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ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THE MOUNTAIN YELLOW-LEGGED FROG

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prepared for:

Division of Economics

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION

1. The purpose of this report is to identify and analyze the potential economic impacts associated with the proposed critical habitat designation for the *Rana muscosa* (mountain yellow-legged frog, referred to as the "frog"). This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service's (Service) Division of Economics.

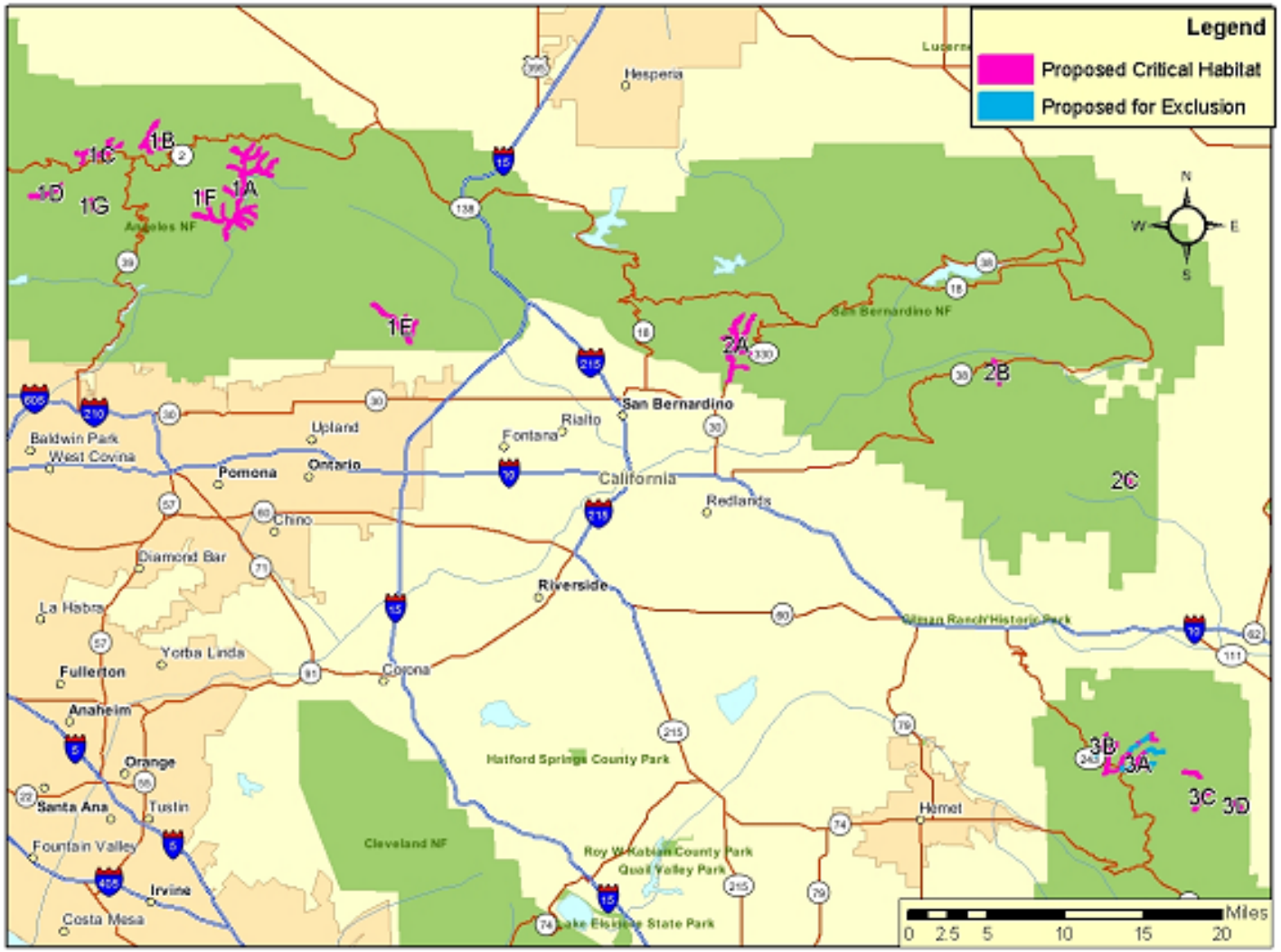
2. On July 2, 2002, the Service published the final rule listing the frog as endangered. On September 13, 2005, the Service published the proposed critical habitat designation ("proposed rule") addressed in this report.[1]

3. In the proposed rule, the Service determines that 8,770 acres of essential frog habitat exist in Los Angeles, San Bernardino, and Riverside Counties in California and proposes to designate approximately 8,283 acres across three units (divided into 14 subunits) in these counties. In addition, the Service proposes to exclude approximately 487 acres from critical habitat designation (CHD) in areas currently covered by approved habitat conservation plans or falling within existing Public/Quasi Public (PQP) lands[2] Of the total critical habitat acres proposed for designation, 96 percent are Federal lands, three percent are State lands, and the remaining one percent are private lands. Exhibit ES-1 shows the location of each subunit of essential habitat.

[1] 70 FR 54106

[2] Ibid.

EXHIBIT #ES-1 MAP OF ESSENTIAL FROG HABITAT



4. Exhibit ES-2 summarizes key findings of the economic analysis. Total future impacts are presented by subunit in Exhibit ES-3. Exhibits ES-4 and ES-5 show the distribution of impacts by affected activity. For a summary of past costs by subunit, see Appendix B.

EXHIBIT #ES-2

KEY FINDINGS

Total future impacts: Frog conservation activities are likely to primarily impact recreation, including trout fishing, hiking, camping, and rock climbing in Angeles and San Bernardino National Forests. In particular, significant uncertainty exists regarding the potential impact to trout fishing. As a result, the analysis applies two methodologies to bound the range of potential costs. The lower-bound estimate assumes that anglers' overall welfare is unaffected, because numerous substitute fishing sites exist. The upper-bound estimate assumes that fishing trips currently taken to streams in essential habitat are foregone and not substituted elsewhere. The actual impact likely falls between these two bounds. Assuming the probability distribution of impacts between these bounds is continuous and the distribution is not skewed toward either bound, the average of the two estimates represents the best estimate of trout fishing impacts.

Total future impacts, including costs resulting from modifications to fishing and other types of activity, range from $11.4 million to $12.9 million (undiscounted) over twenty years. Discounted future costs are estimated to be $7.5 million to $8.9 million over this same time period ($704,000 to $842,000 on an annualized basis) using a real rate of seven percent, or $9.3 million to $10.8 million ($626,000 to $725,000 on an annualized basis) using a real rate of three percent. In summary:

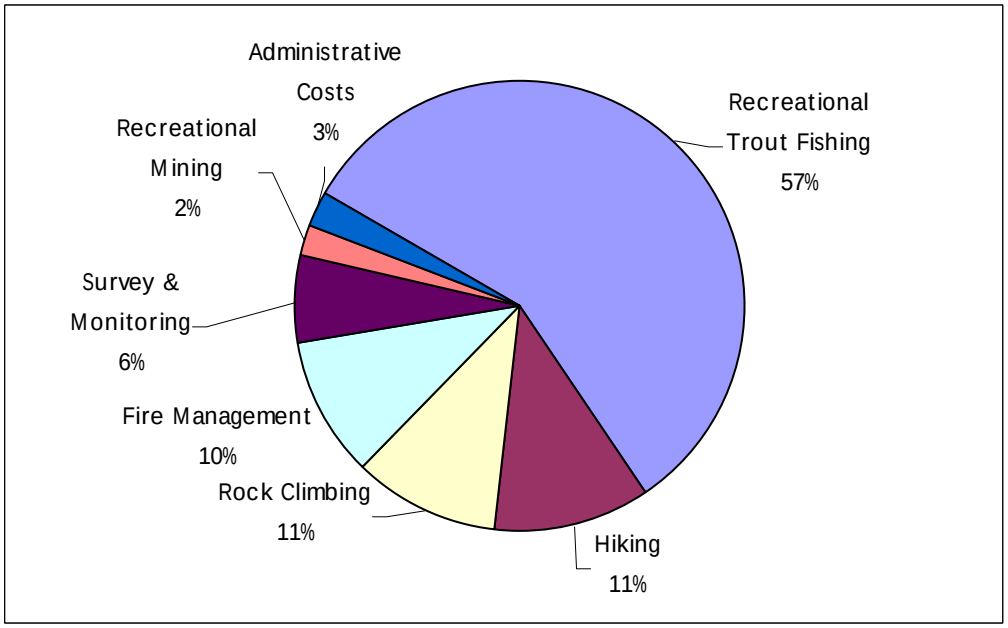
- Impacts are dominated by welfare losses and other costs related to recreational fishing, accounting for over 50 percent of the total impact. Lost fishing opportunities occur in Big Rock Creek, South Fork (Subunit 1B), Little Rock Creek (Subunit 1C), and San Jacinto River, North Fork (Subunit 3A).
- The costs of modifications to fire management practices, costs of modifying hiking trails, and welfare losses to rock climbers resulting from a temporary closure of Williamson Rock in the area of Little Rock Creek (Subunit 1C) account for approximately 30 to 40 percent of the total impact.

Units most impacted: Over 80 percent of the costs are associated with the three subunits: Big Rock Creek, South Fork (Subunit 1B), San Jacinto River, North Fork (Subunit 3A), and Little Rock Creek (Subunit 1C).

EXHIBIT #ES-3 FUTURE IMPACTS (2006 - 2025) TO ALL ACTIVITIES BY SUBUNIT ($1000's)

UNIT	SUBUNIT	UNDISCOUNTED		PRESENT VALUE, 3%		PRESENT VALUE, 7%	
		LOW	HIGH	LOW	HIGH	LOW	HIGH
PROPOSED FOR DESIGNATION							
1	A. San Gabriel River, East Fork	$706	$725	$574	$590	$459	$473
	B. Big Rock Creek, South Fork	$5,867	$5,918	$4,506	$4,551	$3,344	$3,386
	C. Little Rock Creek	$1,302	$1,964	$1,248	$1,909	$1,202	$1,861
	D. Devil's Canyon	$25	$25	$19	$19	$14	$14
	E. Day Canyon	$66	$66	$50	$50	$37	$37
	F. San Gabriel River, East Fork, Iron Fork	$37	$37	$29	$29	$22	$22
	G. Bear Creek	$10	$10	$8	$8	$6	$6
2	A. City Creek	$323	$631	$250	$555	$188	$491
	B. Barton Creek	$482	$482	$451	$451	$417	$417
	C. Whitewater River	$8	$8	$6	$6	$4	$4
3	A. San Jacinto River, North Fork	$2,427	$2,728	$1,994	$2,290	$1,613	$1,905
	B. Indian Creek	$90	$235	$82	$222	$75	$210
	C. Tahquitz Creek	$37	$37	$28	$28	$21	$21
	D. Andreas Creek	$11	$11	$9	$9	$6	$6
Multiple Units		$53	$71	$53	$71	$53	$71
	TOTAL:	$11,442	$12,947	$9,307	$10,790	$7,461	$8,924
PROPOSED FOR EXCLUSION							
3	A: San Jacinto River, North Fork	$71	$312	$67	$308	$62	$304
	B. Indian Creek	$0	$0	$0	$0	$0	$0
Note: Totals may not sum due to rounding.							

EXHIBIT #ES-4 RELATIVE IMPACT BY ACTIVITY: HIGH ESTIMATE (UNDISCOUNTED)[3]



5. Future impacts are presented on an annualized basis below in Exhibit ES-5. The annualized impacts for areas proposed for critical habitat are approximately $704,000 to $842,000, applying a seven percent discount rate. For areas proposed for exclusion, annualized impacts range from $6,000 to $29,000 using the same rate.[4] The remainder of the Executive Summary describes in greater detail the framework for this analysis, the estimation of costs by affected activity, and the areas most likely to experience impacts.

EXHIBIT #ES-5 ANNUALIZED IMPACTS OF POTENTIAL CRITICAL HABITAT

CATEGORY	ANNUALIZED, 3%		ANNUALIZED, 7%	
	LOW	HIGH	LOW	HIGH
Units Proposed for Designation	$626,000	$725,000	$704,000	$842,000
Units Proposed for Exclusion	$4,000	$21,000	$6,000	$29,000

FRAMEWORK FOR THE ANALYSIS AND REGULATORY ALTERNATIVES CONSIDERED

6. Section 4(b)(2) of the Endangered Species Act (Act) requires the Service to designate critical habitat on the basis of the best scientific data available, after taking into

[3] The relative magnitude of the effect on each type of activity does not change significantly for discounted impact estimates.

[4] Note that for trout fishing, the analysis is unable to allocate costs between areas proposed for designation and proposed for exclusion.

consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.[5] In addition, this analysis provides information to allow 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).[6] This report also complies with direction from the U.S. 10th Circuit Court of Appeals that, when deciding which areas to designate as critical habitat, the economic analysis informing that decision should include "co-extensive" effects.[7]

7. Executive Order 12866 directs Federal Agencies to evaluate regulatory alternatives. The Service identifies 16 subunits or areas of essential habitat, and proposes 14 subunits (grouped into three units) for designation as critical habitat. An alternative to the proposed rule is the designation of all 16 subunits and areas, and the potential impacts of all are estimated in this report. In addition, as discussed in the previous paragraph, section 4(b)(2) of the Act allows the Service to exclude additional areas proposed for designation based on economic impact and other relevant impact. Consideration of impacts at a subunit level may result in alternate combinations of essential habitat that may or may not ultimately be designated as critical habitat. As a result, the impacts of multiple combinations of essential habitat are also available to the Service.

8. To comply with the 10th Circuit's direction to include all co-extensive effects, this analysis considers the potential economic impacts of efforts to protect the frog and its habitat (hereinafter referred to collectively as "frog conservation activities") in potential critical habitat. It does so by taking into account the cost of conservation-related measures that are likely to be associated with future economic activities that may adversely effect the habitat within the proposed boundaries. Actions undertaken to meet the requirements of other Federal, State, and local laws and policies may afford protection to the frog and its habitat, and thus contribute to the efficacy of critical habitat-related conservation and recovery efforts. Thus, the impacts of these activities are relevant for understanding the full impact of the proposed designation.

9. This analysis considers both economic efficiency and distributional effects. In the case of habitat conservation, efficiency effects generally reflect the opportunity costs associated with the commitment of resources to comply with habitat protection

[5] 16 U.S.C. §1533(b)(2).

[6] 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.

[7] In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

measures (e.g., lost economic opportunities associated with restrictions on land use). This analysis also addresses how potential economic impacts are likely to be distributed (distributional effects), including an assessment of any local or regional impacts of frog conservation efforts and the potential effects of conservation efforts on small entities and the energy industry. This information can be used by decision-makers to assess whether the effects of the designation might unduly burden a particular group or economic sector. Also, this analysis looks retrospectively at costs that have been incurred since the date the species was listed and considers those costs that may occur after the designation is finalized.

RESULTS OF THE ANALYSIS

10. A variety of activities taking place in or adjacent to essential habitat may be affected by efforts to protect the frog and its habitat. These activities include:

- Trout fishing
- Hiking;
- Rock climbing;
- Residential development;
- Fire management;
- Recreational mining;
- Surveying and monitoring efforts; and
- Administrative costs associated with section 7 consultations.[8]

11. For comparison purposes, Exhibits ES-6 to ES-8 presents costs by affected activity in undiscounted dollars, discounted at seven percent, and discounted at three percent, respectively. As shown in these exhibits, as well as in Exhibit ES-4, impacts associated with recreational trout fishing account for the largest percentage (57 percent) of future costs in the high estimate, followed by welfare losses to rock climbers (11 percent) and fire management activities (10 percent). Note that modifications to fire management practices will not be less effective, thus increasing the risk of a catastrophic fire, only more costly. Results using a discount rate of three percent or seven percent do not yield a significantly different relative distribution of costs.

[8] In addition to the activities listed here, the proposed rule suggests that water withdrawal for ski operations may also threaten the frog and its habitat. The best available data suggest that future water removals by ski resorts from streams in these units is unlikely. Therefore, no impacts to ski operations are estimated. In addition, the proposed rule identifies trampling of habitat in one subunit by cattle as a threat to the species. This subunit lies in a designated wilderness area and U.S. Forest Service (USFS) is unaware of the presence of cattle. Additional information and/or comments are invited on this potential threat, and it is anticipated that any new information received will be included in the final version of this report.

EXHIBIT # ES-6 TOTAL FUTURE IMPACTS (2006 - 2025) BY ACTIVITY, UNDISCOUNTED DOLLARS

SUBUNIT	TROUT FISHING	HIKING		CLIMBING		FIRE MANAGEMENT	SURVEYING & MONITORING	RECREATIONAL MINING	ADMIN		TOTAL	
		LOW	HIGH	LOW	HIGH				LOW	HIGH	LOW	HIGH
UNITS PROPOSED FOR DESIGNATION												
1A	$22,000	$0	$0	$0	$0	$146,000	$221,000	$300,000	$17,000	$36,000	$706,000	$725,000
1B	$5,803,000	$1,000	$31,000	$0	$0	$0	$56,000	$0	$7,000	$28,000	$5,867,000	$5,918,000
1C	$59,000	$152,000	$419,000	$1,008,000	$1,387,000	$0	$55,000	$0	$28,000	$45,000	$1,302,000	$1,964,000
1D	$0	$0	$0	$0	$0	$0	$25,000	$0	$0	$0	$25,000	$25,000
1E	$0	$0	$0	$0	$0	$0	$66,000	$0	$0	$0	$66,000	$66,000
1F	$3,000	$0	$0	$0	$0	$0	$33,000	$0	$0	$0	$37,000	$37,000
1G	$0	$0	$0	$0	$0	$0	$10,000	$0	$0	$0	$10,000	$10,000
2A	$0	$151,000	$442,000	$0	$0	$0	$144,000	$0	$28,000	$45,000	$323,000	$631,000
2B	$0	$1,000	$1,000	$0	$0	$461,000	$20,000	$0	$0	$0	$482,000	$482,000
2C	$0	$0	$0	$0	$0	$0	$8,000	$0	$0	$0	$8,000	$8,000
3A	$1,472,000	$150,000	$422,000	$0	$0	$688,000	$95,000	$0	$21,000	$50,000	$2,427,000	$2,728,000
3B	$49,000	$1,000	$117,000	$0	$0	$0	$19,000	$0	$21,000	$50,000	$90,000	$235,000
3C	$0	$0	$0	$0	$0	$0	$37,000	$0	$0	$0	$37,000	$37,000
3D	$0	$0	$0	$0	$0	$0	$11,000	$0	$0	$0	$11,000	$11,000
Multiple	$0	$0	$0	$0	$0	$0	$0	$0	$53,000	$71,000	$53,000	$71,000
Total:	$7,408,000	$456,000	$1,433,000	$1,008,000	$1,387,000	$1,295,000	$800,000	$300,000	$174,000	$324,000	$11,442,000	$12,947,000
UNITS PROPOSED FOR EXCLUSION												
3A	$0	$0	$242,000	$0	$0	$71,000	$0	$0	$0	$0	$71,000	$312,000
3B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL	$0	$0	$242,000	$0	$0	$71,000	$0	$0	$0	$0	$71,000	$312,000

EXHIBIT # ES-7 TOTAL FUTURE IMPACTS (2006 - 2025) BY ACTIVITY, ASSUMING A SEVEN PERCENT DISCOUNT RATE

SUBUNIT	TROUT FISHING	HIKING		CLIMBING		FIRE MANAGEMENT	SURVEYING & MONITORING	RECREATIONAL MINING	ADMIN		TOTAL	
		LOW	HIGH	LOW	HIGH				LOW	HIGH	LOW	HIGH
UNITS PROPOSED FOR DESIGNATION												
1A	$22,000	$0	$0	$0	$0	$128,000	$125,000	$170,000	$14,000	$27,000	$459,000	$473,000
1B	$3,307,000	$1,000	$31,000	$0	$0	$0	$32,000	$0	$4,000	$16,000	$3,344,000	$3,386,000
1C	$54,000	$87,000	$354,000	$1,008,000	$1,387,000	$0	$31,000	$0	$22,000	$35,000	$1,202,000	$1,861,000
1D	$0	$0	$0	$0	$0	$0	$14,000	$0	$0	$0	$14,000	$14,000
1E	$0	$0	$0	$0	$0	$0	$37,000	$0	$0	$0	$37,000	$37,000
1F	$3,000	$0	$0	$0	$0	$0	$19,000	$0	$0	$0	$22,000	$22,000
1G	$0	$0	$0	$0	$0	$0	$6,000	$0	$0	$0	$6,000	$6,000
2A	$0	$86,000	$377,000	$0	$0	$0	$82,000	$0	$20,000	$32,000	$188,000	$491,000
2B	$0	$1,000	$1,000	$0	$0	$404,000	$11,000	$0	$0	$0	$417,000	$417,000
2C	$0	$0	$0	$0	$0	$0	$4,000	$0	$0	$0	$4,000	$4,000
3A	$853,000	$85,000	$357,000	$0	$0	$604,000	$54,000	$0	$17,000	$37,000	$1,613,000	$1,905,000
3B	$46,000	$1,000	$117,000	$0	$0	$0	$11,000	$0	$17,000	$37,000	$75,000	$210,000
3C	$0	$0	$0	$0	$0	$0	$21,000	$0	$0	$0	$21,000	$21,000
3D	$0	$0	$0	$0	$0	$0	$6,000	$0	$0	$0	$6,000	$6,000
Multiple	$0	$0	$0	$0	$0	$0	$0	$0	$53,000	$71,000	$53,000	$71,000
Total:	$4,285,000	$261,000	$1,238,000	$1,008,000	$1,387,000	$1,136,000	$453,000	$170,000	$147,000	$255,000	$7,461,000	$8,924,000
UNITS PROPOSED FOR EXCLUSION												
3A	$0	$0	$242,000	$0	$0	$62,000	$0	$0	$0	$0	$62,000	$304,000
3B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL	$0	$0	$242,000	$0	$0	$62,000	$0	$0	$0	$0	$62,000	$304,000

EXHIBIT # ES-8 TOTAL FUTURE IMPACTS (2006 - 2025) BY ACTIVITY, ASSUMING A THREE PERCENT DISCOUNT RATE

SUBUNIT	TROUT FISHING	HIKING		CLIMBING		FIRE MANAGEMENT	SURVEYING & MONITORING	RECREATIONAL MINING	ADMIN		TOTAL	
		LOW	HIGH	LOW	HIGH				LOW	HIGH	LOW	HIGH
UNITS PROPOSED FOR DESIGNATION												
1A	$22,000	$0	$0	$0	$0	$138,000	$169,000	$230,000	$16,000	$32,000	$574,000	$590,000
1B	$4,456,000	$1,000	$31,000	$0	$0	$0	$43,000	$0	$5,000	$21,000	$4,506,000	$4,551,000
1C	$56,000	$117,000	$384,000	$1,008,000	$1,387,000	$0	$42,000	$0	$25,000	$39,000	$1,248,000	$1,909,000
1D	$0	$0	$0	$0	$0	$0	$19,000	$0	$0	$0	$19,000	$19,000
1E	$0	$0	$0	$0	$0	$0	$50,000	$0	$0	$0	$50,000	$50,000
1F	$3,000	$0	$0	$0	$0	$0	$26,000	$0	$0	$0	$29,000	$29,000
1G	$0	$0	$0	$0	$0	$0	$8,000	$0	$0	$0	$8,000	$8,000
2A	$0	$116,000	$407,000	$0	$0	$0	$110,000	$0	$24,000	$38,000	$250,000	$555,000
2B	$0	$1,000	$1,000	$0	$0	$435,000	$15,000	$0	$0	$0	$451,000	$451,000
2C	$0	$0	$0	$0	$0	$0	$6,000	$0	$0	$0	$6,000	$6,000
3A	$1,138,000	$115,000	$387,000	$0	$0	$649,000	$73,000	$0	$19,000	$43,000	$1,994,000	$2,290,000
3B	$48,000	$1,000	$117,000	$0	$0	$0	$14,000	$0	$19,000	$43,000	$82,000	$222,000
3C	$0	$0	$0	$0	$0	$0	$28,000	$0	$0	$0	$28,000	$28,000
3D	$0	$0	$0	$0	$0	$0	$9,000	$0	$0	$0	$9,000	$9,000
Multiple	$0	$0	$0	$0	$0	$0	$0	$0	$53,000	$71,000	$53,000	$71,000
Total:	$5,724,000	$351,000	$1,328,000	$1,008,000	$1,387,000	$1,222,000	$613,000	$230,000	$160,000	$287,000	$9,307,000	$10,790,000
UNITS PROPOSED FOR EXCLUSION												
3A	$0	$0	$242,000	$0	$0	$67,000	$0	$0	$0	$0	$67,000	$242,000
3B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	0
TOTAL	$0	$0	$242,000	$0	$0	$67,000	$0	$0	$0	$0	$67,000	$242,000

IMPACTS TO RECREATIONAL TROUT FISHING

12. Frog predation by non-native trout is "one of the best-documented causes of decline.[9] Long-term studies of the distribution of introduced trout and the frog demonstrate that non-native trout have had a negative impact on frog populations due to predation on tadpoles and other frog life stages.[10] Currently, the California Department of Fish and Game (CDFG) maintains a trout hatchery and stocking program to help enhance recreational trout fishing opportunities in California. Stocked trout are identified in the proposed rule as a threat in every subunit of proposed critical habitat.

13. According to the proposed rule, protection measures to mitigate the impact of non-native trout on frog populations, include:

    - Construction of artificial barriers to limit trout movement into frog habitat;
    - Removal of non-native trout; and
    - Elimination of trout stocking in frog habitat.

14. Representatives of CDFG state that the total amount of trout stocked in Los Angeles and San Bernardino Counties will not change; trout formerly stocked in essential habitat will be reallocated to streams or lakes that are not linked to essential habitat. Because stocking locations change from year to year depending on funding availability, water quality, and expected recreational use, CDFG is not able to identify the locations that will receive new or additional pounds of trout. Potential impacts associated with these measures include costs to management agencies of constructing barriers and removing non-native trout, and lost welfare to anglers resulting from diminished or lost trout fishing opportunities.

15. The welfare that anglers' derive from trout fishing is measured in terms of consumer surplus, which refers to the sum of an individual's maximum willingness to pay for services provided by a given natural resource, net of any costs associated with consuming those services. If a particular fishing site becomes unavailable to an angler, the welfare loss suffered by the angler is his consumer surplus derived from that site, net of the surplus derived from visiting the next best alternative location or undertaking the next most preferred alternative activity.

16. To estimate anglers' preferences for different fishing experiences within an angler's choice set of fishing opportunities, and to understand how anglers might substitute between fishing sites, economists survey anglers in the region to obtain information about where and how often they fish and use the resulting data to construct econometric models (e.g., site choice models) of behavior. The existing environmental economics literature was searched for publicly-available economic models estimating anglers' responses to the elimination of stocked trout-fishing sites in similar geographic settings that could be transferred to this analysis. This search identified a number of site choice models, however, they are too dissimilar in terms of the type of fishing activity analyzed (e.g.,

[9] 67 FR 44388.

[10] Ibid.

sport-fishing on the Great Lakes) and/or the change in the fishing opportunity evaluated (e.g., incremental reductions in the density of stocked trout) to allow for a reasonable transfer of information to this situation.[11] As a result, this analysis uses a simplified approach to bound the potential losses.

17. The lower-bound estimate assumes that adequate, equally desirable substitute trout fishing locations exist to offset recreational fishing opportunities lost within essential frog habitat. Therefore, anglers' welfare is unchanged. This assumption is valid if the substitute locations offer exactly the same attributes as the currently stocked sites (e.g., the areas are equally easy to access, crowd levels are similar, the same number and quality of trout are available, the aesthetic enjoyment gained from experiencing the natural landscape is the same). Impacts are limited to compliance costs associated with constructing artificial fish barriers (or enhancing natural barriers) and removing non-native trout. This estimate likely understates impacts, because assuming optimal stocking of trout under current management, re-allocation of trout to alternative sites may result in diminished fishing experiences.

18. The upper-bound estimate makes the simplifying assumption that all fishing trips that would normally be taken to sites in essential habitat are foregone (e.g., not taken). It accounts for the possibility that anglers will experience welfare losses (i.e., losses occurring when trips are diminished, because either anglers decide to go to a second-best location in the area that does not have the same attributes as the sites in essential frog habitat or because they take fewer fishing trips). The analysis transfers welfare values for similar types of fishing trips obtained from studies published in the peer-reviewed economics literature to estimate the value of the lost trips. The welfare losses are added to the costs estimated in the lower-bound, providing an upper-bound estimate of impacts. The upper-bound estimate likely overstates impacts, because given the availability of alternative fishing locations, not all trips are likely to be lost.

19. The actual impact likely falls between these two bounds; however information allowing for further refinement of the methodology presented here is not readily available. Under the assumption that the probability distribution of potential impacts between the two bounds is continuous and not skewed toward either estimate, the average of the two bounds represents a reasonable best estimate of impacts.[12] Therefore, the undiscounted

[11] See for example, Andrews, Thomas P. 1996. Management Alternatives and Trout Angler Benefits in Pennsylvania. Ph.D. Dissertation. Temple University; and Montgomery, Mark and Michael Needelman. 1997. The Welfare Effects of Toxic Contamination in Freshwater Fish. Land Economics 73: 211-273. Ahn et al. estimate the potential welfare loss to trout anglers in the Southern Appalachian Mountains of North Carolina under alternative reductions in available trout habitat resulting from global warming. However, application of their results to this analysis requires information about the total available trout habitat in Los Angeles and San Bernardino Counties. Based on interviews with CDFG, this information is unavailable. (Ahn, S., De Steiguer, J.E., Palmquist, R.B., and T.P. Holmes. 2000. Economic Analysis of the Potential Impact of Climate Change on Recreational Trout Fishing in the Southern Appalachian Mountains: An Application of a Nested Multinomial Logit Model. *Climatic Change*. 45: 493-509.)

[12] For the other types of affected activities, the low and high cost estimates presented in this Executive Summary result from analyzing the impacts of two distinct regulatory scenarios (e.g., signs are erected along hiking trails or the trails are moved out of proposed critical habitat). Because the probability distribution of costs between the scenarios for other activities is not continuous, it is not appropriate to present the average of the estimates.

future costs associated with trout fishing activities is estimated to be $7.4 million over twenty years. Discounted future costs are estimated to be $4.3 million over this same time period ($404,000 on an annualized basis) using a real rate of seven percent, or $5.7 million ($385,000 on an annualized basis) using a real rate of three percent. Welfare losses to anglers occur in three subunits: Big Rock Creek (Subunit 1B), Little Rock Creek (Subunit 1C), and San Jacinto River, North Fork (Subunit 3A). **Note that the welfare losses occurring in these subunits result from ongoing agreements between CDFG and USFS to discontinue trout stocking activities and to remove trout from frog habitat.**

IMPACTS TO HIKING ACTIVITIES

20. In areas occupied by frogs, human use in and along streams can disrupt the various life stages of the frog as well as alter the stream's physical and biological attributes in ways that make the stream less suitable as habitat. According to the proposed rule, protection measures to mitigate the impact of recreational hiking on frog populations include closing, re-routing or re-constructing hiking trails away from frog habitat and installing interpretive signs at trailheads and along access points to educate hikers of the species' biology and habitat requirements.

21. This analysis calculates a low estimate of hiking-related impacts based on the cost of installing interpretive signs and additional patrols in areas of heavy recreational use. For a high estimate, it also includes additional construction costs for relocating trails away from rivers and streams within proposed critical habitat, thus further reducing hiker-frog interactions. The total miles of hiking trails potentially affected represent less than three percent of the trails available to National Forest visitors. Therefore, because of the availability of many alternate trails, and the fact that all of the current trails will remain open, this analysis does not estimate welfare losses to hikers.

22. The undiscounted future costs to recreational hiking range from $456,000 to $1.4 million over twenty years. Discounted future costs are estimated to be $261,000 to $1.2 million over this same time period ($25,000 to $117,000 on an annualized basis) using a real rate of seven percent, or $351,000 to $1.3 million ($24,000 to $89,000 on an annualized basis) using a real rate of three percent. Considering the high-end estimate, the majority of these costs are associated with trail relocation in Little Rock Creek (Subunit 1C), City Creek (Subunit 2A), San Jacinto River, North Fork (Subunit 3A), and Indian Creek (Subunit 3B).

WELFARE LOSSES ASSOCIATED WITH ROCK CLIMBING

23. In the headwaters of Little Rock Creek is Williamson Rock, a unique granite feature that is considered to be the premier rock climbing area in Southern California. Located only an hour and half east of the Los Angeles metropolitan area (40 to 80 miles), Williamson Rock receives a large number of sport climbers, particularly on weekend days during the peak season, which runs from July to September.

24. On December 27, 2005, USFS "temporarily limited access" to approximately 1,000 acres surrounding Williamson Rock in order to protect proposed critical habitat for the frog.

According to USFS' press release, this closure will allow USFS to conduct a formal biological consultation with the Service to analyze the effects, if any, of recreation activities within the area. USFS hopes that a proposal can be developed that will allow rock climbing at Williamson Rock to continue without jeopardizing the frog or its habitat, but until that consultation is complete, the area will remain closed.

25. Ideally, this analysis would develop and use an economic model of climbers' preferences for different rock climbing areas in the Southern California region to predict how climbing behavior and enjoyment might change as a result of frog conservation activities and to estimate the associated welfare losses. For example, as a result of closing Williamson Rock, climbers may decide to go to a second-best rock climbing location, decide to climb indoors, or decide not to go climbing at all. The welfare loss associated with each option will vary depending on the climber's value of his or her first choice climbing experience and alternatives. Because primary research is beyond the scope of this effort, this analysis assumes that the climbers do not take trips to other, substitute locations (e.g., the trips are lost). Costs are estimated using a benefits transfer methodology in which literature-based per-trip consumer surplus values are applied to the estimated the value of lost climbing trips. Using this method, the analysis estimates the impact of a temporary one-year closure of Williamson Rock to result in a total welfare loss of approximately $1.0 to $1.4 million

IMPACTS TO DEVELOPMENT ACTIVITIES

26. Private, potentially developable lands are identified in two areas of essential habitat: approximately 119 acres proposed for designation along City Creek (2A) and 107 acres in essential habitat proposed for exclusion along Fuller Mill Creek of the San Jacinto River, North Fork (Subunit 3A). This analysis does not anticipate that frog conservation activities will substantially affect or limit private development in these areas due primarily to two factors. First, private lands within proposed critical habitat are located in mountainous areas and are generally unsuitable for large-scale development. Second, typical measures to protect frog habitat include a 50-foot buffer around streams, which is likely to be easily incorporated in building designs given the size of affected parcels and existing density restrictions. Overall, existing conditions discourage the type of development that could threaten the frog. However, for reference and to further describe the private lands, Chapter 5 includes a summary of the reported assessed value of these lands.

IMPACTS TO FIRE MANAGEMENT ACTIVITIES

27. In the near future, the San Bernardino National Forest will conduct fire management activities in proposed critical habitat areas within the San Jacinto Mountains (Unit 3). In order to minimize impacts to the frog, USFS included design features in the fuels treatment plan that established a buffer zone adjacent to all creeks within frog habitat and mandated hand and helicopter treatment methods in lieu of mechanized treatment methods. The incremental cost associated with using hand and helicopter treatment methods are included in this analysis in proposed critical habitat areas of Unit 3. Note that the use of these methods will not decrease the effectiveness of fire management

activities, and thus increase the risk of a catastrophic fire; it will only make the activities more expensive.

28. In addition, this analysis uses Geographic Information System (GIS) data to identify Wildland-Urban Interface (WUI) areas within Units 1 and 2 of the proposed critical habitat. WUI are areas "where human life, property, and natural resources are in imminent danger from catastrophic wildfire," where houses meet or intermingle with undeveloped wildland vegetation. This makes the WUI a focal area for human-environment conflicts such as wildland fires. The analysis assumes that similar fire management activities will occur in WUI areas intersecting these two units.

29. Undiscounted future costs associated with fire management activities are estimated to be approximately $1.3 million over twenty years. Discounted future costs are estimated to be $1.1 million over this same time period ($107,000 on an annualized basis) using a real rate of seven percent, or $1.2 million ($82,000 on an annualized basis) using a real rate of three percent.

COSTS OF SURVEY AND MONITORING

30. U.S. Geological Survey (USGS) and various other entities currently conduct frog survey and monitoring. The undiscounted future costs of survey and monitoring is approximately $800,000 over twenty years. Discounted future costs are estimated to be $453,000 over this same time period ($43,000 on an annualized basis) using a real rate of seven percent, or $613,000 ($41,000 on an annualized basis) using a real rate of three percent.

IMPACTS ON RECREATIONAL MINING ACTIVITY

31. The proposed rule discusses the potential for recreational mining to negatively impact essential frog habitat along the San Gabriel River, East Fork (Subunit 1A). The Service suggests additional patrolling of mining activities in order to reduce the risk and impacts associated with this activity. Based on data provided by the USFS staff in the Santa Clara/Mojave Ranger District, Angeles National Forest, the undiscounted future costs of additional patrols is $300,000 over twenty years. Discounted future costs are estimated to be $170,000 over this same time period ($16,000 on an annualized basis) using a real rate of seven percent, or $230,000 ($15,000 on an annualized basis) using a real rate of three percent.

ADMINISTRATIVE COSTS OF SECTION 7 CONSULTATIONS

32. This analysis estimates the past and future costs associated with section 7 consultations for the frog. Since the listing of the species in 2002, there have been one programmatic consultation, two formal consultations, and one informal consultation. Where information is available on future consultation efforts, the administrative cost of these efforts is included in this analysis. Potential future consultations include: seven informal consultations, seven formal consultations and two programmatic consultations. The undiscounted costs of future section 7 consultations are estimated to range from $174,000 to $324,000 over twenty years. Discounted future costs are estimated to be $147,000 to $255,000 over this same time period ($14,000 to $24,000 on an annualized basis) using a

real rate of seven percent, or $160,000 to $287,000 ($11,000 to $19,000 on an annualized basis) using a real rate of three percent.

DISTRIBUTIONAL EFFECTS

33. Federal and State agencies (USFS and CDFG) may be affected by frog conservation activities, along with recreational anglers and rock climbers. Decreased recreational activity in these areas may reduce the amount of money spent in the region across a variety of industries, including food and beverage stores, food service and drinking places, accommodations, transportation, and rental services. Using a tool called IMPLAN, the analysis considers whether lost recreational trips will have an affect on these industries. The impact of these lost expenditures is too small to be measured when the IMPLAN results are rounded to significant figures consistent with model data.

AREAS MOST LIKELY TO EXPERIENCE IMPACTS

34. Exhibits ES-9 illustrates which proposed critical habitat subunits account for the greatest share of costs, looking at both the low and high estimates. Exhibits ES-10 and ES-11 illustrate changes in the ranking of subunits under the low and high estimates, respectively. In both estimates, costs are driven welfare losses to recreational anglers in Big Rock Creek, South Fork (Subunit 1B), San Jacinto River, North Fork (Subunit 3A), and Little Rock Creek (Subunit 1C) and welfare losses to rock climbers at Little Rock Creek (Subunit 1C). The relative rankings of these subunits, by cost, do not change significantly when future costs discounted at seven or three percent are considered.

EXHIBIT #ES-9 RANKING OF SUBUNITS USING FUTURE UNDISCOUNTED COSTS

LOW ESTIMATES		HIGH ESTIMATES	
SUBUNIT	UNDISCOUNTED COSTS	SUBUNIT	UNDISCOUNTED COSTS
1B. Big Rock Creek, South Fork	$5,867,051	1B. Big Rock Creek, South Fork	$5,917,851
3A. San Jacinto River, North Fork	$2,426,768	3A. San Jacinto River, North Fork	$2,728,368
1C. Little Rock Creek	$1,301,642	1C. Little Rock Creek	$1,964,160
1A. San Gabriel River East Fork	$706,035	1A. San Gabriel River East Fork	$724,835
2B. Barton Creek	$481,751	2A. City Creek	$630,651
2A. City Creek	$322,651	2B. Barton Creek	$481,751
3B. Indian Creek	$89,722	3B. Indian Creek	$234,922
1E. Day Canyon	$65,906	1E. Day Canyon	$65,906
3C. Tahquitz Creek	$37,156	1F. Iron Fork	$37,156
1F. Iron Fork	$36,564	3C. Tahquitz Creek	$36,564
1D. Devil's Canyon	$24,900	1D. Devil's Canyon	$24,900
3D. Andreas Creek	$11,313	3D. Andreas Creek	$11,313
1G. Bear Creek	$10,353	1G. Bear Creek	$10,353
2C. Whitewater River	$7,680	2C. Whitewater River	$7,680

EXHIBIT #ES-10 RANKING OF SUBUNITS BASED ON FUTURE PRESENT VALUE COSTS (UNDISCOUNTED): LOW ESTIMATE

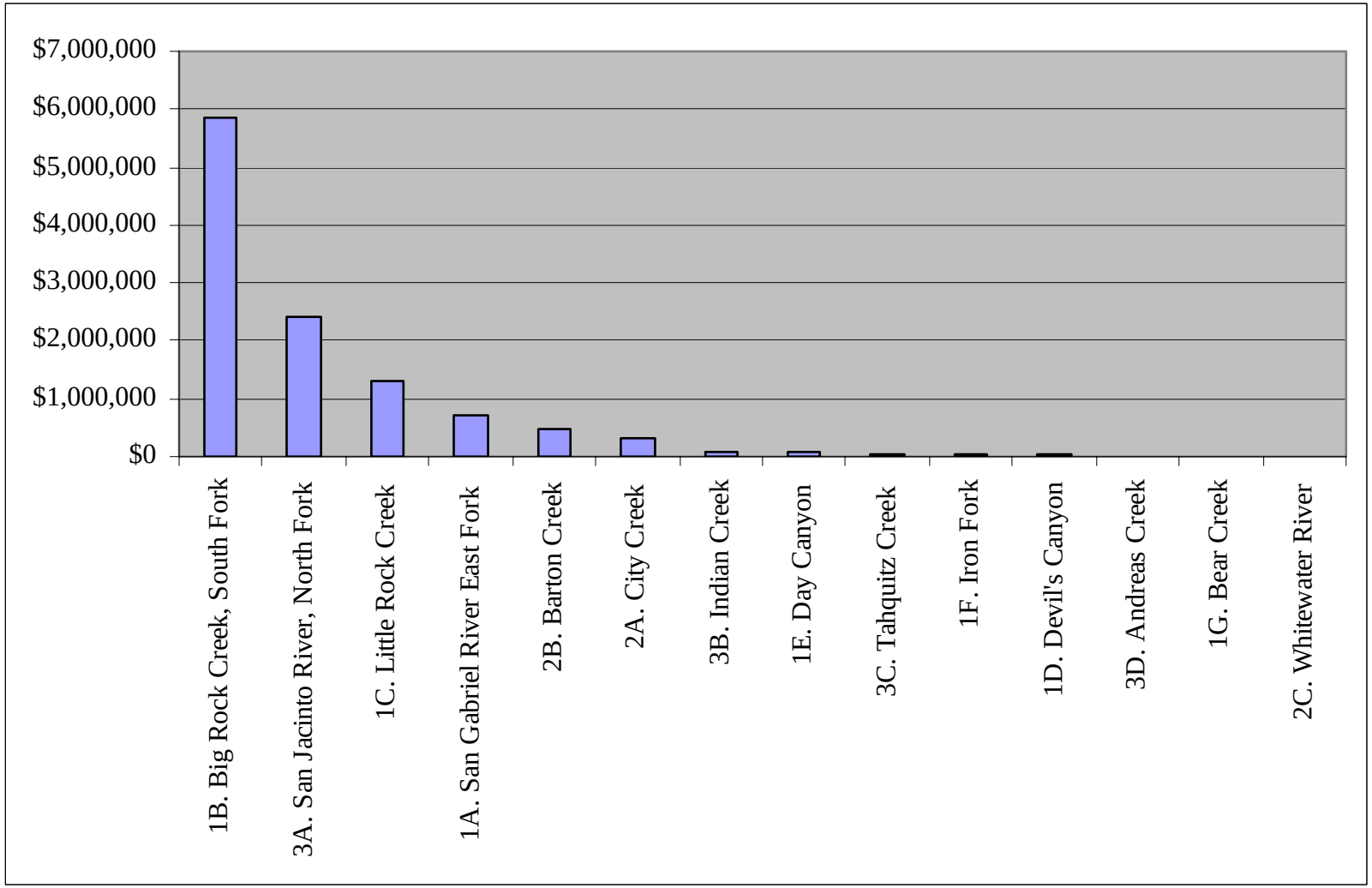
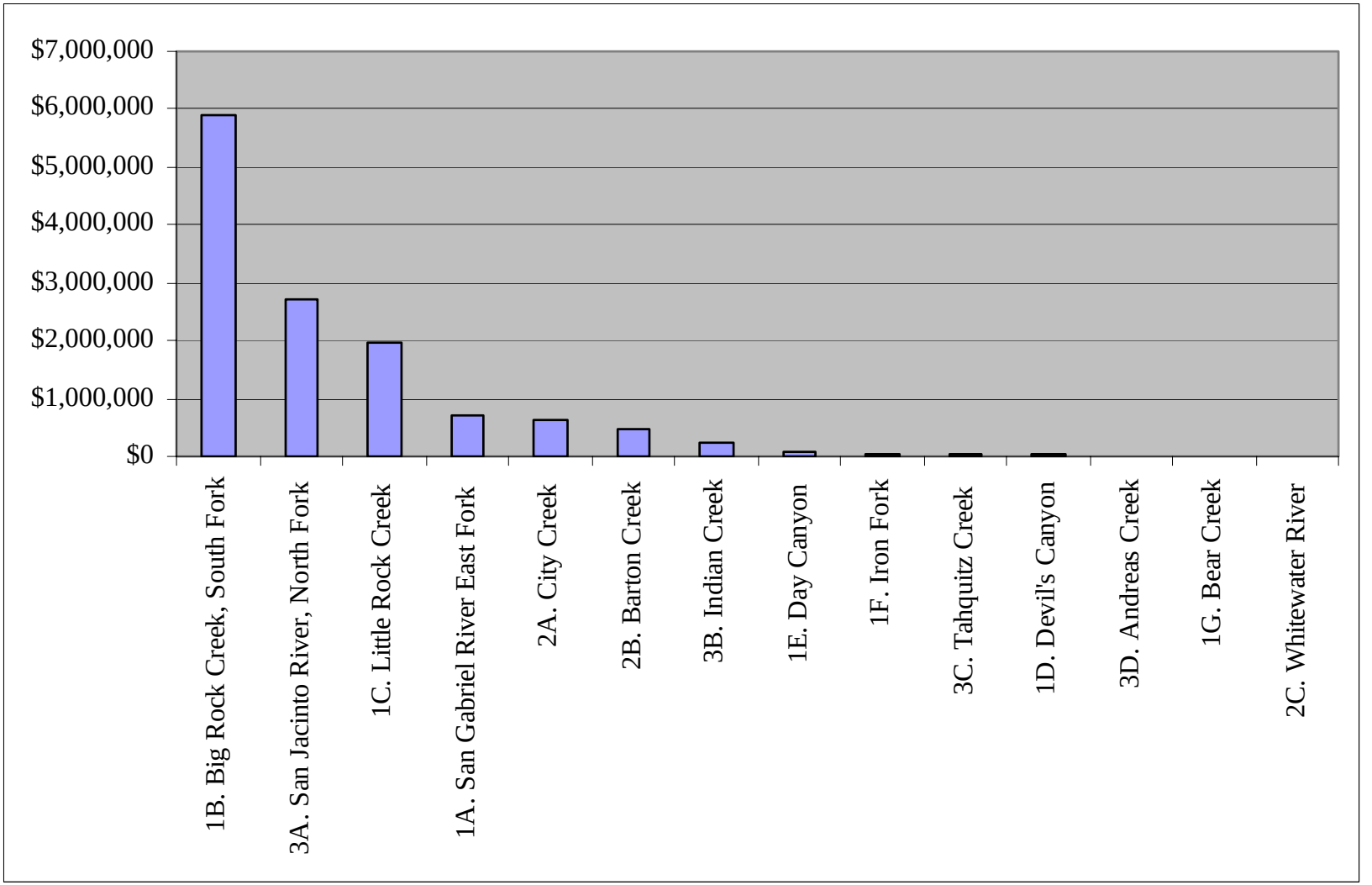


EXHIBIT #ES-11 RANKING OF SUBUNITS BASED ON FUTURE PRESENT VALUE COSTS (UNDISCOUNTED): HIGH ESTIMATE



CHAPTER 1 | FRAMEWORK FOR ANALYSIS

35. The purpose of this report is to estimate the economic impact of actions taken to protect the federally listed *Rana mucosa* (mountain yellow-legged frog, referred to as frog in this report) and its habitat. It attempts to quantify the economic effects associated with the proposed designation of critical habitat. It does so by taking into account the cost of conservation-related measures that are likely to be associated with future economic activities that may adversely affect the habitat within the proposed boundaries. The analysis looks retrospectively at costs incurred since the frog was listed, and it attempts to predict future costs likely to occur after the proposed critical habitat designation (CHD) is finalized.

36. 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.[13] In addition, this information allows the U.S. Fish and Wildlife Service (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).[14] This report also complies with direction from the U.S. Court of Appeals for the 10th Circuit that "co-extensive" effects should be included in the economic analysis to inform decision-makers regarding which areas to designate as critical habitat.[15]

37. This section describes the framework of the analysis. First, it describes the general analytic approach to estimating economic effects, including a discussion of both efficiency and distributional effects. Next, this section discusses the scope of the analysis, including the link between existing and critical habitat-related protection efforts and economic impacts. Then, it presents the analytic time frame used in the report. Finally, this section lists the information sources relied upon in the analysis.

[13] 16 U.S.C. §1533(b)(2)

[14] 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.

[15] In 2001, the U.S. Court of Appeals for the 10th Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (New Mexico Cattle Growers Ass'n v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001)).

1.1 APPROACH TO ESTIMATING ECONOMIC EFFECTS

38. This economic analysis considers both the economic efficiency and distributional effects that may result from activities to protect the frog and its habitat (hereinafter referred to collectively as "frog conservation activities"). 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, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of frog conservation activities.

39. 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 activities on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of frog conservation activities unduly burden a particular group or economic sector. For example, while conservation activities may have a small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

1.1.1 EFFICIENCY EFFECTS

40. 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 frog 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.[16]

41. 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 US 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

[16] 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.

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.

42. Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, 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 (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the market.

43. This analysis begins by measuring costs associated with measures taken to protect the frog 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 activities is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets.

1.1.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

44. Measurements of changes in economic efficiency focus on the net impact of conservation activities, 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.[17] This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

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

45. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the Regulatory Flexibility Act, might be affected by future frog conservation activities.[18] 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 activities on the energy industry and its customers.[19]

[17] 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.

[18] 5 U.S.C. § 601 *et seq*.

[19] Executive Order 13211, *Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use,* May 18, 2001.

CALCULATING PRESENT VALUE AND ANNUALIZED IMPACTS

For each land use activity, this analysis compares economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of economic impacts of past or future costs to present value terms requires the following: a) past or projected future costs of frog conservation activities; 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 frog conservation efforts from year t to T is measured in 2006 dollars according to the following standard formula:[a]

$$PV_c = \sum_{t}^{T} \frac{C_t}{(1+r)^{t-2005}}$$

C_t = cost of frog conservation efforts in year t

r = discount rate[b]

Impacts of conservation efforts for each activity in each unit are also expressed as annualized values. Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). For this analysis, however, all activities employ a forecast period of 20 years, 2006 through 2025. Annualized impacts of future frog conservation activities (APV_c) are calculated by the following standard formula:

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

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

[a] To derive the present value of past conservation activities for this analysis, t is 2002 and T is 2005; to derive the present value of future conservation efforts, t is 2006 and T is 2025.

[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.)

Regional Economic Effects

46. Regional economic impact analysis can provide an assessment of the potential localized effects of conservation activities. 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.

47. The use of regional input/output models in an analysis of the impacts of species and habitat conservation activities 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.

48. 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.

1.2 SCOPE OF THE ANALYSIS

49. This analysis identifies those economic activities believed to most likely threaten the listed species and its habitat and, where possible, quantifies the economic impact to avoid, mitigate, or compensate for such threats within the boundaries of the CHD. In instances where critical habitat is being proposed after a species is listed, some future impacts may be unavoidable, regardless of the final designation and exclusions under 4(b)(2). However, due to the difficulty in making a credible distinction between listing and critical habitat effects within critical habitat boundaries, this analysis considers all future conservation-related impacts to be co-extensive with the designation.[20,21]

[20] In 2001, the U.S. Court of Appeals for the 10th Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (New Mexico Cattle Growers Assn v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001)).

50. Coextensive effects may also include impacts associated with overlapping protective measures of other Federal, State, and local laws that aid habitat conservation in the areas proposed for designation. In past instances, some of these measures have been precipitated by the listing of the species and impending designation of critical habitat. Because habitat conservation efforts affording protection to a listed species likely contribute to the efficacy of the CHD efforts, the impacts of these actions are considered relevant for understanding the full effect of the proposed CHD. Enforcement actions taken in response to violations of the Act, however, are not included.

1.2.1 SECTIONS OF THE ACT RELEVANT TO THE ANALYSIS

51. This analysis focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the Act. Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as CHD. In this section, the Secretary is required to list species as endangered or threatened "solely on the basis of the best available scientific and commercial data."[22] Section 4 also requires the Secretary to designate critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat."[23]

52. The protections afforded to threatened and endangered species and their habitat are described in sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections are the focus of this analysis:

- Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and CHD.[24]
- 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,

[21] In 2004, the U.S. Ninth Circuit invalidated the Service's regulation defining destruction or adverse modification of critical habitat (Gifford Pinchot Task Force v. United States Fish and Wildlife Service). 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.

[22] 16 U.S.C. 1533.

[23] 16 U.S.C. 1533.

[24] The Service notes, however, the Ninth Circuit judicial opinion, *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, 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.

pursue, or collect, or to attempt to engage in any such conduct."[25] The economic impacts associated with this section manifest themselves in sections 7 and 10.

- Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop 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.[26] 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 designation of critical habitat does not require completion of an HCP; however, the designation may influence conservation measures provided under HCPs.

1.2.2 OTHER RELEVANT PROTECTION EFFORTS

53. 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.[27] For the purpose of this analysis, such protective efforts are considered to be co-extensive with the protection offered by critical habitat, and costs associated with these efforts are included in this report. In addition, under certain circumstances, the CHD 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 costs would not have been triggered absent the designation of critical habitat, they are included in this economic analysis.

1.2.3 ADDITIONAL ANALYTIC CONSIDERATIONS

54. This analysis also considers the potential for other types of economic impacts that can be related to section 7 consultations in general and CHD in particular, including time delay, regulatory uncertainty, and stigma impacts.

Time Delay and Regulatory Uncertainty Impacts

55. Time delays are costs due to project delays associated with the consultation process or compliance with other regulations. Regulatory uncertainty costs occur in anticipation of having to modify project parameters (e.g., retaining outside experts or legal counsel to better understand their responsibilities with regard to CHD).

[25] 16 U.S.C. 1532.

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

[27] For example, the Sikes Act Improvement Act (Sikes Act) of 1997 requires Department of Defense (DoD) military installations to develop Integrated Natural Resources Management Plans (INRMPs) that provide for the conservation, protection, and management of wildlife resources (16 U.S.C. §§ 670a - 670o). These plans must integrate natural resource management with the other activities, such as training exercises, taking place at the facility.

Stigma Impacts

56. Stigma refers to the change in economic value of a particular project or activity due to negative (or positive) perceptions of the role critical habitat will play in developing, implementing, or conducting that policy. For example, changes to private property values associated with public attitudes about the limits and costs of implementing a project in critical habitat are known as "stigma" impacts. Because the proposed designation includes little private property, stigma effects are unlikely and are not quantified in this analysis.

1.2.4 BENEFITS

57. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.[28] 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.[29]

58. In the context of CHD, 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.[30] *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.*

59. Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

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[28] Executive Order 12866, *Regulatory Planning and Review*, September 30, 1993.

[29] 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.

[30] Ibid.

60. 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.

61. This analysis is unable to quantify ancillary benefits associated with frog conservation activities. Such benefits may include increased water quality resulting from fewer recreators impacting streams (e.g., reduced siltation), improved biological information resulting from surveys of frog habitat, and reduced threat of catastrophic fire related to increased fire suppression activities. Data required to quantify and monetize these benefits (e.g., incremental changes in water quality resulting from changes in the number of recreators wading in streams) are not readily available.

1.2.5 GEOGRAPHIC SCOPE OF THE ANALYSIS

62. The geographic scope of the analysis includes areas proposed for CHD and areas proposed for exclusion under section 4(b)(2) of the Act. The economic impacts of potential designation are estimated for each of these two categories of land identified in the proposed rule. The analysis focuses on activities within or affecting these areas.

63. Impacts are presented at the finest level of resolution feasible given available data. For the frog, impacts are reported for each subunit identified in the proposed rule. Chapter 2 presents maps showing the location of the subunits relative to major cities, national forest land, and wilderness lands.

1.3 ANALYTIC TIME FRAME

64. 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. This analysis estimates economic impacts to activities from 2002 (year of the species' final listing) to 2025 (20 years from the year of final designation). Forecasts of economic conditions and other factors beyond the next 20 years would be speculative.

1.4 INFORMATION SOURCES

65. The primary sources of information for this report were communications with and data provided by personnel from the Service, Federal action agencies, affected private parties, and local and State governments within California. Specifically, the analysis relies on data collected in communication with personnel from the following entities:

- US Forest Service;

- California Department of Fish and Game;
- Riverside and San Bernardino County Assessor's Offices;
- Local climbing groups; and
- County and city planning departments.

66. In addition, this analysis relies upon the Service's section 7 consultation records, public comments, and published journal sources. The reference section at the end of this document provides a full list of information sources.

1.5 STRUCTURE OF THE REPORT

67. The remainder of this report is organized as follows:

- Section 2: Background and Socioeconomic Overview;
- Section 3: Impacts to Recreational Trout Fishing Activities;
- Section 4: Impacts to Other Recreation Activities;
- Section 5: Impacts to Development Activities;
- Section 6: Impacts to Fire Management Activities;
- Section 7: Impacts to Other Activities on Federal Lands;
- Appendix A: SBREFA Screening Analysis and Impacts to the Energy Industry;
- Appendix B: Summary of Past Impacts to All Activities by Subunit;
- References.

Sections 3 through 7 are organized by affected activity. For each of these activities, the analysis discusses impacts by proposed critical habitat subunit and areas proposed for exclusion from critical habitat.

CHAPTER 2 | BACKGROUND AND SOCIOECONOMIC OVERVIEW

68. This chapter provides information about the frog's regulatory history and essential habitat proposed for inclusion and exclusion from the final rule. Then it provides an overview of California's outdoor recreation industry, the major economic activity impacted by this proposed designation.

2.1 REGULATORY HISTORY

69. On July 2, 2002, the Service published the final rule listing the frog as endangered.[31] In the final rule, the Service determined that designation of critical habitat for the frog was "prudent." However, at the time of the listing, the Service decided to defer critical habitat designation for the frog in order to concentrate "limited resources on higher priority critical habitat designations and other listing actions." On August 19, 2004, the Center for Biological Diversity filed a lawsuit against the Department of the Interior and the Service challenging the Service's failure to designate critical habitat for the frog. On December 20, 2004, the District Court granted the Center's motion for summary judgment and ordered the Service to publish a proposed critical habitat rule for the frog by September 1, 2005 and a final critical habitat rule by September 1, 2006. On September 13, 2005, the Service published the proposed critical habitat designation ("proposed rule") for the frog in the Federal Register.[32] For a description of the frog and the primary constituent elements that are essential to the conservation of the species, refer to the proposed rule.

2.2 PROPOSED CRITICAL HABITAT DESIGNATION[33]

70. In the proposed rule, the Service determined that 8,770 acres of essential habitat exist in Los Angeles, San Bernardino, and Riverside counties, and proposed to designate approximately 8,283 acres of land across three units. The Service is also proposing to exclude approximately 487 acres of non-Federal lands within existing Public/Quasi Public (PQP) lands, proposed conceptual reserve design lands, and lands targeted for conservation within the Western Riverside County Multiple Species Habitat Conservation Plan (WRMSHCP) under section 4(b)(2) of the Act.[34] Exhibits 2-1 summarizes

[31] 67 FR 44382

[32] 70 FR 54106

[33] Information in this section comes from the proposed rule (70 FR 54106).

[34] 70 FR 54106.

landownership within essential habitat by subunit. Exhibit 2-2 provides information on the primary threats to the species within each critical habitat unit and subunit. Exhibit 2-3 shows the location of each subunit of essential habitat.

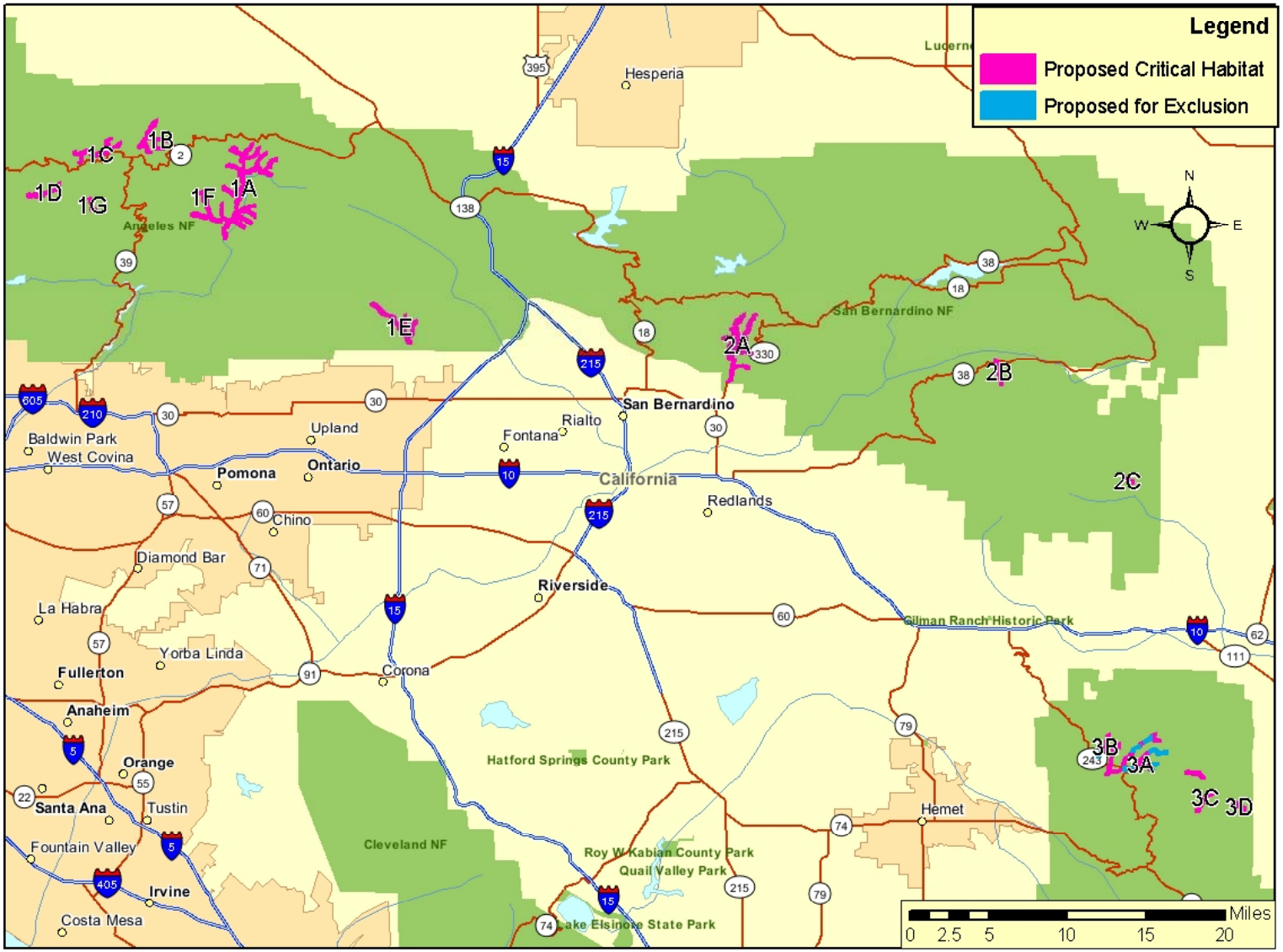
EXHIBIT #2-1 SUMMARY OF LANDOWNERSHIP BY SUBUNIT (ACRES)

UNIT	SUBUNITS	COUNTY	LANDOWNER(S)/ LAND MANAGER(S)	LANDOWNERS (ACRES)			
				FEDERAL	STATE	PRIVATE	TOTAL
1: San Gabriel Mountains	A: San Gabriel River, East Fork	Los Angeles	Angeles National Forest	2,474			2,474
	B: Big Rock Creek, South Fork	Los Angeles	Angeles National Forest	625			625
	C: Little Rock Creek	Los Angeles	Angeles National Forest	615			615
	D: Devil's Canyon	Los Angeles	Angeles National Forest	279			279
	E: Day Canyon	San Bernardino	San Bernardino National Forest	635			635
	F: San Gabriel River, East Fork, Iron Fork	Los Angeles	Angeles National Forest	373			373
	G: Bear Creek	Los Angeles	Angeles National Forest	116			116
2: San Bernardino Mountains	A: City Creek	San Bernardino	San Bernardino National Forest Private	1,267		119	1,386
	B: Barton Creek	San Bernardino	San Bernardino National Forest	193			193
	C: Whitewater River, North Fork	San Bernardino	San Bernardino National Forest	74			74
3: San Jacinto Mountains	A: San Jacinto River, North Fork (the Tributaries Black Mountain Creek, Fuller Mill Creek and Dark Canyon)	Riverside	San Bernardino National Forest Mount Jacinto State Park	823	96		919
	B: Indian Creek (at Hall Canyon)	Riverside	San Bernardino National Forest	126			180
	C: Tahquitz Creek (Upper Reaches, including Willow Creek Tributary)	Riverside	San Bernardino National Forest Mount Jacinto State Park	243	115		358
	D: Andreas Creek (Upper Reaches)	Riverside	San Bernardino National Forest	109			109
Proposed for Exclusion	Portions of Subunits 3A and 3B.	Riverside	State; Private		205	282	487
			TOTAL:	**7,953**	**416**	**401**	**8,770**
			Percent of Total:	**91%**	**5%**	**5%**	**100%**

EXHIBIT #2-2 PRIMARY THREATS BY SUBUNIT

UNIT	SUBUNITS	COUNTY	LANDOWNERS/ LAND MANAGER(S)	PRIMARY THREATS
1: San Gabriel Mountains	A: San Gabriel River, East Fork	Los Angeles	Angeles National Forest	Non-native trout, hiking & camping, water diversions for winter recreation, recreational mining, fire suppression activities
	B: Big Rock Creek, South Fork	Los Angeles	Angeles National Forest	Non-native trout, hiking & camping,
	C: Little Rock Creek	Los Angeles	Angeles National Forest	Non-native trout, hiking & camping, water diversions for winter recreation, hazardous materials spills
	D: Devil's Canyon	Los Angeles	Angeles National Forest	Non-native trout, hiking & camping,
	E: Day Canyon	San Bernardino	San Bernardino National Forest	Non-native trout, hiking & camping,
	F: San Gabriel River, East Fork, Iron Fork	Los Angeles	Angeles National Forest	Non-native trout, hiking & camping,
	G: Bear Creek	Los Angeles	Angeles National Forest	Non-native trout, hiking & camping,
2: San Bernardino Mountains	A: City Creek	San Bernardino	San Bernardino National Forest Private	Non-native trout, hiking & camping, potentially high fuel loads, hazardous materials spills, development
	B: Barton Creek	San Bernardino	San Bernardino National Forest	Non-native trout, hiking & camping,
	C: Whitewater River, North Fork	San Bernardino	San Bernardino National Forest	Non-native trout, hiking & camping,
3: San Jacinto Mountains	A: San Jacinto River, North Fork (the Tributaries Black Mountain Creek, Fuller Mill Creek and Dark Canyon)	Riverside	San Bernardino National Forest Mount Jacinto State Park	Non-native trout, hiking & camping, potentially high fuel loads
	B: Indian Creek (at Hall Canyon)	Riverside	San Bernardino National Forest	Non-native trout, hiking & camping, potentially high fuel loads
	C: Tahquitz Creek (Upper Reaches, including Willow Creek Tributary)	Riverside	San Bernardino National Forest Mount Jacinto State Park	Non-native trout, trampling by cows.
	D: Andreas Creek (Upper Reaches)	Riverside	San Bernardino National Forest	Non-native trout
Proposed for Exclusion	Portions of Subunits 3A and 3B.	Riverside	State; Private	Development
Source: 70 FR 54106-54143				

EXHIBIT #2-3 MAP OF ESSENTIAL FROG HABITAT



2.3 MAJOR ECONOMIC ACTIVITIES IN ESSENTIAL FROG HABITAT AREA

71. Outdoor recreation is the major economic activity potentially impacted by this proposed designation. Specifically, within proposed critical habitat, the Service identified recreational trout fishing, hiking, camping and rock climbing as potential threats to the frog in Los Angeles, San Bernardino and Riverside Counties. This section provides an overview of the California outdoor recreation industry, including a closer examination of recreational trout fishing.

2.3.1 OUTDOOR RECREATION IN CALIFORNIA

72. According to a recent study, approximately 65.5 to 92 percent of all Californians reported participating in outdoor recreation activities in 2002.[35] Picnicking at developed sites, wildlife viewing, and trail hiking were among the top ten adult or family outdoor activities in 2002. In 2002, the Outdoor Industry Association (OIA) estimated the number of participants in outdoor recreation activities at 18.3 million in California, accounting for approximately eight percent of total nationwide participation. In addition, OIA also conducted a nationwide survey to estimate the number of participants by activity by State. Exhibit 2-4 presents the results of this survey for California. An additional analysis of expenditures by state shows that Californians spend more than $1.7 billion each year on athletic and outdoor merchandise.[36] Little quantitative information is available regarding the amount of recreation taking place specifically in the Angeles and San Bernardino National Forests.

2.3.2 RECREATIONAL TROUT FISHING IN CALIFORNIA[37]

73. In 2001, over 2.4 million California residents and non-residents 16 years or older participated in fishing activities in 2001. Of this total, 2.3 million (94 percent) anglers were State residents and 156,000 (six percent) anglers were non-residents. Anglers fished a total of 27.8 million days in California -- an average of 11 days per angler. State residents accounted for 26.8 million days, or approximately 97 percent of all fishing days.

74. In essential frog habitat, frog conservation activities may impact recreational trout fishing in various rivers and streams. According to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for California, approximately 70 percent of all fishing occurs in freshwater, which includes ponds, lakes, reservoirs, rivers and streams. Within freshwater fishing, approximately 52 percent of all fishing days occurs in ponds, lakes, and reservoirs with the remaining 48 percent occurring in rivers and streams. Across freshwater species, trout accounted for approximately 50 percent of all freshwater fishing days.

[35] California State Parks. 2005. Park and Recreation Trends in California. Accessed on: January 3, 2006. Available at: http://www.parks.ca.gov/?page_id=796

[36] Outdoor Industry Association. 2003. Outdoor Recreation Participation & Spending Study: A State-by-State Perspective. Available online at: http://www.outdoorindustry.org/research.archive.html

[37] U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau. 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

EXHIBIT #2-4 NUMBER OF PARTICIPANTS BY OUTDOOR ACTIVITY IN CALIFORNIA (2002)

OUTDOOR ACTIVITY	NUMBER OF PARTICIPANTS
Hiking	10,239,710
Bicycling: Paved Road	8,345,364
Car Camping	6,911,804
Trail Running	5,478,245
Bicycling: Single Track	5,273,451
Bicycling: Off-road	4,940,660
Camping	2,892,718
Bird Watching	1,971,144
Canoeing	1,715,151
Backpacking	1,638,354
Rafting	1,407,960
Skiing: Cross-Country/Nordic	1,331,162
Fly Fishing	1,203,166
Kayaking:TOURING/SEA	1,151,967
Climbing: Artificial Wall	972,772
Kayaking: Recreation/Sit-on-top	895,975
Climbing: Natural Rock	639,982
Snowshoeing	563,184
Skiing: Telemark	486,386
Kayaking: Whitewater	307,191

Source: Outdoor Industry Association. 2003. Outdoor Recreation Participation & Spending Study: A State-by-State Perspective.

CHAPTER 3 | POTENTIAL ECONOMIC IMPACTS TO RECREATIONAL TROUT FISHING ACTIVITIES

75. This section considers how frog conservation activities may impact recreational trout fishing in areas that contain essential frog habitat.

76. Potential costs associated with these frog conservation measures include the costs to management agencies of constructing trout barriers and removing non-native trout, and lost welfare to anglers resulting from diminished or lost trout fishing opportunities. The welfare that anglers' derive from trout fishing is measured in terms of consumer surplus, which refers to the sum of an individual's maximum willingness to pay for services provided by a given natural resource, net of any costs associated with consuming those services. If a particular fishing site becomes unavailable to an angler, the welfare loss suffered by the angler is his consumer surplus derived from the site, net of the surplus derived from visiting the next best alternative location or undertaking the next most preferred alternate activity.

77. Information regarding the relative value of substitute stocked fishing sites in this region and decisions about whether trips will be taken after trout are removed from essential habitat is not readily available. Therefore, this analysis uses publicly-available economic information and a simplified approach to bound potential losses. The lower-bound estimate assumes that adequate, equally desirable substitute trout fishing locations exist to offset recreational fishing opportunities lost within essential frog habitat. As such, the impact is limited to compliance costs associated with constructing artificial fish barriers (or enhancing natural barriers) and removing non-native trout. The upper-bound estimate makes the simplifying assumption that all fishing trips that would normally be taken to sites in essential habitat are foregone (e.g., not taken). It accounts for the possibility that anglers will experience welfare losses (i.e., losses resulting when fishing experiences are diminished, because they must visit less preferable sites, or because they choose to fish less frequently).

78. The actual impact likely falls between these two bounds. Under the assumption that the probability distribution of impacts between these bounds is continuous, and because there is no evidence to suggest that the distribution is skewed toward either bound, the average of the two estimates represents the best estimate of trout fishing impacts. As shown in Exhibit 3-1, the best estimate of frog conservation activities on recreational trout fishing are estimated to be $7.4 million (undiscounted dollars), or as low as $4.3 million applying a discount rate of seven percent.

79. Since the listing of the species in 2002, a fish barrier and trout removal project was undertaken on Little Rock Creek (Subunit 1C). In addition, the California Department of Fish and Game (CDFG) agreed to cease trout stocking activities in Big Rock Creek,

South Fork (Subunit 1B) and San Jacinto River, North Fork (Subunit 3A). The project at Little Rock Creek cost $31,000 (undiscounted dollars) (lower-bound estimate). Adding in the value of lost fishing opportunities at the three sites (upper-bound estimate), past impacts are as high as $2.6 million in undiscounted dollars. The best estimate of past frog conservation activities on recreational trout fishing is $1.3 million (undiscounted). Applying a discount rate of seven percent suggests losses may be as high as $1.5 million.

EXHIBIT # 3-1 SUMMARY OF BEST ESTIMATE OF FUTURE IMPACTS TO RECREATIONAL TROUT ACTIVITIES ($2006)

UNIT	SUBUNIT	UNDISCOUNTED DOLLARS	PRESENT VALUE (3%)	PRESENT VALUE (7%)
1	A: San Gabriel River, East Fork	$22,000	$22,000	$22,000
	B: Big Rock Creek, South Fork	$5,803,000	$4,456,000	$3,307,000
	C: Little Rock Creek	$59,000	$56,000	$54,000
	D: Devil's Canyon	$0	$0	$0
	E: Day Canyon	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork	$3,000	$3,000	$3,000
	G: Bear Creek	$0	$0	$0
2	A: City Creek	$0	$0	$0
	B: Barton Creek	$0	$0	$0
	C: Whitewater River, North Fork	$0	$0	$0
3	A: San Jacinto River, North Fork	$1,472,000	$1,138,000	$853,000
	B: Indian Creek	$49,000	$48,000	$46,000
	C: Tahquitz Creek	$0	$0	$0
	D: Andreas Creek	$0	$0	$0
	TOTAL:	**$7,408,000**	**$5,724,000**	**$4,285,000**

Notes:
Totals may not sum due to rounding.

80. This section begins with a brief description of recreational trout fishing in areas of essential frog habitat. Next, the analysis provides an overview of the general methodology and approach used for estimating frog conservation activities on recreational trout fishing. Then, the analysis presents past and future impacts of frog conservation activities in areas of essential frog habitat. The chapter ends with a discussion of the uncertainty inherent in the methodology and provides a best estimate of impacts.

3.1 BACKGROUND

81. Frog predation by non-native trout is "one of the best-documented causes of decline" of the species.[38] Long-term studies of the distributions of introduced trout and the frog demonstrate that non-native trout have had a negative impact on frog populations due to predation on tadpoles and on frogs at other life stages.[39]

82. Since 1945, the CDFG has maintained a trout hatchery and stocking program to help enhance recreational trout fishing opportunities in California. Within areas of essential frog habitat, non-native trout are identified as a threat to the frog in all subunits. Exhibit 3-2 summarizes CDFG's current and historical trout stocking status by subunit. Because trout swim upstream, the analysis considers stocking taking place both within or downstream of essential habitat. Exhibit 3-3 and 3-4 show general locations where trout are stocked each year relative to essential frog habitat.

3.2 APPROACH

83. According to the proposed rule, protection measures to mitigate the impact of non-native trout on frog populations, include:

- Construction of artificial barriers to limit trout movement into frog habitat;
- Removal of non-native trout; and
- Elimination of trout stocking in frog habitat.

84. Representatives of CDFG state that the total amount of trout stocked in Los Angeles and San Bernardino Counties will not change; trout formerly stocked in essential habitat will be reallocated to streams or lakes that are not linked to essential habitat. Because stocking locations change from year to year depending on funding availability, water quality, and expected recreational use, CDFG is not able to identify the locations that will receive new or additional pounds of trout. Potential impacts associated with these measures include costs to management agencies of constructing barriers and removing non-native trout, and lost welfare to anglers resulting from diminished or lost trout fishing opportunities.

85. The welfare that anglers' derive from trout fishing is measured in terms of consumer surplus, which refers to the sum of an individual's maximum willingness to pay for services provided by a given natural resource, net of any costs associated with consuming those services. If a particular fishing site becomes unavailable to an angler, the welfare loss suffered by the angler is his consumer surplus derived from that site, net of the surplus derived from visiting the next best alternative location or undertaking the next most preferred alternative activity. Exhibits 3-3 and 3-4 suggest that alternative fishing sites are available.

[38] 67 FR 44388.

[39] Ibid.

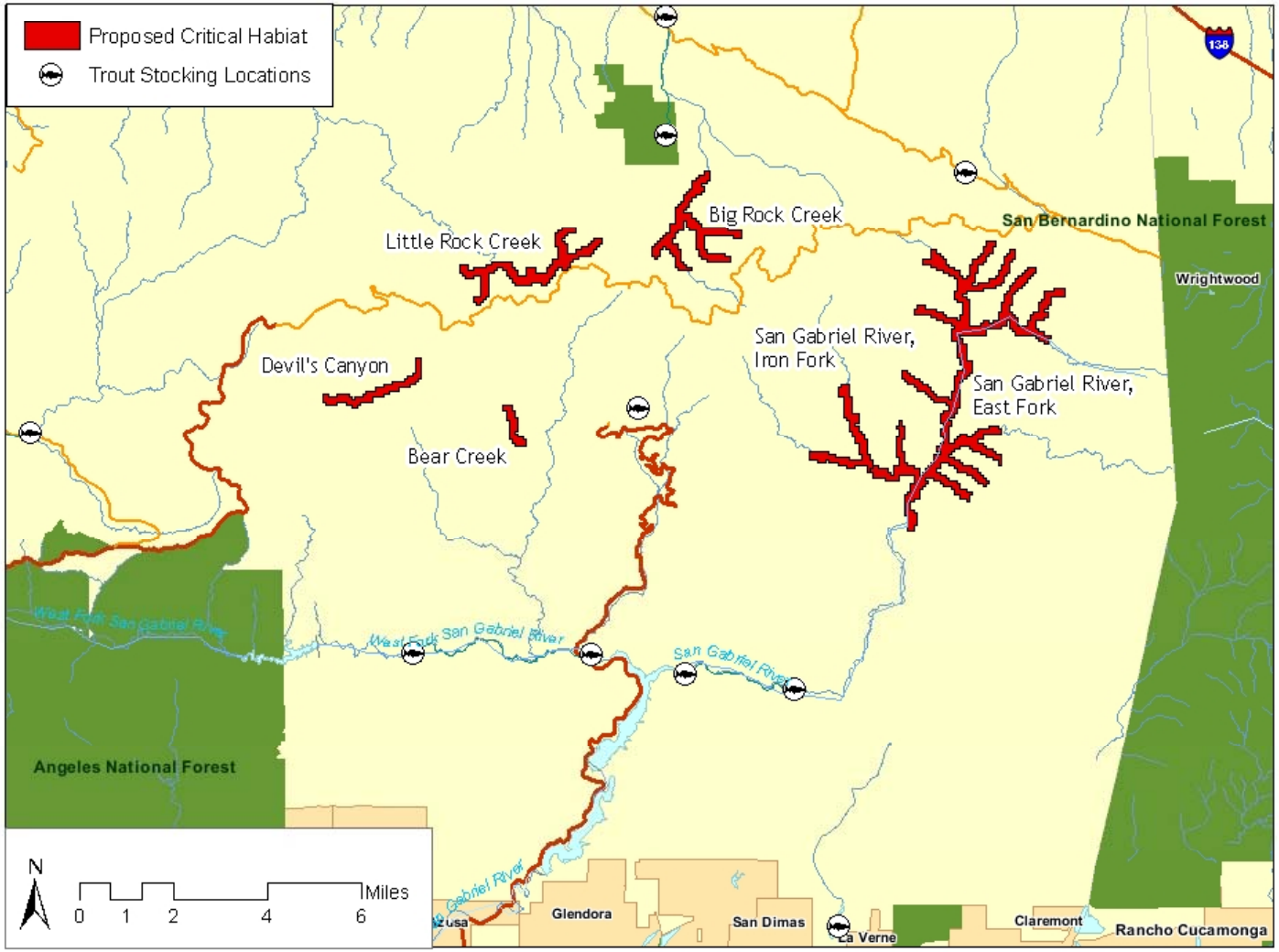
EXHIBIT #3-2 HISTORICAL AND CURRENT TROUT STOCKING STATUS BY SUBUNIT

UNIT	SUBUNIT[1]	HISTORICAL TROUT STOCKING[2]	CURRENT TROUT STOCKING STATUS[3]
1	A: San Gabriel River, East Fork	The San Gabriel River East Fork was stocked with trout near its mouth 52 times between 1947 and 1998.	Trout are stocked downstream at Cattle Canyon.
	B: Big Rock Creek, South Fork	Main stem of Big Rock Creek was stocked 51 times between 1947 and 1988, and the South Fork was stocked 4 times between 1948 and 1953.	In 2003, the USFS and CDFG made an agreement to discontinue trout stocking.
	C: Little Rock Creek	Little Rock Creek has a reservoir at its mouth where trout have been stocked 51 times between 1947 and 1998.	No stocking recorded. Site of a current experiment removing trout from proposed critical habitat.
	D: Devil's Canyon	No historical stocking recorded.	No stocking recorded.
	E: Day Canyon	No historical stocking recorded.	No stocking recorded.
	F: San Gabriel River, East Fork, Iron Fork	No historical stocking recorded.	Trout are stocked downstream at Cattle Canyon.
	G: Bear Creek	No historical stocking recorded.	No stocking recorded.
2	A: City Creek	Non-native brown trout were stocked 11 times between 1949 and 1979.	No stocking recorded.
	B: Barton Creek	The main Barton Creek stem was stocked with non-native trout six times between 1940 and 1955.	No stocking recorded.
	C: Whitewater River, North Fork	The river was stocked with non-native trout two times between 1950 and 1967.	No stocking recorded.
3	A: San Jacinto River, North Fork	The North Fork San Jacinto River was stocked with non-native trout 36 times between 1948 and 1984.	In 2003, the USFS and CDFG made an agreement to discontinue trout stocking.
	B: Indian Creek	Lake Fulmore, located downstream of Indian Creek and proposed critical habitat, was stocked 24 times between 1957 and 1984.	Trout are stocked downstream at Lake Fulmore.
	C: Tahquitz Creek	The creek was stocked 36 times between 1948 and 1984.	No stocking recorded.
	D: Andreas Creek	The creek was stocked nine times between 1949 and 1968.	No stocking recorded.

Sources:

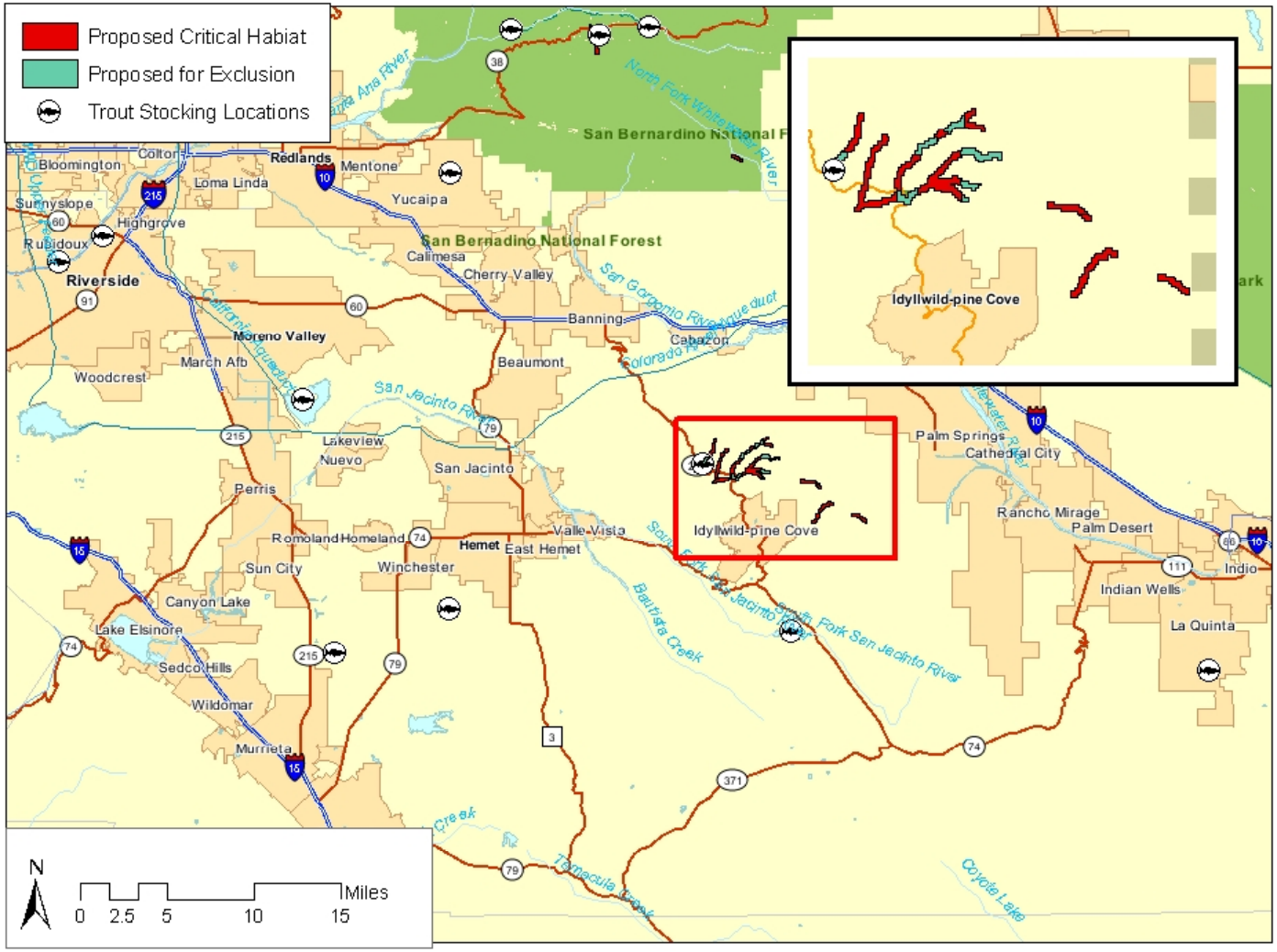
1. Essential habitat proposed for exclusion is located immediately downstream of Subunit 3B and is within segments of Subunit 3A. Because trout can swim between the stretches that are proposed for designation and exclusion, this analysis is unable to separate costs for the two types of essential habitat. Therefore, in this chapter, references to the San Jacinto River, North Fork (Subunit 3A) and Indian Creek (Subunit 3B) include adjacent essential habitat proposed for exclusion.
2. 70 FR 54116 - 54121
3. Personal communications with Dwayne Maxwell and Terry Foreman, California Department of Fish and Game, November - December 2005.

EXHIBIT # 3-3 GENERAL TROUT STOCKING LOCATION IN LOS ANGELES COUNTY



Note: Locations shown here are only general trout stocking locations. Actual trout stocking locations are determined by CDFG on an annual basis based on a variety of factors, including, but not limited to, funding availability, water quality conditions and expected recreational use.

EXHIBIT # 3-4 GENERAL TROUT STOCKING LOCATIONS IN SAN BERNARDINO COUNTY



Note: Locations shown here are only general trout stocking locations. Actual trout stocking locations are determined by CDFG on an annual basis based on a variety of factors, including, but not limited to, funding availability, water quality conditions and expected recreational use.

86. To estimate anglers' preferences for different fishing experiences within an angler's choice set of fishing opportunities, and to understand how anglers might substitute between fishing sites, economists survey anglers to obtain information about where and how often they fish and use the resulting data to construct econometric models (e.g., site choice models) of behavior. The existing environmental economics literature was searched for publicly-available economic models estimating anglers' responses to the elimination of stocked trout-fishing sites in similar geographic settings that could be transferred to this analysis. This search identified a number of site choice models, however, they are too dissimilar in terms of the type of fishing activity analyzed (e.g., sport-fishing on the Great Lakes) and/or the change in the fishing opportunity evaluated (e.g., incremental reductions in the density of stocked trout) to allow for a reasonable transfer of information to this situation.[40] As a result, this analysis uses a simplified approach to bound the potential losses.

87. The lower-bound estimate assumes that adequate, equally desirable substitute trout fishing locations exist to offset recreational fishing opportunities lost within essential frog habitat. Therefore, anglers' welfare is unchanged. This assumption is valid if the substitute locations offer exactly the same attributes as the currently stocked sites (e.g., the areas are equally easy to access, crowd levels are similar, the same number and quality of trout are available, the aesthetic enjoyment gained from experiencing the natural landscape is the same). Impacts are limited to compliance costs associated with constructing artificial fish barriers (or enhancing natural barriers) and removing non-native trout. This estimate likely understates impacts, because assuming optimal stocking of trout under current management, re-allocation of trout to alternative sites may result in diminished fishing experiences.

88. The upper-bound estimate makes the simplifying assumption that all fishing trips that would normally be taken to sites in essential habitat are foregone (e.g., not taken). It accounts for the possibility that anglers will experience welfare losses (i.e., losses occurring when trips are diminished, because either anglers decide to go to a second-best location in the area that does not have the same attributes as the sites in essential frog habitat or because they take fewer fishing trips). The analysis transfers welfare values for similar types of fishing trips obtained from studies published in the peer-reviewed economics literature to estimate the value of the lost trips. The welfare losses are added to the costs estimated in the lower-bound, providing an upper-bound estimate of impacts. The upper-bound estimate likely overstates impacts, because given the availability of alternative fishing locations, not all trips are likely to be lost.

[40]See for example, Andrews, Thomas P. 1996. Management Alternatives and Trout Angler Benefits in Pennsylvania. Ph.D. Dissertation. Temple University; and Montgomery, Mark and Michael Needelman. 1997. The Welfare Effects of Toxic Contamination in Freshwater Fish. Land Economics 73: 211-273. Ahn et al. estimate the potential welfare loss to trout anglers in the Southern Appalachian Mountains of North Carolina under alternative reductions in available trout habitat resulting from global warming. However, application of their results to this analysis requires information about the total available trout habitat in Los Angeles and San Bernardino Counties. Based on interviews with CDFG, this information is unavailable. (Ahn, S., De Steiguer, J.E., Palmquist, R.B., and T.P. Holmes. 2000. Economic Analysis of the Potential Impact of Climate Change on Recreational Trout Fishing in the Southern Appalachian Mountains: An Application of a Nested Multinomial Logit Model. *Climatic Change*. 45: 493-509.)

89. The actual impact likely falls between these two bounds; however information allowing for further refinement of the methodology presented in the chapter is not readily available. Under the assumption that the probability distribution of potential impacts between the two bounds is continuous and not skewed toward either estimate, the average of the two bounds represents a reasonable best estimate of impacts. The remainder of this section provides a detailed explanation of the data and models used to estimate the lower-bound and upper-bound impacts to trout fishing activities. The chapter concludes with a discussion of the uncertainty inherent in this approach and provides a best estimate of the impacts.

3.2.1 LOWER-BOUND: POTENTIAL IMPACTS ASSUMING ADEQUATE SUBSTITUTE TROUT FISHING LOCATIONS

90. Calculation of the lower-bound estimate employs a series of methodological steps as described below:

- **Step One**: First, the analysis identifies the historical and current stocking status for each river segment (see Exhibit 3-2). This analysis assumes that frog conservation activities will occur on river segments that are either currently stocked or have been stocked within the five years prior to the listing of the frog in 2002.
- **Step Two**: Next, the analysis estimates (1) the construction cost of artificial barriers to limit trout movement into frog habitat, and (2) the cost of trout removal projects.
- **Step Three**: The final step of the analysis combines information from the first two steps to calculate the potential economic costs by subunit. The potential costs are estimated as the sum of the costs associated with barrier construction and trout removal.

Step 1: Identify Rivers with Recent Trout Stocking Activity

91. According to discussions with CDFG, trout stocking activities have occurred recently in or downstream from five out of the fifteen subunits (Subunits 1A, 1B, 1F, 3A, and 3B). As shown in Exhibit 3-2, two of these rivers have been the target of past frog conservation activities, and the remaining three rivers could be subject to future conservation activities. In addition, although stocking has not occurred in Little Rock Creek (Subunit 1C) since 1998, the Service is currently undergoing efforts to remove non-native trout from this area (see discussion under "Step 2"). For the remaining nine subunits, trout are not currently stocked in subunit rivers and historical records indicate that stocking has not occurred since 1984 (see Exhibit 3-2 for details).

Step 2: Developing Compliance Cost Estimates

92. Costs of trout removal projects and the installation of fish barriers are obtained from past and current projects to limit trout movement on Little Rock Creek (Subunit 1C) and Big Rock Creek (Subunit 1B); and to remove non-native trout from frog habitat on Little Rock Creek.

93. In 2001, Little Rock Creek was chosen to be the site of a "manipulation experiment" to study the effects of trout removal on the establishment behavior of mountain yellow-legged frogs. The project area encompasses the uppermost reaches of Little Rock Creek where the creek is divided into three consecutive sections by natural fish barriers. An established frog population exists in the first section upstream of a natural waterfall. Rainbow trout occupy the second section although some sightings of the frog have been recorded. The third section includes only rainbow trout.

94. In 2002 and 2003, USFS enhanced the second natural barrier to prevent upstream trout movement, and CDFG initiated a trout removal program using electro-shocking and dip netting between the natural waterfall and the enhanced barrier, approximately one mile. In the first year CDFG removed 900 trout; in 2003, 90 trout were removed; and in 2004, 250 trout were removed. In 2005, high water levels prevented CDFG staff from conducting trout removal operations. According to discussions with the CDFG project lead, trout removal operations are expected to continue at the 2004 level of effort for approximately four more years until 100 percent removal is achieved (i.e., no trout remain).

95. In addition to Little Rock Creek, USFS is currently in the planning stages of constructing a concrete fish barrier on Big Rock Creek. Exhibits 3-5 and 3-6 summarize the compliance costs of past efforts to constructs barriers that limit trout movement on Little Rock Creek and Big Rock Creek and the compliance costs of trout removal operations on Little Rock Creek.

EXHIBIT #3-5 PAST TROUT BARRIER CONSTRUCTION COSTS

PROJECT	DESCRIPTION	COST[1]	COST YEAR	UNDISCOUNTED COST ($2005)[2]
Little Rock Creek	Enhancement of natural fish barrier	$15,000	2002	$15,759
Big Rock Creek	Construction of an artificial concrete-based fish barrier	$25,000	2006	$25,000

Notes:
1. Personal communication with Teresa Sue, Wildlife Biologist, Angeles National Forest.
2. Values adjusted using the GDP Implicit Price Deflator, Table 1.1.9. Implicit Price Deflators for Gross Domestic Product, U.S. Department of Commerce, Bureau of Economic Analysis. December 2005.

EXHIBIT #3-6 PAST TROUT REMOVAL COSTS ON LITTLE ROCK CREEK

YEAR	DESCRIPTION	PER CDFG STAFF[1]	PER VOLUNTEER[2]	TOTAL COSTS[2]	TOTAL UNDISCOUNTED COSTS ($2005)
2002	1 CDFG staff member for 4-days plus 20 volunteers receiving per-diem costs of $300/person.	$1,220	$6,000	$7,220	$7,740
2003	1 CDFG staff member for 4-days plus 12 volunteers receiving per-diem costs of $300/person.	$1,220	$3,600	$4,820	$5,064
2004	1 CDFG staff member for 4-days plus 4 volunteers receiving per-diem costs of $300/person.	$1,220	$1,200	$2,420	$2,477
2005	1 CDFG staff member for 5-days to assess river conditions for trout removal operations.	$1,145	$0	$1,145	$1,145

Source: Personal communication with Tim Hovey, Associate Fisheries Biologist, CDFG, November 16, 2005.

Notes:
1. Assumes an annual salary of $55,000 or approximately $28.65 per hour.
2. Volunteers received a per-diem of $300/person.
3. Total costs do not include equipment needs or disposal activities. CDFG already owns the necessary electro-shocking and dip-netting equipment for trout removal and no disposal costs are incurred as all trout removed are buried at the river, along the shore.

Step 3: Potential Economic Costs Associated with Non-native Trout Activities

96. Lower-bound past costs are limited to trout activities on Little Rock Creek (Subunit 1B), estimated to be approximately $31,000 (undiscounted dollars). Applying discount rates of three and seven percent yields present values of $34,000 and $38,000, respectively (Exhibit 3-7).

97. To estimate aggregate lower-bound future costs, potentially affected subunits identified in Step 1 are multiplied by per unit project costs described in Step 2.[41] The total future losses in subunits proposed for designation is approximately $182,000 (undiscounted dollars). In present value terms, future costs are estimated at $177,000 if a three percent discount rate is applied and $171,000 if a seven percent discount rate is applied (Exhibit 3-7).

[41] This analysis assumes that fish barrier construction occurs in 2006 and trout removal projects occur over a period of seven years. Note that the trout removal project on Little Rock Creek is projected to take place over a period of eight years total. The extra year reflects an incurred project delay due to one year of heavy rains in the San Gabriel mountains.

EXHIBIT # 3-7 LOWER-BOUND: SUMMARY OF PAST AND FUTURE IMPACTS OF FROG CONSERVATION ACTIVITIES ON RECREATIONAL TROUT FISHING

UNIT	SUBUNIT	TROUT BARRIER[1]	TROUT REMOVAL	PAST: 2002-2005			FUTURE: 2006-2026		
				UNDISCOUNTED DOLLARS	PRESENT VALUE 3%	PRESENT VALUE 7%	UNDISCOUNTED DOLLARS	PRESENT VALUE 3%	PRESENT VALUE 7%
1	A: San Gabriel River, East Fork	$22,000	$0	$0	$0	$0	$22,000	$22,000	$22,000
	B: Big Rock Creek, South Fork	$25,000	$24,000	$0	$0	$0	$49,000	$48,000	$46,000
	C: Little Rock Creek	$15,000	$25,000	$31,000	$34,000	$38,000	$10,000	$9,000	$8,000
	D: Devil's Canyon	$0	$0	$0	$0	$0	$0	$0	$0
	E: Day Canyon	$0	$0	$0	$0	$0	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork	$3,000	$0	$0	$0	$0	$3,000	$3,000	$3,000
	G: Bear Creek	$0	$0	$0	$0	$0	$0	$0	$0
2	A: City Creek	$0	$0	$0	$0	$0	$0	$0	$0
	B: Barton Creek	$0	$0	$0	$0	$0	$0	$0	$0
	C: Whitewater River, North Fork	$0	$0	$0	$0	$0	$0	$0	$0
3	A: San Jacinto River, North Fork	$25,000	$24,000	$0	$0	$0	$49,000	$48,000	$46,000
	B: Indian Creek	$25,000	$24,000	$0	$0	$0	$49,000	$48,000	$46,000
	C: Tahquitz Creek	$0	$0	$0	$0	$0	$0	$0	$0
	D: Andreas Creek	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL:		**$115,000**	**$98,000**	**$31,000**	**$34,000**	**$38,000**	**$182,000**	**$177,000**	**$171,000**

Notes: Totals may not sum due to rounding.

1 According to discussions with USFS staff, rivers in Units 1 and 3 have not been assessed for the installation of fish barriers and as such, it is unknown whether an artificial barrier or enhanced natural barrier would be necessary. This analysis assumes a cost of $25,000 per trout barrier for all subunits excluding Little Rock Creek.

2 The San Gabriel River, East Fork falls within the boundaries of the Sheep Mountain Wilderness Area. Therefore, this analysis assumes a fish barrier will be installed just outside of wilderness area on the East Fork of San Gabriel River to prevent upstream movement of trout but that no trout removal activities will occur in designated wilderness area. Costs are allocated to Subunits 1A and 1F based on the relative size of these units.

3.2.2 UPPER-BOUND: POTENTIAL IMPACTS ASSUMING ADEQUATE SUBSTITUTE TROUT FISHING LOCATIONS ARE NOT AVAILABLE

98. In order to estimate the economic impacts of lost trout fishing trips, the analysis employs a series of methodological steps as described below:

- **Step 1**: Estimate the number of trout fishing trips lost as a result of discontinuing trout stocking operations and/or installing barriers and removing stocked trout on rivers and streams within essential frog habitat.
- **Step 2**: Develop an estimate of the value of a lost trout fishing trip obtained by reviewing the economics literature for studies of recreational trout fishing activities with similar attributes (e.g., same species, river and stream fishing).
- **Step 3**: Calculate welfare losses by multiplying the estimated number of annual trout fishing trips lost by the appropriate per-trip welfare value obtained in Step 2 from the published economics literature. Annual losses are then summed over the relevant time period (2002-2005 for past losses and 2006-2025 for future losses).

Step 1: Number of Trips

99. Within proposed critical habitat, there are two types of trout stocking activities that could impact the frog:

- **In-stream Trout Stocking** includes annual trout stocking activities in a river or stream within proposed critical habitat. This type of trout stocking activity was discontinued on the San Jacinto River, North Fork (Subunit 3A) in 2002 and in Big Rock Creek (Subunit 1B) in 2003. For these rivers, the number of lost fishing trips is based on the annual number of trout historically stocked by CDFG in these rivers. CDFG tracks its trout stocking efforts in "total pounds of trout stocked." According to CDFG, pounds stocked translates to number of stocked trout assuming three (3) fish to one pound.[42]
- **Downstream Trout Stocking**, in contrast, describes trout stocking activities that occur downstream of proposed critical habitat. This type of trout stocking activity best describes the situation for Little Rock Creek (Subunit 1C), San Gabriel River East Fork (Subunit 1A), San Gabriel River East Fork, Iron Fork (Subunit 1F), and Indian Creek (Subunit 3B).[43] In the latter three streams, although an effective fish barrier will prevent trout from moving into essential habitat, the trout remain available to anglers downstream of the barriers. Therefore, lost trips are not estimated for Subunits 1A, 1F, and 3B. Because CDFG is undergoing a project to remove non-native trout from Little Rock Creek, lost trips are estimated in Subunit 1C.

[42] Personal communication with Terry Foreman and Dwayne Maxwell, CDFG, November 2005 - January 2006.

[43] CDFG stock trout downstream of Indian Creek at Lake Fulmore (Personal communication with Terry Foreman, CDFG, November 2005). In addition, trout stocking activities also occur downstream of San Gabriel River, East Fork near Cattle Canyon. The San Gabriel River, East Fork falls within the boundaries of the Sheep Mountain Wilderness Area. Therefore, this analysis assumes that a fish barrier will be installed just outside of wilderness area on the East Fork of San Gabriel River to prevent upstream movement of trout but that no trout removal activities will occur in designated wilderness area.

100. No data reporting the number of fishing trips or visitors to stream segments in essential habitat are available. Therefore, the number of fishing trips taken absent frog conservation activities is calculated based on the number of fish stocked in each stream segment, or, in the case of Little Rock Creek (Subunit 1C), the amount of fish removed from the stream. Preferably, the analysis would next rely upon an estimate from CDFG on the number of fishing trips generated from one trout stocked in a stream. However this information is not available for CDFG's trout stocking program. This analysis, therefore relies upon information gathered from previous analyses in other States. The analysis assumes that one trout stocked in a stream can generate from 0.6 to 1.2 fishing trips depending on various stream and recreational user attributes.[44] Therefore:

Annual trips = Number of Stocked Trout Per Year x Trips Generated Per Fish

101. Estimating the number of trout in essential habitat areas that experience in-stream stocking is straightforward. As described above, in Subunits 1B and 3A, CDFG maintains records of the pounds of trout stocked in each segment.

102. In Little Rock Creek, the analysis relies on the amount of trout removed during the CDFG's trout removal project.[45] As shown in Exhibit 3-8, in the first year, CDFG removed 900 trout, 90 trout in the second year, and 250 trout in the third year. Heavy rains prevented CDFG from conducting trout removal operations in the fourth year, however, CDFG expects that trout removal activities will continue for four additional years until there is 100 percent removal of all trout from the river segment. In total, approximately 1,750 fish are estimated to be removed from Little Rock Creek over the life of the project.

[44] In Pennsylvania, a trout stocked in a "high-yield" stream in the pre-season (March and April) is expected to generate 1.2 trips, and a trout stocked in-season (April through February) or in the fall (September and October) is expected to generate 0.9 trips (Hartle 2004a). In Connecticut, approximately 0.6 trips were generated for each stocked trout.

[45] This subunit had not been stocked since 1998, six years prior to this analysis. However, trout that were removed, or will be removed in the future, were available to anglers. Therefore, these fish are included in this welfare analysis.

EXHIBIT #3-8 ESTIMATED NUMBER OF TROUT REMOVED IN LITTLE ROCK CREEK

PROJECT YEAR	NUMBER OF TROUT REMOVED	SOURCE
1	900	Actual number of fish removed in 2002.
2	90	Actual number of fish removed in 2003.
3	250	Actual number of fish removed in 2004.
4	N/A	Heavy rains prevented trout removal activities.
5	170[1]	Average of trout removed in Years 2 and 3.
6	170[1]	Average of trout removed in Years 2 and 3.
7	170[1]	Average of trout removed in Years 2 and 3.
8	0[2]	Assumed to be equal to 0 during the project's final year as objective is 100% trout removal.
TOTAL:	**1,750**	

Source: Actual trout removal numbers obtained from personal communication with Tim Hovey, Associate Fisheries Biologist, CDFG, November 16, 2005.

Notes:
1. Estimated as the average of trout removed in Years 2 and 3.
2. Assumes 0 trout are removed in the final year of the project.

103. Exhibit 3-9 presents the annual fishing trips potentially lost within essential fish habitat by subunit.

EXHIBIT #3-9 AVERAGE ANNUAL FISHING TRIPS BY SUBUNIT

UNIT	SUBUNIT	YEARS OF IMPACT	AVERAGE ANNUAL FISHING TRIPS	
			LOW	HIGH
1	A: San Gabriel River, East Fork*			
	B: Big Rock Creek, South Fork	2003-2026	5,400	10,800
	C: Little Rock Creek	2002-2009	Refer to Exhibit 3-8	
	D: Devil's Canyon			
	E: Day Canyon			
	F: San Gabriel River, East Fork, Iron Fork			
	G: Bear Creek			
2	A: City Creek			
	B: Barton Creek			
	C: Whitewater River, North Fork			
3	A: San Jacinto River, North Fork	2002-2026	1,300	1,600
	B: Indian Creek			
	C: Tahquitz Creek			
	D: Andreas Creek			

Note: Totals may not sum due to rounding.
* Trout stocking activities also occur downstream of San Gabriel River, East Fork near Cattle Canyon. The San Gabriel River, East Fork falls within the boundaries of the Sheep Mountain Wilderness Area. Therefore, this analysis assumes that a fish barrier will be installed just outside of wilderness area on the East Fork of San Gabriel River to prevent upstream movement of trout but that no trout removal activities will occur in designated wilderness area.

Step 2: Value Per Trip

104. To estimate the consumer surplus value of a trout fishing trip, this analysis uses a benefits transfer approach. Benefits transfer involves adapting research conducted to estimate economic values under one set of circumstances to address a new policy question. In this manner, existing valuation research is combined with site-specific data and information to develop a "transferred" estimate. Benefits transfer has been widely applies in policy analysis and is approved for use within the Department of the Interior (DOI) guidelines for natural resource damage assessment under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In this case, existing estimates of consumer surplus value for trout fishing trips are multiplied by estimates of the number of trips not taken to essential habitat streams to estimate consumer surplus losses.

105. Best practice in the conduct of benefits transfer generally involves five steps:

- **Describe conditions to be valued:** Identify and describe in detail the valuation scenario, which in this case involves the nature and extent of trout fishing opportunities in Angeles and San Bernardino National Forests, the nature and extent of management restrictions present, and the manner in which these restrictions may affect angler behavior.

- **Identify relevant research:** Conduct a detailed search for relevant research in the economics literature.
- **Review research for quality and applicability:** Review relevant research carefully for quality and specific applicability.
- **Transfer economic values:** Apply the valuation information identified to the conditions being valued; in this case, to estimated changes in welfare associated with fewer fishing trips to essential habitat streams.
- **Address uncertainty:** Evaluate assumptions made in the process of transferring economic values and the sensitivity of final damage estimates to such assumptions.[46]

106. The nature and extent of fishing opportunities in essential habitat are discussed earlier in this chapter, and the potential for lost trips is quantified in Step 1 of this section.

107. An extensive review of literature producing welfare values for fishing was conducted, focusing on values for trout fishing in California. Exhibit 3-10 summarizes the relevant per day value estimates of a trout fishing trip from the identified studies. The work of Aiken and La Rouche (2003), Brown and Hay (1987), and Boyle et al. (1998) use survey data collected through the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation conducted every five years. Respondents are asked contingent valuation questions (i.e., a stated preference method) about their willingness to pay for trout fishing, and data are grouped in a variety of geographic regions depending on the study year.[47] The study by Roach (1996), though unpublished, uses a travel cost model (i.e., a revealed preference approach that relies on market data) to estimate consumer surplus values for trout fishing in California.[48]

[46] U.S. Environmental Protection Agency (EPA), *Guidelines for Preparing Economic Analyses, EPA 240-R-00-003*, pp. 86-87, September 2000; and Office of Management and Budget (OMB), *Circular A-4*, pp. 24-26, September 17, 2003.

[47] A. Myrick Freeman III notes in *The Measurement of Environmental and Resource Values* that values for respondents' willingness to *accept* a reduction in good or service may be higher than their willingness to *pay* for an increase in the same good or service. Because no studies estimating anglers' willingness to accept a reduction in fishing opportunities in California were identified in the literature search, this analysis uses anglers' willingness to pay for increased fishing opportunities as the best available estimate of fishing value.

[48] Roach estimates a single-site travel cost model that does not provide information about substitution to other locations.

EXHIBIT # 3-10 SUMMARY OF RECREATIONAL TROUT FISHING VALUATION LITERATURE (PER DAY VALUES)

AUTHOR(S)	STUDY LOCATION	TARGET SPECIES	VALUE ESTIMATE ($2005)[1]
Aiken and La Rouche (2003)	California	Trout	$63.26
Brown and Hay (1987)	California	Trout	$33.07
Boyle et al. (1998)	US Fish and Wildlife Service Region 1	Trout	$14.28
Roach (1996)	Four California Rivers in Sacramento, CA	Rainbow Trout	$59.32
		Steelhead Trout	$37.26
Average (All Studies):			**$41.44**
Average (Aiken et al. and Roach):			**$53.28[2]**

Notes:
1. Values adjusted using the GDP Implicit Price Deflator, Table 1.1.9. Implicit Price Deflators for Gross Domestic Product, U.S. Department of Commerce, Bureau of Economic Analysis. December 2005.
2. Aiken et al. (2003) report a per day value, while Roach (1996) reports a per trip value. Roach did not collect information about length of trip, therefore, we assume that average trip length is one day. This assumption is more to likely overstate that understate daily trip value.

108. Although the average of the values estimated in the identified studies is $41.44, this analysis uses $53.28, the average of the values obtained from Aiken et al. (2003) and Roach (1996), as the value of a lost trout fishing trip.[49] Other studies were deemed less suitable for application in this analysis. For example, Brown and Hay (1987) is almost 20 years old, and Boyle et al. (1998) utilizes a small sample size.[50] Exhibit 3-11 compares the applicability of the Aiken and La Rouche (2003) and the Roach (1996) studies to the policy question analyzed in this chapter. Both studies use generally accepted economic modeling tools, and the authors are recognized as experts in their fields. Although revealed preference approaches are generally preferred to stated preference methods, the National Survey of Fishing, Hunting and Wildlife-Associated Recreation is well-recognized study developed by the Service specifically for the purpose of analyzing regulatory policy questions.

[49] Aiken et al. (2003) report a per day value, while Roach (1996) reports a per trip value. Roach did not collect information about length of trip, therefore, we assume that average trip length is one day. This assumption is more to likely overstate that understate daily trip value.

[50] A technical reviewer suggests that we consider including an unpublished study titled "Sport Fishery Use and Value on the Unimpounded Snake River Above Lewiston, Idaho Phase II Report: Part 2 Willingness -to-Pay by Anglers on the Unimpounded Snake River During 1997-1998," prepared for the Army Corps of Engineers by Normandeau Associates in 1998. Because estimates of fishing values are available specifically for California, we chose not to include estimates from studies in other parts of the United States. Furthermore, the value estimated by Normandeau Associated is within the range of values presented in Exhibit 3-10.

EXHIBIT # 3-11 COMPARISON OF FISHING LITERATURE SITES AND ESSENTIAL HABITAT

CHARACTERISTICS	AIKEN AND LA ROACHE (2003)	ROACH (1996)	ESSENTIAL HABITAT
Species	Trout	Rainbow trout, steelhead trout	Non-native trout
Site Location	California (Statewide)	Sacramento Valley, California	Angeles and San Bernardino National Forests in Los Angeles, San Bernardino, and Riverside Counties, California
Habitat Type	Rivers, streams, lakes	American, Feather, Sacramento, and Yuba Rivers	Mountain streams above 1,214 feet in elevation
Valuation Method	Contingent valuation	Travel Cost	-
Unit of Estimate	Per day	Per trip	Per trip

Sources:

Aiken, R. and G.P. La Rouche. 2003. Net Economic Values for Wildlife-Related Recreation in 2001, Addendum to the 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation. U.S. Fish and Wildlife Service. Report 2001-3. Washington, D.C. September 2003.

Roach, B. 1996. Angler Benefits Along Four California Rivers: An Application of Tobit Analysis. Davis, CA. March 1996.

70 FR 54106 - 54143.

Step 3: Welfare Loss Estimation

109. To estimate aggregate recreational trout fishing welfare losses on an annual basis, the per trip value identified in Step 2 is multiplied by estimates of annual lost fishing trips. Annual losses are then summed over the relevant time period. Past welfare losses are calculated from 2002 to 2005, while future losses are calculated from 2006 to 2025.

110. Past welfare losses are estimated at approximately $1.3 million to $2.5 million (undiscounted dollars). Applying a discount rate of three percent yields a present value of $1.4 million to $2.7 million. Using a discount rate of seven percent yields a present value of $1.5 to $3.0 million (Exhibit 3-12). When welfare losses are added to compliance costs, total past impacts range from $1.3 million to $2.6 million (undiscounted dollars), or as high as $1.5 million to $3.0 million when calculating a present value using a seven percent discount rate.

111. Total future welfare losses in subunits proposed for designation are estimated to range from $7.2 to $14.5 million (undiscounted dollars). Applying a discount rate of three percent yields a present value of $5.5 million to $11.1 million. Using a discount rate of seven percent yields a present value of $4.1 to $8.2 million (Exhibit 3-13). When welfare losses are added to compliance costs, total future impacts range from $7.4 million to $14.6 million (undiscounted dollars), or as low as $4.3 million to $8.4 million when calculating a present value using a seven percent discount rate.

EXHIBIT # 3-12 UPPER-BOUND: SUMMARY OF PAST RECREATIONAL TROUT FISHING COSTS, 2002-2005 ($2006)

UNIT	SUBUNIT	PERIOD OF LOSS	AVERAGE ANNUAL TRIPS LOST		AVERAGE ANNUAL WELFARE LOSS		UNDISCOUNTED DOLLARS		PRESENT VALUE (3%)		PRESENT VALUE (7%)	
			LOW[1]	HIGH[1]	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
1	A: San Gabriel River, East Fork		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	B: Big Rock Creek, South Fork	2003-2005	5,400	10,800	$288,000	$575,000	$863,000	$1,726,000	$916,000	$1,832,000	$990,000	$1,979,000
	C: Little Rock Creek	2002-2005	390	790	$21,000	$42,000	$119,000	$238,000	$132,000	$264,000	$151,000	$302,000
	D: Devil's Canyon		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	E: Day Canyon		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	G: Bear Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
2	A: City Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	B: Barton Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	C: Whitewater River, North Fork		0	0	$0	$0	$0	$0	$0	$0	$0	$0
3	A: San Jacinto River, North Fork	2002-2005	1,300	2,700	$71,000	$142,000	$285,000	$569,000	$307,000	$613,000	$338,000	$676,000
	B: Indian Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	C: Tahquitz Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	D: Andreas Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
Total Welfare Losses:[2]					**$380,000**	**$760,000**	**$1,267,000**	**$2,533,000**	**$1,355,000**	**$2,709,000**	**$1,479,000**	**$2,958,000**
Total Compliance Costs (For detail, see Exhibit 3-7):							**$31,000**	**$31,000**	**$34,000**	**$34,000**	**$38,000**	**$38,000**
TOTAL Upper-bound Past Costs:[2]							**$1,297,000**	**$2,564,000**	**$1,388,000**	**$2,743,000**	**$1,517,000**	**$2,996,000**

Notes:
1. Low and high estimates result from a range of assumptions regarding the average number of trout caught per trip, used to estimate the number of trips taken to proposed critical habitat prior to the cessation of trout stocking activities.
2. Totals may not sum due to rounding.

EXHIBIT # 3-13 UPPER-BOUND: SUMMARY OF FUTURE RECREATIONAL TROUT FISHING COSTS, 2006-2025 ($2006)

UNIT	SUBUNIT	PERIOD OF LOSS	AVERAGE ANNUAL TRIPS LOST		AVERAGE ANNUAL WELFARE LOSS		UNDISCOUNTED DOLLARS		PRESENT VALUE (3%)		PRESENT VALUE (7%)	
			LOW[1]	HIGH[1]	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
1	A: San Gabriel River, East Fork		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	B: Big Rock Creek, South Fork	2006-2026	5,400	10,800	$288,000	$575,000	$5,754,000	$11,508,000	$4,409,000	$8,818,000	$3,261,000	$6,523,000
	C: Little Rock Creek	2006-2026	390	790	$21,000	$42,000	$49,000	$98,000	$47,000	$95,000	$46,000	$92,000
	D: Devil's Canyon		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	E: Day Canyon		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	G: Bear Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
2	A: City Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	B: Barton Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	C: Whitewater River, North Fork		0	0	$0	$0	$0	$0	$0	$0	$0	$0
3	A: San Jacinto River, North Fork	2006-2026	1,300	2,700	$71,000	$142,000	$1,423,000	$2,846,000	$1,090,000	$2,181,000	$807,000	$1,613,000
	B: Indian Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	C: Tahquitz Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
	D: Andreas Creek		0	0	$0	$0	$0	$0	$0	$0	$0	$0
Total Welfare Losses:[2]					**$380,000**	**$760,000**	**$7,226,000**	**$14,452,000**	**$5,547,000**	**$11,093,000**	**$4,114,000**	**$8,227,000**
Total Compliance Costs (For detail, see Exhibit 3-7):							**$182,000**	**$182,000**	**$177,000**	**$177,000**	**$171,000**	**$171,000**
TOTAL Upper-bound Future Costs:[2]							**$7,408,000**	**$14,635,000**	**$5,724,000**	**$11,270,000**	**$4,285,000**	**$8,399,000**

Note:
1. Low and high estimates result from a range of assumptions regarding the average number of trout caught per trip, used to estimate the number of trips taken to proposed critical habitat prior to the cessation of trout stocking activities.
2. Totals may not sum due to rounding.

3.3 UNCERTAINTIES

112. The estimates of the upper-bound recreational fishing losses are sensitive to the assumptions and chosen parameter values described in preceding section. Changes in these aspects of the analysis could significantly alter the impact estimate. For example:

- **Stocking Levels**. For rivers characterized by in-stream trout stocking, this analysis assumes that historical stocking levels will remain constant through 2025. However, stocking levels are determined by CDFG on an annual basis and depend on a number of factors, including, but not limited to, available funding, water quality conditions, and anticipated recreational use. To the extent that actual stocking levels differ, this analysis may under- or overestimate the number of trout stocked, the number of angling trips, and the corresponding welfare estimate.
- **Trips Generated per Stocked Fish**. The estimated fishing trips generated per stocked fish applied in this analysis may be an under- or overestimate of the true number of fishing trips generated per stocked fish within proposed critical habitat. Site-specific ratios between stocked fish and fishing trips were not available and the ratios used by other states may not accurately reflect river segments within proposed critical habitat.
- **Benefits Transfer Value**. The value of a recreational fishing trip applied in this analysis may be an under- or overestimate of the true fishing damages within proposed critical habitat. Site-specific trip values for stream segments within proposed critical habitat were not available, and the literature may not accurately reflect site-specific values.

113. More importantly, significant uncertainty exists regarding the decisions made by anglers in response to changes in stocking activity in essential habitat. This analysis uses readily available data to bound the potential impact of changes in fishing opportunities. The actual impact likely falls between these two bounds. Under the assumption that the probability distribution of impacts between these bounds is continuous, and because there is no evidence to suggest that the distribution is skewed toward either bound, the average of the two estimates represents the best estimate of trout fishing impacts.[51] The average is calculated using the lower-bound estimate and the high-end estimate in the upper-bound presented in Exhibits 3-14 and 3-15.

114. As shown in Exhibit 3-14, the best estimate of past impacts is $1.3 million is undiscounted dollars and may be as high as $1.5 million assuming a discount rate of seven percent. Exhibit 3-15 presents the best estimate of future impacts, $7.4 million. Assuming a discount rate of seven percent, the best estimate is $4.3 million.

[51] For the other types of affected activities discussed in this report, the low and high impact estimates presented result from analyzing the impacts of two distinct regulatory scenarios (e.g., signs are erected along hiking trails or the trails are moved out of proposed critical habitat). Because the probability distribution of costs between the scenarios for other activities is not continuous, it is not appropriate to present the average of the estimates.

EXHIBIT # 3-14 SUMMARY OF PAST IMPACTS TO RECREATIONAL TROUT ACTIVITIES IN ESSENTIAL FROG HABITAT ($2006)

UNIT	UNDISCOUNTED DOLLARS			PRESENT VALUE (3%)			PRESENT VALUE (7%)		
	LOWER-BOUND[2]	BEST ESTIMATE[3]	UPPER-BOUND[4]	LOWER-BOUND[2]	BEST ESTIMATE[3]	UPPER-BOUND[4]	LOWER-BOUND[2]	BEST ESTIMATE[3]	UPPER-BOUND[4]
1A	$0	$0	$0	$0	$0	$0	$0	$0	$0
1B	$0	$863,000	$1,726,000	$0	$916,000	$1,832,000	$0	$990,000	$1,979,000
1C	$31,000	$150,000	$268,000	$34,000	$166,000	$298,000	$38,000	$189,000	$340,000
1D	$0	$0	$0	$0	$0	$0	$0	$0	$0
1E	$0	$0	$0	$0	$0	$0	$0	$0	$0
1F	$0	$0	$0	$0	$0	$0	$0	$0	$0
1G	$0	$0	$0	$0	$0	$0	$0	$0	$0
2A	$0	$0	$0	$0	$0	$0	$0	$0	$0
2B	$0	$0	$0	$0	$0	$0	$0	$0	$0
2C	$0	$0	$0	$0	$0	$0	$0	$0	$0
3A	$0	$285,000	$569,000	$0	$307,000	$613,000	$0	$338,000	$676,000
3B	$0	$0	$0	$0	$0	$0	$0	$0	$0
3C	$0	$0	$0	$0	$0	$0	$0	$0	$0
3D	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL:	**$31,000**	**$1,297,000**	**$2,564,000**	**$34,000**	**$1,388,000**	**$2,743,000**	**$38,000**	**$1,517,000**	**$2,996,000**

Notes:
1 Totals may not sum due to rounding.
2 The San Gabriel River, East Fork falls within the boundaries of the Sheep Mountain Wilderness Area. Therefore, this analysis assumes a fish barrier will be installed just outside of wilderness area on the East Fork of San Gabriel River to prevent upstream movement of trout but that no trout removal activities will occur in designated wilderness area.
3 Because the probability distribution of impacts between these bounds is continuous, and there is no evidence to suggest that the distribution is skewed toward either bound, the best estimate of trout fishing impacts is the average of the lower-bound and the high estimate of the upper-bound.
4 The high-end range of the upper-bound estimate is used to calculate the best estimate.

EXHIBIT # 3-15 SUMMARY OF FUTURE IMPACTS TO RECREATIONAL TROUT ACTIVITIES IN ESSENTIAL FROG HABITAT ($2006)

UNIT	UNDISCOUNTED DOLLARS			PRESENT VALUE (3%)			PRESENT VALUE (7%)		
	LOWER-BOUND[2]	BEST ESTIMATE[3]	UPPER-BOUND[4]	LOWER-BOUND[2]	BEST ESTIMATE[3]	UPPER-BOUND[4]	LOWER-BOUND[2]	BEST ESTIMATE[3]	UPPER-BOUND[4]
1A	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000
1B	$49,000	$5,803,000	$11,557,000	$48,000	$4,456,000	$8,865,000	$46,000	$3,307,000	$6,569,000
1C	$10,000	$59,000	$108,000	$9,000	$56,000	$104,000	$8,000	$54,000	$100,000
1D	$0	$0	$0	$0	$0	$0	$0	$0	$0
1E	$0	$0	$0	$0	$0	$0	$0	$0	$0
1F	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000
1G	$0	$0	$0	$0	$0	$0	$0	$0	$0
2A	$0	$0	$0	$0	$0	$0	$0	$0	$0
2B	$0	$0	$0	$0	$0	$0	$0	$0	$0
2C	$0	$0	$0	$0	$0	$0	$0	$0	$0
3A	$49,000	$1,472,000	$2,896,000	$48,000	$1,138,000	$2,229,000	$46,000	$853,000	$1,659,000
3B	$49,000	$49,000	$49,000	$48,000	$48,000	$48,000	$46,000	$46,000	$46,000
3C	$0	$0	$0	$0	$0	$0	$0	$0	$0
3D	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL:	**$182,000**	**$7,408,000**	**$14,635,000**	**$177,000**	**$5,724,000**	**$11,270,000**	**$171,000**	**$4,285,000**	**$8,399,000**

Notes:
1 Totals may not sum due to rounding.
2 The San Gabriel River, East Fork falls within the boundaries of the Sheep Mountain Wilderness Area. Therefore, this analysis assumes a fish barrier will be installed just outside of wilderness area on the East Fork of San Gabriel River to prevent upstream movement of trout but that no trout removal activities will occur in designated wilderness area.
3 Because the probability distribution of impacts between these bounds is continuous, and there is no evidence to suggest that the distribution is skewed toward either bound, the best estimate of trout fishing impacts is the average of the lower-bound and the high estimate of the upper-bound.
4 The high-end range of the upper-bound estimate is used to calculate the best estimate.

CHAPTER 4 | POTENTIAL ECONOMIC IMPACTS TO OTHER RECREATIONAL ACTIVITIES

115. This section considers how frog conservation activities may impact non-fishing recreational activities, including hiking and camping, and rock climbing in areas of the Angeles and San Bernardino National Forests that contain essential frog habitat.

116. According to the proposed rule, recreational activities such as hiking and camping may have contributed to the decline of the frog in the San Gabriel, San Bernardino, and San Jacinto mountains. In areas occupied by frogs, human activities in and along streams can disrupt the various life stages of the frog as well as alter the stream's physical and biological attributes in ways that make the stream less suitable as habitat. The proposed rule cites the threat posed by heavy recreational use within several specific subunits. However, due to the proximity of the mountains to large urban centers, the potential exists for human recreational activities to impact all areas within essential frog habitat.

117. Since the listing of the species in 2002, impacts from frog conservation efforts on other recreational activities have been limited to the costs associated with additional patrolling in essential habitat along the San Jacinto River, North Fork (Subunit 3A), estimated to cost approximately $30,000 (undiscounted dollars). Exhibit 4-1 summarizes the estimated future costs for hiking activities under two different scenarios. The first scenario estimates future costs assuming frog conservation activities are limited to installing interpretive signs at trailheads and additional patrolling in areas with heavy recreational use. The second scenario assumes that in addition to installing signs and additional patrolling, all hiking trails within proposed critical habitat are relocated away from the river to avoid hiker-frog interactions. Under Scenario 1, this analysis estimates total future costs of $456,000 (undiscounted dollars). Under Scenario 2, total future costs are estimated at $1.4 million (undiscounted dollars).

118. In addition to hiking, this analysis estimates a one-year (2006) welfare loss of $1.0 to $1.4 million (undiscounted dollars) to sport climbers as a result of a temporary one-year closure of the area surrounding Williamson Rock on Little Rock Creek (Subunit 1C). Williamson Rock is accessed via an unofficial trail blazed through Little Rock Creek (Subunit 3C). The U.S Forest Service closed access to the site while it conducts a formal biological consultation with the Service to analyze the effects of recreation in the area. Continued closure of the site after completion of the consultation is unlikely.

EXHIBIT #4-1 SUMMARY OF FUTURE IMPACTS OF FROG CONSERVATION ACTIVITIES ON RECREATIONAL HIKING ACTIVITIES, 2006-2025 ($2006)

UNIT	SUBUNIT	UNDISCOUNTED DOLLARS		PRESENT VALUE (3%)		PRESENT VALUE (7%)	
		SCENARIO 1	SCENARIO 2	SCENARIO 1	SCENARIO 2	SCENARIO 1	SCENARIO 2
1	A: San Gabriel River, East Fork	$0	$0	$0	$0	$0	$0
	B: Big Rock Creek, South Fork	$1,000	$31,000	$1,000	$31,000	$1,000	$31,000
	C: Little Rock Creek	$152,000	$419,000	$117,000	$384,000	$87,000	$354,000
	D: Devil's Canyon	$0	$0	$0	$0	$0	$0
	E: Day Canyon	$0	$0	$0	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork	$0	$0	$0	$0	$0	$0
	G: Bear Creek	$0	$0	$0	$0	$0	$0
2	A: City Creek	$151,000	$442,000	$116,000	$407,000	$86,000	$377,000
	B: Barton Creek	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
	C: Whitewater River, North Fork	$0	$0	$0	$0	$0	$0
3	A: San Jacinto River, North Fork	$150,000	$422,000	$115,000	$387,000	$85,000	$357,000
	B: Indian Creek	$1,000	$117,000	$1,000	$117,000	$1,000	$117,000
	C: Tahquitz Creek	$0	$0	$0	$0	$0	$0
	D: Andreas Creek	$0	$0	$0	$0	$0	$0
	TOTAL:	**$456,000**	**$1,433,000**	**$351,000**	**$1,328,000**	**$261,000**	**$1,238,000**

119. The chapter considers impacts to recreational activities in three sections: (1) hiking, (2) rock climbing and (3) camping. Each section begins with a brief discussion of the recreational activity in areas of essential frog habitat. Next, the analysis provides an overview of the general methodology and approach used for estimating the impact of frog conservation activities on the specific recreational activity. Finally, the sections present past and future costs of frog conservation for each recreational activity.

4.1 HIKING ACTIVITIES

120. According to GORP, an organization providing comprehensive information about recreational opportunities on Federal lands, San Bernardino National Forest offers over 500 miles of hiking trails in the San Bernardino National Forest. The Angeles National Forest reports over 550 miles of hiking trails, including 73 miles of National Recreation Trails and 176 miles along the Pacific Crest Trail. Within areas of essential frog habitat, the proposed rule identified hiking as a threat in nearly all subunits.

121. There have been no past consultation on recreational hiking within proposed critical habitat. However, in 2001, the San Jacinto Ranger District in the San Bernardino National Forest installed signs at various sites throughout the District to educate visitors of frog presence. The U.S. Forest Service (USFS) incurred minimal costs for these signs, producing them in-house at a total cost of $1,000, with the majority of these costs going to the purchase of lumber posts.

4.1.1 PAST IMPACTS

122. In proposed critical habitat, past impacts are limited to frog conservation activities implemented by the San Bernardino National Forest on Fuller Mill Creek and Dark Canyon, part of the North Fork of the San Jacinto River (Subunit 3A), an area of heavy recreational use. In 2001, the San Jacinto Ranger District implemented a number of frog conservation activities, including:

- Installing ten (10) interpretive signs at various trailheads to educate visitors on frog presence and habitat requirements;
- At the Fuller Mill Creek picnic area, removing wooden picnic tables located adjacent to the stream and replacing them with concrete picnic tables located upland, away from the stream; and
- Adding a half-time seasonal employee to patrol the Dark Canyon and Fuller Mill Creek areas on peak recreational use days during the summer.

123. Costs associated with installation of the interpretive signs and re-designing the Fuller Mill Creek picnic area occurred in 2001, one year before the final listing of the species in 2002. As a result, this analysis does not include the costs of these past frog conservation activities.

124. According to USFS, a half-time seasonal employee patrolling on days of heavy recreational use costs approximately $7,500 per year, or $30,000 from 2002 to 2005. Applying discount rates of three to seven percent yields total present value costs of $32,000 and $36,000, respectively.

4.1.2 FUTURE IMPACTS

125. According to the proposed rule, protection measures to mitigate the impact of hiking on frog populations, include closing, re-routing or re-constructing hiking trails away from frog habitat and installing interpretive signs at trailheads and along access points to educate hikers of the species' biology and habitat requirements.

126. The analysis employs two scenarios to estimate the potential future impacts of frog conservation activities on recreational hiking within essential frog habitat:

- **Scenario 1**: The San Jacinto Mountains in the San Bernardino National Forest is an area of heavy recreational use, especially during the summer months. Based on past conservation measures undertaken at the forest, Scenario 1 assumes that frog conservation activities for recreational hiking will be limited to installing a minimum of two (2) signs per trail for all trails that intersect essential frog habitat and adding seasonal employees to patrol areas of heavy recreation use during the summer.
- **Scenario 2**: The second scenario, by contrast, assumes that in addition to installing interpretive signs and additional patrolling, USFS will also be required to relocate all hiking trails within essential frog habitat away from the river to avoid interactions between hikers and frog habitat. These measures are recommended in the proposed rule.

Scenario 1: Installing Interpretive Signs & Additional Patrolling

127. To estimate the potential economic impacts to hiking within essential frog habitat, the analysis uses hiking guides, discussions with USFS wildlife biologists, and Geographic Information Systems (GIS) to identify the number of trails that intersect essential frog habitat. Exhibit 4-2 provides a summary of the number of trails that intersect proposed critical habitat units and identifies areas of heavy recreational use where installation of signs and additional patrolling are likely. As shown, much of the proposed critical habitat falls within designated wilderness areas. Typically areas outside of designated wilderness areas are subject to the greatest recreational pressure.

128. Estimates of the cost of installing interpretive signs ranges from $100 to $500. The interpretive signs installed at San Jacinto River, North Fork cost approximately $100 each, while the wildlife biologist at City Creek, estimated the cost at approximately $500 per sign. To be conservative, this analysis uses a per-sign cost estimate of $500. For additional patrolling, this analysis uses the past experience of the San Jacinto Ranger District, estimating costs at $7,500 per year per additional patrol person.

EXHIBIT #4-2 SUMMARY OF RECREATIONAL HIKING USE BY SUBUNIT WITHIN PROPOSED CRITICAL HABITAT

UNIT	SUBUNIT	DESIGNATED WILDERNESS AREA	NUMBER OF HIKING TRAILS INTERSECTING ESSENTIAL HABITAT	HEAVY RECREATIONAL USE
1	A: San Gabriel River, East Fork	Yes		
	B: Big Rock Creek, South Fork	No	1	No
	C: Little Rock Creek	No	2	Yes
	D: Devil's Canyon	Yes		
	E: Day Canyon	Yes		
	F: San Gabriel River, East Fork, Iron Fork	Yes		
	G: Bear Creek	Yes		
2	A: City Creek[1]	No	1	No
	B: Barton Creek	No	1	Yes
	C: Whitewater River, North Fork	Yes		
3	A: San Jacinto River, North Fork	No	Not applicable. Signs and additional patrol installed as part of past conservation activities.	
	B: Indian Creek	No	1	No
	C: Tahquitz Creek	Yes		
	D: Andreas Creek	Yes		
		TOTAL:	**6**	**2**

Notes:
1. According to discussions with the wildlife biologist at City Creek, there are no designated hiking trails in the City Creek area. Prior to the 2003 wildfires, access to this area was limited due to forest and vegetation density. However, since the 2003 wildfires, there is greater access to the creek, resulting in the construction of some informal trails by local hikers. It is not clear how many of these informal trails have developed in the area but the USFS wildlife biologist estimates at least two (2) signs will need to be installed in the area.

129. As shown in Exhibit 4-3, aggregate costs under Scenario 1 from 2006 to 2025 are estimated at $456,000 (undiscounted dollars). Applying discount rates of three and seven percent yield a total present value of $351,000 and $261,000, respectively.

EXHIBIT #4-3 SCENARIO 1: SUMMARY OF FUTURE IMPACTS TO HIKING ACTIVITIES, 2006-2025 ($2006)

		INTERPETIVE SIGNS			ADDITIONAL PATROL		TOTAL COSTS		
UNIT	SUBUNIT	NUMBER OF TRAILS	NUMBER OF SIGNS	UNDISCOUNTED DOLLARS	NUMBER OF ADDITIONAL PATROL	UNDISCOUNTED DOLLARS	UNDISCOUNTED DOLLARS	PRESENT VALUE 3%	PRESENT VALUE 7%
1	A: San Gabriel River, East Fork	0	0	$0	0	$0	$0	$0	$0
	B: Big Rock Creek, South Fork	1	2	$1,000	0	$0	$1,000	$1,000	$1,000
	C: Little Rock Creek	2	4	$2,000	1	$150,000	$152,000	$117,000	$87,000
	D: Devil's Canyon	0	0	$0	0	$0	$0	$0	$0
	E: Day Canyon	0	0	$0	0	$0	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork	0	0	$0	0	$0	$0	$0	$0
	G: Bear Creek	0	0	$0	0	$0	$0	$0	$0
2	A: City Creek	1	2	$1,000	0	$150,000	$151,000	$116,000	$86,000
	B: Barton Creek	1	2	$1,000	1	$0	$1,000	$1,000	$1,000
	C: Whitewater River, North Fork	0	0	$0	0	$0	$0	$0	$0
3	A: San Jacinto River, North Fork	0	0	$0	1	$150,000	$150,000	$115,000	$85,000
	B: Indian Creek	1	2	$1,000	0	$0	$1,000	$1,000	$1,000
	C: Tahquitz Creek	0	0	$0	0	$0	$0	$0	$0
	D: Andreas Creek	0	0	$0	0	$0	$0	$0	$0
TOTAL:		**6**	**12**	**$6,000**	**3**	**$450,000**	**$456,000**	**$351,000**	**$261,000**

Note: Numbers may not add due to rounding.

Scenario 2: Installing Interpretive Signs and Relocating Hiking Trails Away From Essential Frog Habitat

130. Under Scenario 2, this analysis assumes that in addition to installing interpretive signs and additional patrolling, USFS will also be required to relocate all hiking trails within essential frog habitat away from the river to avoid interactions between hikers and frog habitat. In addition, several of the hiking trails within proposed critical habitat lead hikers across the river. For these trails, this analysis assumes that USFS will be required to install foot bridges to keep hikers out of the streams. These assumptions are consistent with information provided in the proposed rule regarding measures that will mitigate threats to the frog and its habitat.

131. To estimate the miles of hiking trails that intersect essential habitat outside of designated wilderness areas, this analysis uses hiking guides, discussions with USFS wildlife biologists, and GIS. As shown in Exhibit 4-4, a total of approximately seven miles of hiking trails within proposed critical habitat may require relocation. In addition, within these seven miles, trails lead hikers across the river on four occasions.

132. According to USFS recreation officers, trail construction costs are approximately $30,000 to $40,000 per mile depending on the type of terrain. Since most habitat is located in fairly steep areas along rivers and streams, this analysis uses $40,000 per mile as the trail construction cost in essential frog habitat. To install a wooden foot bridge with handrails costs approximately $100,000 per bridge.

133. To estimate aggregate costs under Scenario 2, information on trail and foot bridge construction costs are combined with estimates of the miles of hiking trails that intersect proposed critical habitat and the number of river crossings. This analysis assumes that all construction costs will occur in 2006 at a total cost of approximately $980,000 (2006 dollars). Adding this to the costs of installing signs and additional patrolling previously estimated, total costs under Scenario 2 amount to $1.4 million (undiscounted dollars). Applying discount rates of three and seven percent yields total present values of $1.3 million and $1.2 million, respectively (Exhibit 4-4).

EXHIBIT #4-4 SCENARIO 2: SUMMARY OF FUTURE IMPACTS TO HIKING ACTIVITIES, 2006-2025 ($2006)

UNIT	SUBUNIT	DESIGNATED WILDERNESS AREA	ESTIMATED MILES OF HIKING TRAILS INTERSECTING ESSENTIAL HABITAT	NUMBER OF RIVER OR STREAM CROSSINGS	TRAIL RELOCATION	SIGNS & ADDITIONAL PATROLLING	TOTAL COSTS		
							UNDISCOUNTED DOLLARS	PRESENT VALUE, 3%	PRESENT VALUE, 7%
1	A: San Gabriel River, East Fork	Yes	0	0	$0	$0	$0	$0	$0
	B: Big Rock Creek, South Fork	No	0.75	0	$30,000	$0	$31,000	$31,000	$31,000
	C: Little Rock Creek	No	4.18	1	$270,000	$150,000	$419,000	$384,000	$354,000
	D: Devil's Canyon	Yes	0	0	$0	$0	$0	$0	$0
	E: Day Canyon	Yes	0	0	$0	$0	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork	Yes	0	0	$0	$0	$0	$0	$0
	G: Bear Creek	Yes	0	0	$0	$0	$0	$0	$0
2	A: City Creek	No	0[1]	0	$290,000	$150,000	$442,000	$407,000	$377,000
	B: Barton Creek	No	0	0	$0	$0	$1,000	$1,000	$1,000
	C: Whitewater River, North Fork	Yes	0	0	$0	$0	$0	$0	$0
3	A: San Jacinto River, North Fork	No	1.81	2	$270,000	$150,000	$422,000	$387,000	$357,000
	B: Indian Creek	No	0.4	1	$120,000	$0	$117,000	$117,000	$117,000
	C: Tahquitz Creek	Yes	0	0	$0	$0	$0	$0	$0
	D: Andreas Creek	Yes	0	0	$0	$0	$0	$0	$0
TOTAL:			**7.14**	**4**	**$977,000**	**$456,000**	**$1,433,000**	**$1,328,000**	**$1,238,000**

Notes: Numbers may not add due to rounding.

* According to discussions with the wildlife biologist at City Creek, there are no designated hiking trails in the City Creek area.

Estimating the Loss Associated with Diminished Recreational Hiking Opportunities

134. The relocation of hiking trails away from the river may redirect hikers to less desirable routes, diminishing their hiking experience and resulting in welfare loss. Information describing hikers' preferences regarding the specific location of these trails (e.g., distance trail is set back from streams) is not readily available. In addition, the total miles of hiking trails potentially affected by frog conservation activities represent a small percentage, less than three percent, of the total miles of hiking trails available to National Forest visitors.[52] Therefore, this analysis assumes that adequate substitute hiking trails are available to offset potential restrictions placed on recreational hiking within essential frog habitat and does not estimate any welfare losses to recreational hikers.

4.2 ROCK CLIMBING AT WILLIAMSON ROCK (LOS ANGELES COUNTY)

135. In the headwaters of Little Rock Creek is Williamson Rock, a unique granite feature that is considered to be the premier rock climbing area in Southern California. Located only an hour and half east of the Los Angeles metropolitan area (40 to 80 miles), Williamson Rock receives a large number of sport climbers, particularly on weekend days during the peak season, which runs from July to September. According to a local climbing guide, Williamson Rock features over 230 climbing routes for all levels from beginners to experts. Situated inside the Angeles National Forest, visitors to Williamson Rock can pay either a $5 day use fee or $30 for an annual pass.

136. There is no designated trail providing access to Williamson Rock. As a result, an unofficial trail has been blazed by local climbers to the popular site that follows and eventually crosses Little Rock Creek, within proposed critical habitat. On December 27, 2005, USFS "temporarily limited access" to approximately 1,000 acres surrounding Williamson Rock in order to protect critical habitat for the frog.

137. According to USFS' press release, this closure will allow USFS to conduct a formal biological consultation with the Service to analyze the effects, if any, of recreation activities within the area. USFS hopes that a proposal can be developed that will allow rock climbing at Williamson Rock to continue without jeopardizing the frog or its habitat, but until that consultation is complete, the area will remain closed. This section presents an estimate of the future economic impacts of a temporary one-year closure of Williamson Rock.[53] The USFS believes it is unlikely the closure will extend beyond the completion of its consultation with the Service.

[52] Approximately 12 and 11 miles of hiking trails fall within essential frog habitat in the Angeles and San Bernardino National Forest, respectively. Assuming that each National Forest has at least 500 miles of hiking trails available to visitors, hiking trails that fall within proposed critical habitat account for approximately 2.2 and 2.4 percent of the total available hiking miles.

[53] Within the proposed CHD, there have been no past impacts on rock climbing activities due to frog conservation activities.

4.2.1 APPROACH

138. As discussed in Chapter, lost recreational activity is typically measured as a reduction in consumer surplus (see Chapter 3 for discussion of consumer surplus and welfare loss). Ideally, this analysis would develop and use an economic model of climbers' preferences for different rock climbing areas in the Southern California region to predict how climbing behavior and enjoyment might change as a result of frog conservation activities, and to estimate the associated welfare losses. For example, as a result of closing Williamson Rock, climbers may decide to go to a second-best rock climbing location, decide to climb indoors, or decide not to go climbing at all. The welfare loss associated with each option, measured in terms of consumer surplus, will vary depending on the climber's value of his or her first choice climbing experience and alternatives. Because primary research is beyond the scope of this effort, this analysis draws upon existing valuation research performed in similar resource contexts and combines this information with site-specific data to develop an estimate of recreational rock climbing losses due to the temporary closure at Williamson Rock.[54]

139. Specifically, this analysis employs a series of methodological steps to estimate rock climbing losses:

- **Step One**: Estimate the number of rock climbing trips lost as a result of the temporary one-year closure within essential frog habitat.
- **Step Two**: Review relevant economics literature for studies of the value of rock climbing activities with similar attributes.
- **Step Three**: Multiply the estimated number of annual rock climbing trips lost (Step 1) by the per-trip welfare value identified in Step 2. The result is the cost associated with lost climbing trips to Williamson Rock.

Step One: Number of Rock Climbing Trips

140. Estimates of the number of rock climbing day trips were obtained from the local rock climbing group, Friends of Williamson Rock. Based on their experience rock climbing at the site, Williamson Rock receives approximately 10,600 to 14,600 visitors each year. As shown in Exhibit 4-5, the majority (55 percent) of these visits occur during the peak season between July and September.

[54] Unlike the analysis of welfare losses to trout anglers, the analysis of rock-climbing welfare losses does not estimate a lower-bound loss assuming identical substitute sites are available. Williamson Rock is a popular location close to the Los Angeles metropolitan area. While this site is closed, alternatives with similar characteristics in terms of the types of climbing routes, crowding, and proximity to Los Angeles are unlikely to be available.

EXHIBIT #4-5 ANNUAL NUMBER OF ROCK CLIMBING TRIPS AT WILLIAMSON ROCK

SEASON	MONTHS	LOW	HIGH
Peak Season	July - September	5,800	8,000
Off-Peak Season	October, March - June	4,800	6,600
	TOTAL:	**10,600**	**14,600**
Source: Personal communication with Troy Mayer, Founder, Friends of Williamson Rock.			

Step Two: Rock Climbing Value per Trip

141. Chapter 3 describes the practice of benefits transfer, where economic values estimated under one set of circumstances are adapted to address a new policy question. The steps for conducting a benefits transfer exercise are discussed in detail in Section 3.2.2. The condition being valued in this analysis is a one-year closure of access to Williamson Rock, as described previously in this section.

142. Few studies have been conducted on the value of rock climbing opportunities. A search of the published economics literatures returned two studies relevant to the policy question considered in this analysis. Shaw and Jakus (1996) conducted a study of rock climbing activities at Mohonk Preserve. Mohonk Preserve is New York State's largest nonprofit nature preserve and is located just 90 miles North of New York City.[55] Mohonk Preserve, also known as the "Gunks" for its location in the Shawangunk Mountains, is considered the premier rock climbing area in the Northeastern United States offering over 1,000 climbing routes for climbers of all levels from beginners to experts. According to the Preserve's websites, the Gunks receive over 50,000 climber visits each year.[56] Shaw and Jakus collected original survey data in 1993 for 183 Mohonk Preserve climbers. With these data, they developed a travel cost model and produced two potentially relevant rock climbing value estimates: (1) an estimate of the loss in welfare associated with reducing the number of climbing routes at Mohonk Preserve by 50 percent and (2) a per-trip estimate of consumer surplus for rock climbing at the Preserve.

143. The second study, Grijalva et al. (2002), attempts to analyze the impact of a 1998 USFS policy change restricting the way climbers could recreate in wilderness areas.[57] The 1998 proposal prohibited the use or placement of fixed climbing anchors in designated wilderness areas, effectively eliminating access to climbers in these wilderness areas. To estimate the economic impact of this proposal, Grijalva et al. collected original survey data from 597 climbers intercepted at three major rock climbing areas: Red Rocks Canyon (NV), Hueco Tanks (TX), and Obed River (TN). Using a random utility model

[55] Shaw, W. D., and P. Jakus. 1996. "Travel Cost Models of the Demand for Rock Climbing." *Agricultural and Resource Economics Review,* 25:133-142.

[56] Mohonk Preserve Website, " Why do climbers from all over the world climb at Mohonk Preserve?" Accessed on January 13, 2006 at: http://www.mohonkpreserve.org/index.php?climb&hashID=35ec9202a90545b70a9222317466b51f

[57] Grijalva T.C.; Berrens R. P.; Bohara A. K.; Jakus P. M.; Shaw W.D. "Valuing the Loss of Rock Climbing Access in Wilderness Areas: A National-Level, Random-Utility Model" Land Economics, Volume 78, Number 1, 1 February 2002, pp. 103-120(18).

(RUM), Grijalva et al. estimated an annual per person consumer surplus value assuming access to six USFS Wilderness Areas was completely lost for all climbers nationwide.

144. Neither of these two studies provide an ideal match for application in this proposed designation. For example, Grijalva et al. (2002) considers a loss of rock climbing opportunities nationwide at multiple sites. At Williamson Rock, one site within a finite geographic area is closed. In contrast, Shaw and Jakus (1996) focus on one site, the Mohonk Preserve in New York, which shares attributes similar to Williamson Rock, including proximity to a large metropolitan area. The first value estimate provided by Shaw and Jakus models a policy choice that closes a section of Mohonk Preserve to climbing, a model that does not accurately reflect the circumstances facing Williamson Rock. The authors also estimate a per-trip value of $95.20 for a site that is completely open.

145. As previously mentioned, ideally, this analysis would develop and use an economic model that considers climbers' behavior if confronted with the loss of one site out of many within a confined geographic area, thus incorporating the availability of substitute sites. However such a model is not available.[58] Therefore, given the relative similarities between Mohonk Preserve and Williamson Rock, and in order to understand the magnitude of the potential loss to rock climbing activities, this analysis uses the $95.20 per-trip value developed by Shaw and Jakus.[59] Exhibit 4-6 provides a summary of the two studies and the rock climbing value estimated by each study.

Step Three: Welfare Loss Estimation

146. To estimate aggregate rock climbing losses on an annual basis, the valuation information on rock climbing trips lost is combined with estimates of annual rock climbing trips at Williamson Rock. The associated lost welfare is calculated by multiplying the estimated number of trips that would have been taken if Williamson Rock was not closed for one-year by the per trip value ($95.20). This assumes that all trips are lost and not substituted elsewhere.

[58] The study by Grijalva et al. (2002) considers substitution to other climbing sites when certain areas are closed. However, the model assumes that climbers will travel hundreds of miles between locations and the average trip length is approximately two days. Because the type of travel undertaken to get to these sites is fundamentally different than short day trips that characterize Williamson Rock, we do not use this study to consider impacts when substitutes are available.

[59] Note that visitation at the Gunks is more than four times as high as visitation at Williamson Rock. It is unclear whether congestion at the two sites is similar, and congestion levels influence the value climbers derive from a site. The direction of bias from the differing levels of visitation is unknown.

EXHIBIT #4-6 SUMMARY OF ROCK CLIMBING VALUATION LITERATURE

AUTHOR(S)	STUDY DESCRIPTION	STUDY LOCATION	METRIC	METHODOLOGY	VALUE ESTIMATE ($2005)
Shaw and Jakus (1996)	A 50 percent reduction in the number of climbing routes available.	Mohonk Preserve, NY	Per Person per Year	Random Utility Model	$9.34
	Permanent loss of rock climbing opportunities at Mohonk Preserve, NY.	**Mohonk Preserve, NY**	**Per Person per Trip**	**Travel Cost Model**	**$95.20**
Grijalva et al. (2002)	Permanent loss of rock climbing opportunities at six USFS wilderness areas.	United States	Per Person per Year	Random Utility Model	$14.13
Note: Values adjusted using the GDP Implicit Price Deflator, Table 1.1.9. Implicit Price Deflators for Gross Domestic Product, U.S. Department of Commerce, Bureau of Economic Analysis. December 2005.					

4.2.2 FUTURE IMPACTS

147. As shown in Exhibit 4-7, a temporary one-year closure of Williamson Rock is estimated to result in a total welfare loss of approximately $1.0 to $1.4 million.

EXHIBIT #4-7 SUMMARY OF FUTURE IMPACTS OF FROG CONSERVATION ACTIVITIES ON ROCK CLIMBING ACTIVITIES ($2006)

	AVERAGE ANNUAL TRIPS		AVERAGE ANNUAL LOSSES	
SEASON	LOW	HIGH	LOW	HIGH
Peak Season	5,800	8,000	$553,000	$763,000
Off-Peak Season	4,800	6,600	$455,000	$624,000
TOTAL:	**10,600**	**14,600**	**$1,008,000**	**$1,387,000**
Note: Numbers may not add due to rounding.				

4.2.3 UNCERTAINTIES

148. The estimates of recreational rock climbing losses are sensitive to the assumptions and chosen parameter values described in preceding sections. Changes in these or other aspects of the analysis could significantly alter the damage estimate. Some significant aspects include:

- **Annual Rock Climbing Trips**. The estimated number of rock climbing trips used in this analysis may be an under- or overestimate of the true number of rock climbing trips that occur at Williamson Rock.
- **Benefits Transfer Value**. The value of a rock climbing trip applied in this analysis may be an under- or overestimate of the true damages to rock climbing within proposed critical habitat. Site-specific trip values for Williamson Rock were not available, and the literature may not accurately reflect site-specific values.

4.3 CAMPING

149. In addition to miles of hiking trails, both Angeles and San Bernardino National Forests maintain a number of developed campsites for use by forest visitors. Angeles National Forest offers 53 campsites and San Bernardino National Forest offers 19 campsites.

150. In the Angeles National Forest, the majority of essential frog habitat falls within designated wilderness areas with the exception of Little Rock Creek and Big Rock Creek. There are no campsites adjacent to either rivers in these areas. In the San Bernardino National Forest, one campsite, Dark Canyon, falls in essential frog habitat.

4.3.1 PAST IMPACTS

151. Dark Canyon is open from May to October and originally offered a total of 21 campsites at the nightly rate of $12 per site. In 2001, prior to the listing of the species, four campsites adjacent to the river were permanently closed due to the frog, reducing the total available campsites to 17. In addition to closing river campsites, USFS also installed fencing along the river to prevent campers from entering the stream, thus providing greater protection to the existing frog population in that area. Costs associated with closure of the four campsites adjacent to the river occurred in 2001, one year earlier than the final listing of the species in 2002. As a result, this analysis does not include the associated costs of these frog conservation activities.

4.3.2 FUTURE IMPACTS

152. Based on a review of area hiking guides, discussions with USFS wildlife biologists, and GIS there are no additional campsites adjacent to the rivers within the proposed designation.

4.4 CAVEATS

153. It is important to recognize the uncertainty inherent in the assumptions underlying this analysis of potential impacts to other recreational activities. Exhibit 4-8 discusses the uncertainties.

EXHIBIT # 4-8 CAVEATS TO THE ECONOMIC ANALYSIS OF IMPACTS TO OTHER RECREATIONAL ACTIVITIES

KEY ASSUMPTION	EFFECT ON IMPACT ESTIMATE
To estimate the costs associated with relocating hiking trails, this analysis relies on estimates of the miles of hiking trails intersecting essential habitat. To the extent that the actual miles of hiking trails that need to be constructed in order to avoid essential habitat differs, this analysis may over- or understate the impact of frog conservation activities.	+/-
In the estimation of impacts related to lost rock climbing trips, the analysis does not allow for participation at a substitute site or in a substitute activity. To the extent that visitors choose to climb at other locations or in another way, this analysis overstates the impact of frog conservation activities.	+
The value of a rock climbing trip applied in this analysis may be an under- or overestimate of the true damages to rock climbing within proposed critical habitat. Site-specific trip values for Williamson Rock were not available, and the literature may not accurately reflect site-specific values.	+/-
- : This assumption may result in an underestimate of real costs. + : This assumption may result in an overestimate of real costs. +/-: This assumption has an unknown effect on estimates.	

CHAPTER 5 | POTENTIAL ECONOMIC IMPACTS TO DEVELOPMENT ACTIVITIES

154. This section considers how frog conservation activities may impact development activities in areas that contain essential frog habitat. The section first reviews past costs of consultations and the development of Habitat Conservation Plans (HCPs) in areas with essential frog habitat. Then, the analysis reviews the private lands contained within the designation. This is followed by an overview of the potential limitations on development for those areas, including current zoning laws as obtained from city and county planning departments.

155. The analysis does not anticipate that the designation of critical habitat and resulting frog conservation activities will substantially affect or limit private development due to a number of factors. First, private lands within proposed critical habitat are located in mountainous areas and are generally unsuitable for large-scale development. In addition, typical measures to protect frog habitat include a 50-foot buffer around streams, which is likely to be easily incorporated in building designs given the size of affected parcels and existing density restrictions. As a result, future development in these areas is unlikely to threaten the frog. However, for reference and to further describe the private lands contained in essential habitat, this section concludes with a summary of the reported market value of these private lands.

5.1 PRIVATE LANDS WITHIN PROPOSED CRITICAL HABITAT

156. Potentially developable private lands are found in two areas: proposed habitat in City Creek (subunit 2A) and essential habitat proposed for exclusion adjacent to the San Jacinto River, North Fork (subunit 3A). Along City Creek, essential frog habitat overlaps with five privately owned parcels. Exhibit 5-1 provides a map of the location of private lands within this subunit.

157. On the San Jacinto River, North Fork, there are two stretches of private lands along Fuller Mill Creek, known as the Pinewood Community. Within this community, a total of 29 parcels overlap with essential frog habitat proposed for exclusion. The total acreage of these parcels is approximately 243 acres, of which 44 percent (or 107 acres) overlap with essential frog habitat. Exhibit 5-2 provides a map of the location of these private lands within this subunit.

EXHIBIT #5-1 MAP SHOWING THE LOCATION OF PRIVATE LANDS WITHIN SUBUNIT 2A

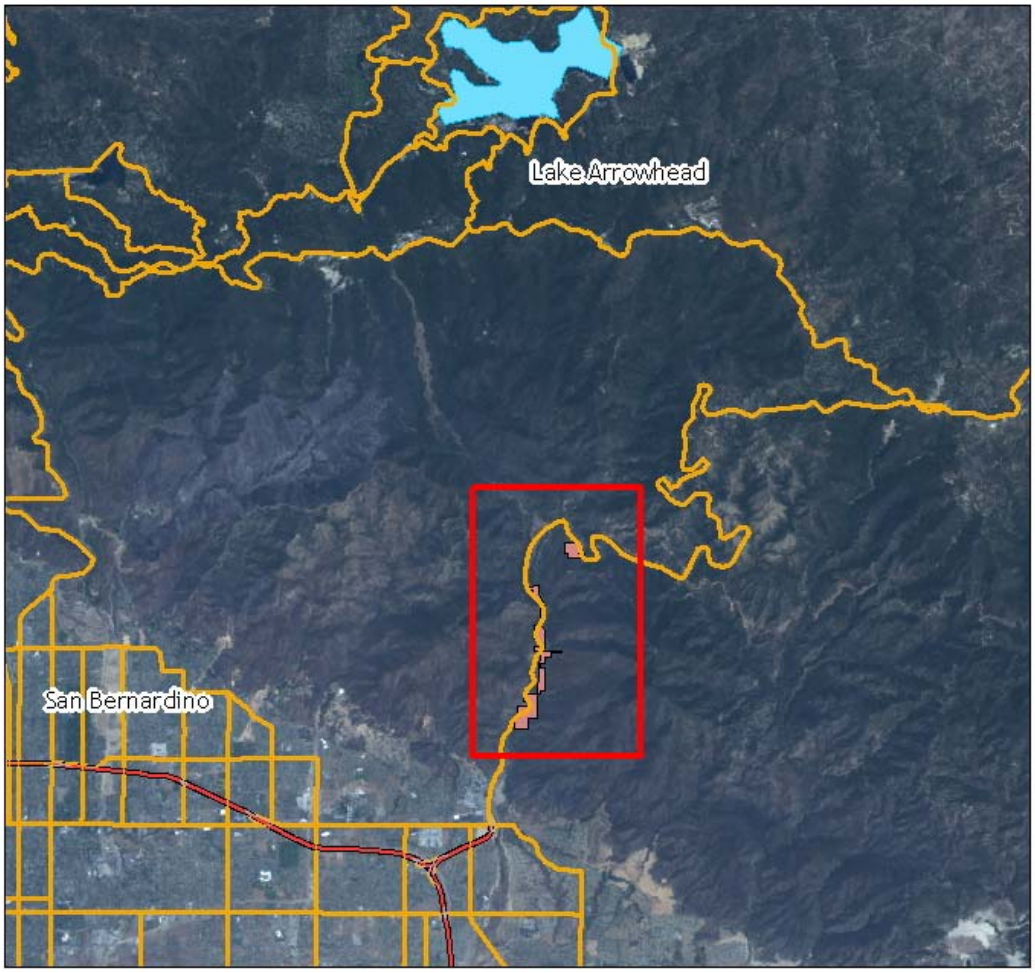
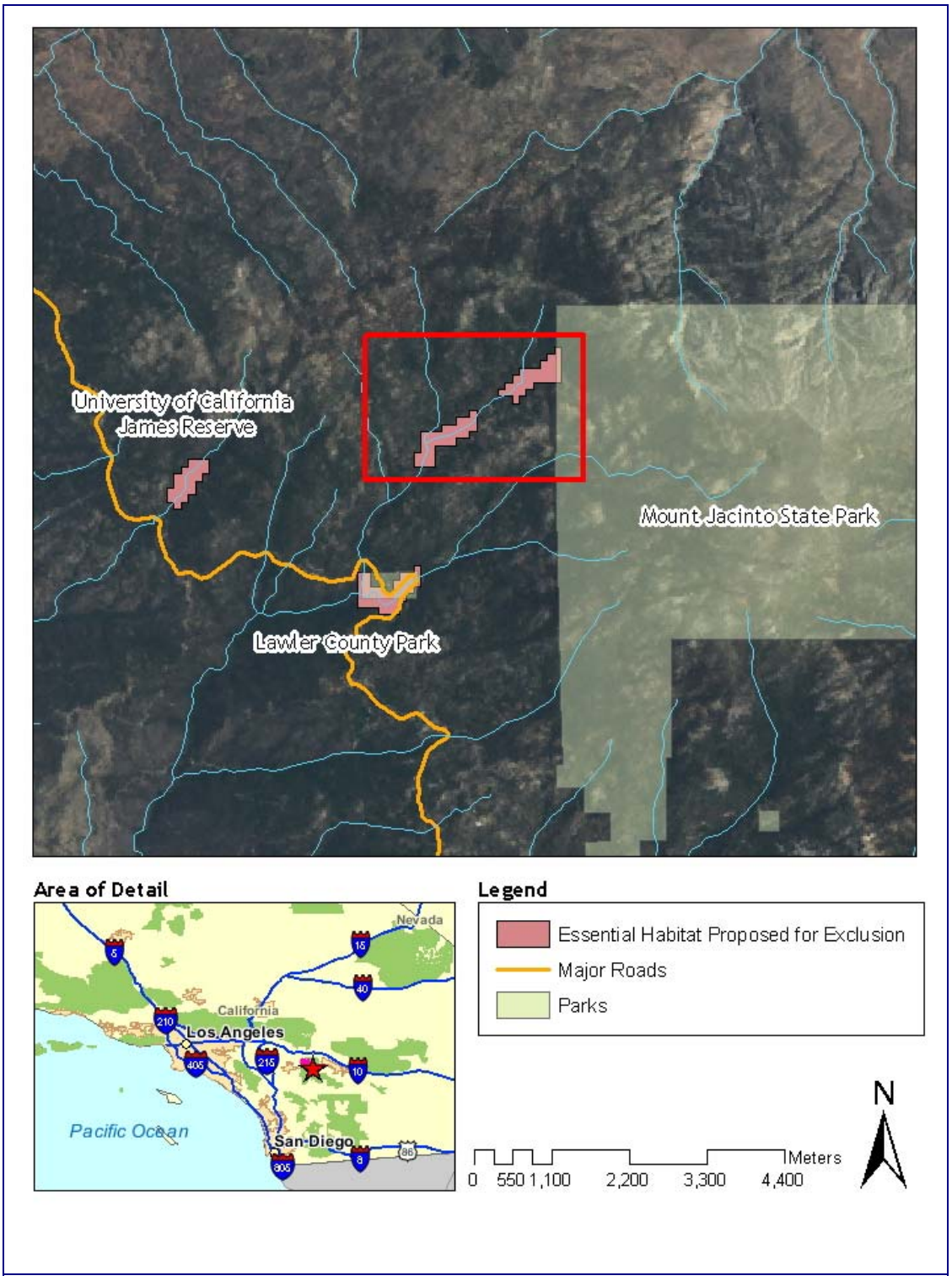


EXHIBIT #5-2 MAP SHOWING THE LOCATION OF PRIVATE LANDS WITHIN SUBUNIT 3A



5.2 PAST IMPACTS[60]

158. The Service has not previously consulted on development projects with potential impacts to the frog since the listing of the species. However, the frog is one of 146 species covered under the Western Riverside Multiple Species Habitat Conservation Plan (WRMSHCP), a comprehensive, multi-jurisdictional Habitat Conservation Plan (HCP) focusing on conservation of species and their associated habitats in Western Riverside County. This Plan is one of several large, multi-jurisdictional habitat-planning efforts in Southern California with the overall goal of "maintaining biological and ecological diversity within a rapidly urbanizing region."[61] The WRMSCHP includes approximately 1.3 million acres in Western Riverside County, including 14 incorporated cities. On June 22, 2004, the Service completed its biological opinion (BO) for the MSHCP and issued a 75-year permit to Western Riverside County MSHCP permittees. In addition, the WRMSHCP is also a subregional plan under California's Natural Community Conservation Plan Act of 1991 and was approved by the State on June 22, 2004.

159. As shown in Exhibit 5-3, the total estimated costs to private entities and local and Federal governments of developing the plan was approximately $4 million (2005 dollars).[62] The plan covers a total of 146 species, including 14 federally listed animals, 11 federally listed plants, and 121 unlisted plants and animals. The frog is included as one of the covered species, however, this analysis is unable to attribute a specific portion of these costs solely to the frog.

EXHIBIT #5-3 WRMSHCP PREPARATION COSTS

CONSULTANT COSTS	LOCAL AGENCY COSTS	FEDERAL AGENCY COSTS	TOTAL COSTS
$3,000,000	$640,000	$320,000	$3,960,000

Source: Economic and Planning Systems. March 2005. Economic Analysis of Critical Habitat Designation for the Arroyo Toad.

5.3 FUTURE IMPACTS

160. Conservation activities impact development in areas of essential habitat in two ways: (1) lands otherwise available for development may be restricted from future development; or (2) development may proceed subject to specific project modifications for frog conservation. In the frog's habitat, neither scenario is likely to occur. As described in the following bullet points, existing geographic conditions and land use regulation result in low density development that can be configured to avoid impacts to the frog. As a result, future costs are not anticipated.

[60] In 2001, USFS purchased approximately 240 acres of USDA land along Fuller Mill Creek for $960,000 for the protection of the frog. Since these costs were incurred in 2001, one year prior to the final listing of the species in 2002, these costs are not included in this analysis.

[61] Riverside County. June 2003. Final MSHCP: Volume 1 - The Plan. Accessed on: January 25, 2006 at: http://rcip.org/mshcpdocs/vol1/mshcpvol1toc.htm

[62] Economic and Planning Systems. March 2005. Economic Analysis of Critical Habitat Designation for the Arroyo Toad.

- **Steep Terrain**. Private lands in essential frog habitat are generally located in relatively remote, mountainous areas with steep terrain unsuitable for large-scale development (see Exhibits 5-1 and 5-2).
- **Zoning Laws**. Current zoning laws limit the types of development that may take place on a parcel of land. Potentially developable private lands in areas of essential frog habitat are governed by zoning laws that make it unlikely that they will be used for large-scale development in the foreseeable future.
    - *Riverside County*: Private land parcels contained in essential frog habitat proposed for exclusion are zoned as either N-A (Natural Assets) or W-2 (Controlled Development Areas).[63] Under these zoning codes, allowed development includes one-family dwellings and light agriculture, including the limited grazing of cattle with minimum lot sizes of 20,000 square feet (W-2) and 20 acres (N-A).[64]
    - *San Bernardino County*: Private land parcels contained in proposed critical habitat are zoned as either Single Family Resident or Industrial. Under these zoning codes, allowed development includes a maximum of four one-family dwellings per parcel or light industrial use.[65]
- **Western Riverside Multiple Species Habitat Conservation Plan (WRMSHCP)**. Finally, private land in Unit 3 of proposed critical habitat falls within the boundaries of the WRMSHCP. Under the terms of the WRMSHCP, frog surveys must be conducted annually for five years or whenever a landowner wants to develop land falling within the boundaries of the WRMSCHP. If a survey determines that an area is occupied by the frog, 90 percent of that area must be avoided. Given the terrain and zoning laws in this area, development in this area is limited to single family homes or extensions of existing homes. According to discussions with Service biologists administering the WRMSCHP, development proposals of this type in this area will only be required to avoid the stream and a 50 foot radius of the stream. As a result, in the event that development occurs in these areas, it is likely that landowners will be able to locate development away from the stream and out of essential frog habitat.

[63] County of Riverside Transportation and Land Planning Department. " Acreage, Supervisorial, Vicinity or Zoning Maps Search by APN" accessed at http://www.tlma.co.riverside.ca.us/gis/gisbasicquery.html on January 11, 2006.

[64] Riverside County Planning Department. "Zoning Descriptions and Requirements" accessed at http://www.tlma.co.riverside.ca.us/planning/content/zoning/ordnance/ord348_zones.html# on January 11, 2006.

[65] San Bernardino Property Information Management System, Accessed on January 24, 2006 at: https://nppublic.co.san-bernardino.ca.us/newpims/PimsInterface.aspx.

5.4 LAND VALUES ON PRIVATE PARCELS IN ESSENTIAL FROG HABITAT

161. Though the analysis does not currently expect any substantial impacts to private development, Exhibit 5-4 presents the reported assessed values of potentially developable private lands contained in essential frog habitat. As shown, the total assessed value of all private lands in essential frog habitat is approximately $1.3 million.

162. In California, Proposition 13, an initiative passed in June 1978, governs the property assessment process. Proposition 13 included four major provisions: (1) a limit on the ad valorem property tax rate to one percent of the assessed value; (2) a rollback of assessed values to their 1975-1976 levels; (3) a limit on the annual growth in assessed value to a maximum of two percent per year; and (4) limiting property reassessment to current market values only when a change in ownership occurs or new construction takes place.[66] As a result, two identical properties with the same market value could have different assessed values for tax purposes if one of them has been sold since 1975. Information on the year that parcels were last assessed was not readily available from the County Assessor's offices. As a result, the reported land values in Exhibit 5-4 likely understate the current market value of these lands.

EXHIBIT #5-4 REPORTED LAND VALUES BY SUBUNIT

UNIT	SUBUNIT	NUMBER OF PARCELS	TOTAL REPORTED LAND VALUE
2	A: City Creek	29	$1,049,184
3	A: San Jacinto River, North Fork	5	$219,877
	TOTAL:	**34**	**$1,269,061**

Sources: San Bernardino and Riverside County Assessor's Offices.

[66] California. March 2003. State Assessment Manual. California State Board of Equalization.

CHAPTER 6 | POTENTIAL ECONOMIC IMPACTS TO FIRE MANAGEMENT ACTIVITIES

163. Various agencies may conduct fire management activities within the essential frog habitat. This section is divided into two parts. First, a background discussion is presented on the potential for the interaction of frog conservation activities and fire management. This is followed by an analysis that identifies the areas within essential frog habitat where fire management activities are most likely to occur and the incremental cost of treating those acres with less intrusive methods in order to minimize impacts to the frog and its habitat. Note that fire suppression activities are beneficial to the frog. The presence of the frog and its habitat makes these activities more costly, however it will not reduce the effectives of fire suppression efforts.

164. Exhibit 6-1 summarizes future impacts to fire management activities.[67] These impacts represent the incremental cost of using less intrusive fuel treatment methods in essential frog habitat. Total future impacts are estimated to be $1.3 million (undiscounted dollars). The remainder of the chapter describes the calculation of costs presented in Exhibit 6-1.

[67] Within essential frog habitat, there have been no past impacts on fire management activities due to frog conservation activities.

EXHIBIT # 6-1 SUMMARY OF FUTURE IMPACTS OF FROG CONSERVATION ACTIVITIES ON FIRE MANAGEMENT ACTIVITIES, 2006-2025 ($2006)

UNIT	SUBUNIT	UNDISCOUNTED DOLLARS	PRESENT VALUE, 3%	PRESENT VALUE, 7%
Proposed for Designation				
1	A: San Gabriel River, East Fork	$146,000	$138,000	$128,000
	B: Big Rock Creek, South Fork	$0	$0	$0
	C: Little Rock Creek	$0	$0	$0
	D: Devil's Canyon	$0	$0	$0
	E: Day Canyon	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork	$0	$0	$0
	G: Bear Creek	$0	$0	$0
2	A: City Creek	$0	$0	$0
	B: Barton Creek	$461,000	$435,000	$404,000
	C: Whitewater River, North Fork	$0	$0	$0
3	A: San Jacinto River, North Fork	$688,000	$649,000	$604,000
	B: Indian Creek	$0	$0	$0
	C: Tahquitz Creek	$0	$0	$0
	D: Andreas Creek	$0	$0	$0
	TOTAL:	$1,295,000	$1,222,000	$1,136,000
Proposed for Exclusion				
3	A: San Jacinto River, North Fork	$71,000	$67,000	$62,000

Note: Totals may not add due to rounding.

6.1 FROG CONSERVATION ACTIVITIES AND FIRE MANAGEMENT

165. The proposed rule discusses the potential for forest thinning or clearing for fire prevention to impact the physical and biological features essential for conservation of the frog. For example, fire management activities conducted adjacent to streams could increase flooding and sedimentation within stream channels due to exposed soils, negatively impact water quality, or alter riparian vegetation resulting in a reduction in the frog's available prey base. However, the proposed rule also notes that fire management activities could also benefit the species by reducing the potential for catastrophic fires like the "Old Fire," which burned over 90,000 acres throughout San Bernardino County in 2003. The Old Fire burned the front range of the San Bernardino National Forest, including the watershed for City Creek, decimating much of the fish and frog populations in that area. In addition, fire management activities can directly benefit the species by reducing the presence of unnaturally high canopy cover or dense riparian vegetation, which would otherwise decrease the number of basking areas available to the frog.

166. Within essential frog habitat, there have been no past impacts on fire management activities due to frog conservation activities. However, in 2005, the San Jacinto Ranger District in the San Bernardino National Forest initiated talks with the Service regarding the U.S. Forest Service's (USFS') proposal for the North Fork of San Jacinto Healthy Forest Project ("North Forks project"). This project, initiated under the Healthy Forests Restoration Act (HFRA) of 2003 (Public Law 108-148), is designed to provide long-term wildland fire protection and restore forest health on Federal lands surrounding the community of Idyllwild. The project area encompasses 14,000 acres and proposes fuels treatment for approximately 6,500 acres. USFS consulted with the Service during early 2005 to identify and map areas where treatment activities could potentially impact the frog. On August 10, 2005, USFS and the Service attended a joint field trip to review treatment units and discuss additional design features and monitoring necessary to minimize frog impacts. On August 22, 2005, USFS released a biological assessment of wildlife that included design features incorporated into the North Forks project in order to minimize impacts to threatened and endangered species occurring within the project area, including the frog. Specifically, the plan incorporates the following frog conservation measures for its fire management activities:[68]

- On all creeks within modeled frog habitat, delineate a no-treatment, no-equipment buffer of at least 100 feet slope distance from the streambank.
- On all creeks currently occupied by the frog, delineate a no-treatment, no-equipment buffer of at least 200 feet slope distance from the streambank.
- On all creeks currently occupied by the frog, implementation of treatment activities will be conducted outside the frog breeding season.
- No material would be piled or burned within the no-treatment buffer zones.
- Only low-intensity underburning, hand thinning and piling, or helicopter logging systems will be used within the boundaries of modeled frog habitat.

[68] Dyke, S. 2005. Biological Assessment for Wildlife. North Fork of the San Jacinto Healthy Forest Project. August 22, 2005.

- No heavy equipment allowed within the boundaries of modeled frog habitat.
- No water would be drafted from creeks that are or could be occupied by the frog.

167. The public comment period for the North Forks Environmental Assessment ended on October 26, 2005 and USFS is currently in the process of reviewing and responding to written comments. The North Forks project is expected to begin in the year 2006 and continue over a five year period through 2010.[69]

6.2 APPROACH

168. The analysis employs a three step approach to estimating the economic impacts of frog conservation activities on fire management.

- **Step One**: Identify areas within essential frog habitat where fire management activities will occur or are likely to occur.
- **Step Two**: Based on the North Forks project, develop an estimate of the costs associated with incorporating additional design features necessary to minimize impacts to the frog, primarily hand and helicopter treatment in lieu of mechanical treatment.
- **Step Three**: To estimate the economic impacts to fire management, multiply the per acre cost estimates for frog conservation activities associated with the North Forks project by estimates of the number of acres within essential frog habitat where fire management activities will occur or are likely to occur.

Step One: Identify Fire Management Areas Within Essential Frog Habitat

169. To identify areas within essential frog habitat where fire management activities are likely to occur, this analysis relies on data from two sources. Based on this information, the analysis estimates that a total of 210 potentially affected acres fall within essential frog habitat (Exhibit 6-1).

- **North Fork of San Jacinto Healthy Forest Project**. In order to reduce the risk of forest wildfires, the San Bernardino National Forest has proposed the North Forks project to treat over 6,500 acres surrounding the community of Idyllwild. As part of this project, areas have been mapped using Geographic Information Systems (GIS) that identify the type of treatment (fire, mechanical, hand, or helicopter) for each unit. Based on analysis of this treatment data, approximately 122 acres in essential frog habitat in and adjacent to Unit 3 overlap with the North Forks project (Exhibit 6-1).
- **Wildland-Urban Interface (WUI) Areas**. In many areas across the U.S., the Department of Agriculture and the Department of the Interior are jointly implementing what is known as the "National Fire Plan," which grew out of a report to the President called *Managing the Impacts of Wildfire on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000.* The National Fire Plan calls for a substantial increase in the number of

[69] After 2010, fire management activities are not expected to be necessary again within the time frame of this analysis.

forested acres treated annually to reduce hazardous fuels. Under the plan, Wildland-Urban Interface (WUI) areas are defined by each agency "where human life, property, and natural resources are in imminent danger from catastrophic wildfire." WUI are areas where houses meet or intermingle with undeveloped wildland vegetation. This makes the WUI a focal area for human-environment conflicts such as wildland fires. This analysis relies on USFS data that map WUI areas within National Forest boundaries. Based on an analysis of this WUI data, approximately 20 acres in Unit 1 and 80 acres in Unit 2 overlap with WUI areas (Exhibit 6-2).

EXHIBIT # 6-2 LIKELY FIRE MANAGEMENT AREAS WITHIN ESSENTIAL FROG HABITAT BY SUBUNIT

UNIT	SUBUNIT	RIVER SEGMENT	COUNTY	ESTIMATED FIRE MANAGEMENT ACRES WITHIN PROPOSED CRITICAL HABITAT
1	A	San Gabriel River, East Fork	Los Angeles	20
2	B	City Creek	San Bernardino	80
3	A	San Jacinto River, North Fork	Riverside	110
			TOTAL:	**210**
Areas Proposed for Exclusion				
3	A	San Jacinto River, North Fork	Riverside	**12**

Step Two: Incremental Fuels Treatment Cost of Frog Conservation Activities

170. The majority (over 60 percent) of the North Forks project will use "prescribed burning only" to reduce fire intensity within the project area. Only low-intensity burning will be allowed in areas scheduled for prescribed burning that fall within frog habitat. In addition to prescribed burning, the North Forks project also plans to use mechanical thinning to further reduce tree density while still maintaining the current uneven-age structure. For areas scheduled for mechanical thinning that fall within frog habitat, the plan calls for use of hand or helicopter thinning methods that are less-intrusive, thus minimizing the potential impact to the species. According to North Forks project staff, mechanical thinning typically costs $4,000 per acre while hand and helicopter methods cost approximately $10,000 per acre. Thus, the incremental cost for fuel treatments activities that minimize impacts to the frog is approximately $6,000 per acre.[70]

Step Three: Estimated Economic Impacts on Fire Management Activities

171. To estimate the economic impacts of frog conservation activities on fire management, the per acre cost estimate from Step Two is multiplied by estimates generated in Step One of the number of acres within essential frog habitat where fire management activities will occur or are likely to occur.

[70] Email communication with Shelly Dyke, USFS, North Forks Project, dated December 15, 2005.

6.3 FUTURE IMPACTS TO FIRE MANAGEMENT ACTIVITIES

172. Total costs to fire management activities due to frog conservation efforts is estimated at $1.3 million (undiscounted). Applying discount rates of three and seven percent yields a total present value of approximately $1.2 and $1.1 million ($2006), respectively (Exhibit 6-3).[71] Note that fire suppression activities are beneficial to the frog. The presence of the frog and its habitat makes these activities more costly, however it will not reduce the effectives of fire suppression efforts.

EXHIBIT # 6-3 FUTURE ECONOMIC IMPACTS TO FIRE MANAGEMENT ACTIVITIES IN ESSENTIAL FROG HABITAT, 2006-2010[1]

UNIT	SUBUNIT	TOTAL IMPACTED CRITICAL HABITAT ACRES[2,3]	IMPACTED CRITICAL HABITAT ACRES PER YEAR[4]	INCREMENTAL TREATMENT COST ($2006)[5]	AVERAGE ANNUAL COSTS ($2006)	TOTAL COSTS (UNDISCOUNTED DOLLARS)	PRESENT VALUE (2006-2010) ($2006, 3%)	PRESENT VALUE (2006-2010) ($2006, 7%)
1	A	20	4	$6,000	$29,000	$146,000	$138,000	$128,000
2	B	80	16	$6,000	$92,000	$461,000	$435,000	$404,000
3	A	110	22	$6,000	$138,000	$688,000	$649,000	$604,000
TOTAL:		**216**	**43**		**$259,000**	**$1,295,000**	**$1,222,000**	**$1,136,000**
Areas Proposed for Exclusion								
3	**A**	**12**	**2.4**	**$6,000**	**$14,000**	**$71,000**	**$67,000**	**$62,000**

Totals may not add due to rounding.

Notes:
1 After 2010, fire management activities are not expected to be necessary again within the timeframe of this analysis.
2 In Units 1 and 2, estimated acres impacted based on the spatial overlap between MYLF pCHD and Wildland and Urban Interface (WUI) classifications.
3 In Unit 3, estimated acres impacted based on the spatial overlap between MYLF pCHD and the North Fork San Jacinto Healthy Forest Project.
4 Assuming equal treatment of total acres over a 5-year project life.
5 Email communication with Shelly Dyke, Project Lead, North Fork San Jacinto Healthy Forest Project, dated December 15, 2005.

[71] Within essential frog habitat, there have been no past impacts on fire management activities due to frog conservation activities.

CHAPTER 7 | POTENTIAL ECONOMIC IMPACTS TO OTHER ACTIVITIES ON FEDERAL LANDS

173. Other activities potentially affected by frog conservation activities include recreational mining, ski operations, hazardous materials spills management on Federal lands, frog surveying and monitoring efforts, and the associated administrative costs of consultations undertaken in accordance with section 7 of the Act.[72]

174. Exhibits 7-1 and 7-2 summarize past and future impacts to the activities discussed in this chapter. Administrative costs associated with species consultations and measures such as additional patrols, and survey and monitoring comprise the majority of these costs. Since the listing of the species in 2002, the total impacts range from $218,000 to $254,000 (undiscounted dollars). Total future impacts are estimated to be $1.3 million to $1.4 million (undiscounted dollars). Future costs associated with developing hazardous spills management plans are anticipated, but not quantified in these estimates. The remainder of the chapter describes the calculation of costs presented in Exhibits 7-1 and 7-2.

[72] In Unit 3C, the proposed rule also identifies trampling of habitat due to cows as a threat to the species. This subunit lies in designated wilderness area and USFS is unaware of the presence of cows in this area. Additional information and/or comments are invited on this potential threat, and it is anticipated that any new information received will be included in the final version of this report.

EXHIBIT # 7-1 SUMMARY OF PAST IMPACTS OF FROG CONSERVATION ACTIVITIES ON OTHER ACTIVITIES ON FEDERAL LANDS, 2002-2005 ($2006)

UNIT	SUBUNIT	UNDISCOUNTED DOLLARS		PRESENT VALUE 3%		PRESENT VALUE 7%	
		LOW	HIGH	LOW	HIGH	LOW	HIGH
1	A: San Gabriel River, East Fork	$44,000	$44,000	$48,000	$48,000	$52,000	$52,000
	B: Big Rock Creek, South Fork	$29,000	$47,000	$31,000	$52,000	$36,000	$60,000
	C: Little Rock Creek	$11,000	$11,000	$12,000	$12,000	$13,000	$13,000
	D: Devil's Canyon	$5,000	$5,000	$5,000	$5,000	$6,000	$6,000
	E: Day Canyon	$13,000	$13,000	$14,000	$14,000	$16,000	$16,000
	F: San Gabriel River, East Fork, Iron Fork	$7,000	$7,000	$7,000	$7,000	$8,000	$8,000
	G: Bear Creek	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
2	A: City Creek	$29,000	$29,000	$31,000	$31,000	$34,000	$34,000
	B: Barton Creek	$4,000	$4,000	$4,000	$4,000	$5,000	$5,000
	C: Whitewater River, North Fork	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
3	A: San Jacinto River, North Fork	$33,000	$41,000	$35,000	$44,000	$39,000	$48,000
	B: Indian Creek	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
	C: Tahquitz Creek	$7,000	$7,000	$8,000	$8,000	$9,000	$9,000
	D: Andreas Creek	$2,000	$2,000	$2,000	$2,000	$3,000	$3,000
	Multiple	$26,000	$36,000	$27,000	$37,000	$28,000	$38,000
	TOTAL:	**$218,000**	**$254,000**	**$232,000**	**$272,000**	**$257,000**	**$300,000**

Note: Totals may not sum due to rounding.

EXHIBIT # 7-2 SUMMARY OF FUTURE IMPACTS OF FROG CONSERVATION ACTIVITIES ON OTHER ACTIVITIES ON FEDERAL LANDS, 2006-2025 ($2006)

UNIT	SUBUNIT	UNDISCOUNTED DOLLARS		PRESENT VALUE 3%		PRESENT VALUE 7%	
		LOW	HIGH	LOW	HIGH	LOW	HIGH
1	A: San Gabriel River, East Fork	$538,000	$557,000	$415,000	$431,000	$309,000	$323,000
	B: Big Rock Creek, South Fork	$63,000	$84,000	$48,000	$64,000	$36,000	$47,000
	C: Little Rock Creek	$83,000	$99,000	$67,000	$81,000	$53,000	$66,000
	D: Devil's Canyon	$25,000	$25,000	$19,000	$19,000	$14,000	$14,000
	E: Day Canyon	$66,000	$66,000	$50,000	$50,000	$37,000	$37,000
	F: San Gabriel River, East Fork, Iron Fork	$33,000	$33,000	$26,000	$26,000	$19,000	$19,000
	G: Bear Creek	$10,000	$10,000	$8,000	$8,000	$6,000	$6,000
2	A: City Creek	$172,000	$188,000	$134,000	$148,000	$102,000	$114,000
	B: Barton Creek	$20,000	$20,000	$15,000	$15,000	$11,000	$11,000
	C: Whitewater River, North Fork	$8,000	$8,000	$6,000	$6,000	$4,000	$4,000
3	A: San Jacinto River, North Fork	$116,000	$145,000	$92,000	$116,000	$71,000	$91,000
	B: Indian Creek	$40,000	$69,000	$33,000	$57,000	$28,000	$47,000
	C: Tahquitz Creek	$37,000	$37,000	$28,000	$28,000	$21,000	$21,000
	D: Andreas Creek	$11,000	$11,000	$9,000	$9,000	$6,000	$6,000
	Multiple	$53,000	$71,000	$53,000	$71,000	$53,000	$71,000
	TOTAL:	**$1,275,000**	**$1,423,000**	**$1,003,000**	**$1,129,000**	**$770,000**	**$877,000**

Note: Totals may not sum due to rounding.

7.1 IMPACTS TO RECREATIONAL MINING ACTIVITIES

175. The proposed rule discusses the potential for recreational mining to negatively impact essential frog habitat along the San Gabriel River, East Fork (Subunit 1A). For example, recreational mining activities could alter and/or decrease the presence of habitat structure within a stream, alter pool substrate, erode stream banks, or reduce riparian vegetation, thereby reducing or eliminating available foraging, resting, breeding, or egg-laying sites and increasing suspended sediments and turbidity. The proposed rule suggests additional patrolling of mining activities in order to reduce the risk and impacts associated with this activity on the frog and its habitat.

176. Discussions with the U.S. Forest Service (USFS) staff in the Santa Clara/Mojave Ranger District, Angeles National Forest suggest that effective patrolling of the area during the summer months would require two seasonal staff at an annual salary rate of $30,000 for 3 months, or approximately $7,500 per person.[73] This results in an annual cost of $15,000 ($2006) with total costs over twenty years equal to $300,000 (undiscounted). In present value terms total costs are $230,000 and $170,000, assuming discount rates of three and seven percent, respectively.

7.2 IMPACTS TO SKI OPERATIONS

177. There are several ski areas that operate on Federal lands throughout California. To ensure that adequate snow levels are available throughout the winter season, many of these facilities maintain snowmaking operations that require large water withdrawals from nearby rivers and streams. The proposed rule discusses the potential for water diversions of this type to reduce stream levels, thereby decreasing the quality and extent of suitable breeding, wintering and foraging sites as well as potentially reducing the available prey-base to the frog within essential frog habitat. Specifically, the proposed rule identifies potential water diversions for ski operations on the San Gabriel River, East Fork (Subunit 1A) and in the upper reaches of Little Rock Creek (Subunit 1C). However, the best available data suggest that future water removals in these units are unlikely, as described below. Therefore, no impacts to ski operations are estimated.

7.2.1 SAN GABRIEL RIVER, EAST FORK

178. According to the proposed rule, there have been proposals for water removal from the upper part of the drainage area above Vincent Gulch and Bear Gulch for winter recreation on Blue Ridge. The Mountain High Ski Area sits on the northern side of Blue Ridge and is one of the closest ski areas to the Los Angeles area. The facility operates eleven chairs and snowmaking operations cover 95 percent of the area, ensuring adequate skiing conditions throughout most of the area. According to the USFS Special Permits officer for this area, Mountain High withdraws water from the north side of Blue Ridge and does not withdraw water from proposed critical habitat in the San Gabriel River, East Fork.[74]

[73] Personal communication with Marty Dumpus, San Bernardino National Forest, December 2005.

[74] Personal communication with Shawn Lawler, Special Permits, Angeles National Forest, January 4, 2006.

7.2.2 LITTLE ROCK CREEK

179. There are two ski areas located opposite Little Rock Creek along Highway 2: (1) Mt. Waterman and (2) Kratka Ridge. Mt. Waterman ceased operations in 2003 and Kratka Ridge in 2001. Prior to their closure, both ski areas maintained minimal snowmaking capacity primarily for occasional snow patchwork. According to discussions with the USFS Special Permits officer for this area, as of December 2005, there are no active proposals with the USFS for snowmaking operations by either ski area, and it is unclear whether either ski area will resume operations in the near future.[75]

7.3 IMPACTS TO HAZARDOUS MATERIALS SPILLS MANAGEMENT ON FEDERAL LANDS

180. Hazardous materials spills along roads that cross streams represent a potential threat impacting water quality in essential frog habitat. The proposed rule identifies Little Rock Creek (Subunit 1C) in the Angeles National Forest and City Creek (Subunit 2A), Dark Canyon (Subunit 3A), Fuller Mill Creek ((Subunit 3A) and Indian Creek (at Hall Canyon) (Subunit 3B) in the San Bernardino National Forest as areas at risk from hazardous materials spills on adjacent roadways.[76] To mitigate these risks, the proposed rule recommends the development of an action plan for prevention, notification, and containment of spills before they enter the stream or its tributaries.

181. In September 2005, USFS announced the availability of the Revised Land and Resource Management Plans for each of the National Forests in Region 5, including the Angeles and San Bernardino National Forests. According to the forest strategy for both the Angeles and San Bernardino National Forests, management of known hazardous materials risks is a program priority over the next three to five years (2006 through 2008-2010). Work defined under this subject includes:

- Maintain a written Hazardous Materials Response Plan that addresses risk and standard cleanup procedures.
- Coordinate with Federal, tribal, State, city and county agencies and local landowners to develop emergency response guidelines for hazardous spills on National Forest System land or on adjacent land with potential to affect threatened, endangered, proposed, candidate and sensitive fish and amphibian habitat. In the event of hazardous materials spills in known habitat on National Forest System land, the Forest Service will contact the Service within 24 hours. Quickly contact resource personnel and use them as consultants to minimize impacts to habitat and to initiate emergency consultation with the Service if necessary. Provide habitat maps to response personnel for hazardous spills.

182. According to discussions with USFS personnel, hazardous spill management plans will be developed at the Ranger District level in close cooperation with CalTrans for various areas within each forest and would include all threatened and endangered species identified for concern within the area. However, at this time, it is unclear when exactly

[75] Ibid.

[76] 70 FR 54114.

this work would take place within the next five years, and the estimated costs of plan development were not available.

7.4 SURVEY AND MONITORING

183. The USFS conducts frog surveying and monitoring along rivers throughout the Angeles and San Bernardino National Forests.[77] Beginning in 2000, USFS contracted frog survey and monitoring efforts through USGS. According to USGS biologists, annual costs associated with frog surveying and monitoring are approximately $20,000 per year per forest.

184. Exhibit 7-3 provides a summary of past and future survey and monitoring costs by subunit.[78] Future costs of frog survey and monitoring efforts total $800,000 (undiscounted). Applying a discount rate of three percent yields a total present value of $613,000, while applying a discount rate of seven percent yields a total present value of $453,000.

[77] Note, USFS' survey and monitoring work includes efforts on private lands in Unit 3, for example, in James Reserve, owned by the University of California on Indian Creek (Unit 3, Subunit B).

[78] Costs are allocated to subunits based on the percent of proposed critical habitat acres in each subunit.

EXHIBIT #7-3 SUMMARY OF PAST AND FUTURE IMPACTS OF FROG SURVEY AND MONITORING COSTS ($2006)

UNIT	SUBUNIT*	PAST COSTS (2002-2005)			FUTURE COSTS (2006-2025)		
		UNDISCOUNTED DOLLARS	PRESENT VALUE (3%)	PRESENT VALUE (7%)	UNDISCOUNTED DOLLARS	PRESENT VALUE (3%)	PRESENT VALUE (7%)
1	A: San Gabriel River, East Fork	$44,000	$48,000	$52,000	$221,000	$169,000	$125,000
	B: Big Rock Creek, South Fork	$11,000	$12,000	$13,000	$56,000	$43,000	$32,000
	C: Little Rock Creek	$11,000	$12,000	$13,000	$55,000	$42,000	$31,000
	D: Devil's Canyon	$5,000	$5,000	$6,000	$25,000	$19,000	$14,000
	E: Day Canyon	$13,000	$14,000	$16,000	$66,000	$50,000	$37,000
	F: San Gabriel River, East Fork, Iron Fork	$7,000	$7,000	$8,000	$33,000	$26,000	$19,000
	G: Bear Creek	$2,000	$2,000	$2,000	$10,000	$8,000	$6,000
2	A: City Creek	$29,000	$31,000	$34,000	$144,000	$110,000	$82,000
	B: Barton Creek	$4,000	$4,000	$5,000	$20,000	$15,000	$11,000
	C: Whitewater River, North Fork	$2,000	$2,000	$2,000	$8,000	$6,000	$4,000
3	A: San Jacinto River, North Fork	$19,000	$21,000	$23,000	$95,000	$73,000	$54,000
	B: Indian Creek	$4,000	$4,000	$4,000	$19,000	$14,000	$11,000
	C: Tahquitz Creek	$7,000	$8,000	$9,000	$37,000	$28,000	$21,000
	D: Andreas Creek	$2,000	$2,000	$3,000	$11,000	$9,000	$6,000
TOTAL:		**$160,000**	**$172,000**	**$190,000**	**$800,000**	**$613,000**	**$453,000**

Note: Totals may not add due to rounding.

* Costs are allocated to subunits based on the percent of proposed critical habitat acres in each subunit.

7.5 ADMINISTRATIVE COSTS OF SECTION 7 CONSULTATIONS

185. This section presents expected total administrative costs of consultations undertaken in accordance with section 7 of the Act. First, this section defines the types of administrative costs likely to be associated with the proposed habitat. Next, the analysis presents estimated past and future administrative costs of consultation efforts.

7.5.1 CATEGORIES OF ADMINISTRATIVE COSTS

186. The following section provides an overview of the categories of administrative cost impacts that arise due to the implementation of section 7 for the frog.

Technical Assistance

187. The Service responds to requests for technical assistance from State agencies, local municipalities, and private landowners and developers who may have questions regarding whether specific activities affect the frog and its critical habitat. Technical assistance costs represent the estimated economic costs of informational conversations between these entities and the Service. Such conversations may occur between municipal or private property owners and the Service regarding lands designated as critical habitat or lands adjacent to critical habitat. The Service's technical assistance activities are voluntary and may occur with Federal, State, or local agencies, or private stakeholders.

Section 7 Consultations

188. Section 7(a)(2) of the Act requires Federal agencies (Action agencies) to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. In some cases, consultations will involve the Service and another Federal agency only, such as the U.S. Forest Service. More often, they will also include a third party involved in projects on non-Federal lands with a Federal nexus, such as State agencies and private landowners.

189. During a consultation, the Service, the Action agency, and the land manager applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, and the potential effects to the species and designated critical habitat, the Federal agency involved, and whether there is a private applicant involved.

190. Section 7 consultations with the Service may be either informal or formal. Informal consultations consist of discussions between the Service, the Action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat. Informal consultations are designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a formal consultation is required if the Action agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in the Service's determination in its Biological Opinion of whether the action is likely to jeopardize a

species or adversely modify critical habitat. The Service also provides recommendations to minimize those impacts. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

7.5.2 ESTIMATED COSTS OF CONSULTATIONS AND TECHNICAL ASSISTANCE

191. Estimates of the cost of an individual consultation and technical assistance request were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country conducted in 2002. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures were based on an average level of effort of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.

192. The administrative cost estimates presented in this Section take into consideration the level of effort of the Service, the Action agency, and the applicant, as well as the varying complexity of the consultation or the technical assistance request. Costs associated with these consultations include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings, preparing letters, and the development of a biological opinion. Exhibit 7-4 summarizes the estimated administrative costs of consultations and technical assistance requests.

EXHIBIT #7-4 ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS (PER EFFORT)

CONSULTATION TYPE	SERVICE	ACTION AGENCY	THIRD PARTY	BIOLOGICAL ASSESSMENT
Technical Assistance	$260 - $680	N/A	$600 - $1,500	N/A
Informal Consultation	$1,000 - $3,100	$1,300 - $3,900	$1,200 - $2,900	$0 - $4,000
Formal Consultation	$3,100 - $6,100	$3,900 - $6,500	$2,900 - $4,100	$4,000 - $5,600
Programmatic Consultation	$11,500 - $16,100	$9,200 - $13,800	$0	$5,600

Sources: IEc analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, a review of consultation records from several Service field offices across the country. Confirmed by local Action agencies. Note: Low and high estimates primarily reflect variations in staff wages and time involvement by staff.

193. Since the listing of the species in 2002, there has been one programmatic consultation, two formal consultations, and one informal consultation. Where information is available on future consultation efforts, the administrative costs of these efforts are included in this analysis. Exhibit 7-5 summarizes potential future consultations in proposed critical habitat units.

EXHIBIT #7-5 NUMBER OF ESTIMATED FUTURE SECTION 7 CONSULTATIONS IN PROPOSED CRITICAL HABITAT

UNIT	SUBUNIT	TECHNICAL ASSISTANCE	INFORMAL CONSULTATIONS	FORMAL CONSULTATIONS	PROGRAMMATIC CONSULTATIONS	NOTES
1	A: San Gabriel River, East Fork	0	1	1	0	One informal consultation regarding installation of a fish barrier. One formal consultation on fire management activities.
	B: Big Rock Creek, South Fork	0	2	0	0	Two informal consultations regarding installation of a fish barrier and implementation of a trout removal project. Fish barrier consultation is currently underway.
	C: Little Rock Creek	0	0	2	0	Two formal consultations on construction of a trail to Williamson Rock for rock climbers and developing a hazardous spills management plan.
2	A: City Creek	0	0	2	0	Two formal consultations for development of a hazardous spills management plan and fire management.
3	A: San Jacinto River, North Fork	0	2	1	0	Two informal consultations regarding installation of a fish barrier and implementation of a trout removal project. One formal consultation on developing a hazardous spills management plan.
	B: Indian Creek	0	2	1	0	Two informal consultations regarding installation of a fish barrier and implementation of a trout removal project. One formal consultation on developing a hazardous spills management plan.
	Multiple Subunits	0	0	0	2	Programmatic consultation for all recreation activities in the San Bernardino National Forest and the Angeles National Forest.
	TOTAL:	**0**	**7**	**7**	**2**	

Notes:

1. Because of unknown time frame on fish barrier, trout removal, and fire management activities, costs associated with section 7 consultation are spread evenly throughout future time.

2. According to the forest strategy for both the Angeles and San Bernardino National Forests (September 2005), management of known hazardous materials risks is a program priority over the next three to five years (2006 through 2008-2010). Based on this time frame, this analysis spreads costs associated with consultation on the development of hazardous spills management plans over a five-year time frame. Discussions with USFS staff indicate that hazardous spills management plans would be developed at the ranger district level, requiring one consultation per subunit.

194. As shown in Exhibit 7-6, past costs associated with section 7 consultations are estimated to be $58,000 to $94,000 (undiscounted dollars). In present value terms, costs are $61,000 to $101,000, assuming a three percent discount rate and $67,000 to $110,000, assuming a seven percent discount rate.

195. In the future, costs associated with section 7 consultation costs are estimated to range from $174,000 to $324,000 (undiscounted dollars) in areas proposed for critical habitat. In present value terms, costs are $160,000 to $287,000, assuming a three percent discount rate; and $147,000 to $255,000, assuming a seven percent discount rate (Exhibit 7-7).

EXHIBIT #7-6 SUMMARY OF PAST SECTION 7 ADMINISTRATIVE COSTS, 2002-2005 ($2006)

		UNDISCOUNTED DOLLARS		PRESENT VALUE, 3%		PRESENT VALUE, 7%	
UNIT	SUBUNIT	LOW	HIGH	LOW	HIGH	LOW	HIGH
1	A: San Gabriel River, East Fork	$0	$0	$0	$0	$0	$0
	B: Big Rock Creek, South Fork	$17,000	$36,000	$19,000	$40,000	$23,000	$46,000
	C: Little Rock Creek	$0	$0	$0	$0	$0	$0
	D: Devil's Canyon	$0	$0	$0	$0	$0	$0
	E: Day Canyon	$0	$0	$0	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork	$0	$0	$0	$0	$0	$0
	G: Bear Creek	$0	$0	$0	$0	$0	$0
2	A: City Creek	$0	$0	$0	$0	$0	$0
	B: Barton Creek	$0	$0	$0	$0	$0	$0
	C: Whitewater River, North Fork	$0	$0	$0	$0	$0	$0
3	A: San Jacinto River, North Fork	$14,000	$22,000	$15,000	$24,000	$16,000	$26,000
	B: Indian Creek	$0	$0	$0	$0	$0	$0
	C: Tahquitz Creek	$0	$0	$0	$0	$0	$0
	D: Andreas Creek	$0	$0	$0	$0	$0	$0
Multiple Subunits		$26,000	$36,000	$27,000	$37,000	$28,000	$38,000
	TOTAL:	**$58,000**	**$94,000**	**$61,000**	**$101,000**	**$67,000**	**$110,000**

Note: Totals may not add due to rounding.

EXHIBIT #7-7 SUMMARY OF FUTURE SECTION 7 ADMINISTRATIVE COSTS, 2006-2025 ($2006)

		UNDISCOUNTED DOLLARS		PRESENT VALUE, 3%		PRESENT VALUE, 7%	
UNIT	SUBUNIT	LOW	HIGH	LOW	HIGH	LOW	HIGH
1	A: San Gabriel River, East Fork	$17,000	$36,000	$16,000	$32,000	$14,000	$27,000
	B: Big Rock Creek, South Fork	$7,000	$28,000	$5,000	$21,000	$4,000	$16,000
	C: Little Rock Creek	$28,000	$45,000	$25,000	$39,000	$22,000	$35,000
	D: Devil's Canyon	$0	$0	$0	$0	$0	$0
	E: Day Canyon	$0	$0	$0	$0	$0	$0
	F: San Gabriel River, East Fork, Iron Fork	$0	$0	$0	$0	$0	$0
	G: Bear Creek	$0	$0	$0	$0	$0	$0
2	A: City Creek	$28,000	$45,000	$24,000	$38,000	$20,000	$32,000
	B: Barton Creek	$0	$0	$0	$0	$0	$0
	C: Whitewater River, North Fork	$0	$0	$0	$0	$0	$0
3	A: San Jacinto River, North Fork	$21,000	$50,000	$19,000	$43,000	$17,000	$37,000
	B: Indian Creek	$21,000	$50,000	$19,000	$43,000	$17,000	$37,000
	C: Tahquitz Creek	$0	$0	$0	$0	$0	$0
	D: Andreas Creek	$0	$0	$0	$0	$0	$0
Multiple Subunits		$53,000	$71,000	$53,000	$71,000	$53,000	$71,000
	TOTAL:	**$174,000**	**$324,000**	**$160,000**	**$287,000**	**$147,000**	**$255,000**

Note: Totals may not add due to rounding.

APPENDIX A | SMALL ENTITY AND ENERGY IMPACTS ANALYSIS

196. This appendix considers the extent to which the analytic results presented in the previous sections reflect potential future impacts to small entities and the energy industry. The screening analysis presented in this appendix is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) in 1996. Information for this analysis was gathered from the Small Business Administration (SBA), U.S. Census Bureau, and the Risk Management Association (RMA). The energy analysis in Section A.2 is conducted pursuant to Executive Order No. 13211.

A.1 SBREFA ANALYSIS

197. In accordance with SBREFA, when a Federal agency publishes a notice of rulemaking for any proposed or final rule, it must make available for public comments a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). No regulatory flexibility analysis is required, however, 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.

198. To assist in this process, the following represents a screening level analysis of the potential for frog conservation efforts to affect small entities. This analysis is based on the estimated impacts associated with the proposed rulemaking as described in Chapters 3 through 7 of this analysis.

199. This appendix first describes the governments and industries that may experience impacts due to frog conservation efforts within the potential critical habitat. It then provides more detail on the specific type of impacts potentially affecting small entities.

A.1.1 IDENTIFICATION OF ACTIVITIES THAT MAY INVOLVE SMALL ENTITIES

200. This analysis estimates prospective economic impacts due to implementation of frog conservation activities in six categories:

- Recreational trout fishing activities;
- Recreational hiking activities;
- Recreational rock climbing activities;
- Residential development activity;

- Fire management activities; and
- Other activities on Federal lands.

201. Of these six categories, impacts of frog conservation are not anticipated to affect small entities in three of these categories: residential development, fire management, and other activities on Federal lands. Chapter 5 concludes that residential development is unlikely to be impacted by frog conservation activities. As described in Chapters 4, 6, and 7, the modifications to activities on Federal lands, including installation of signs and relocation of hiking trails, fire suppression efforts, monitoring recreational mining activity, development of hazardous spills management plans, and surveying and monitoring activities will be borne by the U.S. Forest Service (USFS) and the California Department of Fish and Game (CDFG). Neither Federal nor State government are defined as small entities by the Small Business Administration (SBA), therefore, the economic impacts resulting from implementation of frog conservation activities are not relevant to the screening analysis.

202. Accordingly, the small business analysis contained in this appendix focuses on economic impacts to recreational trout fishing and rock climbing activities.

A.1.2 ANALYSIS OF IMPACTS TO SMALL BUSINESSES RELATED TO RECREATIONAL TROUT FISHING

203. In Chapter 3, this analysis uses a simplified approach to bound the potential losses to recreational trout fishing activities (for more detail, see Chapter 3). The lower-bound estimate assumes that adequate, equally desirable substitute trout fishing locations exist to offset recreational trout fishing opportunities lost within essential frog habitat. As a result, future costs are limited to the compliance costs associated with installing fish barriers and removing non-native trout. The directly regulated entities under Scenario 1 include USFS and CDFG, both of which are large government agencies. As a result, the directly affected entities are not subject to this screening analysis.

204. The upper-bound estimate makes the simplifying assumption that all fishing trips that would normally be taken to sites in essential habitat are foregone (e.g., not taken). It accounts for the possibility that anglers will experience welfare losses (i.e., losses occurring when trips are diminished, because either anglers decide to go to a second-best location in the area that does not have the same attributes as the sites in essential frog habitat or because they take fewer fishing trips). The upper-bound estimate concludes that fishing trips may decrease by as much as 7,100 to 14,300 trips per year. The welfare value lost to an angler is $53.28 per trip. Importantly, this per trip impact represents the non-market value to anglers of a fishing experience, not changes in cash flow to local businesses.

205. If fewer recreational fishing trips occur to areas within proposed critical habitat, local establishments providing services to anglers may be indirectly affected by frog conservation activities. Decreased visitation may reduce the amount of money spent in the region across a variety of industries, including food and beverage stores, food service and drinking places, accommodations, transportation and rental services.

206. To determine the potential regional economic impacts of decreases in recreational fishing trips, this analysis uses regional economic modeling to quantify the dollar value of goods and services produced and employment generated by consumer expenditures. Regional economic modeling accounts for the interconnectedness of industries within a geographic area -- that is industries not only supply goods and services to consumers, but also to each other. Thus, spending in one economic sector tends to have a larger impact on the regional economy as a whole. This concept is commonly referred to as the "multiplier" effect.

207. In particular, this analysis utilizes a software package called IMPLAN to estimate the total economic effects of the reduction in economic activity in recreational fishing-related industries in the two counties associated with frog conservation activities, Los Angeles and Riverside Counties. Commonly used by State and Federal agencies for policy planning and evaluation purposes, IMPLAN translates estimates of initial trip expenditures (e.g., food, lodging, and gas) into changes in demand for inputs to affected industries.[79] Changes in output and employment are calculated for all industries and then aggregated to determine the regional economic impact of reduced recreational fishing-related expenditures potentially associated with frog conservation activities.

208. Based on the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for California, average expenditures per fishing trip are approximately $38 ($2005), with the bulk of these expenditures occurring in the food service and gasoline industries. This per-trip estimate of expenditures is combined with the number of fishing trips potentially lost due to frog conservation activities (7,100 to 14,300 trips per year) to estimate total expenditures of $271,000 to $543,000 due to recreational trout fishing in proposed critical habitat areas. According to IMPLAN, these recreational fishing-related expenditures contribute between $471,000 and $943,000 per year to the regional economy. When compared to the total output of the industry sectors directly impacted by these expenditures (e.g., groceries, restaurants, gasoline stations, and lodging) in the regional economy of Los Angeles and Riverside Counties (or $29.4 billion), the potential loss generated by a decrease in recreational trout fishing trips is less than one hundredth of a percent.

A.1.3 ANALYSIS OF IMPACTS TO SMALL BUSINESSES RELATED TO ROCK CLIMBING ACTIVITIES

209. In Section 4, this analysis also estimates welfare losses to rock climbers as the result of a temporary one-year closure of Williamson Rock, adjacent to Little Rock Creek (Subunit 1C) in Los Angeles County. Section 4 concludes that a one-year closure will result in the loss of approximately 10,600 to 14,600 rock climbing trips in 2006. The welfare value lost to a climber is $95.20 per trip. Importantly, this per trip impact represents the non-market value to climbers of a climbing experience, not changes in cash flow to local businesses.

79 The IMPLAN model is owned and maintained by the Minnesota IMPLAN Group, Inc. (MIG). For more information see: IMPLAN Professional, Social Accounting and Impact Analysis Software, User's Guide, Analysis Guide, Data Guide, Minnesota IMPLAN Group, Inc. 1997.

210. As for recreational fishing trips, if fewer rock climbing trips occur to areas within proposed critical habitat, local establishments providing services to rock climbers may be indirectly affected by frog conservation activities. Decreased visitation may reduce the amount of money spent in the region across a variety of industries, including food and beverage stores, food service and drinking places, and gas and transportation services.

211. To determine the potential regional economic impacts of decreases in rock climbing trips, this analysis uses IMPLAN to quantify the dollar value of goods and services produced and employment generated by consumer expenditures (see above for more detail on IMPLAN).

212. Ideally, this analysis would develop and use a per-trip estimate of expenditures for rock climbing based on the existing economics literature. However, no such data is available for rock climbing activities. In the absence of this information, and in order to understand the magnitude of the potential impacts, this analysis uses the average expenditures reported by the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for California for fishing, hunting and wildlife-associated recreation, or approximately $26.23 per trip (Exhibit A-1).

EXHIBIT #A-1 RECREATION-RELATED EXPENDITURES PER TRIP ($2005)[1]

EXPENDITURE CATEGORY[2]	PER FISHING TRIP	PER HUNTING TRIP	PER WILDLIFE-RECREATION TRIP	AVERAGE
Food	$13.58	$16.11	$11.78	$13.82
Gas & Auto	$9.92	$12.92	$14.40	$12.41
TOTAL:	**$23.50**	**$29.03**	**$26.18**	**$26.23**

Notes:
1 Values adjusted using the GDP Implicit Price Deflator, Table 1.1.9. Implicit Price Deflators for Gross Domestic Product, U.S. Department of Commerce, Bureau of Economic Analysis. December 2005.
2 Expenditures were limited to the above categories because the majority of rock climbing trips (94 percent) are taken as day trips.

Source: U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau. 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

213. This per-trip estimate of expenditures is then combined with the number of rock climbing trips potentially lost due to frog conservation activities (a one-year loss of 10,600 to 14,600 trips per year) to estimate total expenditures of $278,000 to $382,000 due to rock climbing in proposed critical habitat areas. According to IMPLAN, these rock climbing-related expenditures contribute between $480,000 and $660,000 per year to the regional economy, a result that is indiscernible if rounded to significant digits consistent with model data. When compared to the total output of the industry sectors directly impacted by these expenditures (e.g., groceries, restaurants and gasoline stations) in the regional economy of Los Angeles County (or $21.6 billion), the potential loss generated by a decrease in rock climbing trips is less than one hundredth of a percent.

214. It is important to note that the estimates of lost fishing and climbing trips assume that the trips are not substituted to another location within these counties (e.g., anglers do not visit

another lake or stream in the county where trout continue to be stocked). In addition, the analysis assumes that recreators do not undertake substitute activities (e.g., climbers do not go hiking or biking instead of taking trips to Williamson's Rock). If recreators visit substitute sites or choose alternative activities, the regional impacts predicted in this section may be smaller or would not occur.

A.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY

215. 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."[80]

216. 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.[81]

As none of these criteria is relevant to this analysis, energy-related impacts associated with conservation efforts within the potential critical habitat are not expected.

[80] 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.

[81] Ibid.

APPENDIX B | SUMMARY OF PAST IMPACTS TO ALL ACTIVITIES BY SUBUNIT

EXHIBIT #B-1 PAST IMPACTS (2002-2005) TO ALL ACTIVITIES BY SUBUNIT

UNIT	SUBUNIT	UNDISCOUNTED		PRESENT VALUE, 3%		PRESENT VALUE, 7%	
		LOW	HIGH	LOW	HIGH	LOW	HIGH
Proposed for Designation							
1	A: San Gabriel River, East Fork	$44,000	$44,000	$48,000	$48,000	$52,000	$52,000
	B: Big Rock Creek, South Fork	$892,000	$910,000	$947,000	$968,000	$1,025,000	$1,049,000
	C: Little Rock Creek	$191,000	$191,000	$210,000	$210,000	$238,000	$238,000
	D: Devil's Canyon	$5,000	$5,000	$5,000	$5,000	$6,000	$6,000
	E: Day Canyon	$13,000	$13,000	$14,000	$14,000	$16,000	$16,000
	F: San Gabriel River, East Fork, Iron Fork	$7,000	$7,000	$7,000	$7,000	$8,000	$8,000
	G: Bear Creek	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
2	A: City Creek	$29,000	$29,000	$31,000	$31,000	$34,000	$34,000
	B: Barton Creek	$4,000	$4,000	$4,000	$4,000	$5,000	$5,000
	C: Whitewater River, North Fork	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
3	A: San Jacinto River, North Fork	$318,000	$326,000	$342,000	$351,000	$377,000	$386,000
	B: Indian Creek	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
	C: Tahquitz Creek	$7,000	$7,000	$8,000	$8,000	$9,000	$9,000
	D: Andreas Creek	$2,000	$2,000	$2,000	$2,000	$3,000	$3,000
Multiple Subunits		$26,000	$36,000	$27,000	$37,000	$28,000	$38,000
	TOTAL:	**$1,545,000**	**$1,581,000**	**$1,654,000**	**$1,693,000**	**$1,809,000**	**$1,852,000**
Proposed for Exclusion							
3	A: San Jacinto River, North Fork	$0	$0	$0	$0	$0	$0
	B: Indian Creek	$0	$0	$0	$0	$0	$0

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