis quantifies impacts to land use activities within or affecting the entire study area.

1.3.5 ANALYTIC TIME FRAME

45. The analysis estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. The analysis estimates economic impacts to activities from 2000 (year of the species' final listing) to 2027 (20 years from the expected year of final critical habitat designation). Estimated impacts are divided into pre-designation (2000-2007) and post-designation (2008-2027) impacts. The land uses within the study area are not expected to substantially change over this time period.

1.4 INFORMATION SOURCES

46. The primary sources of information for this report are communications with, and data provided by, personnel from the Service, Federal, State, and local governments and other stakeholders. In addition, this analysis relies upon the Service's section 7 consultation records, and existing conservation plans that consider the bighorn sheep. Due to the high number of entities contacted, the complete list of contacted stakeholders is within the reference section at the end of this document.

1.5 STRUCTURE OF THE REPORT

47. This remainder of this report is organized as follows:

- Chapter 2: Potential Economic Impacts to Grazing;
- Chapter 3: Potential Economic Impacts to Habitat Management;
- Chapter 4: Potential Economic Impacts to Recreation;
- References;
- Appendix A: Small Business, Regulatory Flexibility, and Energy Impacts Analysis;
- Appendix B: Study Area Maps;
- Appendix C: Summary of Pre-designation and Post-designation Impacts; and
- Appendix D: Detailed Calculations for Grazing Impacts.

CHAPTER 2 | POTENTIAL ECONOMIC IMPACTS TO GRAZING

48. This chapter describes how conservation efforts to protect the bighorn sheep and its habitat may affect domestic sheep grazing in the study area. Domestic sheep grazing is considered to be the most substantial threat to the bighorn sheep's recovery since domestic sheep (and goats) can carry a transmittable respiratory disease that can be lethal to bighorn sheep.^{22,23} The bighorn sheep conservation impacts to grazing considered in this chapter include:
- Additional administrative costs incurred by agencies that manage grazing;
 - Additional management and administrative costs borne by sheep ranchers; and,
 - Opportunity costs of foregone forage values in sheep and goat grazing allotments where grazing is no longer allowed due to proximity of bighorn sheep.
49. These activities were identified through a review of historical section 7 consultation efforts related to the bighorn sheep, review of public comments on the proposed rule, and interviews with stakeholders.
50. Some restrictions on domestic sheep grazing that began before emergency listing have continued since. Additional grazing management activities to conserve the bighorn sheep were developed in subsequent years. Opportunity costs from lost grazing values due to grazing reductions or discontinuances that began during the pre-listing and post-listing periods are both included, since both represent bighorn sheep conservation efforts that were in place during the pre-designation period. These opportunity costs and activities, and their associated economic impacts constitute the pre-designation baseline. Continuation of these activities after designation are a continuation of the baseline. Post-designation incremental grazing impacts specifically due to critical habitat designation are limited to addressing adverse modification in predicted post-designation section 7 consultations.
- 2.1 IMPACTS TO GRAZING AND SHEEP OPERATIONS IN THE STUDY AREA**
51. This section provides a brief history of how sheep grazing has changed in the study area following the 1999 emergency listing of the bighorn sheep. Because conservation costs depend on the type of sheep operation, the section also describes the different types of

²² Personal communication with Service Wildlife Biologist, Nevada Fish and Wildlife Office, September 10, 2007.

²³ U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Habitat for the Sierra Nevada Bighorn Sheep and Proposed Taxonomic Revision; Proposed Rule, 72 FR 142, July 25, 2007.

domestic sheep operations that use grazing allotments in the study area. Next, the linkages between conservation impacts and sheep operation type are described. The section concludes with an explanation of the methodology used to measure the economic impacts of grazing forage values that are foregone to protect the bighorn sheep.

2.1.1 DOMESTIC SHEEP GRAZING FOLLOWING FEDERAL LISTING

52. Historically, domestic sheep have grazed seasonally in several allotments in Mono and Inyo counties. The emergency listing occurred in 1999. The Recovery Plan for the Sierra Nevada Bighorn Sheep was published in September 2007.²⁴ The plan specified a number of herd units, twelve of which have been proposed for critical habitat (72 FR 40956).
53. Domestic sheep grazing was discontinued in several places following the emergency listing. In 1999, the Los Angeles Department of Water and Power, which owns and leases several areas for domestic sheep grazing in Inyo County, discontinued domestic sheep grazing on those leases. In 2000, Inyo National Forest discontinued grazing on the Bloody Canyon, Algiers Lake, and a portion of the June Lake allotments. All of these allotments are west of Highway 395 and were considered high risk for disease transmission from domestic to bighorn sheep at that time; most of the allotments east of Highway 395 were considered low risk.²⁵ In addition, since 1999 a sheep rancher using the Rock Creek allotment in Inyo National Forest has voluntarily not grazed domestic sheep on the Western portion of that allotment in order to provide an additional buffer of protection.²⁶ Several other grazing allotments have also had grazing discontinued during the period for reasons not related to the bighorn sheep.²⁷
54. The appearance of bighorn sheep in Humboldt-Toiyabe National Forest occurred before it was expected (biologists had not predicted bighorn sheep would migrate from the southern habitat units as quickly as they did). As a result, many new programs and policies had to be quickly instituted in this forest. In 2000, grazing was discontinued in the Jordan Basin portion of the Dunderberg allotment. In 2006, grazing was discontinued in the primary (northern) Dunderberg allotment.

2.1.2 TYPES OF DOMESTIC SHEEP OPERATIONS

55. There are two distinct types of domestic sheep operations in the study area. These different types of operations follow varying procedures while using grazing allotments.

²⁴U.S. Fish and Wildlife Service. 2007. Recovery Plan for the Sierra Nevada Bighorn Sheep. Sacramento, California. xiv + 199 pages.

²⁵ US Fish and Wildlife Service, "Interagency Domestic Sheep Management Strategy," June 27, 2001.

²⁶ The voluntary grazing reduction in the Rock Creek Allotment (Wheeler Ridge, Unit 4) is between the highways and serves as a buffer to the portion of the allotment that previously burned and is currently closed to grazing. Personal communication with Joe Echenique, September 11, 2007. Personal communication with Service Wildlife Biologist, Nevada Fish and Wildlife Office, September 10, 2007.

²⁷ For example, grazing in the McGee sheep and goat allotment is viewed as unsustainable due to the poor vegetation cover, see US Department of Agriculture, "Scoping of Proposed Action for Crowley Lake Basin Grazing Allotments," June 25, 2007, File Code 1950/2230.

The different activities that are employed by these two ranching types are affected in distinct ways by the conservation efforts that were developed to manage domestic sheep grazing in proximity to bighorn sheep.

56. The southern sheep operations, called “dry sheep,” graze ewes over the summer in the allotments in Inyo county. Dry sheep ewes are impregnated in the spring and summer, and lamb in the fall. The dry sheep ranchers graze on allotments in Inyo County in the summer, then transport their sheep to the San Joaquin Valley for the winter. The dry sheep ranchers travel with water trucks and fill portable water troughs for the sheep at night. The nightly watering of the sheep involves rounding them up every evening and bringing them to a central location to bed down. As part of this process, the sheep are counted frequently. This type of ranching works well with the frequent counts required to track the location of domestic sheep when they are grazing in proximity to bighorn sheep habitat. Since regular sheep counts are a normal part of dry sheep operations, the frequent counts required by the US Forest Service (USFS) and the Service as a condition for grazing in proximity to bighorn sheep habitat do not impose additional costs on the ranchers.²⁸
57. Closer to the northern proposed critical habitat units, domestic sheep operations are “ewes and lambs.” Ewes and lambs operations lamb in the spring, and both ewes and lambs graze on the allotments through the summer. These ranchers do not haul water to their sheep every night. Instead, ewes and lamb ranchers generally herd their sheep away from the watering area to graze. The common practice in the Inyo and Humboldt-Toiyabe National Forest allotments has been for the ranchers to herd the sheep away from water to grazing pastures one day, then bring them back the next.
58. The important difference between ewes and lambs and dry operations is that the ewes and lambs ranchers do not customarily count their sheep. Doing so requires additional effort, the hiring of an additional herder, purchase of equipment, and additional movement of the sheep. While dry sheep ranchers can comply with environmental agencies’ restrictions for protecting bighorn sheep at negligible cost, ewes and lambs operations may incur costs from performing several different compliance procedures. In addition, the breeding period for the ewes and lambs operations typically occur when the bighorn sheep are in rut, which can make monitoring the bighorn and domestic sheep populations more challenging as well as more important.

2.1.3 CONSERVATION IMPACTS

59. Estimated costs for the ewes and lambs ranchers in the study area are presented in Exhibit 2-4.²⁹ Detailed explanations of these impacts are described in Appendix D. These activities include training costs for herd dogs and the hiring of additional herders. In addition, FIM Corporation has incurred administrative costs in complying with required

²⁸ Personal communication with Joe Echenique, September 11, 2007.

²⁹ Conservation measure compliance costs similar to those reported by FIM Corporation were assumed to be true for Ted Borda, who grazed sheep in the Summer Meadows Allotment in Unit 1 until he voluntarily stopped grazing them there in 2005.

conservation efforts. Following the species listing, FIM Corporation also reports that it commissioned research on domestic and bighorn sheep interactions. The administrative, monitoring, and added labor costs are direct compliance impacts related to the listing of the bighorn sheep. The decreases in lamb weights (due to stress from additional counting as required to conserve bighorn sheep), legal costs, and research costs are indirect impacts that occurred as a consequence of listing.

EXHIBIT 2-1 CONSERVATION COMPLIANCE IMPACTS: EWES AND LAMBS SHEEP GRAZERS

ACTIVITY	IMPACTED COMPANY	YEARS	YEARLY IMPACTS (2007\$)
Administration Costs for complying with bighorn sheep regulations	FIM Corporation	2000-2007; 2008-2027	\$104,100 ²
		2000-2007	\$28,600 ³
	Ted Borda ¹	2000-2004	\$ 41,600 ⁴
Vaccination/health inspection costs	FIM Corporation	2000-2007; 2008-2027	\$3,900
	Ted Borda	2000-2004	\$ 3,900
	FIM Corporation	2000-2007; 2008-2027	\$3,000
Additional count costs	Ted Borda	2000-2004	\$3,000
Salary of additional camp-tender requirements for extra herding dogs	FIM Corporation	2000-2007; 2008-2027	\$9,900
	Ted Borda	2000-2004	\$9,900
Decreases in lamb weights due to extra counting and herding	FIM Corporation	2000-2006 2006-2027	\$50,000 \$23,500 ⁵
	Ted Borda	2000-2004	\$20,000
Yearly Legal Costs	FIM Corporation	2000-2027	\$32,500
Biological Research Staff	FIM Corporation	2000-2027	\$96,000
One Time Biology Study	FIM Corporation	2007	\$6,650

Notes:

Totals may not sum due to rounding

(1) Ted Borda had no compliance costs after 2004 because he stopped grazing his allotment in that year.

(2) This calculation begins with a wage rate of \$80 per hour suggested by FIM Corporation. 52 weeks * 5 hours per day * 5 days per work week * \$80 per hour = \$104,000 per year. (These are the effort levels reported by FIM Corporation).

(3) FIM reported \$200,000 of additional administrative costs for addressing Federal and State agencies on bighorn sheep related issues. These costs are assumed to be spread across the period 2000 to 2007.

(4) Administration costs for Ted Borda were assumed to be proportionate to those of FIM Corporation relative to the differences in herd sizes.

(5) Weight loss impacts declined after the number of sheep declined in 2006, as the Dunderberg allotment closed and Tamarack and Cameron Canyon allotments became more restrictive.

60. The costs described in Exhibit 2-1 were provided by FIM Corporation. To the extent possible, these costs have been verified for accuracy. In a few cases, costs other than those reported by FIM were used in this analysis because they were a more accurate

accounting of the cost rationalization provided by FIM.³⁰ Some costs, as reported by FIM, such as grazing permit fees and the costs of obtaining alternative forage, were not used in the analysis because actual market values were able to be estimated from publicly available data. The full resource value for each grazing allotment is the number of Animal Unit Months (AUMs) it yields over the grazing season multiplied by the market forage price (in dollars per AUM). These values are computed in Exhibit 2-2.

61. There were also several impacts borne by agencies that administered grazing. Inyo National Forest had informal section 7 consultations in 1999 and 2000.³¹ Humboldt-Toiyabe National Forest was involved in a number of bighorn sheep conservation related activities. These included consultations in 2004-2007, in which the conservation efforts were formulated; consultations are predicted to occur yearly to address the grazing issue. FIM Corporation is also in litigation with Inyo National Forest regarding future grazing on the Bloody Canyon allotment, and may enter into future litigation over bighorn sheep conservation in other areas. Humboldt-Toiyabe National Forest expects several appeals following the 2006 grazing discontinuation in the Dunderberg allotment, and grazing level reductions in the Cameron Canyon and Tamarack allotments.³²

2.1.4 VALUATION OF GRAZING OPPORTUNITIES FOREGONE

62. Forage values are expressed in Animal Unit Months (AUMs), which is an amount of forage sufficient to feed five sheep for one month. Information on the amount of forage for allotments where grazing was discontinued or reduced was gathered from several sources.³³ Grazing has been discontinued voluntarily in two cases; this voluntary action is predicted to continue.³⁴ While voluntary discontinuation of grazing is not a direct effect from listing, it is an important indirect effect and is included as such. Exhibit 2-2 provides information about the number of AUMs foregone in the allotments that are

³⁰ For example, FIM Corporation states that there is a \$10 loss of value per sheep due to stress from herding in order to take sheep counts. The full cost provided by FIM (\$50,000) is assumed to have continued until 2005. However, in 2006, when grazing in the Dunderberg allotment was discontinued and when grazing in the Tamarack and Cameron Canyon allotments was reduced, fewer sheep were subject to this stress induced weight loss. Thus, the estimated impact of stress induced weight loss are adjusted downward proportional to the decrease in useable AUMs. Further details on information provided by FIM Corporation but not included in the analysis are presented in Appendix D.

³¹ Only the costs for the 2000 consultation are included (post listing). U.S. Fish and Wildlife Service. "Domestic Sheep Grazing on Two Portions of the Rock Creek Allotment and One Portion of the June Lake Allotment, Mono County, California" Informal consultation, with the Inyo National Forest. August 22, 2000.

³² Appeals are expected under Sections 215 and 251 of the Forest Service management code, with appeal costs of \$40,000 and \$16,000 respectively. These appeals are assumed to begin in 2008. Interview with Humboldt-Toiyabe National Forest officials, September 13, 2007; Written communication from Amy Baumer, Biologist, Humboldt-Toiyabe National Forest, September 19, 2007.

³³ Where data were in conflict or missing, the most recent data source was relied on as the more precise estimate. Calculations of AUMs were employed when no other data were available. AUM calculations multiplied the number of sheep by the number of months the allotment was grazed. This product was then divided by 5, since the definition of an AUM is the forage to feed five sheep for one month.

³⁴ Personal communication with Lee Ann Murphy, Biologist, Humboldt-Toiyabe National Forest, October 11, 2007. Personal communication with Joe Echenique, September 11, 2007.

closest to critical habitat. Appendix D provides a detailed explanation of the calculations used to estimate grazing impacts.

EXHIBIT 2-2 FORAGE VALUES FOREGONE FOR EWES AND LAMBS SHEEP GRAZERS

UNIT	ALLOTMENT	MANAGING AGENCY OR LANDOWNER	PERMITEE	DATE GRAZING DISCONTINUED OR REDUCED	AUMS FOREGONE	ANNUAL FORAGE VALUE (2007\$)
1. Mount Warren	LA DWP ¹	LA DWP	Joe Mendiburu	1999	6,350	\$97,800
	Jordan Basin (Dunderberg Southern Unit) ²	Humboldt-Toiyabe National Forest	FIM Corporation		178	\$2,740
	Summer Meadow ³	Humboldt-Toiyabe National Forest	FIM Corporation	2000	32	\$493
	Dunderberg Northern Unit ⁴	Humboldt-Toiyabe National Forest	Ted Borda	2005	234	\$3,600
	Tamarack ⁵	Humboldt-Toiyabe National Forest	FIM Corporation	2006	665	\$10,200
	Cameron Canyon ⁶	Humboldt-Toiyabe National Forest	FIM Corporation	2006	120	\$1,850
	LA DWP ¹	LA DWP	FIM Corporation	2006	233	\$3,590
2. Mount Gibbs	Bloody Canyon ⁷	Inyo National Forest	Joe Mendiburu	1999	6,350	\$97,800
	June Lake (West of Highway 395) ⁷	Inyo National Forest	FIM Corporation	1999	675	\$10,395
	Alger Lake ⁷	Inyo National Forest	Joe Mendiburu	1999	450	\$6,930
4. Wheeler Ridge	Western Portion of Rock Creek ⁷	Inyo National Forest	Joe Mendiburu	1999	450	\$6,930
				1999	477	\$7,340

Notes:

Totals may not sum due to rounding. A total summation is not provided because the forage value foregone depends on the year due to cyclical grazing season restrictions. See Appendix D for more details.

(1) Los Angeles Department of Water and Power owns several grazing allotments near proposed critical habitat units one and two. AUMs provided in written communication from Brian Tillemans, Los Angeles Department of Water and Power, September 27, 2007. AUMs foregone are assumed to be split evenly across units 1 and 2.

(2) Prior to discontinuation of grazing, the Jordan Basin allotment was grazed on an alternating cycle: for three months for each of three consecutive years, then two weeks in the fourth year. AUM totals provided in written communication from Amy Baumer, Biologist, Humboldt-Toiyabe National Forest, September 19, 2007.

(3) The removal of domestic sheep from this allotment has been a voluntary action by the permittee, personal communication with Lee Ann Murphy, Biologist, Humboldt-Toiyabe National Forest, October 11, 2007. AUM totals provided in written communication from Amy Baumer, Biologist, Humboldt-Toiyabe National Forest, September 19, 2007.

(4) Prior to discontinuation of grazing, the Dunderberg allotment was grazed on an alternating cycle: for three months for each of three consecutive years, then two weeks in the fourth year. AUM totals provided in written communication from Amy Baumer, Biologist, Humboldt-Toiyabe National Forest, September 19, 2007.

(5) The Tamarack allotment has had reduced grazing three out of every four years. AUM reduction totals provided in written communication from provided by Fred Fulstone and Marianne F. Leinassar, FIM Corporation, September 21, 2007.

(6) The Cameron Canyon allotment has had reduced grazing three out of every four years. AUM reduction totals provided in written communication from provided by Fred Fulstone and Marianne F. Leinassar, FIM Corporation, September 21, 2007.

(7) AUM estimate is based on numbers of sheep and grazing period (from US Fish and Wildlife Service, "Interagency Domestic Sheep Management Strategy," June 27, 2001). One AUM is forage for five sheep for one month.

63. Exhibit 2-2 displays the date when grazing was discontinued, after which the foregone yearly forage values were added to the economic impacts. In the case of the Cameron Canyon and Tamarack allotments, the date indicates when the amount of grazing was reduced to current levels. This analysis is complicated by the fact that, prior to the listing, several allotments were grazed for a period of three or four months for three years, then for half a month for one year. This pattern of alternating grazing period was projected into the future to accurately forecast the hypothetical alternative forage values that would have been realized if grazing levels were not reduced.
64. To estimate the economic losses associated with potential AUM reductions, this analysis utilizes the private grazing fee rate per AUM for California in 2006, or \$16.50 per foregone AUM (2006 dollars).³⁵ This grazing fee rate is then multiplied by the per acre AUM loss for the land where grazing no longer takes place. The product is the yearly loss of resource value from not grazing the area of excluded land; the total cost is summed (and discounted as appropriate) across years. This calculation assumes that AUMs lost on private lands are perfectly substitutable with AUMs lost on public lands.
65. To estimate the economic opportunity costs associated with potential AUM reductions, this analysis utilizes the private grazing fee per AUM for California in 2007, \$16.50 per foregone AUM (2007 dollars).³⁶ This grazing fee rate is then multiplied by the number of AUMs that are reduced. The product is the yearly loss of resource value from not grazing the area of excluded land; the total cost is summed (and discounted as appropriate) across years. This calculation assumes that AUMs lost on private lands are perfectly substitutable with AUMs lost on public lands.
66. The market rate per AUM is the most appropriate measure of value for a grazing AUM on public lands. The market rate is the value for a standardized good; when non-traded goods in the public sector do not have prices assigned, economists look to market equilibriums for equivalent traded goods to provide the value of that good. In this case, public AUMs are not traded in a market, but private AUMs are.
67. The market rate is used by several agencies within the Federal Government to provide pricing for AUMs from public land. The market rate is used by all Department of Defense Branches for setting prices for use of their rangeland.³⁷ Market rates are also used by the Bureau of Land Management (BLM) as a penalty for unauthorized grazing use, though the rates the BLM charges for permitted grazing are substantially lower.³⁸ Many Federal agencies use some formulation that includes the market value, including the National Park Service, the Reclamation Service, the Fish and Wildlife Service, and

³⁵ US Department of Agriculture, National Agricultural Statistics Service, "Agricultural Prices," released January 31, 2008, page 65.

³⁶ Ibid.

³⁷ US Government Accountability Office (2004) *Livestock Grazing: Federal Expenditures and Receipts Vary, Depending on the Agency and the Purpose of the Fee Charged*, GAO-05-869, page 39.

³⁸ US Department of the Interior, Bureau of Land Management, "The 2006 Grazing Fee, Surcharge Rates, and Penalty for Unauthorized Grazing Use," EMS Transmission 03/10/2006, Instruction Memorandum No. 2006-101.

the Forest Service in eastern states.³⁹ In addition, the state of California uses the average market rate when it is setting the price for grazing on state public lands.⁴⁰

Other AUM Valuations

68. Some economists have suggested other rationales for estimating the value of AUMs that may be foregone due to critical habitat designation. Most suggestions for pricing Federal AUMs differently than private AUMs concern specification issues.⁴¹ That is, Federal AUMs may have different facilities constructed on them than private pastures, such as corrals and loading ramps. These types of facilities may be required for private parties to use public land effectively. To the extent that there are differences between the physical characteristics between Federal and private grazing lands, the market price per AUM may be inaccurate.
69. There have been several estimates of the net return to AUMs for the Northern and Northeastern Nevada counties. These estimates have relied upon the application of linear programming production models. These production models use the costs and input quantities for a representative ranch to estimate the net returns to a public sector AUM, under the condition that some large quantity of public AUMs becomes unavailable. This methodology asks the question, “What is the net impact of reducing AUMs on operating revenues?” However, the use of these linear programming models is specific to the ranch and the local data in question. Changing the sample data and the model parameters (the relationship between how inputs are combined and used in production) can lead to widely varying results.⁴²
70. Exhibit 2-3 presents different results for different runs of linear programming production models by the University of Nevada, Reno’s University Center for Economic Development. Linear programming production models use enterprise budgeting to deduct all costs except range forage from the total value of ranch output.⁴³ The residual value is then divided by the number of AUMs to generate an estimate of the value per AUM.⁴⁴

³⁹ US Government Accountability Office (2004) *Livestock Grazing: Federal Expenditures and Receipts Vary, Depending on the Agency and the Purpose of the Fee Charged*, GAO-05-869, page 39.

⁴⁰ Ibid.

⁴¹ Bartlett, E. Tom, L. Allen Torrell, Neil R. Rimbey, Larry W. Van Tassell, and Daniel W. McCollum (2002), “Valuing Grazing Use on Public Land,” *Journal of Range Management*, vol. 55, pp. 426-538.

⁴² Ibid.

⁴³ Ibid.

⁴⁴ This approach implicitly assumes that any residual profits generated by the ranch are exclusively due to public rangeland access. This assumption is unlikely to be true.

EXHIBIT 2-3 LINEAR PROGRAMMING PRODUCTION MODEL ESTIMATES OF AUM VALUES

STUDY	VALUATION METHOD	LOCATION	AUM VALUE ESTIMATE
Torrel et al, 2002 ¹	Graduated reductions of AUMs from 0% to 100%	Jordan Valley, Idaho ²	\$2.41 to \$3.44
		Northeastern Nevada ³	\$5.77 to \$6.16
		Lake County, Oregon ⁴	\$10.07 to \$11.77
	Elimination of Spring Grazing	Jordan Valley, Idaho ²	\$24.17
		Northeastern Nevada ³	\$25.82
		Lake County, Oregon ⁴	\$8.17
Alevy, et al., 2007 ⁵	Not Specified	Elko County, Nevada	\$38
	Not Specified	Northeastern Nevada ³	\$84

Notes:

(1) Torrell, L. Allen, John A. Tanaka, Neil Rimby, Tim Darden, Larry Van Tassell, and Aaron Harp (2002) "Ranch-Level Impacts of Changing Grazing Policies on BLM Land to Protect the Greater Sage-Grouse: Evidence from Idaho, Nevada, and Oregon," Policy Analysis Center for Western Public Lands, Policy Paper SG-01-02.

(2) Jordan Valley, Idaho, is in Southwestern Idaho, bordering Nevada.

(3) The Northeastern Nevada model is used in multiple analyses of the impact of federal grazing access on ranch profitability.

(4) Lake County, Oregon, is in South Central Oregon, bordering Nevada.

(5) Alevy, Jonathan, Elizabeth Fadali, and Thomas R. Harris (2007) "Analysis of Impacts of Public Land Grazing on the Elko County Economy: Part III: Economic Impacts of Federal Grazing in Elko County," University of Nevada, Reno, University Center for Economic Development, Technical Report UCED 2006/07-03.

71. As Exhibit 2-3 shows, estimates of AUM values can vary widely based on the sample data and assumptions made in the model. The results from the Northeastern Nevada Model itself range from \$5.77 to \$85 per AUM. The tendency for results from linear programming production models to be highly sensitive to sample data and model assumptions has been recognized in the professional literature.⁴⁵ Furthermore, the author of the cited study indicated that the values for Northeastern Nevada may not be valid for other parts of Nevada or California.⁴⁶
72. This analysis presents the market value of Federal grazing AUMs instead of relying on production model results. In this way, the analysis uses a widely used valuation

⁴⁵ Bartlett, E. Tom, L. Allen Torrell, Neil R. Rimby, Larry W. Van Tassell, and Daniel W. McCollum (2002), "Valuing Grazing Use on Public Land," *Journal of Range Management*, vol. 55, pp. 426-538.

⁴⁶ Personal Communication with Jonathan Alevy, Assistant Research Professor, University of Nevada, Reno, Department of Resource Economics, April 1, 2008.

methodology that provides a valid, robust estimate of the value of a standardized good (an AUM).

Impacts of AUM Reductions on Ranch Profitability

73. Public AUM reductions may affect working ranch profitability. FIM Corporation claims that it will sustain substantial economic impacts due to the existing and continued grazing restrictions.⁴⁷ There are, however, no publicly available data to verify this claim. Some insight can be inferred, however, based on the results of a model of ranch profitability developed by the University of Nevada, Reno's University Center for Economic Development. This study is focused on the Elko County economy in Northeastern Nevada; as such it is subject to the same limitations of the net return calculations discussed in the previous section. According to the model for AUM reductions for ranches in Elko County, mean ranch profitability begins to decline following a 30 percent reduction in federal grazing AUMs.⁴⁸ For reductions less than this percentage, there are no appreciable changes to ranch viability.
74. The total amount of public AUMs used by FIM Corporation was not publicly available information at the time of this publication. However, by comparing the listing related reductions in public AUM access to the sum of those reductions and the sum of federal AUMs known to be used yearly in Nevada, it is possible to get a sense of the amount of AUMs that are used by FIM on a yearly basis. FIM leases on 11 allotments in Nevada were identified, totaling approximately 14,500 AUMs.⁴⁹ There are an additional 12 allotments in California for which there is no publicly available information at the time of this publication concerning the total amount of AUMs.⁵⁰
75. The grazing restrictions for the bighorn sheep on Federal allotments in California sum to 1,811 AUMs (See Appendix D). The reduction in public AUMs for these known allotments alone constitutes an 11 percent reduction in Federal allotments. However, the eleven percent reduction is an over-estimation of the actual percentage reduction experienced by FIM Corporation. The total number of AUMs that FIM Corporation grazes is not publicly available information. The known total of AUMs includes the number of reduced California AUMs and the number of unreduced Nevada AUMs. This total does not include the unknown number of AUMs for the additional twelve allotments leased by FIM Corporation in California. The true percentage reduction of Federal AUMs for FIM Corporation is likely to be much less than 11 percent.
76. Even an 11 percent reduction in Federal AUMs is much less than the 30 percent reduction necessary to impact ranch profitability in the model run by the University of Nevada,

⁴⁷ Written communication from FIM Corporation, September 21, 2007.

⁴⁸ Alvey, Jonathan, Elizabeth Fadali, and Thomas R. Harris (2007) "Analysis of Impacts of Public Land Grazing on the Elko County Economy, Part III: Economic Impacts of Federal Grazing in Elko County," Technical Report UCED 2006/07-03.

⁴⁹ Resource Concepts, Inc., (2001) "Nevada Grazing Statistics Report and Economic Analysis for Federal Lands in Nevada," State of Nevada Department of Agriculture,

⁵⁰ These allotments were identified in Personal Communication with Biologist, Service Reno Field Office, April 3, 2008.

Reno’s University Center for Economic Development. While the model run by the University Center for Economic Development is specific to data in Elko County (Northeastern), Nevada, the results are at least suggestive that the reductions in AUMs may have no impact on the profitability of FIM Corporation.

2.2 PRE-DESIGNATION BASELINE IMPACTS

- 77. The baseline impacts to grazing are those impacts that occurred between listing and the publication of the final rule, between 2000 and 2007. Continuation of these baseline impacts are then forecast for the period 2008 to 2027. Continued baseline impacts would have occurred regardless of whether critical habitat was designated or not. Grazing impacts are only present for the Mount Warren (unit 1), Mount Gibbs (unit 2), and Wheeler Ridge (unit 4) proposed critical habitat units.
- 78. The pre-designation impacts consist of the forage values foregone when grazing was discontinued and/or reduced by the Inyo National Forest , the Humboldt-Toiyabe National Forest, the Los Angeles Department of Water and Power, and by the voluntary actions of Ted Borda and Joe Mendiburu. Additional pre-designation impacts include costs incurred by ewes and lambs sheep operations, the costs of the informal and formal consultations, and the allotment management costs incurred by Humboldt-Toiyabe National Forest.⁵¹ Exhibit 2-4 presents the summarized pre-designation baseline impacts.

EXHIBIT 2-4 PRE-DESIGNATION BASELINE GRAZING IMPACTS

UNIT	PRESENT VALUE UNDISCOUNTED	PRESENT VALUE 3% DISCOUNT RATE	PRESENT VALUE 7% DISCOUNT RATE
1. Mount Warren	\$4,450,000	\$5,090,000	\$6,090,000
2. Mount Gibbs	\$1,030,000	\$1,150,000	\$1,320,000
4. Wheeler Ridge	\$120,000	\$134,000	\$156,000
Total	\$5,600,000	\$6,370,000	\$7,570,000

Note: Totals may not sum due to rounding.

2.3 POST-DESIGNATION BASELINE IMPACTS

- 79. The post-designation baseline impacts are the economic impacts from the continuation of conservation activities from the pre-designation period. These impacts would have occurred regardless of critical habitat designation. The post-designation baseline impacts consist of the forecast forage values foregone following the pre-designation discontinuance and/or reduction in grazing on allotments by the Inyo National Forest, the Humboldt-Toiyabe National Forest, the Los Angeles Department of Water and Power, and by the voluntary actions of Ted Borda and Joe Mendiburu. Additional post-

⁵¹ As discussed in Section 2.1.2, only ewes and lambs operators incurred conservation costs. Ted Borda stopped incurring these costs in 2004 when he stopped grazing his allotment.

designation baseline impacts include the forecast costs incurred by ewes and lambs sheep operations, based on historical costs.⁵² Humboldt-Toiyabe National Forest is assumed to continue to hold a yearly formal consultation on the Tamarack and Cameron Canyon allotments, and to continue to incur bighorn sheep related allotment management costs in addition to the consultation costs. Humboldt-Toiyabe National Forest also predicts appeals in response to the 2006 Tamarack and Cameron Canyon allotment reductions; these appeals are assumed to occur in 2008.⁵³

80. Exhibit 2-5 presents the summarized post-designation baseline impacts. As in the pre-designation period, no impacts occur outside of proposed critical habitat Units 1, 2, and 4.

EXHIBIT 2-5 POST-DESIGNATION BASELINE GRAZING IMPACTS

UNIT	PRESENT VALUE UNDISCOUNTED	PRESENT VALUE 3% DISCOUNT RATE	PRESENT VALUE 7% DISCOUNT RATE	ANNUALIZED 3% DISCOUNT RATE	ANNUALIZED 7% DISCOUNT RATE
1. Mount Warren	\$9,680,000	\$7,420,000	\$5,490,000	\$498,000	\$518,000
2. Mount Gibbs	\$2,570,000	\$1,970,000	\$1,450,000	\$132,000	\$137,000
4. Wheeler Ridge	\$289,000	\$221,000	\$164,000	\$14,900	\$15,400
Total	\$12,500,000	\$9,600,000	\$7,110,000	\$645,000	\$671,000

Note: Totals may not sum due to rounding.

2.4 POST-DESIGNATION INCREMENTAL IMPACTS

81. The post-designation incremental impacts to grazing are those impacts that are forecast to occur in the twenty years following critical habitat designation specifically as a result of critical habitat designation. These impacts are displayed in Exhibit 2-6. The forecast post-designation incremental impacts are the portion of forecast section 7 consultations that will be devoted to considering the potential for the project at hand to adversely modify critical habitat. Since section 7 consultations are expected solely in the Mount Warren unit (Unit 1), there are no forecast post-designation incremental impacts for any of the other proposed critical habitat units.
82. Both Humboldt-Toiyabe National Forest and FIM Corporation are expected to enter formal consultations once every year in the future. The estimated annual Section 7 administrative costs are \$1,450 (2007 dollars) for Humboldt Toiyabe National Forest, and \$875 (2007 dollars) for FIM Corporation. At a three percent discount rate, the present value of the total grazing related impacts on FIM Corporation are estimated to be \$13,000 (\$875 annualized). At a three percent discount rate, the present value of the total grazing

⁵² These costs are predicted to be borne solely by FIM Corporation because they are the only ewes and lambs operation continuing to graze in proximity to proposed critical habitat units.

⁵³ Interview with Humboldt-Toiyabe National Forest officials, September 13, 2007; Written communication from Amy Baumer, Biologist, Humboldt-Toiyabe National Forest, September 19, 2007.

related impacts on Humboldt-Toiyabe National Forest are estimated to be \$21,600 (\$1,450 annualized).

EXHIBIT 2-6 POST-DESIGNATION INCREMENTAL GRAZING IMPACTS

UNIT	PRESENT	PRESENT	PRESENT	ANNUALIZED	ANNUALIZED
	VALUE	VALUE	VALUE	3% DISCOUNT	7% DISCOUNT
	UNDISCOUNTED	3% DISCOUNT	7% DISCOUNT	RATE	RATE
		RATE	RATE		
1. Mount Warren	\$97,600	\$74,800	\$55,300	\$5,030	\$5,220
Total	\$97,600	\$74,800	\$55,300	\$5,030	\$5,220

Note: Totals may not sum due to rounding.

2.5 REGIONAL ECONOMIC ANALYSIS OF GRAZING RESTRICTIONS

83. The value of lost grazing production associated with bighorn sheep critical habitat designation is approximately \$261,000 in Mono County and \$14,000 in Inyo County annually. The analysis presented in this section relies on regional economic modeling to estimate the economic impacts of grazing restrictions on the regional economy.

2.5.1 AFFECTED REGION

84. This analysis examines the region wide impacts of grazing restrictions on the economies of Mono and Inyo counties. These impacts are distributional in effect; they relate to how Mono and Inyo counties are affected relative to other areas, but do not address economic welfare effects.

2.5.2 THE IMPLAN MODEL

85. This analysis utilizes a software package called IMPLAN to estimate the regional economic effects of the grazing limitations in Mono and Inyo Counties, California. IMPLAN is commonly used by State and Federal agencies for policy planning and evaluation purposes. The model draws upon data from several Federal and State agencies, including the Bureau of Economic Analysis and the Bureau of Labor Statistics.⁵⁴ To group related industries into sectors, IMPLAN utilizes the categories defined by the U.S. Office of Management and Budget's North American Industry Classification System (NAICS) code. IMPLAN translates initial changes in expenditures into changes in demand for inputs to affected industries. These effects can be described as direct, indirect, or induced, depending on the nature of the change.

- **Direct effects** represent changes in output attributable to a change in demand or a supply shock. These are specified initially by the modeler (e.g., the change in ranch expenditures on goods and services, by sector).⁵⁵

⁵⁴ The IMPLAN model is owned and maintained by the Minnesota IMPLAN Group, Inc. (MIG). Information in this section is compiled in part from: *IMPLAN Professional, User Guide, Analysis Guide, Data Guide, and Impact Analysis Software*, Minnesota IMPLAN Group, Inc., 1999-2004.

⁵⁵ Output is the value of all good and services produced.

- **Indirect effects** are changes in output of industries that supply goods and services to those that are directly affected by the initial change in expenditures.
- **Induced effects** reflect changes in household consumption, arising from changes in employment (which in turn are the result of direct and indirect effects). For example, changes in employment in a region may affect the consumption of certain goods and services.

These categories are calculated for all industries and aggregated to determine the regional economic impacts associated with the forecast grazing restrictions.

2.5.3 METHODS AND RESULTS

86. To estimate the regional economic impacts of reduced grazing activity, this analysis assumed that output in “animal production, except cattle and poultry and goats “(NAICS code 112411) would be reduced by \$230,000 annually (\$216,000 in Mono County and \$14,000 in Inyo County).⁵⁶ Total regional economic impacts in Mono County are estimated at \$332,000, with an additional \$18,000 estimated in Inyo County. These impacts are summarized in Exhibits 2-7 and 2-8. The animal production industry would bear most (78 to 82 percent) of total regional impacts. Induced effects also make up a substantial portion of regional effects (approximately 20 percent in both counties), reflecting the relatively large proportion of regional effects stemming from changes in household spending (e.g., impacts on food services and drinking places, real estate, etc.). Estimated employment impacts are relatively small, at four percent in Mono County and less than one percent in Inyo County, the majority of which is in animal production. It is worth noting, however, that due to its seasonal nature, ranch employment is often not well captured in employment estimates that are used as the inputs to IMPLAN.

2.5.4 CAVEATS

87. There are two important caveats relevant to the interpretation of IMPLAN model estimates, generally, and within the context of this analysis. The first is that the model is static in nature and measures only those effects resulting from a specific policy change (or the functional equivalent specified by the modeler) at one point in time. Thus, IMPLAN does not account for posterior adjustments that may occur, such as the subsequent re-employment of workers displaced by the original policy change. In this analysis, this caveat suggests that the long-run net output and employment effects resulting from changes in grazing restrictions are smaller than those estimated in the model, which will lead to an upward bias in the estimates. For this reason, the regional impacts that are calculated by IMPLAN do not represent true economic welfare losses. Instead, they measure regional changes that may be ameliorated by adaptive behavior. The IMPLAN results are useful for illustrating static regional impacts, but are not appropriate to add with the economic impacts estimated in this report.

⁵⁶ The corresponding IMPLAN code for this industry is 13, Animal production, except cattle, poultry and eggs. This category is the one which most closely matches sheep ranching.

88. A second caveat to the IMPLAN analysis is related to the model data. The IMPLAN analysis relies upon input/output relationships derived from 2004 data, which was the most recent data available at the time of this analysis. If significant changes have occurred in the structure of the economies of the affected areas over the previous four years, the results may be sensitive to this assumption. However, the magnitude and direction of any such bias are unknown.

EXHIBIT 2-7 REGIONAL ECONOMIC IMPACTS IN MONO COUNTY

INDUSTRY	DIRECT	INDIRECT	INDUCED	TOTAL	PERCENT OF TOTAL REGIONAL IMPACT
Animal production- except cattle and poultry and eggs	\$261,000	\$9,953	\$3	\$270,956	82%
All other crop farming	\$0	\$33,166	\$1	\$33,168	10%
Real estate	\$0	\$11,727	\$359	\$12,086	4%
Wholesale trade	\$0	\$1,468	\$68	\$1,536	<1%
Owner-occupied dwellings	\$0	\$0	\$1,250	\$1,250	<1%
Other State and local government enterprises	\$0	\$861	\$131	\$993	<1%
Maintenance and repair of nonresidential buildings	\$0	\$886	\$15	\$901	<1%
Monetary authorities and depository credit	\$0	\$765	\$109	\$874	<1%
Food services and drinking places	\$0	\$149	\$523	\$672	<1%
All Other Industries	\$0	\$9,632	\$3,062	\$9,257	3%
Total	\$261,000	\$65,950	\$4,746	\$331,696	100%

EXHIBIT 2-8 REGIONAL ECONOMIC IMPACTS IN INYO COUNTY

INDUSTRY	DIRECT	INDIRECT	INDUCED	TOTAL	PERCENT OF TOTAL REGIONAL IMPACT
Animal production- except cattle and poultry and eggs	\$14,000	\$393	\$0	\$14,393	78%
All other crop farming	\$0	\$1,679	\$0	\$1,679	9%
Other State and local government enterprises	\$0	\$250	\$28	\$279	2%
Power generation and supply	\$0	\$240	\$19	\$259	1%
Real estate	\$0	\$222	\$13	\$235	1%
Truck transportation	\$0	\$226	\$7	\$233	1%
Wholesale trade	\$0	\$182	\$14	\$196	1%
Agriculture and forestry support activities	\$0	\$155	\$0	\$155	1%
Owner-occupied dwellings	\$0	\$0	\$110	\$110	1%
Veterinary services	\$0	\$104	\$2	\$105	1%
All Other Industries	\$0	\$458	\$336	\$798	4%
Total	\$14,000	\$3,912	\$534	\$18,445	100%

2.6 SOURCES OF UNCERTAINTY

89. Sources of uncertainty that may affect the estimates presented in this chapter primarily involve a lack of publicly available data for specific purposes. No data are publicly available to evaluate the claims by FIM Corporation that they have water rights as part of their allotments, and that value is lost because these rights are curtailed. Furthermore, other unspecified expenditures have been claimed, but insufficient information is available to evaluate those claims.
90. In some public grazing areas, there may be physical structures built by the private ranching companies, such as corrals, roads, or buildings that may have a use value to the user of the allotment. Estimating a value for such structures is not feasible with publicly available data. In order to estimate such a value, it would be necessary to know all contractual details of the allotment contract; it may be that the allotment user gives up all future legal claim to such structures on the allotment if the allotment lease is terminated. If there is a valid claim to such structures, the total impacts estimated in this chapter may underestimate the true costs. In order to properly estimate the value of all structures, it would be necessary to know the construction cost, construction date, depreciation rate and maintenance costs, and the amount of use each structure receives in all locations. It is important to note that any potential value that has not been included for this reason does not change the value of the AUM; the market price is still the value of the grazing content of the allotment.
91. Allotments on Federal land may differ from those on private land by having access and rights to drinking water for the livestock. If there are water rights associated with the allotment that accompany the lease of the allotment (rights owned by the lessee agency, in this case the USFS), the lease of the allotment may provide both AUMs (valued at the market rate) and drinking water rights, which should be valued at the implicit yearly rental rate for such water rights. In that case, restrictions on the use of the allotment would also remove the market value of that livestock drinking water right from the rancher. However, if the water right is owned by the rancher fee-simple, then the water right is transferable, and can be sold at its market rate to a downstream user for grazing or irrigation. In that case, there would be no lost value intrinsic to the water in the allotment. It was not feasible to determine the extent of and limitations to the water rights for each allotment displayed in Exhibit 2-2 with publicly available data.⁵⁷ Although this analysis is unable to investigate the individual water rights claims, the valuation methods discussed above (loss of the yearly rental rate for grazing leased water rights or no loss of value for transferable water rights owned by the rancher) are presented to provide the framework for estimation of such costs.

⁵⁷ Documentation from FIM Corporation claimed that water rights values are reduced by grazing restrictions but did not provide details on the ownership or limitations on the rights in question (Written communication from FIM Corporation, September 21, 2007.) Water rights in these grazing allotments tend to be idiosyncratic and can be very complicated and time consuming to research fully. (Personal communication with Margie Apotaca, April 10, 2008).

CHAPTER 3 | POTENTIAL ECONOMIC IMPACTS TO HABITAT MANAGEMENT

92. This chapter describes the potential economic impacts of habitat management designed to protect the bighorn sheep and its habitat. Bighorn sheep conservation efforts in response to the activities discussed in this chapter consist of habitat management actions. Habitat management activities include programs by the California Department of Fish and Game (CDFG) to encourage bighorn sheep recovery, fire management within the study area, consultations and conservation efforts related to mining within the study area, and avalanche control. This chapter discusses each of these activities in turn, then provides estimates of the pre-designation baseline, post-designation baseline, and post-designation incremental impacts of habitat management.

3.1 HABITAT MANAGEMENT ACTIVITIES

93. This section describes the various activities that constitute habitat management. First, the Bighorn Sheep Recovery Program is discussed. Next, the issue of fire management is discussed, and forecasted activities are described. A discussion of mining-related activities follows. The section concludes with a qualitative discussion of avalanche control within the study area.

3.1.1 THE BIGHORN SHEEP RECOVERY PROGRAM

94. CDFG manages the risks posed to the bighorn sheep and its habitat by monitoring predators, available forage, domestic sheep locations, and bighorn herd locations.⁵⁸ The Bighorn Sheep Recovery Program is designed to encourage population growth while minimizing factors that result in the take of bighorn sheep. The CDFG Recovery Program manages Sierra Nevada Bighorn Sheep population dynamics. When population levels exceed the forage availability of an area, CDFG staff will relocate individuals in order to prevent over-foraging and to meet distributional goals outlined in the *Recovery Plan for the Sierra Nevada Bighorn Sheep*.⁵⁹

⁵⁸ *Outdoor California*, State of California, Resources Agency, Fish and Game Commission, Department of Fish and Game January-February 2004; *Outdoor California*, State of California, Resources Agency, Fish and Game Commission, Department of Fish and Game, March-April 2006. This document was provided by CDFG as a comprehensive description of its programs.

⁵⁹ U.S. Fish and Wildlife Service. 2007. *Recovery Plan for the Sierra Nevada Bighorn Sheep*. Sacramento, California. xiv + 199 pages.

95. The Recovery Program employs the use of Global Positioning System (GPS) collars and radio collars to track locations of mountain lions and bighorn sheep. GPS collars are placed on bighorn sheep to monitor their movement patterns, especially rams that are more likely to serve as disease vectors between domestic sheep and bighorn sheep.⁶⁰ CDFG staff also periodically sample sheep for bluetongue virus, bovine respiratory syncytial virus, contagious ecthyma virus, epizootic hemorrhagic disease, para-influenza virus, and Chlamydia.⁶¹
96. The CDFG tracks mountain lion locations in order to understand movement patterns and predict locations with increased efficiency and precision. Integrating information about animal sightings, and kills indicates areas and periods of high predation risk.⁶² Geographic Information Systems (GIS) are used to model habitat characteristics such as elevation, slope, terrain, distance to escape terrain, and vegetation to rank habitats and forecast. The Recovery Program integrates data gathered about disease rates, predation risks and foraging behaviors to model the relationships between these variables.⁶³
97. The *Recovery Plan for the Sierra Nevada Bighorn Sheep (2007)* specifies 17 herd units, which are areas that bighorn sheep either occupy, or may occupy in the future. CDFG has identified 14 of these herd units to address. Twelve of these herd units are proposed for critical habitat designation by the Service. Currently, the CDFG allocates its \$725,000 annual Recovery Program budget to eight herd units that are currently occupied by bighorn sheep. Seven of these occupied herd units are proposed for designation as critical habitat units. CDFG plans on distributing the budget evenly between across all twelve of the proposed critical habitat units by 2027. They will accomplish this by distributing their budget across an additional unit in 2008 and adding a unit every four years until all proposed critical habitat units receive equal amounts of the budget allocation. CDFG plans to begin with adding Olancho Peak (Unit 12) in 2008 and move north (*i.e.*, Unit 11 in 2012, and so on). This budget was originally allocated to the herd units outlined in the *Recovery Plan for the Sierra Nevada Bighorn Sheep (2007)* and will be allocated to the currently unoccupied herd units regardless of whether they are designated as critical habitat or not. Thus these future budget expenditures are solely attributable to the post-designation baseline scenario. The continued distribution of funding to the *Recovery Plan for the Sierra Nevada Bighorn Sheep (2007)* herd units, including the herd unit that is not proposed for critical habitat designation, underscores how this expenditure program is a continuation of baseline policy.⁶⁴

⁶⁰ *Outdoor California*, State of California, Resources Agency, Fish and Game Commission, Department of Fish and Game), March-April, 2006.

⁶¹ *Outdoor California*, State of California, Resources Agency, Fish and Game Commission, Department of Fish and Game, January-February 2004.

⁶² *Ibid.*

⁶³ *Outdoor California*, State of California, Resources Agency, Fish and Game Commission, Department of Fish and Game, March-April, 2006.

⁶⁴ For pre-designation impacts, 7/8 of the \$725,000 budget was divided across the seven occupied proposed critical habitat units. In 2008, 8/9 of the \$725,000 budget will be divided across the seven occupied proposed critical habitat units as well

98. In 2006, the Recovery Program performed a study in the Convict Creek herd area; the budget for that project was \$36,000. Between 2000 and 2007, the Recovery Program received approximately \$150,000 through competitively bid Service Section 6 Grants (average of \$18,750 per year from the Service). The receipt of these grants is assumed to continue into the future at the same rate. None of these budget items are incremental to critical habitat designation.

3.1.2 FIRE MANAGEMENT

99. Heavily forested areas pose a threat to bighorn sheep because these areas provide cover for predators to hide in. Inyo National Forest routinely engages in fire management practices to clear forested areas in order to reduce predation by mountain lions. This involves prescribed burns to clear out underbrush and trees that act as a cover for mountain lions and other natural predators in low to mid-elevation ranges. There were controlled burns to reduce the threat of predation by Inyo National Forest in Lee Vining Canyon and Georges Creek prior to listing. Prescribed burns are forecast to occur at five year intervals over the next 20 years, with an average cost of \$50,000 per burn.⁶⁵ Formal consultations are assumed to occur at the time of each burn. The adverse modification component for the four forecast section 7 consultations represent post-designation incremental costs.

3.1.3 AVALANCHE CONTROL MANAGEMENT

100. Natural catastrophes that have the potential to extirpate sub-populations of bighorn sheep are listed as potential threats in the proposed rule.⁶⁶ Discussion with various stakeholders, however, yielded no information on potential catastrophic management programs, such as avalanche management.⁶⁷ Such actions are judged to be improbable, and therefore are not considered in the analysis.

3.2 HABITAT MANAGEMENT FOR MINING ACTIVITY

101. The Pine Creek Tungsten mine is within the Wheeler Ridge (Unit 4) proposed critical habitat unit. This mine, and an adjacent tungsten processing mill, operated from the 1920s until production was temporarily suspended in 2000.⁶⁸ Production will restart when

as the Olancho Peak unit. This pattern will continue as more units are included. Personal communication with Tom Stephenson, Associate Wildlife Biologist, California Department of Fish and Game, Sierra Nevada Bighorn Sheep Recovery Program, November 19, 2007

⁶⁵ Personal communication with Jon Regelbrugge, Mammoth and Mono Lakes District Ranger and Richard Perloff, Wildlife Ecologist, Inyo National Forest, September 13, 2007.

⁶⁶ U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Habitat for the Sierra Nevada Bighorn Sheep and Proposed Taxonomic Revision; Proposed Rule, 72 FR 142, July 25, 2007.

⁶⁷ Personal communication with Humboldt-Toiyabe National Forest officials, September 13, 2007; Jon Regelbrugge, Mammoth and Mono Lakes District Ranger and Richard Perloff, Wildlife Ecologist, Inyo National Forest, September 13, 2007; and Personal communication with Tom Stephenson, Associate Wildlife Biologist, California Department of Fish and Game Bighorn Sheep Recovery Program, September 12, 2007.

⁶⁸ Personal Communication with Doug Hicks, Avocet Mining, September 12, 2007.

the reclamation plan is updated, and some financial issues are resolved.⁶⁹ Although the current mill of the Pine Creek Mine is not within proposed critical habitat, “all of the mine sites and ore bodies are within the proposed critical habitat as are all of the access roads to the mill and mine.”⁷⁰

102. The ore seams at the Pine Creek Mine run through several contiguous mountains. In order to restart operations at the mine, as planned by Avocet Tungsten Inc., some safety structures would have to be constructed at 11,000 feet, near the portal to the Panaminas Mine, which connects to the Pine Creek Mine underground. These safety structures would have to be constructed within proposed critical habitat. Furthermore, Avocet Tungsten Inc. is interested in re-processing the tailings from the earlier mining operations. These tailings are within proposed critical habitat; they were planted over and are grazed on by bighorn sheep in winter months.
103. Pollution clean-up from previous mining activities was the subject of two informal section 7 consultations with Inyo National Forest in 2001 and one informal consultation in 2003. The costs of these consultations are baseline pre-designation impacts.⁷¹
104. Avocet Tungsten Inc. claims that the value of tungsten and molybdenum ore within the mine and the tailings piles exceeds \$1.5 billion.⁷² A recent sampling and analysis estimates that proposed critical habitat lands in Unit 4 contain over 90 million pounds of tungsten, which makes these lands the largest tungsten reserves in the United States.⁷³ The gross value of re-processable ore within the tailings piles is estimated to be \$579 million.⁷⁴ There may be national security issues concerning the operation of the mine in the future; tungsten is used in producing armor-piercing ammunition.
105. Based on information provided by Avocet Tungsten, Inc. (and confirmed by Inyo County), this analysis assumes that the Pine Creek Mine will resume operations as soon as financial assurances are received, and the reclamation plan is upgraded.⁷⁵ Exhibit 3-1 lists and quantifies the economic impacts of conservation efforts that are expected to be undertaken for the bighorn sheep. For some conservation efforts, the impacts cannot be predicted; these impacts are not quantified.
106. The conservation efforts presented in Exhibit 3-1 are consistent with conservation efforts for mine operations in the past, and are also consistent with conservation efforts in other

⁶⁹ Public comment from Avocet Tungsten, Inc. on Draft Economic Analysis of Critical Habitat Designation for the Sierra Nevada Bighorn Sheep (*Ovis Canadensis Californiana*), March 6, 2008.

⁷⁰ Ibid.

⁷¹ Information requests have been made to Secor, Inc., the named company in the consultations regarding expenditures on mine waste remediation. To date no impact estimates have been provided.

⁷² Public comment from Avocet Tungsten, Inc. on Draft Economic Analysis of Critical Habitat Designation for the Sierra Nevada Bighorn Sheep (*Ovis Canadensis Californiana*), March 6, 2008.

⁷³ Ibid.

⁷⁴ Written documentation provided by Doug Hicks, Vice President, Avocet Tungsten Inc., September 12, 2007.

⁷⁵ Personal communication with Adena Fansler, Inyo County Planning Department Associate Planner, March 14, 2008.

locations where endangered species are present, and with CDFG requirements. These conservation efforts are a forecast of what the Service may require in its consultations based on previous requirements. As such, the application of these efforts is considered to generate post-designation baseline costs.

107. It is estimated that the economic impacts for contouring and vegetation of lands after mining stops in the mine’s tailing pond area will be a total of \$143,500 (undiscounted) which is assumed to be divided evenly over the next 20 years.⁷⁶ The annual cost of educating mine staff by a biologist is estimated to be \$3,500; thus this analysis estimates that \$53,600 (3 percent discount rate) will be spent for employee education programs in the future. It is also estimated that a fence will need to be constructed around the upper portal of the mine to protect bighorn sheep. This is estimated to cost \$9,600 (3 percent discount rate). It is also assumed that Avocet Tungsten, Inc. and Inyo National Forest will enter into three formal consultations with the Service, and that biological opinions will be issued for each consultation.⁷⁷ The total Section 7 administrative costs are estimated to be \$43,800 (three times the average predicted formal consultation cost of \$14,600).

EXHIBIT 3-1 POTENTIAL CONSERVATION EFFORTS FOR RESUMING PRODUCTION AT PINE CREEK MINE

CONSERVATION EFFORTS	ECONOMIC IMPACT (UNDISCOUNTED)
Re-contouring and re-vegetation of mine lands post completion of ground disturbing activities. ¹	\$110,000
Preparation and implementation of an employee education program covering SN bighorn sheep ecology and management, and applicable sections of the ESA, performed every year. ²	\$53,600
Administrative costs for three Section 7 Consultations. ³	\$43,800
Construction of a fence around the abandoned shaft. ⁴	\$9,600
Spatial restriction of operations to permitted areas only.	Not quantified
Prohibit construction of surface facilities above 10,000 feet during lambing season (April 15 - July 15) for the bighorn sheep.	Not quantified
Prohibit use of explosives during bighorn sheep lambing season (April 15 - July 15), or whenever sheep could be in danger.	Not quantified
Prohibit mining personnel from approach bighorn sheep.	Not quantified
Restrict vehicle speed limits to a maximum of 30 mph. on all mine access roads starting at the lowest tailing pond.	Not quantified
Prohibit the presence of domestic dogs from all mining facilities.	Not quantified
Protecting bighorn sheep from human sources of water in portions of the mine that would pose injury or mortality to the sheep.	Not quantified
Time limits on the tailing pile	Not quantified

⁷⁶ The estimated area of tailings piles to be replanted is 10,000 X 1,250 ft based on map provided in Personal Communication by Avocet Tungsten, Inc., March 6, 2008. This is multiplied by the cost of \$500/acre for revegetation from the California Natural Resource Conservation Service (NRCS) State Approved Cost Share List for Fiscal Year 2007.

⁷⁷ These consultations are for resuming operations within the mill, at the mine sites, and for the tailings. The consultations are assumed to occur in 2008.

Gating of roads accessing mine sites during non-operating hours, and deconstruction and reclamation following the cessation of mining activities. Not quantified

Sources:

- (1) The estimated area of tailings piles to be replanted is 10,000 X 1,250 ft based on map provided in Personal Communication by Avocet Tungsten, Inc., March 6, 2008. This is multiplied by the cost of \$500/acre for revegetation from the California Natural Resource Conservation Service (NRCS) State Approved Cost Share List for Fiscal Year 2007.
- (2) Estimates from similar California endangered species training program (for Tidewater Goby), Personal communication with Gail Campos, US Army Corps of Engineers, May 16, 2007.
- (3) Estimated consultation costs are from an IEC analysis based on data from the Federal Government Schedule Rates, Office of Personnel Management, 2006, and review of consultation records from several Service field offices across the country.
- (4) Estimated cost of fencing the perimeter of the abandoned shaft (100 X 100 yds) at \$8/feet at Pine Creek Mine in 2008.

3.3 PRE-DESIGNATION BASELINE IMPACTS

108. Pre-designation baseline impacts span the period 2000-2007, between listing and publication of the proposed critical habitat designation. Pre-designation impacts related to habitat management are primarily from the Bighorn Sheep Recovery Program and fire management efforts. The Los Angeles Department of Water and Power, which owns and manages substantial tracts of land inside and adjacent to proposed critical habitat estimates a yearly cost of habitat management and bighorn sheep conservation efforts of \$32,000; these costs are assumed to be baseline pre and post designation because they would have continued in these areas regardless of critical habitat designation.⁷⁸ Inyo National Forest estimates yearly expenditures of \$6,000 across the proposed critical habitat to address bighorn sheep conservation issues; these costs are also part of the pre and post designation baseline impacts for the same reason.⁷⁹ Total pre-designation baseline impacts are presented in Exhibit 3-2.

⁷⁸ Personal communication with Brian Tillemans September 12, 2007; Written communication from Brian Tillemans September 27, 2007.

⁷⁹ Personal communication Jon Regelbrugge, Mammoth and Mono Lakes District Ranger and Richard Perloff, Wildlife Ecologist, Inyo National Forest, September 13, 2007.

EXHIBIT 3-2 PRE-DESIGNATION BASELINE HABITAT MANAGEMENT IMPACTS

UNIT	PRESENT VALUE	PRESENT VALUE	PRESENT VALUE
	UNDISCOUNTED	3% DISCOUNT RATE	7% DISCOUNT RATE
1 Mount Warren	\$787,000	\$901,000	\$1,080,000
2 Mount Gibbs	\$787,000	\$901,000	\$1,080,000
3 Convict Creek	\$0	\$0	\$0
4 Wheeler Ridge	\$852,000	\$974,000	\$1,170,000
5 Taboose Creek	\$0	\$0	\$0
6 Sawmill Canyon	\$787,000	\$901,000	\$1,080,000
7 Mount Baxter	\$787,000	\$901,000	\$1,080,000
8 Mount Williamson	\$787,000	\$901,000	\$1,080,000
9 Big Arroyo	\$0	\$0	\$0
10 Mount Langley	\$787,000	\$901,000	\$1,080,000
11 Mount Laurel	\$0	\$0	\$0
12 Olancha Peak	\$0	\$0	\$0
Total:	\$5,570,000	\$6,380,000	\$7,650,000

Note: Totals may not sum due to rounding.

3.4 POST-DESIGNATION BASELINE IMPACTS

109. Post-designation baseline impacts are associated with the continuation of pre-existing policies or with activities that would have occurred without critical habitat designation. These impacts include the continued conservation activities of the California Department of Fish and Game, the Los Angeles Department of Water and Power, Humboldt-Toiyabe National Forest, and Inyo National Forest. These impacts also include the forecasted controlled burns by Inyo National Forest in continuation of their pre-listing policy. Additionally, administration costs due to consultations regarding resumption of mining operations by Avocet Tungsten Inc. in Unit 4 are also expected. Since these consultations would have occurred regardless of critical habitat designation, the impacts are assumed not to be incremental.⁸⁰ The post-designation baseline impacts are presented in Exhibit 3-3.

⁸⁰ Incremental costs associated with considering adverse modification considerations in future consultations are discussed below in Section 3.4.

EXHIBIT 3-3 POST-DESIGNATION BASELINE HABITAT MANAGEMENT IMPACTS

UNIT	PRESENT VALUE UNDISCOUNTED ¹	PRESENT	PRESENT	ANNUALIZED	ANNUALIZED
		VALUE	VALUE	3% DISCOUNT	3% DISCOUNT
		3% DISCOUNT	7% DISCOUNT	3% DISCOUNT	7% DISCOUNT
		RATE	RATE	RATE	RATE
1 Mount Warren	\$1,460,000	\$1,140,000	\$863,000	\$76,600	\$81,400
2 Mount Gibbs	\$1,460,000	\$1,140,000	\$863,000	\$76,600	\$81,400
3 Convict Creek	\$342,000	\$223,000	\$134,000	\$15,000	\$12,700
4 Wheeler Ridge	\$1,730,000	\$1,360,000	\$1,040,000	\$91,200	\$97,900
5 Taboose Creek	\$584,000	\$385,000	\$231,000	\$25,900	\$21,800
6 Sawmill Canyon	\$1,460,000	\$1,140,000	\$863,000	\$76,600	\$81,400
7 Mount Baxter	\$1,460,000	\$1,140,000	\$863,000	\$76,600	\$81,400
8 Mount Williamson	\$1,460,000	\$1,140,000	\$863,000	\$76,600	\$81,400
9 Big Arroyo	\$813,000	\$559,000	\$353,000	\$37,600	\$33,300
10 Mount Langley	\$1,460,000	\$1,140,000	\$863,000	\$76,600	\$81,400
11 Mount Laurel	\$1,100,000	\$806,000	\$553,000	\$54,200	\$52,200
12 Olancha Peak	\$1,460,000	\$1,140,000	\$863,000	\$76,600	\$81,400
Total:	\$14,800,000	\$11,300,000	\$8,350,000	\$760,000	\$788,000

Note: Totals may not sum due to rounding.

¹ Includes \$267,000 for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

3.5 POST-DESIGNATION INCREMENTAL IMPACTS

110. The post-designation incremental impacts of critical habitat designation are the portions of future section 7 consultations that concern adverse modification of critical habitat. New consultations for controlled burns in several units, and for resumption of mining activities in Unit 4 will have to spend some effort considering critical habitat. These impacts are presented in Exhibit 3-4. Any potential project modifications that may arise from the section 7 consultations are unknown at this time, and based upon available data, projections would be speculative.

EXHIBIT 3-4 POST-DESIGNATION INCREMENTAL HABITAT MANAGEMENT IMPACTS

UNIT	PRESENT VALUE UNDISCOUNTED ¹	PRESENT VALUE 3% DISCOUNT RATE	PRESENT VALUE 7% DISCOUNT RATE	ANNUALIZED 3% DISCOUNT RATE	ANNUALIZED 7% DISCOUNT RATE
1 Mount Warren	\$725	\$523	\$357	\$35	\$34
2 Mount Gibbs	\$725	\$523	\$357	\$35	\$34
3 Convict Creek	\$725	\$523	\$357	\$35	\$34
4 Wheeler Ridge	\$15,400	\$15,200	\$15,000	\$1,020	\$1,420
5 Taboose Creek	\$725	\$523	\$357	\$35	\$34
6 Sawmill Canyon	\$725	\$523	\$357	\$35	\$34
7 Mount Baxter	\$725	\$523	\$357	\$35	\$34
8 Mount Williamson	\$725	\$523	\$357	\$35	\$34
9 Big Arroyo	\$0	\$0	\$0	\$0	\$0
10 Mount Langley	\$725	\$523	\$357	\$35	\$34
11 Mount Laurel	\$0	\$0	\$0	\$0	\$0
12 Olancha Peak	\$725	\$523	\$357	\$35	\$34
Total:	\$21,900	\$19,900	\$18,200	\$1,340	\$1,720

Note: Totals may not sum due to rounding.

¹ Includes \$14,600 for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

3.6 SOURCES OF UNCERTAINTY

111. The conservation efforts provided in Exhibit 3-1 are forecasts of the actual impacts from conservation efforts that will be necessary for resumption of mining operations. The timing of consultations and application of conservation efforts is estimated as well. To the extent that actual conservation efforts have different impacts and the timing is different, the impacts in this chapter may be inaccurate.

CHAPTER 4 | POTENTIAL ECONOMIC IMPACTS TO RECREATION

112. This chapter describes how conservation efforts to protect the bighorn sheep and its habitat may affect recreational activities that occur within these units. The proposed rule indicates that recreational activities may pose a threat to the bighorn sheep in eleven out of the twelve proposed critical habitat units.⁸¹ This chapter discusses the issues concerning recreation in bighorn sheep habitat. The chapter then focuses on the development of recreational facilities. Next, the chapter quantifies these impacts. The impacts from four informal consultations in Inyo County constitute the basis for estimating baseline pre-designation costs. Forecast consultations on recreation and resort development are the basis for estimating the post-designation baseline impacts. The post-designation incremental impacts from critical habitat designation are forecast to be a portion of the expected consultation costs.
113. The recreation and development related consultation history shows that project modifications were not required in the past. In addition, discussions with the Service and multiple stakeholders indicated that no project modifications, such as restrictions on recreation activities, can be predicted at this time. As a result this analysis examines pre-designation and forecasts post-designation costs of consultations only, since no project modifications can be predicted for the future. Information on the number of businesses and amounts of employment in outdoor recreation industries is provided as context for this chapter.

4.1 RECREATIONAL ACTIVITIES IN BIGHORN SHEEP HABITAT

114. Recreational companies that operate within critical habitat areas include pack station management companies and outfitter guide companies. These companies operate horse and mule pack trains into the wilderness for camping excursions. Previous informal consultations completed by Inyo National Forest address potential threats posed by both types of operations. Pack stations activities such as pack trains can disturb bighorn sheep when passing on high mountain passes. This routine disturbance over long periods of time can potentially influence bighorn sheep foraging and traveling behavior, in an effort to avoid the pack trains.⁸² In addition, foraging by pack animals can reduce the amounts of available forage for bighorn sheep, decreasing the habitat quality in those areas.⁸³

⁸¹ U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants; Designation of Habitat for the Sierra Nevada Bighorn Sheep and Proposed Taxonomic Revision; Proposed Rule, 72 FR 142, July 25, 2007.

⁸² US Fish and Wildlife Service, Section 7 Consultation to Lucinda McKee, Inyo National Forest, May 12, 2007.

⁸³ US Fish and Wildlife Service, Section 7 Consultation to Jeffrey Bailey, Inyo National Forest, May 9, 2000.

Pack dogs and other animals pose an additional disturbance threat; dogs may trigger a predator response from bighorn sheep upon contact. This response may be heightened when lambs are present. Bighorn sheep may injure themselves when attempting to escape.

115. Four informal section 7 consultations have been conducted on the impacts of pack station and outfitting guide activities on the bighorn sheep habitat. These consultations have taken place due to activities in Inyo National Forest. Mitigation of the potential disturbance threats involves limiting pack stock to designated trails and to high elevation areas when crossing passes. The US Forest Service maintains that dogs or animals accompanying pack operations must be under complete verbal and physical control at all times, especially when approaching bighorn sheep habitat. It encourages pack stations to voluntarily opt to not bring animals on the trails.⁸⁴ Trails that provide access points to the Gibbs, Bloody Canyon, Glacier Canyon, Parker Creek, Lundy Lake, Warren Fork, Saddlebag Lakes, Taboose, Meysan Lake, Cottonwood Lakes, Tuttle Creek, Tamarack, Little Lakes Valley, Morgan Pass trails are subject to Forest Order No. 04-02-08 which states “dogs must be under immediate verbal or physical control of their owners at all times.”⁸⁵
116. Outfitter guide companies coordinate mountaineering and related activities, and lead groups for instruction and practice. Specific activities include rock climbing, guided hiking, ice climbing, ski touring, and technical mountaineering instruction. Bighorn sheep may be disturbed when groups pass at high elevations and when being approached by individuals coming from higher elevations.
117. The Forest Service mitigates these potential disturbances by restricting the use of specific trail segments that lead into bighorn sheep habitat. This policy imposes some limits on a few specific trail segments, but does not completely restrict trails, nor the use of bighorn sheep habitat in general. These limitations affect small areas and do not appreciably decrease opportunities for outdoor recreation. The Forest Service educates the outfitter guide companies on the habitat elevations of bighorn sheep and requests that these companies not approach any sensitive habitat area from an area of higher elevation.
118. Recreational and pack companies reported that neither the presence of the bighorn sheep, nor the Forest Service permitting process have had quantifiable impacts on their businesses. While some parts of the permitting process are onerous, the pack operators believe that the permitting process is not primarily about the bighorn sheep.⁸⁶ There were concerns from outfitters about potential limitation to access for recreational activities in two areas: ice climbing in the Lee Vining area adjacent to Unit 1 and potential limitations on access to Sims Creek near Independence, CA.^{87,88} However, none of the

⁸⁴ US Fish and Wildlife Service, Section 7 Consultation to Jeffrey Bailey, Inyo National Forest, November 18, 2005.

⁸⁵ Inyo National Forest. Recreational Activities, Bighorn Sheep Restricted Areas.
<http://www.fs.fed.us/r5/inyo/recreation/wild/bighornandpets.shtml> Accessed on October 15, 2007.

⁸⁶ Personal communication with Craig London, Rock Creek Pack Station, October 11, 2007.

⁸⁷ Personal communication with Todd Vogel, Sierra Mountain Center, September 14, 2007.

representatives of the Service, Humboldt-Toiyabe National Forest, Inyo National Forest, and CDFG that were queried about potential recreational closures said that such measures could be predicted at this time.

119. Three consultations are expected in the next twenty years in the Humboldt-Toiyabe National Forest concerning pack outfitters and existing recreational facility maintenance. Inyo National Forest expects to consult once on recreational trail designation.

Resort Development

120. The twelve potential critical habitat units are located on the eastern portion of the Sierra Nevada Mountain range and run parallel to Highway 395. Future development of these areas is tied to the recreational industries of the cities along Highway 395. At present, there are no known expansion plans for the resorts in these areas.
121. Humboldt-Toiyabe National Forest and Inyo National Forest anticipate consultations in the next twenty years to revisit current permits to the Virginia Lakes Resort and the Tioga Pass Resort, respectively. Humboldt-Toiyabe anticipates consulting on the construction of a parking lot for resort use.

4.1.1 RECREATION IN PROPOSED CRITICAL HABITAT

122. Since there are no conservation measures or recreation restrictions that can be predicted at this time, this section presents data that describe the relevance of recreational businesses to the counties potentially affected by critical habitat designation. These data are presented in Exhibit 4-1. Exhibit 4-1 provides data from multiple sources to present a multi-dimensional snapshot of the recreation related businesses in areas near proposed critical habitat.
123. The second column of Exhibit 4-1 shows the percentage of proposed critical habitat that is within each county. This is one indication of the degree to which each county is likely to be affected. Inyo County has the most proposed critical habitat, followed by Mono and Fresno Counties. Fresno County, however, stretches west into more highly populated areas. The primary economic locations in Inyo and Mono Counties are east of the Sierra Nevada Mountains and are more affected by the tourism industry.
124. The third and fourth columns of Exhibit 4-1 provide information on the number and size of recreation-related businesses (excluding casinos) near proposed critical habitat. These companies also include dining establishments and hotels.⁸⁹ The last column indicates the percentage of employment in each county related to recreation and tourism.

⁸⁸ Personal communication with Craig London, Rock Creek Pack Station, August 28, 2007.

⁸⁹ The NAICS codes selected include hotels (712110), historical sites (712120), zoos and botanical gardens (712130), nature parks and other similar institutions (712190), all other recreation and entertainment industries, excluding casinos, golf, theaters, amusement parks (713990), hotels (except casino hotels) and motels (721110), bed-and-breakfast inns (721191), all other traveler accommodation (721199), RV parks and campgrounds (721211), full-service restaurants (722110), limited-service restaurants (722211), Cafeterias, Grill Buffets, and Buffets (722212), Snack and Nonalcoholic Beverage Bars (722213), and Drinking Places (722410). While the companies counted in Exhibit 4-1 include more than just outdoor, wilderness recreation businesses, the data provides an overall sense of the magnitude of recreation and tourism related businesses in vicinity to proposed critical habitat.

EXHIBIT 4-1 RECREATION BUSINESS ACTIVITY IN PROPOSED CRITICAL HABITAT

COUNTY	PERCENT PROPOSED CRITICAL HABITAT PER COUNTY	NUMBER OF BUSINESSES, REVENUES < \$6.5 MILLION ¹	NUMBER OF BUSINESSES, REVENUES > \$6.5 MILLION ¹	PERCENT COUNTY EMPLOYMENT ²
Inyo	46%	117	10	16%
Mono	21%	168	17	36%
Fresno	17%	1646	590	7%
Tulare	14%	677	215	5%
Tuolumne	3%	235	52	9%

Notes: percentages are rounded.

(1) Included establishments are tourism/recreation related businesses, hotels, and restaurants, excluding casinos or other site-specific (non-outdoor recreation oriented) businesses. Dun & Bradstreet, Inc, D&B Duns Market Identifiers (File 516) database. Search performed on April 09, 2008 for select North American Industrial Classification System (NAICS) Codes.

(2) California Employment Development Department, Labor Market Information Division, March 21, 2008.

125. Exhibit 4-1 shows the importance of the recreation industry, especially in Mono and Inyo Counties. Pack outfitters, who operate horse and mule pack trains into the wilderness for camping excursions, are an important recreation business in Mono and Inyo Counties. Yearly gross business revenues for ten pack outfitters in Mono and Inyo Counties are estimated at almost \$3.5 million; there are three large companies and the remaining nine generate approximately \$100,000 to \$200,000 per year.⁹⁰ Pack outfitters are restricted from using goats as pack animals in areas near bighorn sheep because of the threat of disease transmission from domestic goats to bighorn sheep. Pack outfitters, many of whom operate pack stations as supply depots for their trips, have to comply with permitting restrictions which have some stipulations for protection of the bighorn sheep. No impacts specific to bighorn sheep conservation could be estimated.⁹¹ No additional restrictions on pack outfitters can be predicted at this time.⁹²
126. As of this publication, there are widespread concerns that recreation restrictions may be implemented following designation, though none are anticipated by the public agencies that manage bighorn sheep habitat at this time. The information provided in this section

⁹⁰ Written communication from Matt Taylor, Partner, Virginia Lakes Pack Outfit, April 10, 2008.

⁹¹ Personal communication with Craig London, Rock Creek Pack Station, October 11, 2007. Personal communication from Matt Taylor, Partner, Virginia Lakes Pack Outfit, April 10, 2008.

⁹² Discussion with officials from the Service, California Department of Fish and Game, and Inyo and Humboldt-Toiyabe National Forests indicated that there were no new conservation measures being considered and none could be predicted.

provides economic context for the potential application of recreation restrictions should such restrictions ever be warranted to protect the bighorn sheep or its habitat.

4.2 PRE-DESIGNATION BASELINE IMPACTS

127. Recreational impacts from bighorn sheep conservation and habitat protection are due to pre-designation consultations and forecast post-designation consultations. Inyo National Forest conducted four informal section 7 consultations on outfitter permits and pack stations for areas in multiple proposed critical habitat units between 2000 and 2007. A formal consultation was undertaken by Inyo National Forest concerning expansion of the Mammoth Lakes Airport in 2001. Exhibit 4-2 displays the distribution of impacts from these consultations. No project modifications were required by these consultations.

EXHIBIT 4-2 PRE-DESIGNATION BASELINE RECREATION IMPACTS

UNIT	PRESENT VALUE	PRESENT VALUE	PRESENT VALUE
	UNDISCOUNTED	3% DISCOUNT RATE	7% DISCOUNT RATE
1 Mount Warren	\$5,000	\$5,940	\$7,450
2 Mount Gibbs	\$6,500	\$7,780	\$9,860
3 Convict Creek	\$0	\$0	\$0
4 Wheeler Ridge	\$24,100	\$28,800	\$34,100
5 Taboose Creek	\$0	\$0	\$0
6 Sawmill Canyon	\$4,630	\$5,480	\$6,850
7 Mount Baxter	\$4,630	\$5,480	\$6,850
8 Mount Williamson	\$4,630	\$5,480	\$4,810
9 Big Arroyo	\$0	\$0	\$0
10 Mount Langley	\$0	\$0	\$0
11 Mount Laurel	\$0	\$0	\$0
12 Olancho Peak	\$0	\$0	\$0
Total	\$49,500	\$58,900	\$69,900

Note: Totals may not sum due to rounding.

4.3 POST-DESIGNATION BASELINE IMPACTS

128. The baseline impacts are for forecasted section 7 consultations. Neither the consultation history nor multiple interviews with various stakeholders indicate that any project modifications, such as restrictions on the use of recreational areas, can be predicted at this time. Humboldt-Toiyabe National Forest anticipates five consultations in the Mount Warren unit (Unit 1). Three of these consultations concern recreational programs and two concern resort development. Inyo National Forest anticipates a consultation across several southern proposed critical habitat units, and a repeated consultation for a permit renewal at a resort proximate to Mount Warren (Unit 1) and Mount Gibbs (Unit 2). Exhibit 4-3 provides information concerning these impacts.

EXHIBIT 4-3 POST-DESIGNATION BASELINE RECREATION IMPACTS

UNIT	PRESENT	PRESENT	PRESENT	ANNUALIZED	ANNUALIZED
	VALUE	VALUE	VALUE	3% DISCOUNT	7% DISCOUNT
	UNDISCOUNTED	3% DISCOUNT	7% DISCOUNT	RATE	RATE
		RATE	RATE		
1 Mount Warren	\$76,100	\$66,000	\$55,800	\$4,440	\$5,260
2 Mount Gibbs	\$7,130	\$4,630	\$2,730	\$311	\$258
3 Convict Creek	\$0	\$0	\$0	\$0	\$0
4 Wheeler Ridge	\$0	\$0	\$0	\$0	\$0
5 Taboose Creek	\$1,190	\$1,150	\$1,110	\$1,110	\$105
6 Sawmill Canyon	\$1,190	\$1,150	\$1,110	\$78	\$105
7 Mount Baxter	\$1,190	\$1,150	\$1,110	\$78	\$105
8 Mount Williamson	\$1,190	\$1,150	\$1,110	\$78	\$105
9 Big Arroyo	\$0	\$1,150	\$0	\$0	\$0
10 Mount Langley	\$1,190	\$0	\$1,110	\$78	\$105
11 Mount Laurel	\$0	\$0	\$0	\$0	\$0
12 Olancha Peak	\$1,190	\$1,150	\$1,110	\$78	\$105
Total	\$90,400	\$77,600	\$65,100	\$6,250	\$6,150

Note: Totals may not sum due to rounding.

4.4 POST-DESIGNATION INCREMENTAL IMPACTS

129. Potential post-designation incremental impacts due to critical habitat designation concern the portions of forecast section 7 consultations that will address adverse modification of proposed critical habitat. Each of the consultations discussed as part of the baseline post-designation estimates will have a portion of effort devoted to adverse modification. These impact estimates are presented in Exhibit 4-4. Consistent with the baseline pre and post designation impacts, no post-designation incremental project modifications can be predicted at this time.

EXHIBIT 4-4 POST-DESIGNATION INCREMENTAL RECREATION IMPACTS

UNIT	PRESENT	PRESENT	PRESENT	ANNUALIZED	ANNUALIZED
	VALUE	VALUE	VALUE	3% DISCOUNT	7% DISCOUNT
	UNDISCOUNTED	3% DISCOUNT	7% DISCOUNT	3% DISCOUNT	7% DISCOUNT
		RATE	RATE	RATE	RATE
1 Mount Warren	\$25,400	\$22,100	\$18,600	\$1,480	\$1,760
2 Mount Gibbs	\$2,380	\$1,540	\$912	\$104	\$86
3 Convict Creek	\$0	\$0	\$0	\$0	\$0
4 Wheeler Ridge	\$0	\$0	\$0	\$0	\$0
5 Taboose Creek	\$397	\$385	\$371	\$26	\$35
6 Sawmill Canyon	\$397	\$385	\$371	\$26	\$35
7 Mount Baxter	\$397	\$385	\$371	\$26	\$35
8 Mount Williamson	\$397	\$385	\$371	\$26	\$35
9 Big Arroyo	\$0	\$0	\$0	\$0	\$0
10 Mount Langley	\$0	\$0	\$0	\$0	\$0
11 Mount Laurel	\$0	\$0	\$0	\$0	\$0
12 Olancha Peak	\$397	\$385	\$371	\$26	\$35
Total	\$29,800	\$25,500	\$21,400	\$1,720	\$2,020

Note: Totals may not sum due to rounding.

4.5 SOURCES OF UNCERTAINTY

130. The most substantial source of uncertainty stems from the fact that although recreation activities are identified as threats to the species, and there is concern that further restrictions may occur in the future, there is no information on the nature, extent, or timing of any such potential restrictions. If new restrictions are adopted because unexpected threats are revealed or present themselves, then the impacts presented in Sections 4.3 and 4.4 will underestimate the impacts by the economic costs of any such conservation measures. The nature of any revealed or new threat to the bighorn sheep will determine whether the threat is considered incremental or baseline. The economic data provided in Section 4.1 provides background on existing economic activity that any new recreation restrictions might impact.

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APPENDIX A | SMALL BUSINESS ANALYSIS AND ENERGY IMPACTS ANALYSIS

1. This appendix considers the extent to which incremental impacts from critical habitat designation could be borne by small entities and the energy industry. The analysis presented in Section A.1 is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996. Information for this analysis was gathered from the Small Business Administration (SBA), the Service, and from interviews with stakeholders contacted in the development of the economic analysis. The energy analysis in Section A.2 is conducted pursuant to Executive Order No. 13211.
2. The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts associated with the proposed critical habitat designation, and not the post-designation baseline impacts of Sierra Nevada Bighorn Sheep conservation. The incremental impacts of the rulemaking are considered most relevant for the small business and energy impacts analyses as they are expected to stem from the critical habitat designation, and are therefore not expected to occur in the case that critical habitat is not designated for the bighorn sheep. The post-designation baseline impacts associated with the listing of the bighorn sheep, as quantified in Chapters 2 through 4 of this report, are expected to occur regardless of the outcome of this rulemaking and are therefore not considered in terms of their impacts on small businesses and the energy industry.

A.1 SBREFA ANALYSIS

3. When a Federal agency proposes regulations, the RFA requires the agency to prepare and make available for public comment an analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).⁹³ No initial regulatory flexibility analysis (IRFA) is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have significant economic impact on a substantial number of small entities. To assist in this process, this appendix provides a screening level analysis of the potential for Sierra Nevada Bighorn Sheep conservation efforts to affect small entities.
4. To ensure broad consideration of impacts on small entities, the Service has prepared this small business analysis without first making the threshold determination whether the

⁹³ 5 U.S.C. 601 et seq.

proposed critical habitat designation could be certified as not having a significant economic impact on a substantial number of small entities.

A.1.1 SUMMARY OF IMPACTS ON SMALL ENTITIES

5. This screening analysis is based on the estimated incremental impacts associated with the proposed rulemaking as described in Chapters 2 through 4 of this analysis. The analysis evaluates the potential for economic impacts related to activity categories, including:
 - Grazing,
 - Habitat management, and
 - Recreation.

6. As discussed in these chapters, the only incremental impacts associated with this rulemaking are administrative costs associated with future section 7 consultations that address adverse modification in addition to jeopardy. The total impact on small businesses over the next 20 years is estimated to be \$15,800 (discounted at 3 percent). Exhibit A-1 summarizes the estimated impacts on small businesses.

EXHIBIT A-1 SUMMARY OF IMPACTS TO SMALL ENTITIES

ACTIVITY	AFFECTED SMALL ENTITY	ESTIMATED IMPACT PER SMALL ENTITY (OVER 20 YEARS, PRESENT VALUE, 3% DISCOUNT RATE)	IMPACTS AS A PERCENT OF AVERAGE REVENUES
Grazing	FIM Corporation	\$13,000	Unknown
	VA Lakes Resort		
	Tioga Pass Resort	\$2,730	Unknown
Recreation	Pack outfitter(s) in VA Lakes		
TOTAL		\$15,700	Unknown

Note: Numbers may not add up due to rounding.

A.1.2 DETAILED ANALYSIS OF IMPACTS TO SMALL BUSINESSES

7. This analysis is intended to improve the Service's understanding of the potential effects of the proposed rule on small entities, and to identify opportunities to minimize these impacts in the final rulemaking. The Endangered Species Act (Act) requires the Service to designate critical habitat for threatened and endangered species to the maximum extent prudent and determinable. Section 4(b)(2) of the Act requires that the Service designate critical habitat “on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular areas as critical habitat.” The Secretary’s discretion is limited as (s)he may not exclude areas if so doing “will result in the extinction of the species.”

8. Three types of small entities are defined in the RFA:

- Small Business - Section 601(3) of the RFA defines a small business as having the same meaning as small business concern under section 3 of the Small Business Act. This includes any firm that is independently owned and operated and is not dominant in its field of operation. The U.S. Small Business Administration (SBA) has developed size standards to carry out the purposes of the Small Business Act, and those size standards can be found in 13 CFR 121.201. The size standards are matched to North American Industry Classification System (NAICS) industries. The SBA definition of a small business applies to a firm's parent company and all affiliates as a single entity.
 - Small Governmental Jurisdiction - Section 601(5) defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000. Special districts may include those servicing irrigation, ports, parks and recreation, sanitation, drainage, soil and water conservation, road assessment, etc. When counties have populations greater than 50,000, those municipalities of fewer than 50,000 can be identified using population reports. Other types of small government entities are not as easily identified under this standard, as they are not typically classified by population.
 - Small Organization - Section 601(4) defines a small organization as any not-for-profit enterprise that is independently owned and operated and not dominant in its field. Small organizations may include private hospitals, educational institutions, irrigation districts, public utilities, agricultural co-ops, etc.
9. The courts have held that the RFA/SBREFEA requires federal agencies to perform a regulatory flexibility analysis of forecast impacts to small entities that are directly regulated. In the case of *Mid-Tex Electric Cooperative, Inc., v. Federal Energy Regulatory Commission (FERC)*, FERC proposed regulations affecting the manner in which generating utilities incorporated construction work in progress in their rates. The generating utilities that expected to be regulated were large businesses; however, their customers -- transmitting utilities such as electric cooperatives -- included numerous small entities. In this case, the court agreed that FERC simply authorized large electric generators to pass these costs through to their transmitting and retail utility customers, and FERC could therefore certify that small entities were not directly impacted within the definition of the RFA.⁹⁴
10. Similarly, *American Trucking Associations, Inc. v. Environmental Protection Agency (EPA)* addressed a rulemaking in which EPA established a primary national ambient air quality standard for ozone and particulate matter.⁹⁵ The basis of EPA's RFA/SBREFEA certification was that this standard did not directly regulate small entities; instead, small entities were indirectly regulated through the implementation of state plans that incorporated the standards. The court found that, while EPA imposed regulation on

⁹⁴ 773 F. 2d 327 (D.C. Cir. 1985).

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

states, it did not have authority under this rule to impose regulations directly on small entities and therefore small entities were not directly impacted within the definition of the RFA.

11. The Small Business Administration (SBA) in its guidance on how to comply with the RFA recognizes that consideration of indirectly affected small entities is not required by the RFA, but encourages agencies to perform a regulatory flexibility analysis even when the impacts of its regulation are indirect.⁹⁶ "If an agency can accomplish its statutory mission in a more cost-effective manner, the Office of Advocacy [of the SBA] believes that it is good public policy to do so. The only way an agency can determine this is if it does not certify regulations that it knows will have a significant impact on small entities even if the small entities are regulated by a delegation of authority from the federal agency to some other governing body."⁹⁷
12. The regulatory mechanism through which critical habitat protections are enforced is section 7 of the Act, which directly regulates only those activities carried out, funded, or permitted by a Federal agency. By definition, Federal agencies are not considered small entities, although the activities they may fund or permit may be proposed or carried out by small entities. Given the SBA guidance described above, this analysis considers the extent to which this designation could potentially affect small entities, regardless of whether these entities would be directly regulated by the Service through the proposed rule or by a delegation of impact from the directly regulated entity.
13. This screening analysis focuses on small entities that may bear the incremental impacts of this rulemaking quantified in Chapters 2-4 of this economic analysis. Although businesses affected indirectly are considered, this analysis considers only those entities for which impact would not be measurably diluted. This analysis concludes that the only incremental impacts associated with this rulemaking are administrative costs associated with section 7 consultations to address adverse modification. A portion of these incremental administrative costs may be borne by small entities (third parties to the consultation) associated with grazing and recreation in the region.
14. The incremental impacts will be borne by Inyo National Forest, Humboldt-Toiyabe National Forest, FIM Corporation, Tioga Pass Resort, Virginia Lakes Resort, Avocet Tungsten Inc., and unidentified outdoor pack outfitting companies in Inyo and Mono Counties. Of these, Inyo and Humboldt-Toiyabe National Forests and Avocet Tungsten Inc. are not small businesses. The following sections describe where these incremental impacts may be borne by small entities.

⁹⁶ Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act. pg. 20.

⁹⁷ *ibid.*, pg. 21.

Grazing

15. Incremental costs of section 7 consultations on grazing are expected for Mount Warren (unit 1). Both Humboldt-Toiyabe National Forest and FIM Corporation are expected to enter formal consultations once every year in the future. As described in chapter 2, the estimated annual Section 7 administrative costs are \$1,450 (2007 dollars) for Humboldt-Toiyabe National Forest, and \$875 (2007 dollars) for FIM Corporation. Humboldt-Toiyabe National Forest is a federal agency, which is not considered a small entity. FIM Corporation is the only small business that will be affected due to grazing related conservation efforts. At a three percent discount rate, the present value of the total grazing related impacts on small businesses is estimated to be \$13,000 (\$875 annualized). Other ranchers included in the discussion in Chapter 2 are not expected to incur incremental costs in the future.

Habitat Management

16. The Inyo National Forest is expected to incur incremental costs in the future from consultations for implementing its burn management plans that are expected to occur in the future (years 2012, 2017, 2022, and 2027). Avocet Tungsten Inc. is expected to incur incremental costs for three consultations regarding sheep conservation measures for resuming mining operations. Inyo National Forest is a federal agency, and is not considered a small entity. Avocet Tungsten Inc. also cannot be considered a small business. Therefore this analysis does not estimate any impact to small businesses due to habitat management related conservation efforts for the sheep.

Recreation

17. Humboldt-Toiyabe National Forest, Inyo National Forest, two resort operators, and outdoor pack companies are expected to incur incremental impacts of critical habitat designation in the future due to recreation related consultations. Humboldt-Toiyabe National Forest and Inyo National Forest are not considered small businesses; therefore the only incremental costs to small businesses are those expected to be borne by two resort operators and outdoor pack companies.
18. Inyo National Forest is expected to initiate three informal Section 7 consultations with the Service. Two consultations will be for the Tioga Pass Resort permits in 2017 and 2027 for Units 1 and 2. The Tioga Pass Resort is a small business, and is expected to incur impacts of \$513 (2007 dollars) per consultation (\$1,026 total). At a three percent discount rate, the present value of the total incremental impact of recreation consultations on Tioga Pass Resort is estimated to be \$666 (\$44 annualized). The third informal consultation will involve only Inyo National Forest, and is therefore not expected to result in any incremental impacts to any small business.
19. Humboldt-Toiyabe National Forest is expected to initiate two formal consultations with a small business, Virginia Lakes Resort, in 2009 and 2010. The estimated costs of each of these consultations are \$875 (2007 dollars) each (\$1750 total), and will be due to conservation efforts in Unit 1. At a three percent discount rate, the present value of the total incremental impact of recreation consultations on Virginia Lakes Resort is estimated

to be \$1626 (\$109 annualized). In 2012, Humboldt-Toiyabe National Forest is expected to initiate a permitting consultation with a pack outfitter in Virginia Lakes for conservation of the species in Unit 1. The incremental costs that will be borne by the outfitter for this consultation is estimated to be \$513 (2007 dollars). At a three percent discount rate, the present value of this consultation is estimated to be \$443 (\$30 annualized). Humboldt-Toiyabe National Forest is expected to initiate two other consultations with the Service in 2012, but these will not impact any small business.

20. No other required project modifications are expected to arise from recreation consultations. The pre-designation consultations solely contained advisory precautions. In addition, none of the stakeholders involved in permitting recreational activities have advocated project modifications. Given the historical record and the current inability to predict unknown potential recreation related conservation efforts by potential recreation activity regulators, no project modifications are forecast in this analysis. Thus, the total incremental impact on small entities involved in recreation related businesses is estimated to be \$2,730 (3 percent discounted).
21. Exhibit A-2 summarizes the incremental economic impacts to small business for the 12 proposed critical habitat units. As shown incremental impacts to small businesses are expected to result from conservation efforts in Units 1 and 2 only.

EXHIBIT A-2 SUMMARY OF INCREMENTAL IMPACTS TO SMALL ENTITIES BY UNIT

UNIT	UNDISCOUNTED	DISCOUNTED AT 3 PERCENT	DISCOUNTED AT 7 PERCENT
1 Mount Warren	\$20,300	\$15,400	\$11,300
2 Mount Gibbs	\$513	\$333	\$197
3 Convict Creek	\$0	\$0	\$0
4 Wheeler Ridge	\$0	\$0	\$0
5 Taboose Creek	\$0	\$0	\$0
6 Sawmill Canyon	\$0	\$0	\$0
7 Mount Baxter	\$0	\$0	\$0
8 Mount Williamson	\$0	\$0	\$0
9 Big Arroyo	\$0	\$0	\$0
10 Mount Langley	\$0	\$0	\$0
11 Laurel Creek	\$0	\$0	\$0
12 Olancha Peak	\$0	\$0	\$0
Total Costs	\$20,800	\$15,800	\$11,500

A.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY

22. Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal

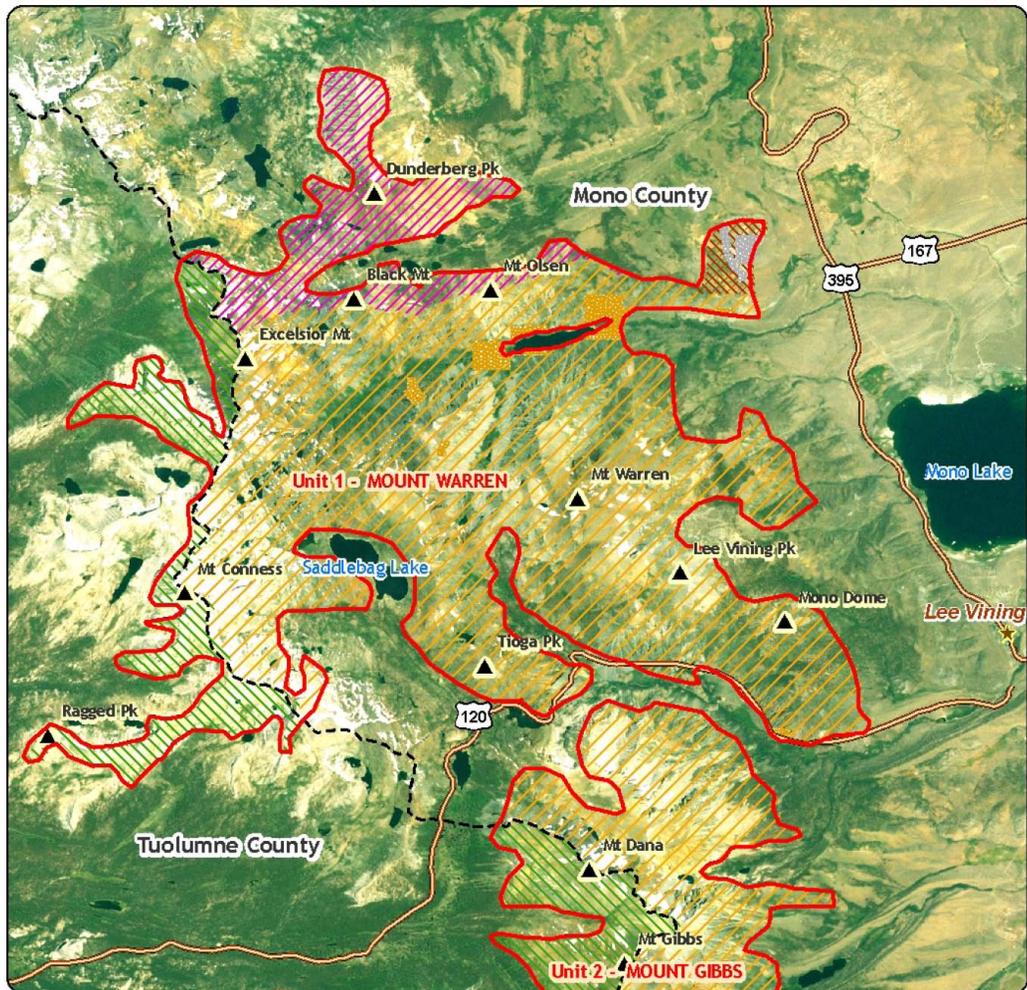
agencies must prepare and submit a “Statement of Energy Effects” for all “significant energy actions.” The purpose of this requirement is to ensure that all Federal agencies “appropriately weigh and consider the effects of the Federal Government’s regulations on the supply, distribution, and use of energy.”⁹⁸

23. The Office of Management and Budget provides guidance for implementing this Executive Order, outlining nine outcomes that may constitute “a significant adverse effect” when compared with the regulatory action under consideration:
- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
 - Reductions in fuel production in excess of 4,000 barrels per day;
 - Reductions in coal production in excess of 5 million tons per year;
 - Reductions in natural gas production in excess of 25 million Mcf per year;
 - Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;
 - Increases in energy use required by the regulatory action that exceed the thresholds above;
 - Increases in the cost of energy production in excess of one percent;
 - Increases in the cost of energy distribution in excess of one percent; or
 - Other similarly adverse outcomes.⁹⁹
24. As none of these criteria are relevant to this analysis, energy –related impacts associated with critical habitat designation for the Sierra Nevada Bighorn sheep are not expected.

⁹⁸ Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>.

⁹⁹ Ibid.

APPENDIX B | PROPOSED CRITICAL HABITAT MAPS



Proposed Critical Habitat for Sierra Nevada Bighorn Sheep

Unit 1: Mount Warren

- ▲ Mountain Peak
- ⚡ Mine
- * Town
- Stream / River
- = State Highway
- ▭ Proposed Critical Habitat
- ▭ County Boundary
- Land Owners
- ▨ Inyo National Forest
- ▨ Humboldt-Toiyabe National Forest
- ▨ Yosemite National Park
- ▨ Bureau of Land Management
- Los Angeles Dept. of Water and Power
- Private

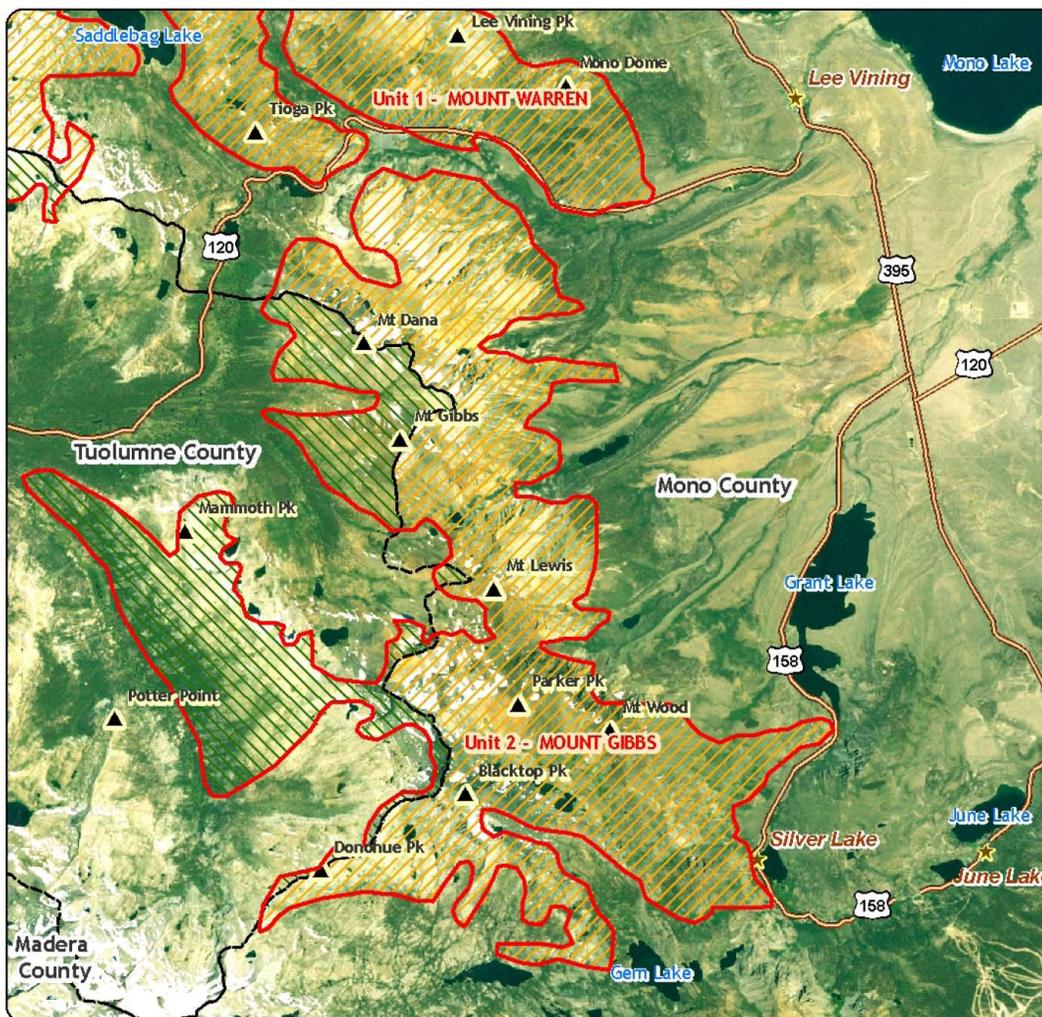


UNIT NUM	UNIT NAME	LANDOWNERS / LANDMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
1	Mount Warren	Humboldt-Toiyabe National Forest Inyo National Forest Yosemite National Park Bureau of Land Management Los Angeles Department of Water and Power Private	35,279	165	568	36,012

Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



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Proposed Critical Habitat for Sierra Nevada Bighorn Sheep

Unit 2: Mount Gibbs

- ▲ Mountain Peak
- ⛏ Mine
- ★ Town
- Stream *J* River
- = State Highway
- ▭ Proposed Critical Habitat
- County Boundary
- Land Owners**
- ▨ Inyo National Forest
- ▨ Yosemite National Park

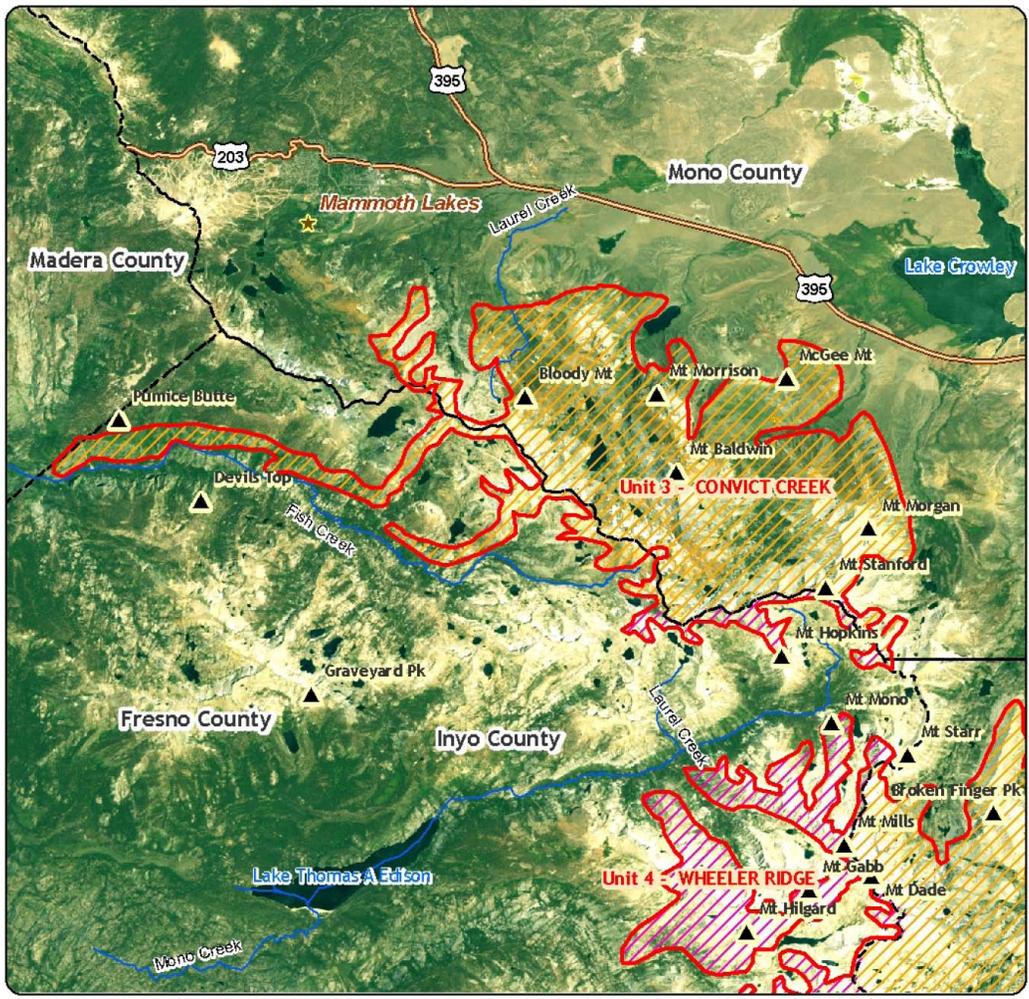


UNIT NUM	UNIT NAME	LANDOWNERS / LAND MANAGERS	LANDOWNERS (ACRES)				TOTAL
			FEDERAL	LOCAL	PRIVATE		
1	Mount Warren	Inyo National Forest Yosemite National Park	29,702			29,702	
2	Mount Gibbs	Inyo National Forest Yosemite National Park	29,702			29,702	



SoU"ce:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA

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Proposed Critical Habitat for Sierra Nevada Bighorn Sheep
Unit 3: Convict Creek

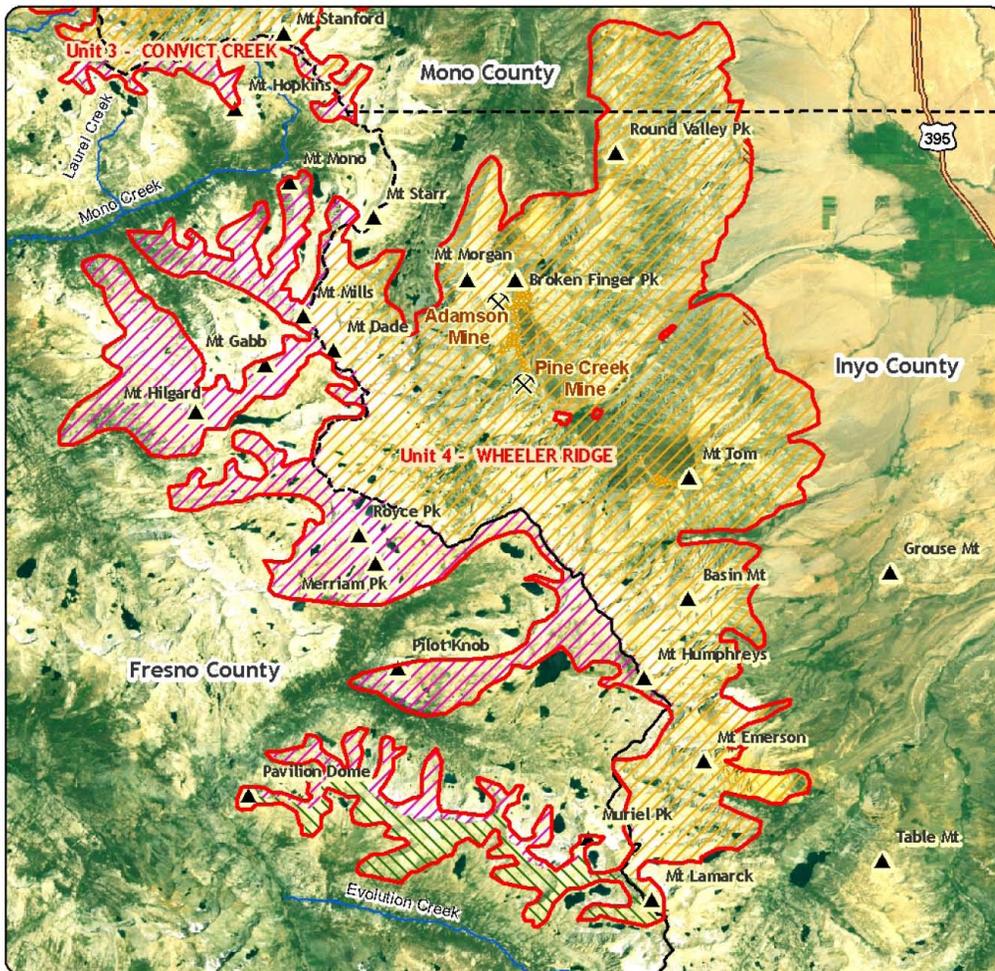
- ▲ Mountain Peak
- ⛏ Mining
- ★ Town
- Stream / River
- = State Highway
- ▭ Proposed Critical Habitat
- County Boundary
- land Owners**
- ▨ Inyo National forest
- ▨ Sierra National forest
- Private



UNITNUM	UNIT NAME	LANDOWNERS / LANDMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
3	Convict Creek	Inyo National Forest Sierra National Forest Private	36,497		17	36,514

Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA





Proposed Critical Habitat for Sierra Nevada Bighorn Sheep

Unit 4: Wheeler Ridge

- ▲ Mountain Peak
 - ⊗ Mine
 - * Town
 - Stream / River
 - = State Highway
 - Proposed Critical Habitat
 - County Boundary
- land Owners**
- ▨ Inyo National forest
 - ▨ Sierra National forest
 - ▨ Kings Canyon National Park
 - ▨ US Bureau of Land Management
 - Private

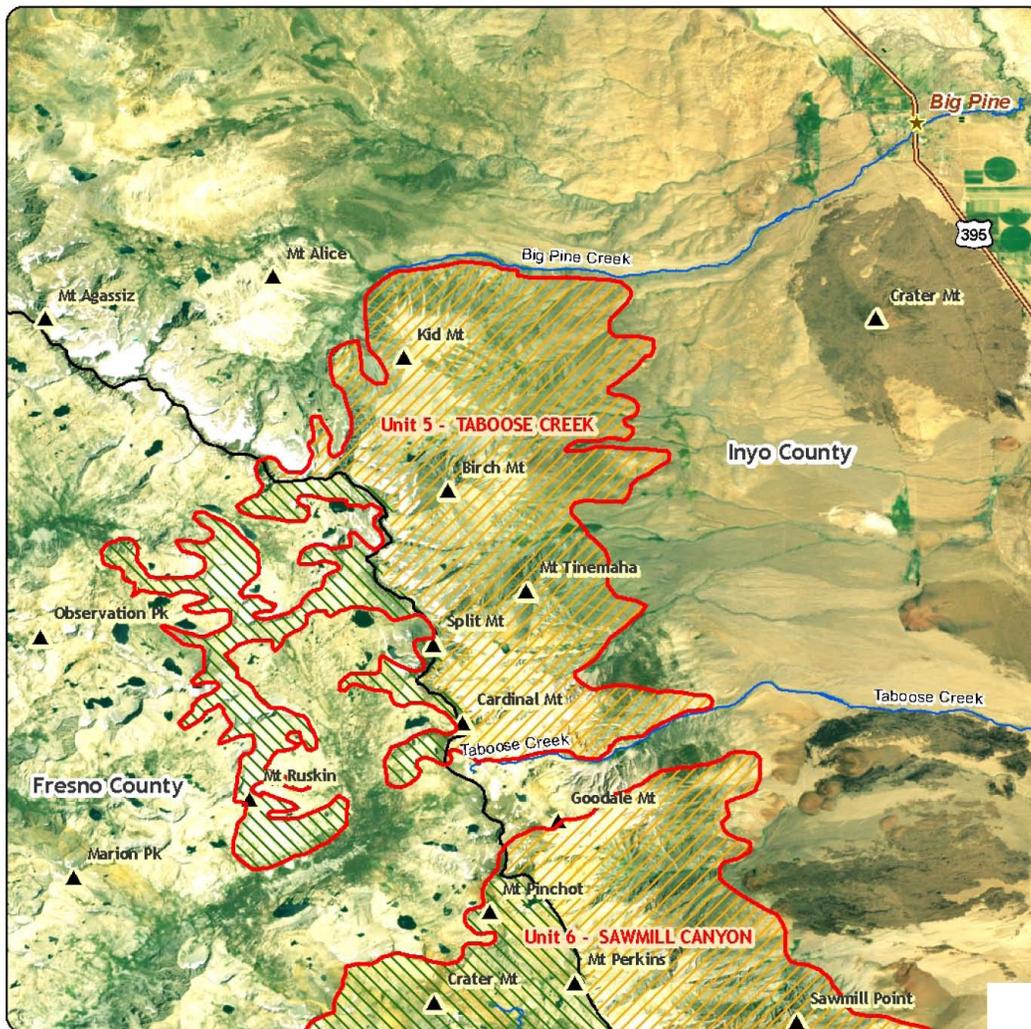


UNIT NUM	UNIT NAME	LANDOWNERS / LANOMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
4	Wheeler Ridge	Inyo National Forest Sierra National Forest Kings Canyon National Park Bureau of land Management Private	80,568	398	80,966	

Soll"ce:
 1. US Fish and Wildlife Service, Ventura, Caifornia, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



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Proposed Critical Habitat for Sierra Nevada Bighorn Sheep

Unit 5: Taboose Creek

- ▲ Mountain Peak
- ⚒ Mine
- ★ Town
- Stream / River
- = State Highway
- ▭ Proposed Critical Habitat
- - - County Boundary
- Land Owners
- ▨ Inyo National Forest
- ▩ Kings Canyon National Park



UNIT NUM	UNIT NAME	LANDOWNERS / LANOMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
5	Taboose Creek	Inyo National Forest Kings Canyon National Park	28,805			28,805

Source:
 1. US Fish and Wildlife service, ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRJ), Redlands, California, USA

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Proposed Critical Habitat for Sierra Nevada Bighorn Sheep

Unit 6: Sawmill Canyon

- ▲ Mountain Peak
- ⛏ Mine
- ★ Town
- Stream / River
- State Highway
- - - County Boundary
- ▭ Proposed Critical Habitat
- Land Owners**
- ▨ Inyo National Forest
- ▩ Kings Canyon National Park



UNIT NUM	UNIT NAME	LANDOWNERS / LANDMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
6	Sawmill Canyon	Inyo National Forest Kings Canyon National Park	30,508			30,508

Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



INDUSTRIAL ECONOMICS. INCORPORATED



Proposed Critical Habitat for Sierra Nevada Bighorn Sheep

Unit 7: Mount Baxter

- ▲ Mountain Peak
- ⚒ Mine
- ★ Town
- ▬▬▬ Pacific Crest Trail
- Stream / River
- = State Highway
- ▭ Proposed Critical Habitat
- County Boundary
- Land Owners
- ▨ Inyo National Forest
- ▨ Kings Canyon National Park
- Private

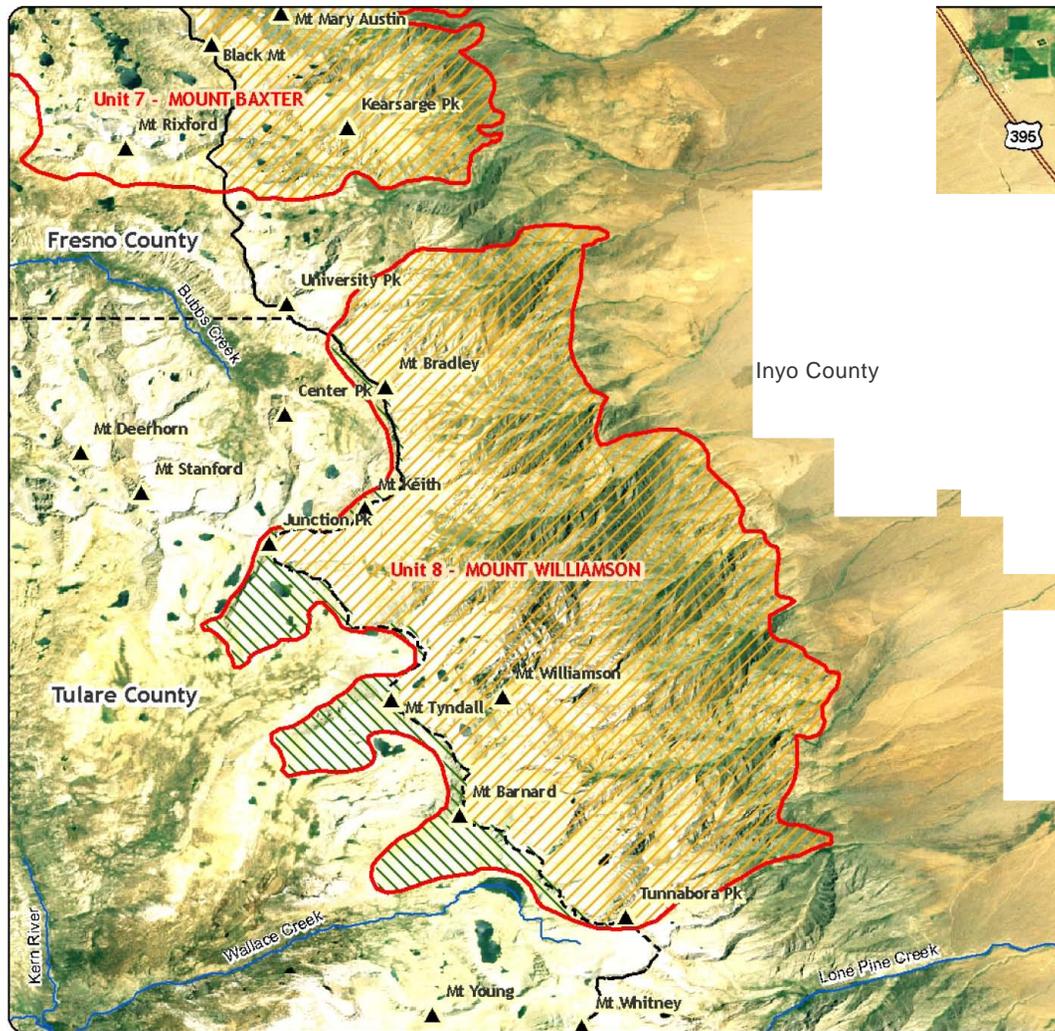


UNIT NUM	UNIT NAME	LANDOWNERS / LANDMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
7	Mount Baxter	Inyo National Forest Kings Canyon National Park Private	32,198		22	32,220

Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. US Department of Agriculture, Forest Service
 3. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



INDUSTRIAL ECONOMICS . INCORPORATED



Proposed Critical Habitat for Sierra Nevada Bighorn Sheep

Unit 8: Mount Williamson

- ▲ Mountain Peak
- ⊗ Mine
- * Town
- Stream / River
- = State Highway
- - - County Boundary
- ▭ Proposed Critical Habitat
- Land Owners
- ▨ Inyo National Forest
- ▩ Sequoia National Park

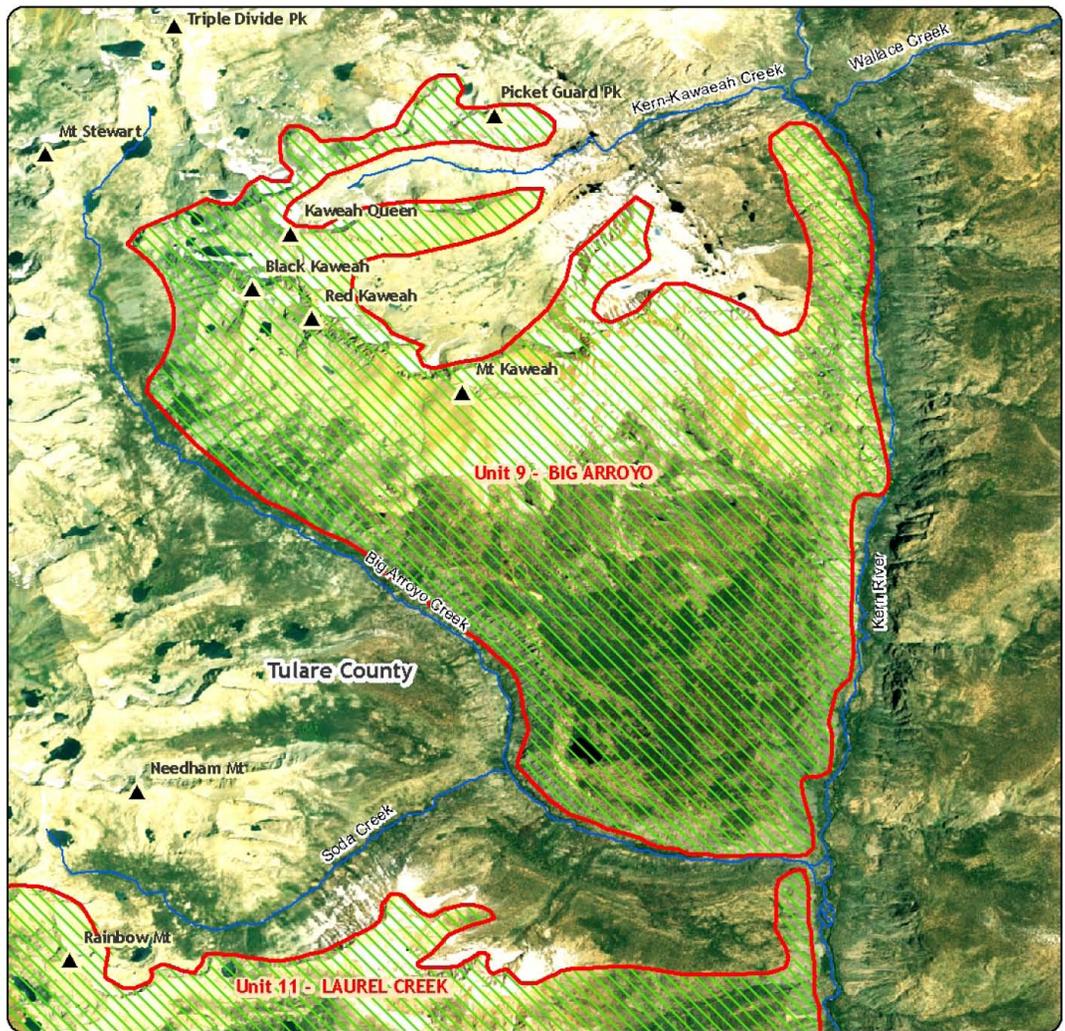


UNIT NUM	UNIT NAME	LANDOWNERS / LANDMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
	Mount Williamson	Inyo National Forest Sequoia National Park	32,560			32,560

Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



INDUSTRIAL ECONOMICS . INCORPORATED



Proposed Critical Habitat for Sierra Nevada Bighorn Sheep

Unit 9: Big Arroyo

- ▲ Mountain Peak
- ⊗ Mine
- * Town
- Stream / River
- = State Highway
- ▭ Proposed Critical Habitat
- ▭ County Boundary
- Land Owners
- ▨ Sequoia National Park



UNIT NUM	UNIT NAME	LANDOWNERS / LANOMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
9	Big Arroyo	Sequoia National Park	24,987			24,987



Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



INDUSTRIAL ECONOMICS, INCORPORATED

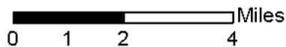


Proposed critical Habitat for
Sierra Nevada Bighorn Sheep
Unit 10; MOUNT LANGLEY

- ▲ Mountain Peak
- ⊗ Mine
- * Town
- Stream / River
- State Highway
- D-- Proposed Critical Habitat
- - - County Boundary
- Land Owners
- Inyo National Forest
- Sequoia National Park
- US Bureau of Land Management

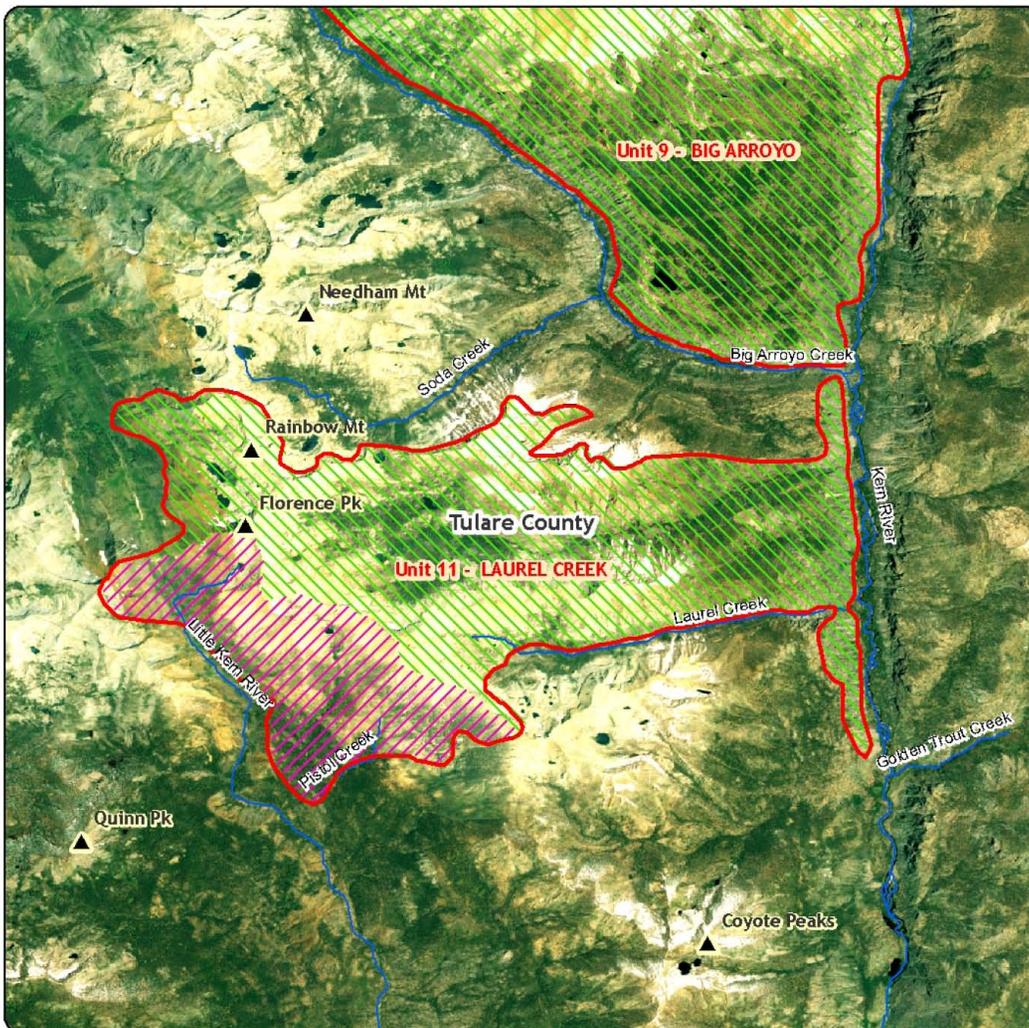


UNIT NUM	UNIT NAME	LANDOWNERS / LANDMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
10	Mount Langley	Inyo National Forest Sequoia National Park Bureau of Land Management	32,845			32,845



Source: 1. Fish and Wildlife Service, Washington, USA
2. Environmental Systems Research Institute (ESRI), Redlands, California, USA





Proposed Critical Habitat for
Sierra Nevada Bighorn Sheep

Unit 11 : Laurel Creek

- ▲ Mountain Peak
- ⊗ Mine
- * Town
- Stream / River
- == State Highway
- D Proposed Critical Habitat
- - - County Boundary
- Land Owners
- ▨ Sequoia National forest
- ▨ Sequoia National Park



UNIT NUM	UNIT NAME	LANDOWNERS / LANDMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
11	laurel Creek	Sequoia National Forest Sequoia National Park	22,037			22,037

Source:
1. US Fish and Wildlife Service, Ventura, California, USA
2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



INDUSTRIAL ECONOMICS, INCORPORATED



Proposed Critical Habitat for
Sierra Nevada Bighorn Sheep
Unit 12: Olancha Peak

- ▲ Mountain Peak
- ⛏ Mine
- ★ Town
- Stream / River
- = State Highway
- Lake
- ▭ Proposed Critical Habitat
- ⋮ County Boundary
- land Owners**
- ▨ Inyo National Forest
- ▩ US Bureau of Land Management



UNIT NUM	UNIT NAME	LANDOWNERS / LANDMANAGERS	LANDOWNERS (ACRES)			
			FEDERAL	LOCAL	PRIVATE	TOTAL
12	Olancha Peak	Inyo National Forest Bureau of Land Management	30,421			30,421

Source:
 1. US Fish and Wildlife Service, Ventura, California, USA
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



**APPENDIX C
DETAILED UNIT BY UNIT IMPACTS**

APPENDIX C | PAST COSTS

EXHIBIT C-1 SUMMARY OF PRE-DESIGNATION IMPACTS (2000-2007): UNDISCOUNTED

UNIT	GRAZING	HABITAT MANAGEMENT	RECREATION	TOTAL
1 Mount Warren	\$4,450,000	\$787,000	\$5,000	\$5,250,000
2 Mount Gibbs	\$1,030,000	\$787,000	\$6,500	\$1,820,000
3 Convict Creek	\$0	\$0	\$0	\$0
4 Wheeler Ridge	\$120,000	\$852,000	\$24,100	\$996,000
5 Taboose Creek	\$0	\$0	\$0	\$0
6 Sawmill Canyon	\$0	\$787,000	\$4,630	\$792,000
7 Mount Baxter	\$0	\$787,000	\$4,630	\$792,000
8 Mount Williamson	\$0	\$787,000	\$4,630	\$792,000
9 Big Arroyo	\$0	\$0	\$0	\$0
10 Mount Langley	\$0	\$787,000	\$0	\$787,000
11 Laurel Creek	\$0	\$0	\$0	\$0
12 Olancha Peak	\$0	\$0	\$0	\$0
Total	\$5,600,000	\$5,570,000	\$49,500	\$11,200,000

EXHIBIT C-2 SUMMARY OF PRE-DESIGNATION IMPACTS (2000-2007): DISCOUNTED AT 3 PERCENT

UNIT	GRAZING	HABITAT MANAGEMENT	RECREATION	TOTAL
1 Mount Warren	\$5,090,000	\$901,000	\$5,940	\$6,000,000
2 Mount Gibbs	\$1,150,000	\$901,000	\$7,780	\$2,060,000
3 Convict Creek	\$0	\$0	\$0	\$0
4 Wheeler Ridge	\$134,000	\$974,000	\$28,800	\$1,140,000
5 Taboose Creek	\$0	\$0	\$0	\$0
6 Sawmill Canyon	\$0	\$901,000	\$5,480	\$907,000
7 Mount Baxter	\$0	\$901,000	\$5,480	\$907,000
8 Mount Williamson	\$0	\$901,000	\$5,480	\$907,000
9 Big Arroyo	\$0	\$0	\$0	\$0
10 Mount Langley	\$0	\$901,000	\$0	\$901,000
11 Laurel Creek	\$0	\$0	\$0	\$0
12 Olancha Peak	\$0	\$0	\$0	\$0
Total	\$6,370,000	\$6,380,000	\$58,900	\$12,800,000

**EXHIBIT C-3 SUMMARY OF PRE-DESIGNATION IMPACTS (2000-2007):
DISCOUNTED AT 7 PERCENT**

UNIT	GRAZING	HABITAT MANAGEMENT	RECREATION	TOTAL
1 Mount Warren	\$6,090,000	\$1,080,000	\$7,450	\$7,180,000
2 Mount Gibbs	\$1,320,000	\$1,080,000	\$9,860	\$2,410,000
3 Convict Creek	\$0	\$0	\$0	\$0
4 Wheeler Ridge	\$156,000	\$1,170,000	\$34,100	\$1,360,000
5 Taboose Creek	\$0	\$0	\$0	\$0
6 Sawmill Canyon	\$0	\$1,080,000	\$6,850	\$1,090,000
7 Mount Baxter	\$0	\$1,080,000	\$6,850	\$1,090,000
8 Mount Williamson	\$0	\$1,080,000	\$4,810	\$1,090,000
9 Big Arroyo	\$0	\$0	\$0	\$0
10 Mount Langley	\$0	\$1,080,000	\$0	\$1,080,000
11 Laurel Creek	\$0	\$0	\$0	\$0
12 Olancha Peak	\$0	\$0	\$0	\$0
Total	\$7,570,000	\$7,650,000	\$69,900	\$15,300,000

APPENDIX C | POST DESIGNATION BASELINE COSTS

EXHIBIT C-4 SUMMARY OF POST DESIGNATION BASELINE IMPACTS (2008-2027):
UNDISCOUNTED

UNIT	GRAZING	HABITAT MANAGEMENT ¹	RECREATION	TOTAL
1 Mount Warren	\$9,680,000	\$1,460,000	\$76,100	\$11,200,000
2 Mount Gibbs	\$2,570,000	\$1,460,000	\$7,130	\$4,030,000
3 Convict Creek	\$0	\$342,000	\$0	\$342,000
4 Wheeler Ridge	\$289,000	\$1,730,000	\$0	\$2,020,000
5 Taboose Creek	\$0	\$584,000	\$1,190	\$585,000
6 Sawmill Canyon	\$0	\$1,460,000	\$1,190	\$1,460,000
7 Mount Baxter	\$0	\$1,460,000	\$1,190	\$1,460,000
8 Mount Williamson	\$0	\$1,460,000	\$1,190	\$1,460,000
9 Big Arroyo	\$0	\$813,000	\$0	\$813,000
10 Mount Langley	\$0	\$1,460,000	\$1,190	\$1,460,000
11 Laurel Creek	\$0	\$1,100,000	\$0	\$1,100,000
12 Olancha Peak	\$0	\$1,460,000	\$1,190	\$1,460,000
Total	\$12,500,000	\$14,800,000	\$90,400	\$27,400,000

¹ Includes \$267,000 for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

EXHIBIT C-5 SUMMARY OF POST DESIGNATION BASELINE IMPACTS (2008-2027):
DISCOUNTED AT 3 PERCENT

UNIT	GRAZING	HABITAT MANAGEMENT ¹	RECREATION	TOTAL
1 Mount Warren	\$7,420,000	\$1,140,000	\$66,000	\$8,620,000
2 Mount Gibbs	\$1,970,000	\$1,140,000	\$4,630	\$3,110,000
3 Convict Creek	\$0	\$223,000	\$0	\$223,000
4 Wheeler Ridge	\$221,000	\$1,360,000	\$0	\$1,580,000
5 Taboose Creek	\$0	\$385,000	\$1,150	\$386,000
6 Sawmill Canyon	\$0	\$1,140,000	\$1,150	\$1,140,000
7 Mount Baxter	\$0	\$1,140,000	\$1,150	\$1,140,000
8 Mount Williamson	\$0	\$1,140,000	\$1,150	\$1,140,000
9 Big Arroyo	\$0	\$559,000	\$0	\$559,000
10 Mount Langley	\$0	\$1,140,000	\$1,150	\$1,140,000
11 Laurel Creek	\$0	\$806,000	\$0	\$806,000
12 Olancha Peak	\$0	\$1,140,000	\$1,150	\$1,140,000
Total	\$9,600,000	\$11,300,000	\$77,600	\$21,000,000

¹ Includes \$217,000 for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

**EXHIBIT C-6 SUMMARY OF POST DESIGNATION BASELINE IMPACTS (2008-2027):
DISCOUNTED AT 7 PERCENT**

UNIT	GRAZING	HABITAT MANAGEMENT ¹	RECREATION	TOTAL
1 Mount Warren	\$5,490,000	\$863,000	\$55,800	\$6,410,000
2 Mount Gibbs	\$1,450,000	\$863,000	\$2,730	\$2,320,000
3 Convict Creek	\$0	\$134,000	\$0	\$134,000
4 Wheeler Ridge	\$164,000	\$1,040,000	\$0	\$1,200,000
5 Taboose Creek	\$0	\$231,000	\$1,110	\$232,000
6 Sawmill Canyon	\$0	\$863,000	\$1,110	\$864,000
7 Mount Baxter	\$0	\$863,000	\$1,110	\$864,000
8 Mount Williamson	\$0	\$863,000	\$1,110	\$864,000
9 Big Arroyo	\$0	\$353,000	\$0	\$353,000
10 Mount Langley	\$0	\$863,000	\$1,110	\$864,000
11 Laurel Creek	\$0	\$553,000	\$0	\$553,000
12 Olancha Peak	\$0	\$863,000	\$1,110	\$864,000
Total	\$7,100,000	\$8,350,000	\$65,100	\$15,500,000

¹ Includes \$174,000 for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

APPENDIX C | POST DESIGNATION INCREMENTAL COSTS

EXHIBIT C-7 SUMMARY OF POST DESIGNATION INCREMENTAL IMPACTS (2008-2027): UNDISCOUNTED

UNIT	GRAZING	HABITAT MANAGEMENT ¹	RECREATION	TOTAL
1 Mount Warren	\$97,600	\$725	\$25,400	\$124,000
2 Mount Gibbs	\$0	\$725	\$2,380	\$3,110
3 Convict Creek	\$0	\$725	\$0	\$725
4 Wheeler Ridge	\$0	\$15,400	\$0	\$15,400
5 Taboose Creek	\$0	\$725	\$397	\$1,120
6 Sawmill Canyon	\$0	\$725	\$397	\$1,120
7 Mount Baxter	\$0	\$725	\$397	\$1,120
8 Mount Williamson	\$0	\$725	\$397	\$1,120
9 Big Arroyo	\$0	\$0	\$0	\$0
10 Mount Langley	\$0	\$725	\$0	\$725
11 Laurel Creek	\$0	\$0	\$0	\$0
12 Olancha Peak	\$0	\$725	\$397	\$1,120
Total	\$97,600	\$21,900	\$29,800	\$149,000

¹ Includes \$14,600 for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

EXHIBIT C-8 SUMMARY OF POST DESIGNATION INCREMENTAL IMPACTS (2008-2027): DISCOUNTED AT 3 PERCENT

UNIT	GRAZING	HABITAT MANAGEMENT	RECREATION	TOTAL
1 Mount Warren	\$74,800	\$523	\$22,100	\$97,400
2 Mount Gibbs	\$0	\$523	\$1,540	\$2,070
3 Convict Creek	\$0	\$523	\$0	\$523
4 Wheeler Ridge	\$0	\$15,200	\$0	\$15,200
5 Taboose Creek	\$0	\$523	\$385	\$908
6 Sawmill Canyon	\$0	\$523	\$385	\$908
7 Mount Baxter	\$0	\$523	\$385	\$908
8 Mount Williamson	\$0	\$523	\$385	\$908
9 Big Arroyo	\$0	\$0	\$0	\$0
10 Mount Langley	\$0	\$523	\$0	\$523
11 Laurel Creek	\$0	\$0	\$0	\$0
12 Olancha Peak	\$0	\$523	\$385	\$908
Total	\$74,800	\$19,900	\$25,500	\$120,000

¹ Includes \$14,600 for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

EXHIBIT C-9 SUMMARY OF POST DESIGNATION INCREMENTAL IMPACTS (2008-2027): DISCOUNTED AT 7 PERCENT

UNIT	GRAZING	HABITAT MANAGEMENT	RECREATION	TOTAL
1 Mount Warren	\$55,300	\$357	\$18,600	\$74,300
2 Mount Gibbs	\$0	\$357	\$912	\$1,270
3 Convict Creek	\$0	\$357	\$0	\$357
4 Wheeler Ridge	\$0	\$15,000	\$0	\$15,000
5 Taboose Creek	\$0	\$357	\$371	\$728
6 Sawmill Canyon	\$0	\$357	\$371	\$728
7 Mount Baxter	\$0	\$357	\$371	\$728
8 Mount Williamson	\$0	\$357	\$371	\$728
9 Big Arroyo	\$0	\$0	\$0	\$0
10 Mount Langley	\$0	\$357	\$0	\$357
11 Laurel Creek	\$0	\$0	\$0	\$0
12 Olancha Peak	\$0	\$357	\$371	\$728
Total	\$55,300	\$18,200	\$21,400	\$94,900

¹ Includes \$14,600 for impacts due to mining related conservation efforts in Wheeler Ridge (Unit 4).

APPENDIX D | DETAILED CALCULATIONS FOR GRAZING IMPACTS**D1. SUMMARY**

1. This appendix is provided to increase the clarity and transparency of the estimation process. Many of the calculations involved in the estimation required several steps, which are not presented in the grazing chapter (Chapter 2). These calculations are explained in detail here. Sources for each estimate are also presented here in detail.

D2. MANAGEMENT AND ADMINISTRATION IMPACTS TO GRAZING

2. This section provides greater detail regarding the derivation of the Management and Administration impacts described in Section 2.1.3 and listed in Exhibit 2-1. Extensive information about management and administration costs were provided by FIM Corporation, a Nevada sheep ranch that utilizes many of the allotments near the Mount Warren unit (Unit 1). These impacts were reviewed for plausibility and logical consistency. The costs that are included in this analysis are those for which supporting arguments and calculations could be made. Some claimed costs were not included because these were not justified in the documentation provided.
3. Exhibit 2-1 in Chapter 2 provides summarized details about the costs paid by sheep grazers near proposed critical habitat units 1, 2, and 4. Section 2.1.2 provides details on the types of sheep grazing operations, and why costs are higher for ewes and lambs operations. The costs paid by FIM Corporation were assumed to be paid proportionally by Ted Borda, another sheep rancher using the same production methods in the same location. Ted Borda's sheep management costs, however, ended in 2004 when he stopped using grazing allotments altogether. The following sections provide details for each row in Exhibit 2-1 and reference the source materials from FIM Corporation.

EXHIBIT D-1 ESTIMATION METHOD FOR CONSERVATION COMPLIANCE IMPACTS

ACTIVITY	ESTIMATION METHOD	ANNUAL IMPACT (2007\$)
Administrative Costs of complying with bighorn sheep regulations	Administrative costs of FIM staff to comply with bighorn sheep related regulations estimated to be \$104,000 per year. This is based on an estimate of five hours per day spent on bighorn sheep related issues, at \$80 per hour, (52 weeks X 5 hours per day X 5 days per week X \$80 per hour = \$104,000). This is somewhat less than the annual amount of \$134,400 claimed by FIM Corporation. FIM document, page 8 response to question #5	\$104,000
Vaccination/health inspection costs	Estimate of staff travel and time away from the ranch to meet with public officials: \$200,000 for seven years. $200,000 / 7 = \$28,600$ per year. FIM document, page 8 response to question #5	\$28,600.
Additional count costs	These costs include: vaccine (\$1,500 per year), labor (\$1,600 per year), and corrals and preparation (\$800), FIM document, page 11, response to question #8.	\$3,900
Salary of additional camp-tender requirements for extra herding dogs	Required counting of the sheep as they are put on and are taken off the allotment. \$1,500 twice per year. FIM document, page 12, in response to question #12.	\$3,000
Decreases in lamb weights due to extra counting and herding	The salary of an extra camp-tender is \$3,000 per month and an extra guard dog costs \$300 per month. The grazing season is 3 months. FIM document, page 8, in response to question #6.	\$9,900
Yearly legal costs	Average weight loss of 10 to 12 pounds per lamb, resulting in a \$10 loss per lamb per year. This loss results in \$50,000 of lost potential revenues through 2006. FIM document, page 12, in response to question #12.	\$50,000
Biological research staff	Average weight loss of 10 to 12 pounds per lamb, resulting in a \$10 loss per lamb per year. This loss results in \$3,500 of lost potential revenues after 2006 because Tamarack and Cameron Canyon restrictions reduce the number of sheep on allotments. Since there are fewer sheep grazing, fewer are subject to stress-induced weight loss. Since the reduction in AUMs is 53%, a 53% reduction is applied to the weight loss costs. $0.47 \times \$50,000 = \$23,500$. Weight loss calculation is from FIM document, page 6. Grazing restriction information is from FIM document, page 12.	\$23,500
One time biology study	Yearly expenditures on consultant and attorney fees range between \$25,000 and \$40,000. FIM document, page 8, in response to question #5. The mid-point of this range (\$32,500) is used as the annual impact estimate.	\$32,500
	The professional services of several scientists constitute a yearly cost of \$96,000 = three weeks of work (480 hours) at \$200 per hour. FIM document, page 8, in response to question #5.	\$96,000
	Cost to sponsor 2007 scientific roundtable discussion on disease transmission between bighorn and domestic sheep. \$6,650. FIM document, page 11, in response to question #5.	\$6,650.

Sources: Written communication from FIM Corporation, September 21, 2007.

FIM INFORMATION NOT INCLUDED IN THE ANALYSIS

- Some information on a few activities provided by FIM Corporation was not included in the analysis because the economic analysis in Chapter 2 measured the impacts of those activities. Costs that were provided with insufficient information were not included in the analysis. The first column of Exhibit D-2 presents the information that was either

redundant to the valuation in Chapter 2 or was un-useable as presented. The second column of Exhibit D-2 provides an explanation why the information was not included.

EXHIBIT D-2 FIM INFORMATION NOT INCLUDED IN THE ANALYSIS

PROVIDED INFORMATION

REASON INFORMATION NOT USED

Page 1, 2nd paragraph of Introduction.
Provides several asserted equivalencies between sheep and cattle AUMs and sheep vs. cattle productivity.

Page 3, 7 point list.
Provides information on importance of sheep to local economy.

Page 5, 4th paragraph.
FIM asserts that they own water rights in the allotments, and should be compensated for the loss of the use of this water. Insufficient details about the nature or ownership are given.

Page 6, 1st full paragraph.
Discusses payments made to the Forest Service for the allotment and provides unexplained annual costs of more than \$20 per AUM for grazing permits.

Page 8, paragraph 3.
Claims that due to reductions in range permits, FIM has had to spend \$30,000 to lease new pastures and buy additional permits for \$300,000.

Page 9, point #7
States that a 25 percent reduction in permits results in thousands of dollars in lost productivity.

Section 2.1.4 provides the industry standard AUM equivalency: 1 AUM = forage for one cow and one calf = forage for five sheep for one month. The section discusses how the resource value is the appropriate measure of reduced value, not the estimated productivity.

The IMPLAN analysis in Section 2.5 assesses the effects of grazing restrictions on the overall economies in Inyo and Mono Counties. IMPLAN is economic software that estimates the linkages between changes in values in different industries and the effects on the local economy as a whole.

There is sufficient ambiguity concerning claims of lost water rights to make estimation of value changes infeasible. Valuation will largely depend upon ownership of the water rights, which would determine if there is an economic impact to the rancher. This is discussed in Section 2.6.

As discussed in Section 2.1.4, the market price of grazing AUMs is the true resource value, not the amount paid by FIM (federal grazing fees are generally below market rates). Inclusion of this information would be double-counting. No information is provided to explain how grazing costs are more than \$20 per AUM.

Chapter 2 estimates the value of the resource loss due to the grazing restrictions. This is the value of the next best substitute, which is private grazing AUMs. Inclusion of this information would be double-counting.

As explained in Section 2.1.4, the resource value is the private market value. Lost productivity may be compensated for by purchasing private forage at the market rate.

D3. OPPORTUNITY COSTS OF GRAZING RESTRICTIONS

5. This section explains the sources and/or calculations used to estimate the number of AUMs per grazing allotment, and then the number of AUM reductions per allotment. The calculation of the value of grazing opportunities foregone due to grazing restrictions is then discussed.

D3.1 ESTIMATING THE NUMBER OF AUMS REDUCED

6. Where possible, the number of AUMs per allotment is taken from sources identified through written documentation or interviews. As discussed in Section 2.1.4, wherever AUM data per allotment were available, the most recent source of data was used.
7. In cases where AUM values were not given, AUMs were estimated as:

$$\text{Number of Permitted Sheep} \times \text{Number of Months of Permit} \times 1/5 = \text{Number of AUMs}$$

8. The number of permitted sheep multiplied by the grazing season provides the number of sheep-months. Since an AUM is the forage necessary to feed five sheep for one month, the number of sheep-months is divided by five to produce the number of AUMs.
9. The number of AUMs foregone per unit per year is determined by the stipulations of the allotment. The Dunderberg, Jordan Basin, Cameron Canyon, and Tamarack allotments had three month grazing seasons three out of four years, and two week grazing seasons every fourth year.¹⁰⁰ During the two-week grazing period every four years in the Cameron Canyon and Tamarack allotments, there is no grazing restriction, and so no lost value. This zero value of forage value foregone can be seen in Tamarack and Cameron Canyon as zero values for 2009, 2013, 2017, 2021, and 2025. For the Dunderberg and Jordan Basin allotments, there were restrictions that made fewer AUMs available every fourth year, and, as a result less grazing resource value lost in those years.
10. Exhibit D-3 provides details on the undiscounted value of the AUMs foregone for each allotment for the pre-designation period. The Jordan Basin column shows the cyclical nature of the length of the grazing season, as described above. Exhibit D-4 provides details on the undiscounted values of the foregone AUMs for the post-designation period.
11. These foregone values are included in Exhibits 2-4 and 2-5, undiscounted and discounted.¹⁰¹ These values are then added to the costs shown in Exhibit D-1, estimated consultation costs, and other estimated costs described in Chapter 2 to produce the estimate of total impacts.

¹⁰⁰ Written communication from Amy Baumer, Humboldt-Toiyae National Forest, September 11, 2007.

¹⁰¹ This analysis presents undiscounted totals as well as totals discounted at three and seven percent, as suggested by the US Office of Management and Budget, Circular A-4.

EXHIBIT D-3 PRE-DESIGNATION GRAZING VALUES FOREGONE (UNDISCOUNTED)

YEAR	UNIT 1: MOUNT WARREN						UNIT 2: MOUNT GIBBS				UNIT 3: WHEELER RIDGE	ALL UNITS
	DUNDERBERG	DUNDERBERG (JORDAN BASIN)	SUMMERS MEADOW	HALF OF LA DWP ALLOTMENT	TAMARACK REDUCTION	CAMERON CANYON REDUCTION	BLOODY CANYON	JUNE LAKE (W OF HIGHWAY 395)	ALGER LAKE	HALF OF LA DWP ALLOTMENT	ROCK CREEK (VOLUNTARY CLOSURE)	TOTAL
2000		\$2,930		\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$251,000
2001		\$2,930		\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$251,000
2002		\$2,930		\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$251,000
2003		\$528		\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$248,000
2004		\$2,930		\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$251,000
2005		\$2,930	\$3,860	\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$255,000
2006	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2007	\$11,000	\$528	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$271,000
Total	\$22,000	\$18,636	\$11,580	\$840,000	\$7,680	\$7,680	\$59,400	\$88,800	\$39,600	\$840,000	\$115,000	\$2,050,000

Note: totals may not sum due to rounding.

EXHIBIT D-4 POST-DESIGNATION GRAZING VALUES FOREGONE (UNDISCOUNTED)

YEAR	UNIT 1: MOUNT WARREN						UNIT 2: MOUNT GIBBS				UNIT 3: WHEELER RIDGE	ALL UNITS
	DUNDERBERG	DUNDERBERG (JORDAN BASIN)	SUMMERS MEADOW	HALF OF LA DWP ALLOTMENT	TAMARACK REDUCTION	CAMERON CANYON REDUCTION	BLOODY CANYON	JUNE LAKE (W OF HIGHWAY 395)	ALGER LAKE	HALF OF LA DWP ALLOTMENT	ROCK CREEK (VOLUNTARY CLOSURE)	TOTAL
2008	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2009	\$1,980	\$2,930	\$3,860	\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$257,000
2010	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2011	\$11,000	\$528	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$271,000
2012	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2013	\$1,980	\$2,930	\$3,860	\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$257,000
2014	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2015	\$11,000	\$528	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$271,000
2016	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2017	\$1,980	\$2,930	\$3,860	\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$257,000
2018	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2019	\$11,000	\$528	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$271,000
2020	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2021	\$1,980	\$2,930	\$3,860	\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$257,000
2022	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2023	\$11,000	\$528	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$271,000
2024	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2025	\$1,980	\$2,930	\$3,860	\$105,000			\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$257,000
2026	\$11,000	\$2,930	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$273,000
2027	\$11,000	\$528	\$3,860	\$105,000	\$3,840	\$3,840	\$7,430	\$11,100	\$4,950	\$105,000	\$14,400	\$271,000
Total	\$175,000	\$46,600	\$77,200	\$2,100,000	\$57,600	\$57,600	\$149,000	\$222,000	\$99,000	\$2,100,000	\$288,000	\$5,370,000

Note: totals may not sum due to rounding.