



ECONOMIC ANALYSIS OF CRITICAL
HABITAT DESIGNATION FOR THE JEMEZ
MOUNTAINS SALAMANDER

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prepared for:

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EXECUTIVE SUMMARY

1. The purpose of this report is to evaluate the potential economic impacts associated with the designation of critical habitat for the Jemez Mountains salamander (*Plethodon neomexicanus*) (hereafter “the salamander”). This information is intended to assist the Secretary of the U.S. Department of the Interior (DOI) in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.¹ This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service (Service).
2. The Service proposed to list the salamander as endangered under the Endangered Species Act (the Act) on September 12, 2012.² In conjunction with the listing of the salamander, the Service proposed to designate as critical habitat two units incorporating areas in Los Alamos, Rio Arriba, and Sandoval Counties in New Mexico. This proposed critical habitat totals 90,787 acres (36,741 hectares), including areas under Federal, state, and private ownership. Federal landowners include the United States Forest Service, the Valles Caldera National Preserve, and the National Park Service. The Service did not propose any of the proposed critical habitat for exclusion. The study area for this analysis is identical to the proposed critical habitat. Exhibit ES-1 provides an overview map of the study area.
3. In addition to quantifying potential economic impacts associated with the designation of critical habitat, this analysis considers the costs of existing plans, regulations, and other actions that provide protection for the salamander and its habitat. These are “baseline” protections accorded the salamander even absent the designation of critical habitat. The discussion of the regulatory baseline provides context for the evaluation of the economic impacts of critical habitat designation, which are the focus of this analysis. These “incremental” economic impacts are those not expected to occur absent the designation of critical habitat for the salamander.
4. Review of the proposed rule identified the following activities as potentially impacting the salamander and its habitat within the boundaries of the critical habitat:
 1. **Severe wildland fire.** Large-scale, stand-replacing wildfires that change forest composition.

¹ 16 U.S.C. §1533(b)(2).

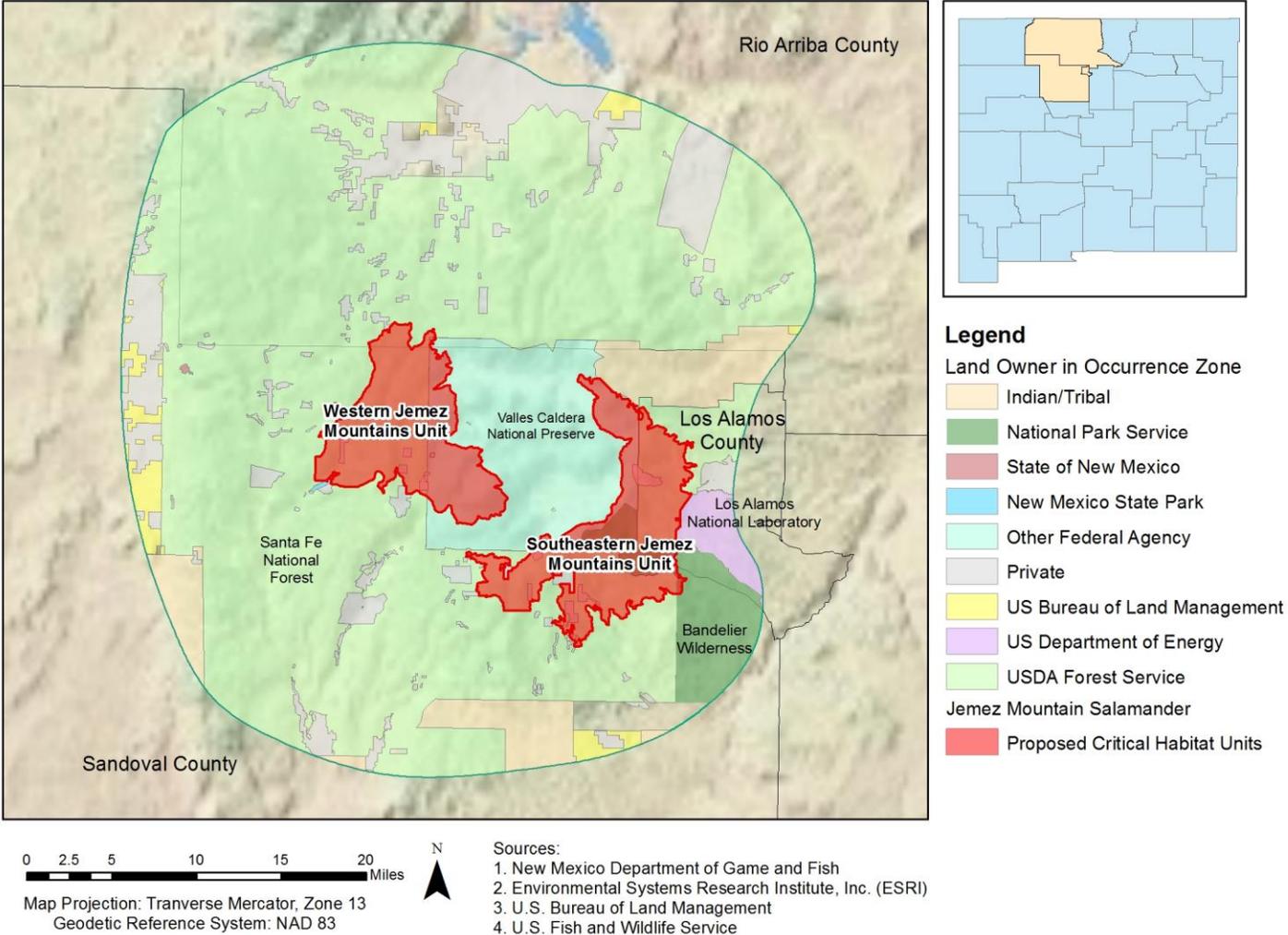
² 2012 Proposed Rule. 77 FR 56582.

2. **Fire management.** Fire exclusion (prevention), fire suppression (extinguishing wildfire), and post-fire rehabilitation.
 3. **Other Federal land management.** May include tree density thinning, use of herbicides on invasive species, decommissioning of roads, and recreational activities on Federal land.
 4. **Private development.** Private residential and recreational development.
 5. **Transportation.** Construction and expansion of new roads. Maintenance activities on existing roads.
5. In addition to the above threats, the area has a history of livestock grazing. However, the Service does not consider livestock grazing to be a current threat to salamander habitat. As stated in the proposed rule, “although some small-scale habitat modification is possible, livestock are managed to maintain a grassy forest understory. Therefore, we do not consider livestock grazing to be a current threat to the salamander’s habitat, nor do we anticipate that it will be in the future.”³
 6. The proposed rule also identifies climate change as a threat to the salamander and its habitat, as warming and drying can reduce appropriate habitat and can reduce the amount of time that the species can live above ground. Evidence suggests that the Jemez Mountains are at particular risk to warming and drying as a result of climate change. However, we do not expect the Service to initiate section 7 consultations on activities for purposes of mitigating for climate change alone. Instead, it is likely to be consulted on as part of consideration of other threats.
 7. This analysis considers impacts to economic activities occurring from 2013 (expected year of final critical habitat designations) to 2032. This 20-year analysis reflects the time period over which future activities and economic impacts associated with the proposed rule can be reliability projected, given available data and information. Economic impacts are estimated for severe wildland fire, fire management, other Federal land management, livestock grazing, and transportation. No impacts are forecast for private development, because no projects with a Federal nexus were identified within the study area.

³ 2012 Proposed Rule, 88 FR 56495.

EXHIBIT ES-1. OVERVIEW OF PROPOSED CRITICAL HABITAT STUDY AREA FOR THE JEMEZ MOUNTAINS SALAMANDER

Overview of Proposed Critical Habitat Units for the Jemez Mountains Salamander



KEY FINDINGS

8. The Service anticipates that in cases where an action is found to adversely modify critical habitat for the salamander, the action would also be found to jeopardize the species. That is, actions which the Service is likely to recommend to avoid adverse modification are the same as those to avoid jeopardy. Thus, the incremental impacts of the critical habitat designation for the salamander appear unlikely to include additional conservation actions/project modifications. As a result, this analysis focuses on quantifying the incremental impacts associated with the administrative effort of addressing potential adverse modification of critical habitat in the context of section 7 consultations. Our analysis notes that if fire management activities are affected by critical habitat designation, impacts outside of proposed critical habitat could occur, particularly to Santa Clara Pueblo as well as ranchers.
9. Exhibit ES-2 summarizes the total baseline costs for all areas proposed for designation. Exhibit ES-3 summarizes incremental impacts for all areas proposed for designation. The key findings are as follows.
 - Total present value baseline costs are approximately \$26 million over 20 years following the designation, assuming a seven percent discount rate (\$29 million assuming a three percent discount rate).
 - Total present value incremental impacts are approximately \$260,000 over 20 years following the designation, assuming a seven percent discount rate (\$330,000 assuming a three percent discount rate).
 - All incremental costs are administrative in nature and result from the consideration of adverse modification in section 7 consultations.
 - The analysis forecasts a total of 42.4 formal consultations and 85 informal consultations.
 - Both proposed units are expected to experience similar levels of incremental impact.
 - Differences in forecast impacts across the two units are predominately a result of the distribution of land ownership, rather than differences in activities across units.

EXHIBIT ES-2. SUMMARY OF TOTAL FORECAST BASELINE ECONOMIC IMPACTS, 2013-2032 (2012\$, DISCOUNTED AT SEVEN AND THREE PERCENT)

PROPOSED CRITICAL HABITAT UNIT	UNIT NAME	SEVEN PERCENT REAL DISCOUNT RATE		THREE PERCENT REAL DISCOUNT RATE	
		PRESENT VALUE BASELINE IMPACTS	ANNUALIZED BASELINE IMPACTS	PRESENT VALUE BASELINE IMPACTS	ANNUALIZED BASELINE IMPACTS
1	Western Jemez Mountains Unit	\$13,000,000	\$1,200,000	\$15,000,000	\$990,000
2	Southeastern Jemez Mountains Unit	\$12,000,000	\$1,100,000	\$14,000,000	\$910,000
	Total	\$26,000,000	\$2,300,000	\$29,000,000	\$1,900,000
Note: Entries may not sum to totals reported due to rounding. Estimates are rounded to two significant digits.					

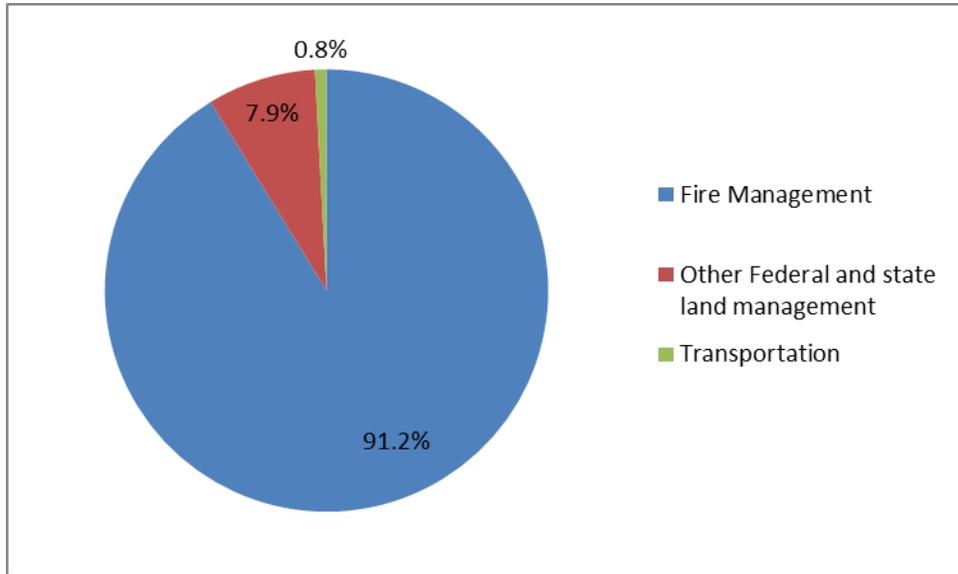
EXHIBIT ES-3. SUMMARY OF TOTAL FORECAST INCREMENTAL ECONOMIC IMPACTS, 2013-2032 (2012\$, DISCOUNTED AT SEVEN AND THREE PERCENT)

PROPOSED CRITICAL HABITAT UNIT	UNIT NAME	SEVEN PERCENT REAL DISCOUNT RATE		THREE PERCENT REAL DISCOUNT RATE	
		PRESENT VALUE INCREMENTAL IMPACTS	ANNUALIZED INCREMENTAL IMPACTS	PRESENT VALUE INCREMENTAL IMPACTS	ANNUALIZED INCREMENTAL IMPACTS
1	Western Jemez Mountains Unit	\$130,000	\$12,000	\$170,000	\$11,000
2	Southeastern Jemez Mountains Unit	\$130,000	\$11,000	\$160,000	\$11,000
	Total	\$260,000	\$23,000	\$330,000	\$22,000
Note: Entries may not sum to totals reported due to rounding. Estimates are rounded to two significant digits.					

IMPACTS BY ACTIVITY

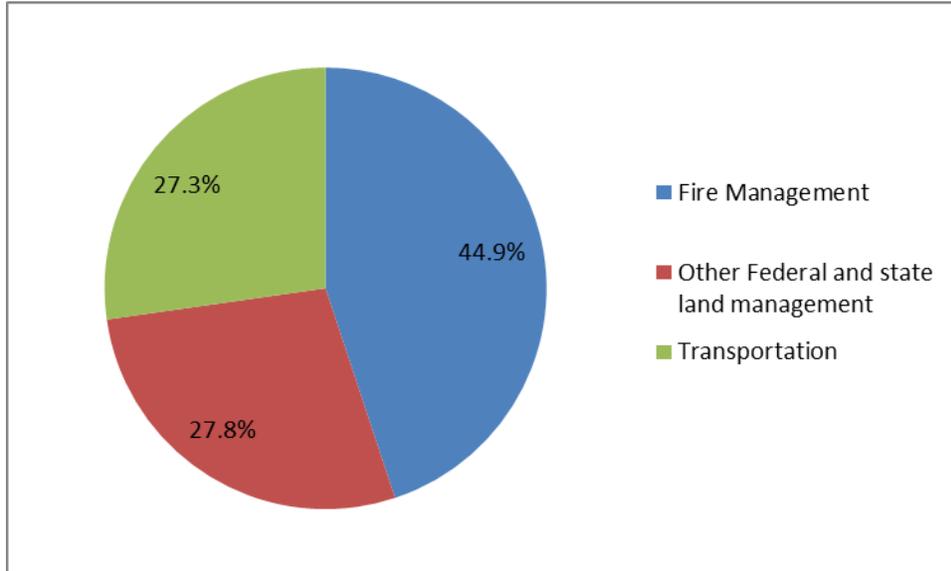
10. Exhibit ES-4 presents the breakdown of total baseline impacts by activity. As shown in the exhibit, consultations associated with fire management activities account for approximately 91 percent of all baseline impacts. These costs primarily stem from forest restoration efforts on USFS and VCNP lands.

EXHIBIT ES-4. FORECAST PRESENT VALUE BASELINE IMPACTS BY ACTIVITY, 2013-2032 (2012\$, DISCOUNTED AT SEVEN PERCENT)



11. Incremental impacts associated with specific activities are presented in Exhibit ES-5. As shown, consultations associated with fire management activities account for approximately 45 percent of incremental impacts in this analysis, other Federal land management 28 percent, and transportation 27 percent.

**EXHIBIT ES-5. FORECAST PRESENT VALUE INCREMENTAL IMPACTS BY ACTIVITY, 2013-2032
(2012\$, DISCOUNTED AT SEVEN PERCENT)**



Fire Management

12. The Service highlights high-severity, stand-replacing wildfire as posing the most significant threat to the salamander and its habitat.⁴ While the goal of preventing large-scale wildfires is paramount for protection of the salamander and its habitat, fire management activities can themselves pose a threat to salamander habitat by reducing canopy cover, removing habitat elements such as downed logs, increasing soil temperatures, decreasing soil moisture, introducing toxins into the air and soil, and increasing soil pH. To forecast future emergency consultations, we anticipate that there is a 36 percent chance of a severe fire occurring in the area in a given year. In addition, we forecast periodic consultations on fire management plans and actions based on discussions with land managers.

13. Baseline impacts associated with fire management are estimated to be \$23 million in present value terms, discounted at seven percent. Incremental impacts associated with fire management are estimated to be \$120,000 in present value terms, discounted at seven percent.

Other Federal and State Land Management

14. Other Federal and state land management activities considered include travel management and recreation, noxious weed control, grazing, and operation of the Seven Springs Fish Hatchery. To forecast future consultations on these activities, we use information provided by the various relevant land managers about when they expect to consult on their various plans for operation. Baseline costs associated with other land management are estimated to be \$2 million in present value terms, discounted at seven

⁴ 2012 Proposed Rule, 77 FR 56486.

percent. Increment effects associated with other land management activities are estimated to be \$73,000 in present value terms, discounted at seven percent.

Transportation

15. Two state highways, NM 126 and NM 501, intersect critical habitat. Through discussion with the New Mexico Department of Transportation and the Central Federal Lands Highway Division of the U.S. Department of Transportation's Federal Highway Administration, this analysis identified a single planned project for critical habitat. In addition, based on these discussions, this analysis forecasts two additional projects for each road, as well as yearly informal consultations on maintenance activities in the next 20 years. Baseline costs associated with transportation projects are estimated to be \$210,000 in present value terms, discounted at seven percent. Incremental impacts to transportation projects are estimated to be \$71,000 in present value terms, discounted at seven percent.

POTENTIAL BENEFITS

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

KEY SOURCES OF UNCERTAINTY

17. At the end of each chapter, we include a discussion of the key sources of uncertainty and major assumptions affecting the estimation of impacts. The assumptions that are likely to have the most significant effect on the estimated impacts include:
- a. The Service will not request additional project modifications to address adverse modification beyond what is requested to avoid jeopardy;
 - b. The rate of forecast consultation activity estimated using available information accurately reflects future consultation activity. Specific consultation assumptions include:
 - a. There is a 0.36 chance that each major land manager will have to hold an emergency fire consultation in a given year;
 - b. Each land owner will hold a formal consultation on their fire management plans every 10 years;

- c. Yearly informal consultations on fire prevention activities will occur for both Santa Fe National Forest and Valles Caldera National Preserve;
- d. Periodic formal consultations on various other land management plans will occur every 10 years;
- e. NMDOT will hold two consultations per unit over the next 20 years;
- f. NMDOT will participate in yearly informal consultations on maintenance activities in each unit.

The direction of the potential bias introduced by these assumptions is mixed (i.e., in some cases leading to an underestimate and in some cases leading to an overestimate) and in some cases unknown.

CHAPTER 1 | INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

18. This chapter provides an overview of the proposed critical habitat for the Jemez Mountains salamander (*Plethodon neomexicanus*) (hereafter “the salamander”). We include a description of the species, a summary of publications that relate to the current proposal, a summary of land ownership within the current proposal, maps of the proposed units, and a summary of threats to the proposed critical habitat. All official definitions and boundaries should be taken from the proposed rule.⁵

1.2 SPECIES DESCRIPTION

19. The salamander occupies terrestrial habitat in mixed-conifer forest. Their habitat extent is confined to the Jemez Mountains in Los Alamos, Rio Arriba, and Sandoval Counties in New Mexico. The salamander breathes through its skin, thus a moist microclimate allowing gas exchange is very important to the salamander’s survival. Decaying coniferous logs are an important habitat component for the salamander.⁶

1.3 PREVIOUS FEDERAL ACTIONS

20. Below, we summarize key milestones in the Federal regulatory history for the salamanders.

Listing: The salamander was proposed for listing as endangered under the Endangered Species Act (the Act) on September 12, 2012.⁷

Proposed critical habitat: In conjunction with the proposed listing of the Jemez Mountains salamander on September 12, 2012, the Service proposed the designation of two critical habitat units totaling 90,789 acres.

1.4 PROPOSED CRITICAL HABITAT DESIGNATION

21. The 2012 proposed critical habitat designation divides the proposed habitat into two units. These units, the Western Jemez Mountains Unit (42,445 acres), and the adjacent Southeastern Jemez Mountains Unit (48,344 acres), are located in northern New Mexico, in Sandoval, Rio Arriba, and Los Alamos Counties. Exhibit 1-1 provides information on

⁵ U.S. Fish and Wildlife Service. 2012. Endangered and Threatened Wildlife and Plants; Endangered Status for the Jemez Mountains Salamander and Designation of Critical Habitat; Proposed Rule. 77 FR 56582-556513.

⁶ Ibid.

⁷ Ibid.

land ownership within the proposed critical habitat. As shown, nearly 97 percent of the proposed area is federally managed, with only three percent being privately owned. Federal land managers include the United States Forest Service's (USFS) Santa Fe National Forest (SFNF) (63 percent of proposed critical habitat), the Valles Caldera National Preserve (VCNP) (26 percent of proposed critical habitat), and the National Park Service's (NPS) Bandelier National Monument (Bandelier) (8 percent of proposed critical habitat). As shown in Exhibit 1-1, private lands consist of relatively small inholdings, most of which are within Santa Fe National Forest. The largest private parcel includes the privately owned Pajarito Ski Area.

EXHIBIT 1-1. LANDOWNERSHIP WITHIN PROPOSED CRITICAL HABITAT BY MANAGEMENT UNIT (ACRES) ¹

MANAGEMENT UNIT		FEDERAL			STATE	PRIVATE	TOTAL
		USFS	VCNP	NPS	NMDGF		
1	Western Jemez Mountains	26,531	14,935	0	73	906	42,444
2	Southeastern Jemez Mountains	30,437	8,810	7,198	0	1,897	48,343
	Total	56,968	23,745	7,198	73	2,803	90,787
	Percent of total proposed area	63%	26%	8%	0%	3%	100%

Source: US Bureau of Land Management, New Mexico State Office. 2012. Land Ownership Data [GIS File] and Proposed Rule.

1.5 ECONOMIC ACTIVITIES CONSIDERED IN THIS ANALYSIS

22. Review of the proposed rule identified the following activities as potentially impacting the salamander and its habitat within the boundaries of the critical habitat:
- (1) **Severe wildland fire.** Large-scale, stand-replacing wildfires that change forest composition.
 - (2) **Fire Management.** Fire exclusion (prevention), fire suppression (extinguishing wildfire), and post-fire rehabilitation.
 - (3) **Other Federal Land Management.** May include tree density thinning, use of herbicides on invasive species, decommissioning of roads, grazing, and recreational activities on Federal land.
 - (4) **Private Development.** Private residential and recreational development.
 - (5) **Transportation.** Construction and expansion of new roads. Maintenance activities on existing roads.
23. In addition to the above threats, the area has a history of livestock grazing. However, the Service does not consider livestock grazing to be a current threat to salamander habitat. As stated in the proposed rule, "although some small-scale habitat modification is possible, livestock are managed to maintain a grassy forest understory. Therefore, we do

not consider livestock grazing to be a current threat to the salamander's habitat, nor do we anticipate that it will be in the future.”⁸ The analysis briefly discusses current livestock grazing practices and the potential for future consultation on this activity.

24. The proposed rule also identifies climate change as a threat to the salamander and its habitat, as warming and drying can reduce appropriate habitat and can reduce the amount of time that the species can live above ground. Evidence suggests that the Jemez Mountains are at particular risk to warming and drying as a result of climate change. However, we do not expect the Service to initiate section 7 consultations on activities for purposes of mitigating for climate change alone. Instead, it is likely to be consulted on as part of consideration of other threats.

1.6 ORGANIZATION OF THE REPORT

25. The remainder of this report proceeds through three additional chapters. Chapter 2 discusses the framework employed in the analysis. Chapter 3 describes the extensive baseline protections that apply to the salamanders. Chapter 4 provides an assessment of potential incremental economic impacts to the activities listed above, as well as incremental administrative impacts. Chapter 4 also describes the potential benefits of the proposed critical habitat designations.
26. In addition, this report includes the following appendices: Appendix A considers potential impacts on small entities and the energy industry; Appendix B discusses the sensitivity of the results to discount rate, including undiscounted values; and Appendix C provides the basis for identifying the incremental effects of critical habitat designation.

⁸ 2012 Proposed Rule, 88 FR 56495.

CHAPTER 2 | FRAMEWORK FOR THE ANALYSIS

27. The purpose of this report is to estimate the economic impact of actions taken to protect the salamander and their habitat. This analysis examines the impacts of restricting or modifying specific land uses or activities for the benefit of the species and their habitat within the proposed critical habitat areas. This analysis employs "without critical habitat" and "with critical habitat" scenarios. The "without critical habitat" scenario represents the baseline for the analysis, considering protections otherwise accorded the salamanders; for example, under the Federal listing and other Federal, State, and local regulations. The "with critical habitat" scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts are those not expected to occur absent the designation of critical habitat.
28. This information is intended to assist the Secretary of the U.S. Department of Interior in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.⁹ In addition, this information allows the Service to address the requirements of Executive Orders 12866 (as amended by 13563) and 13211, and the RFA, as amended by SBREFA.¹⁰
29. This chapter describes the framework for this analysis. We describe case law that led to the selection of the framework applied in this report. Next, we describe in economic terms the general categories of economic effects that are the focus of the impact analysis, including a discussion of both efficiency and distributional effects. This chapter then defines the analytic framework used to measure these impacts in the context of critical habitat regulation and the consideration of benefits. We conclude with a presentation of the information sources relied upon in the analysis.

2.1 BACKGROUND

30. The Office of Management and Budget's (OMB) guidelines for conducting an economic analysis of regulations direct Federal agencies to measure the costs of a regulatory action against a baseline, which it defines as the "best assessment of the way the world would

⁹ 16 U.S.C. §1533(b)(2).

¹⁰ Executive Order 12866, Regulatory Planning and Review, September 30, 1993; Executive Order 13563, Improving Regulation and Regulatory Review, January 18, 2011; Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001; 5 U.S.C. §601 et seq; and Contract with American Advancement Act of 1996, Pub Law No. 104-121.

look absent the proposed action.”¹¹ In other words, the baseline includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat. Impacts that are incremental to that baseline (i.e., occurring over and above existing constraints) are attributable to the proposed regulation. Significant debate has occurred regarding whether assessing the impacts of the Service’s proposed regulations using this baseline approach is appropriate in the context of critical habitat designation.

31. In 2001, the U.S. Court of Appeals for the Tenth Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable co-extensively to other causes.¹² Specifically, the court stated,

“The statutory language is plain in requiring some kind of consideration of economic impact in the CHD [critical habitat designation] phase. Although 50 C.F.R. 402.02 is not at issue here, the regulation’s definition of the jeopardy standard as fully encompassing the adverse modification standard renders any purported economic analysis done utilizing the baseline approach virtually meaningless. We are compelled by the canons of statutory interpretation to give some effect to the congressional directive that economic impacts be considered at the time of critical habitat designation.... Because economic analysis done using the FWS’s [Fish and Wildlife Service’s] baseline model is rendered essentially without meaning by 50 C.F.R. § 402.02, we conclude Congress intended that the FWS conduct a full analysis of all of the economic impacts of a critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes. Thus, we hold the baseline approach to economic analysis is not in accord with the language or intent of the ESA [Endangered Species Act].”¹³

32. Since that decision, however, courts in other cases have held that an incremental analysis of impacts stemming solely from the critical habitat rulemaking is proper.¹⁴ For example, in the March 2006 ruling that the August 2004 critical habitat rule for the Peirson’s milk-vetch was arbitrary and capricious, the United States District Court for the Northern District of California stated,

“The Court is not persuaded by the reasoning of *New Mexico Cattle Growers*, and instead agrees with the reasoning and holding of *Cape Hatteras Access*

¹¹ U.S. Office of Management and Budget, “Circular A-4,” September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>

¹² *New Mexico Cattle Growers Assn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

¹³ *Ibid.*

¹⁴ In explanation of their differing conclusion, later decisions note that in *New Mexico Cattle Growers*, the U.S. Court of Appeals for the Tenth Circuit relied on a Service regulation that defined “destruction and adverse modification” in the context of section 7 consultation as effectively identical to the standard for “jeopardy.” Courts had since found that this definition of “adverse modification” was too narrow. For more details, see the discussion of *Gifford Pinchot Task Force v. United States Fish and Wildlife Service* provided later in this section.

Preservation Alliance v. U.S. Dep't of the Interior, 344 F. Supp 2d 108 (D.D.C. 2004). That case also involved a challenge to the Service's baseline approach and the court held that the baseline approach was both consistent with the language and purpose of the ESA and that it was a reasonable method for assessing the actual costs of a particular critical habitat designation *Id* at 130. 'To find the true cost of a designation, the world with the designation must be compared to the world without it.'"¹⁵

33. More recently, in 2010, the U.S Court of Appeals for the Ninth Circuit came to similar conclusions during its review of critical habitat designation for the Mexican spotted owl and 15 vernal pool species.¹⁶ Plaintiffs in both cases requested review by the Supreme Court, which declined to hear the cases in 2011.
34. In order to address the divergent opinions of the courts and provide the most complete information to decision-makers, this economic analysis:
- Describes the baseline protections accorded the salamander absent critical habitat designation (Chapter 3); and
 - Monetizes the potential incremental impacts precipitated specifically by the critical habitat designation for the species (Chapter 4).
35. Several Courts of Appeal, including the Ninth Circuit and the Fifth Circuit, have invalidated the Service's regulation defining destruction or adverse modification of critical habitat.¹⁷ At this time the Service is analyzing whether destruction or adverse modification would occur based on the statutory language of the Act itself, which requires the Service to consider whether the agency's action is likely "to result in the destruction or adverse modification of habitat which is determined by the Service to be critical" to the conservation of the species. To perform this analysis, the Service considers how the proposed action is likely to impact the ability of critical habitat to carry out its intended function and conservation role. To assist us in evaluating these likely impacts, the Service provided information regarding what potential consultations could occur in the critical habitat units for the salamander and what project modifications may be imposed as a result of critical habitat designation. The Service also provided a memorandum characterizing the effects of critical habitat designation over and above those associated with the listing (see Appendix C). A detailed description of the methodology used to define baseline and incremental impacts is provided at the end of this chapter.

2.2 CATEGORIES OF POTENTIAL ECONOMIC EFFECTS OF SPECIES CONSERVATION

36. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the salamander and its habitat (hereafter referred to

¹⁵ *Center for Biological Diversity v. United States Bureau of Land Management*, 422 F. Supp.2d 1115 (N.D. Cal. 2006).

¹⁶ *Home Builders Association of Northern California v. United States Fish and Wildlife Service*, 616 F.3d 983 (9th Cir. 2010), cert. denied, 179 L. Ed 2d 301, 2011 U.S. Lexis 1392, 79 U.S.L.W. 3475 (2011); *Arizona Cattle Growers v. Salazar*, 606 F. 3d 1160 (9th Cir. 2010), cert. denied, 179 L. Ed. 2d 300, 2011 U.S. Lexis 1362, 79 U.S.L.W. 3475 (2011).

¹⁷ *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, No. 03-35279 (9th Circuit 2004).

collectively as “salamander conservation efforts”). Economic efficiency effects generally reflect “opportunity costs” associated with the commitment of resources required to accomplish species and habitat conservation. For example, if the set of activities that may take place on a parcel of land is limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of salamander conservation efforts.

37. This analysis also addresses the distribution of impacts associated with the designations, including an assessment of any local or regional impacts of habitat conservation. This information may be used by decision-makers to assess whether the effects of species conservation efforts unduly burden a particular group or economic sector. For example, while conservation efforts may have a small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts.

2.2.1 EFFICIENCY EFFECTS

38. At the guidance of OMB and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect the salamanders' 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.¹⁸
39. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal land manager may enter into a section 7 consultation with the Service to ensure that a particular activity is not likely to 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 a compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.
40. Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, protection measures that reduce or preclude the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in

¹⁸ 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>.

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

2.2.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

41. Measurements of changes in economic efficiency focus on the net impact of conservation efforts, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.¹⁹ This analysis considers several types of distributional effects, including impacts on 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.

Regional Economic Effects

42. Regional economic impact analysis can provide an assessment of the potential localized effects of conservation efforts. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that represent the relationship between a change in one sector of the economy (e.g., expenditures by recreators) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreators). These economic data provide a quantitative estimate of the magnitude of shifts in jobs and revenues in the local economy.
43. The use of regional input-output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.
44. Despite these and other limitations, in certain circumstances regional economic impact analyses 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. Given the limited nature

¹⁹ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>

of incremental impacts likely to result from these designations (see Chapter 4), measurable regional impacts are not anticipated.

2.3 ANALYTIC FRAMEWORK AND SCOPE OF THE ANALYSIS

45. This analysis: 1) identifies those economic activities most likely to impact the salamander and its habitat; 2) describes the baseline regulatory protection for the species; and 3) monetizes the incremental economic impacts to avoid adverse modification of the proposed critical habitat.²⁰ This section provides a description of the methodology used by the Service to separately identify baseline protections from the incremental impacts stemming from the designation of critical habitat. This evaluation of impacts in a "with critical habitat" versus a "without critical habitat" framework effectively measures the net change in economic activity associated with the proposed rule. Specific discussion of the analytic approach used to identify baseline and incremental impacts associated with the salamander is provided in Section 2.3.2.

2.3.1 IDENTIFYING BASELINE IMPACTS

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

47. Baseline protections include sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections to the extent that they are expected to occur absent the designation of critical habitat for the species. This analysis describes these baseline regulations. The primary focus, however, is not on baseline costs, because these will not be affected by the proposed regulation. Instead, the focus of this analysis is on monetizing the incremental impacts forecast to result from the proposed critical habitat designations.

- Section 7 of the Act, absent critical habitat designation, requires Federal agencies to consult with the Service to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species. Consultations under section 7 result in administrative costs, as well as impacts of conservation efforts resulting from consultation.
- 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,

²⁰ Throughout this document, use of the term 'adverse modification' should be read to reference the full relevant standard under section 7 of the Act (i.e., each Federal agency must ensure that any action it authorizes, funds, or carries out is not likely to result in the destruction or adverse modification of critical habitat). 16 U.S.C. §1536(a)(2).

pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."²¹ 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 a listed animal species in order to meet the conditions for issuance of an incidental take permit in connection with a land or water use activity or project.²² The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are minimized and mitigated to the maximum extent practicable. The development and implementation of HCPs is considered a baseline protection for the species and habitat unless the HCP is determined to be precipitated by the designation of critical habitat, or the designation influences stipulated conservation efforts under HCPs.

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

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

2.3.2 IDENTIFYING INCREMENTAL IMPACTS

49. This analysis quantifies the potential incremental impacts of this rulemaking. The focus of the incremental analysis is to determine the impacts on land uses and activities from the designation of critical habitat that are above and beyond those impacts resulting from existing required or voluntary conservation efforts being undertaken due to other Federal, State, and local regulations or guidelines.
50. When critical habitat is designated, section 7 requires Federal agencies to consult on their actions regarding the potential destruction or adverse modification of critical habitat (in addition to considering whether the actions are likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations, and the additional impacts of implementing conservation efforts (i.e., conservation measures and reasonable and prudent alternatives in the case of an adverse modification finding) resulting from the protection of critical

²¹ 16 U.S.C. 1532.

²² U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.

habitat are the direct compliance costs of designating critical habitat. These costs are not in the baseline and are considered incremental impacts of the rulemaking.

51. Incremental impacts may be the direct compliance costs associated with additional effort for consultations, new consultations occurring specifically because of the designation, and additional conservation efforts that would not be requested during consultation for the listed species without critical habitat. Additionally, incremental impacts may include indirect impacts resulting from reaction to the potential designation of critical habitat (e.g., implementing salamander conservation in an effort to avoid designation of critical habitat), triggering of additional requirements under State or local laws intended to protect sensitive habitat, and uncertainty and perceptual effects on markets.

Direct Impacts

52. The direct, incremental impacts of critical habitat designation stem from the consideration of the potential for destruction or adverse modification of critical habitat during section 7 consultations. The two categories of direct, incremental impacts of critical habitat designation are: 1) the administrative costs of conducting section 7 consultation; and 2) implementation of any conservation efforts requested by the Service through section 7 consultation to avoid potential destruction or adverse modification of critical habitat.²³
53. Section 7(a)(2) of the Act requires Federal agencies to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. Parties involved in section 7 consultations include the Service, a Federal “action agency,” such as the U.S. Army Corps of Engineers (the Corps), and in some cases, a private entity involved in the project or land use activity (“applicant”), such as the recipient of a CWA section 404 permit. If there is an applicant, the action agency (i.e., the agency with the Federal nexus necessitating the consultation) consults with the Service and also serves as the liaison between the applicant and the Service.
54. During consultation, the Service, the action agency, and the entity applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these interactions. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, and the potential effects to the species and designated critical habitat associated with the proposed activity, the Federal agency, and whether there is a private applicant involved.
55. 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 have discountable, insignificant, or beneficial effects on a listed species. By contrast, a *formal consultation* is required if the action agency determines that its proposed action is likely to adversely affect the listed species

²³ The term conservation efforts is intended to broadly capture efforts that stakeholders may undertake for the species, regardless of whether these efforts are explicitly called for in a section 7 consultation.

or adversely modify designated critical habitat. 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 destroy or adversely modify critical habitat. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

Administrative Section 7 Consultation Costs

56. As described above, parties involved in section 7 consultations include the Service, the Federal action agency, and in some cases, a third-party applicant. While consultations are required for activities that involve a Federal nexus and may affect a species regardless of whether critical habitat is designated, the designation may increase the effort for consultations in the case that the project or activity in question may affect critical habitat. Administrative efforts for consultation may therefore result in both baseline and incremental impacts.
57. In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:
1. **Additional effort to address adverse modification in a new consultation -** New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the listing issues. In this case, only the additional administrative effort required to consider critical habitat and any project modification costs incurred solely to address critical habitat impacts are considered incremental impacts of the designation.
 2. **Re-initiation of consultation to address adverse modification -** Consultations that have already been completed on a project or activity (but for which the project or activity is not yet completed) may require re-initiation to address critical habitat. In this case, the costs of re-initiating the consultation, including all associated administrative and project modification costs, are considered incremental impacts of the designation.
 3. **Consultation resulting entirely from critical habitat designation -** Critical habitat designation may trigger additional consultations that may not occur absent the designation (e.g., for an activity for which adverse modification may be an issue, while jeopardy is not, or consultations resulting from the new information about the potential presence of the species provided by the designation). Such consultations may, for example, be triggered in critical habitat areas that are not occupied by a listed species. All associated administrative and project modification costs of these consultations are considered incremental impacts of the designation.
58. The administrative costs of these consultations vary depending on the specifics of the project. One way to address this variability is to show a range of possible costs of a consultation, as it may not be possible to predict the precise outcome of each future consultation in terms of level of effort. Review of consultation records and discussions with multiple Service field offices resulted in a range of estimated administrative costs

per consultation. For simplicity, the average of the range of costs per consultation in each category is applied in this analysis.²⁴

59. Exhibit 2-1 provides the incremental administrative consultation costs applied in this analysis. To estimate the fractions of the total administrative consultation costs that are baseline and incremental, the following assumptions are applied.
- The greatest effort will be associated with consultations that consider both jeopardy and adverse modification. To the extent that the consultation is precipitated by the listing, costs will be attributed to the listing rule, and to the extent that costs are precipitated by designation of critical habitat, costs will be attributed to the proposed rule designating critical habitat.
 - Efficiencies exist when considering both jeopardy and adverse modification at the same time (e.g., in staff time saved for project review and report writing), and therefore incremental administrative costs of considering adverse modification in consultations precipitated by the listing result in the least incremental effort, roughly 10 percent of the cost of the entire consultation.²⁵ The remaining 90 percent of the costs are attributed to consideration of the jeopardy standard in the baseline scenario. This latter amount also represents the cost of a consultation that only considers adverse modification (e.g., an incremental consultation for activities in unoccupied critical habitat) and is attributed wholly to critical habitat.
 - Incremental costs of the re-initiation of a previously completed consultation because of the critical habitat designation are assumed to be approximately half the cost of a consultation considering both jeopardy and adverse modification. This assumes that re-initiations are less time-consuming as the groundwork for the project has already been considered in terms of its effect on the species. However, because the previously completed effort must be re-opened, they are more costly than simply adding consideration of critical habitat to a consultation already underway.

²⁴The validity of these cost estimates was confirmed for this analysis by Service and U.S. Forest Service biologists. U.S. Fish and Wildlife Service. Carlsbad Field Office biologist. Personal communication on May 23, 2012; and Winter, Kirsten. U.S. Forest Service biologist at Cleveland National Forest. Personal communication on May 22, 2012.

²⁵ *Ibid.*

EXHIBIT 2-1. RANGE OF ADMINISTRATIVE CONSULTATION COSTS (2011\$)

CONSULTATION TYPE	SERVICE	FEDERAL AGENCY	THIRD PARTY	BIOLOGICAL ASSESSMENT	TOTAL COSTS
NEW CONSULTATION RESULTING ENTIRELY FROM CRITICAL HABITAT DESIGNATION (TOTAL COST OF A CONSULTATION CONSIDERING BOTH JEOPARDY AND ADVERSE MODIFICATION)					
Technical Assistance	\$570	n/a	\$1,050	n/a	\$1,620
Informal	\$2,450	\$3,100	\$2,050	\$2,000	\$9,500
Formal	\$5,500	\$6,200	\$3,500	\$4,800	\$20,000
Programmatic	\$16,700	\$13,900	n/a	\$5,600	\$36,100
NEW CONSULTATION CONSIDERING ONLY ADVERSE MODIFICATION (UNOCCUPIED HABITAT)					
Technical Assistance	\$428	n/a	\$788	n/a	\$1,220
Informal	\$1,840	\$2,330	\$1,540	\$1,500	\$7,130
Formal	\$4,130	\$4,650	\$2,630	\$3,600	\$15,000
Programmatic	\$12,500	\$10,400	n/a	\$4,200	\$27,100
RE-INITIATION OF CONSULTATION TO ADDRESS ADVERSE MODIFICATION					
Technical Assistance	\$285	n/a	\$525	n/a	\$810
Informal	\$1,230	\$1,550	\$1,030	\$1,000	\$4,750
Formal	\$2,750	\$3,100	\$1,750	\$2,400	\$10,000
Programmatic	\$8,330	\$6,930	n/a	\$2,800	\$18,100
INCREMENTAL EFFORT TO ADDRESS ADVERSE MODIFICATION IN A NEW CONSULTATION					
Technical Assistance	\$143	n/a	\$263	n/a	\$405
Informal	\$613	\$775	\$513	\$500	\$2,380
Formal	\$1,380	\$1,550	\$875	\$1,200	\$5,000
Programmatic	\$4,160	\$3,460	n/a	\$1,400	\$9,030
Source: IEC analysis of full administrative costs is based on data from the Federal Government Schedule Rates, Office of Personnel Management, 2011, and a review of consultation records from several Service field offices across the country conducted in 2002. The Albuquerque Service office did not provide alternative site-specific consultation cost estimates for use in this analysis.					
Notes:					
1. Estimates are rounded to three significant digits and may not sum due to rounding.					
2. Estimates reflect average hourly time required by staff.					

Section 7 Conservation Effort Impacts

60. Section 7 consultation considering critical habitat may also result in additional conservation effort recommendations specifically addressing potential destruction or adverse modification of critical habitat. For future consultations considering jeopardy and adverse modification, and for re-initiations of past consultations to consider critical habitat, the economic impacts of conservation efforts undertaken to avoid adverse

modification are considered incremental impacts of critical habitat designation. For consultations that are forecast to occur specifically because of the designation, impacts of all associated conservation efforts are assumed to be incremental impacts of the designation. This is summarized below.

1. **Additional effort to address adverse modification in a new consultation -** Only project modifications above and beyond what would be requested to avoid or minimize jeopardy are considered incremental.
2. **Re-initiation of consultation to address adverse modification -** Only project modifications above and beyond what was requested to avoid or minimize jeopardy are considered incremental.
3. **Incremental consultation resulting entirely from critical habitat designation** Impacts of all project modifications are considered incremental.

Indirect Impacts

61. The designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to the provisions of section 7 under the Act. Indirect impacts are those unintended changes in economic behavior that may occur outside of the Act, through other Federal, State, or local actions, and that are caused by the designation of critical habitat. For example:
- **Habitat Conservation Plans.** Under section 10 of the Act, landowners seeking an incidental take permit must develop an HCP to counterbalance the potential harmful effects that an otherwise lawful activity may have on a species. As such, the purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately avoided or minimized. Thus, HCPs are developed to meet the requirements of section 10 of the Act and avoid unauthorized take of listed species.
 - **Triggering Other State and Local Laws.** Under certain circumstances, critical habitat designation may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation. The designation of critical habitat for the salamanders is not anticipated to trigger State and local laws as a result of the widespread awareness of the species and their habitats resulting from existing baseline protections.
 - **Time Delays.** Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the need to re-initiate the section 7 consultation process and/or compliance with other laws triggered by the designation. To the extent that delays result from the designation, they are considered indirect, incremental impacts of the designation.

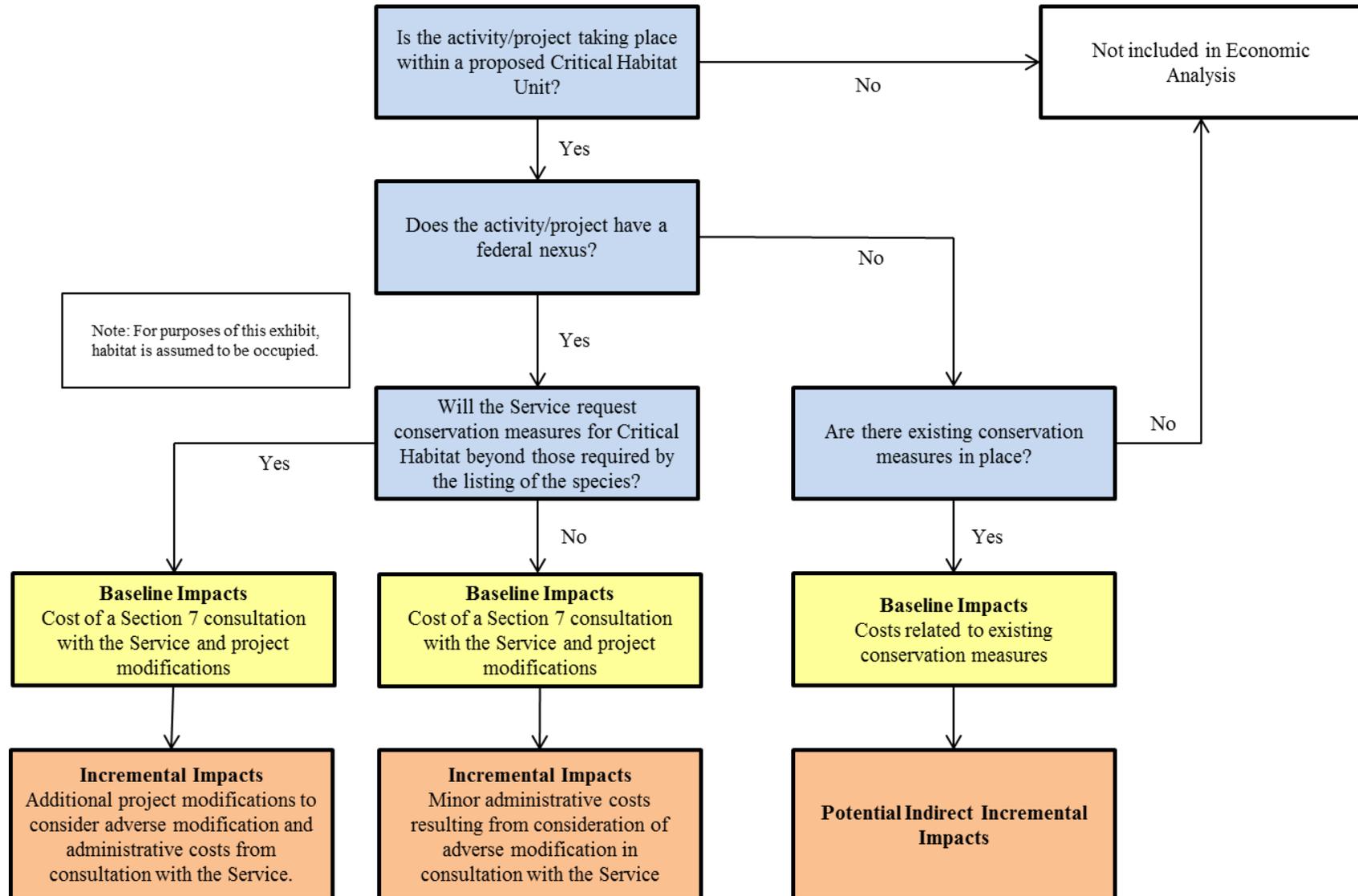
- **Regulatory Uncertainty or Stigma.** Government agencies and affiliated private parties who consult with the Service under section 7 may face uncertainty concerning whether project modifications will be recommended by the Service and what the nature of these alternatives will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. Where information suggests that this type of regulatory uncertainty stemming from the designation may affect a project or economic behavior, associated impacts are considered indirect, incremental impacts of the designation. In some cases, the public may perceive that critical habitat designation may result in limitations on private property uses above and beyond those associated with anticipated conservation efforts and regulatory uncertainty described above. Public attitudes about the limits or restrictions that critical habitat may impose can cause real economic effects to property owners, regardless of whether such limits are actually imposed. As the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets may decrease. Data allowing for the quantification of such effects are generally unavailable.

Approach to Identifying Incremental Impacts

62. To inform the economic analysis, the Service provided a memorandum describing its expected approach to conservation for the salamanders following critical habitat designation. Specifically, the Service’s memorandum provides information on how the Service intends to address projects during section 7 consultation that might lead to adverse modification of critical habitat as distinct from projects that may jeopardize the species. The Service’s memorandum is provided in Appendix C. Exhibit 2-2 illustrates the process used to isolate incremental impacts. We describe this approach to isolating incremental impacts in Chapter 4 of this report.
63. The salamander lives predominantly underground, thus making estimation of its population difficult. Salamanders are also highly reliant on the primary constituents of their habitat for survival. Thus, the Service determined that:
- If we determine that an action adversely modifies critical habitat [for Jemez Mountains salamander], we anticipate that we would also determine that the action would jeopardize the species. We therefore anticipate that the actions we might recommend to avoid adverse modification would be the same as those for avoiding jeopardy.²⁶
64. Because actions which the Service is likely to recommend to avoid adverse modification are the same as those to avoid jeopardy, the incremental impacts of critical the habitat designation for the salamander appear unlikely to include additional conservation actions. Instead, incremental impacts as a result of the designation of proposed critical habitat for the salamander are expected to be limited to administrative costs.

²⁶ Service, “Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical Habitat for the Jemez Mountains Salamander.”

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



2.3.3 BENEFITS

65. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.²⁷ 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.²⁸
66. In the context of critical habitat, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.²⁹ *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.*
67. Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements (PCEs) on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

2.3.4 GEOGRAPHIC SCOPE OF THE ANALYSIS

68. Economic impacts of salamander conservation are considered across the entire area proposed for critical habitat designation, including those areas presently being considered for exclusion, as defined in Chapter 1. Results are presented by proposed critical habitat unit.

²⁷ Executive Order 12866, Regulatory Planning and Review, September 30, 1993.

²⁸ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>

²⁹ *Ibid.*

2.3.5 ANALYTIC TIME FRAME

69. Ideally, the time frame of this analysis would be based on the time period over which the critical habitat regulations are expected to be in place. Specifically, the analysis would forecast impacts of implementing this rule through species recovery (i.e., when the rule is no longer required). However, absent specific information on the expected time frame for recovery of the salamander, this analysis forecasts impacts over a “reasonably foreseeable” time frame. The time frame for this analysis includes, but is not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Forecasted impacts will be based on the planning periods for potentially affected projects and will look out over a 20-year time horizon for most activities (2013 through 2032). OMB supports this time frame stating that “for most agencies, a standard time period of analysis is 10 to 20 years, and rarely exceeds 50 years.”³⁰

2.4 INFORMATION SOURCES

70. The primary sources of information for this report are communications with, and data provided by, personnel from the Service, local governments, and other stakeholders. In addition, this analysis relies upon existing habitat management and conservation plans that consider the Jemez Mountains salamander. Data on baseline land use were obtained from regional planning authorities. A complete list of references is provided at the end of this document.

³⁰ U.S. Office of Management and Budget, February 7, 2011. “Regulatory Impact Analysis: Frequently Asked Questions (FAQs).” Accessed on May 3, 2011 by http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4_FAQ.pdf.

CHAPTER 3 | FIRE MANAGEMENT

3.1 INTRODUCTION AND OVERVIEW OF ACTIVITY

71. As stated in the proposed rule, the “principal threats to the habitat of the Jemez Mountains salamander include historical fire exclusion (the act of preventing fire) and suppression (the act of putting out fire) and severe wildland fire.”³¹ As such, the Service identifies severe wildland fire, historical and current fire management practices, and post-fire rehabilitation activities as potentially requiring special management to reduce threats to salamander habitat.³²

KEY FINDINGS: FIRE MANAGEMENT

Baseline Impacts:

- The primary threat to salamander and its habitat is severe wildland fire. Relatively large expenditures on forest restoration and fire management are planned in the Jemez Mountains in the next 20 years. These expenditures are targeted at efforts to increase the resiliency of the area from the effects of severe wildland fires. Thus, these efforts should benefit the salamander and its habitat
- We quantify baseline protections of \$23 million over the next 20 years in proposed critical habitat areas (\$2.1 million annualized) associated with fire management and forest restoration. The primary component of these protections is the Southwest Jemez Mountains Collaborative Forest Landscape Restoration Program, which includes actions in the Santa Fe National Forest and Valles Caldera National Preserve.
- The Service may recommend some modifications to planned fire management activities to be protective of salamander, such as avoidance of habitat areas, maintaining canopy cover and habitat components such as downed logs, and utilizing chemicals that are thought to pose less harm to the salamander. These recommendations are anticipated to be the same under the listing of the species as under critical habitat designation.

Incremental Impacts:

- Because the Service determined that the actions that it is likely to recommend to avoid adverse modification are the same as those to avoid jeopardy of the salamander, the incremental impacts of critical habitat are most likely limited to these additional administrative costs of consultation.
- We estimate a total of \$120,000 (\$10,000 annualized) in incremental costs to Federal entities related to consultations on severe wildland fires and fire management over the next 20 years. These impacts reflect additional effort to consider potential effects on critical habitat, above and beyond effort already expected to address impacts to the salamander itself.

Key Uncertainties:

- This analysis relies on a probability of 0.36 for a severe wildland fire to occur in a given year in the study area to forecast future emergency consultations. This may or may not reflect actual rates of future wildland fire.
- At this time, the Service does not anticipate critical habitat designation will generate additional project modification requests beyond those recommended to avoid jeopardizing the species. To the extent that additional project modifications to avoid adverse modification of critical habitat are requested, however, this analysis underestimates costs.

³¹ 2012 Proposed Rule, 77 FR 56486.

³² 2012 Proposed Rule, 77 FR 56486.

72. While it identifies other threats, the Service highlights high-severity, stand-replacing wildfire as posing the most significant threat to the salamander and its habitat.³³ The threat of fires is confirmed by the USFS in its public comment: “We believe the largest threat facing the salamander is large and severe wild fire (e.g., Las Conchas, 2011).”³⁴ This chapter discusses the potential impacts of critical habitat designation for the salamander on responses to severe wildfire fire, including post-fire recovery efforts. In addition, the chapter discusses potential impacts of critical habitat designation on proactive fire management activities. The threats of severe wildland fires and fire management apply to both units of proposed critical habitat.

3.1.1 RECENT SEVERE WILDLAND FIRES IN THE JEMEZ MOUNTAINS

73. Large-scale, high-severity, stand-replacing wildland fires adversely affect salamander habitat by reducing canopy cover, removing habitat elements such as downed logs, increasing soil temperatures, decreasing soil moisture, and increasing soil pH.³⁵ Such fires have been increasing in frequency in recent years, due to a combination of factors, including historical forest management, livestock grazing practices, invasive species, and climate change. At least seven large wildland fires have occurred the Jemez Mountains in the past 20 years. The Las Conchas Fire in 2011 burned over 150,000 acres of land in the Jemez Mountains, including nearly 18,000 acres of salamander habitat. Some habitat areas burned in both the Cerro Grande Fire in 2000 and in the Las Conchas Fire. Exhibit 3-1 presents the names and burned areas of fires that have burned in the Jemez Mountains since 1977.

EXHIBIT 3-1. RECENT SEVERE WILDLAND FIRES AFFECTING JEMEZ MOUNTAINS SALAMANDER HABITAT AREAS

FIRE NAME	YEAR	ACRES BURNED
La Mesa Fire	1977	15,400
Buchanon Fire	1993	11,543
Dome Fire	1996	16,516
Oso Fire	1997	6,508
Cerro Grande Fire	2000	42,970
Lakes Fire Complex	2002	4,026
Las Conchas Fire	2011	150,590

Source: 2012 Proposed Rule, 77 FR 56487.

74. The USFS estimates that “there is a 36 percent probability of having at least one fire of 4,000 acres (over 1,600 ha) every year for the next 20 years in the Southwest Jemez

³³ 2012 Proposed Rule, 77 FR 56486.

³⁴ Garcia, Maria T. Supervisor’s Office, Santa Fe National Forest, US Forest Service. “Public Comment on Proposed Rule: Endangered and Threatened Wildlife and Plants: Status for Jemez Mountains Salamander and Proposed Designation of Critical Habitat.” November 9, 2012.

³⁵ 2012 Proposed Rule, 77 FR 56487-56488.

Mountains.”³⁶ Thus, the threat of severe wildfires is expected to persist throughout the analytic timeframe considered in this report.

3.1.2 FIRE MANAGEMENT ACTIVITIES

75. While the goal of preventing large-scale wildfires is paramount for protection of the salamander and its habitat, fire management activities can themselves pose a threat to salamander habitat by reducing canopy cover, removing habitat elements such as downed logs, increasing soil temperatures, decreasing soil moisture, introducing toxins into the air and soil, and increasing soil pH. Fire management activities include fire exclusion (prevention) and fire suppression (putting out fires). Exclusion practices include fire use and mechanical thinning of fuels. Use of naturally ignited wildfires and prescribed fire are techniques for reducing fire fuel in a controlled fashion that can reduce the long term wildfire risk in an area. Typically, these practices occur during the fall, when the salamander is subterranean and is unlikely to be harmed by surface activities. However, prescribed fires and naturally ignited small wildfires can also reduce ground litter important to soil conditions, thus adversely affecting salamander habitat. Practices that accompany fire use practices such as the creation of fire breaks and the use of fire retardant chemicals are also potentially detrimental to the salamander and its habitat.³⁷
76. Mechanical treatment of hazardous fuels is another practice intended to prevent fires. This practice involves mastication of trees thus leaving debris behind. The practice can compact soils and change forest composition. Furthermore, if the salamander is active aboveground during times when these practices occur, crushing of salamanders is a threat.³⁸

3.1.3 FIRE SUPPRESSION

77. Like fire prevention, fire suppression can both threaten and protect the salamander. Fire suppression techniques include the creation of fire lines, back-burning, clearing of areas, and aerial drops of fire retardants or water. Chemicals in fire retardants and firefighting substances may be harmful to salamanders; however, the Rule states that further study is necessary to more fully understand the effects of these chemicals.³⁹ Water drops for fire suppression can potentially spread water-borne pathogens into salamander habitat. Clearing of areas, especially using heavy machinery such as bulldozers can affect soil composition.⁴⁰ These potentially adverse effects of these factors on the salamander are generally short term. Because these actions aim to prevent the development of severe wildland fire, they offer protection to the salamander.

3.1.4 POST-FIRE LANDSCAPE REHABILITATION

³⁶ US Forest Service. 2009a. SW Jemez Mountains Landscape Assessment Fire and Fuels Report. As cited in 2012 Proposed Rule, 77 FR 56487.

³⁷ 2012 Proposed Rule, 77 FR 56490.

³⁸ 2012 Proposed Rule, 77 FR 56491

³⁹ 2012 Proposed Rule, 77 FR 56490.

⁴⁰ 2012 Proposed Rule, 77 FR 56489.

78. Fires can drastically change landscapes, thus requiring post-fire landscape rehabilitation. Based on a 1971 Congressional decision, the USFS is in charge of Burn Area Emergency Rehabilitation (BAER) following wildfires.⁴¹ Past BAER activities that have occurred in the area have included use of heavy equipment, tree felling, techniques for securing slopes, and vegetative seeding.⁴² As discussed above, the use of heavy machinery can compact soil and harm salamander habitat. Seeding of nonnative grass species can create surfaces impermeable to salamanders. Fertilizers accompanying grass seeding can contain nitrate, a potentially toxic substance to the salamander. BAER activities can also benefit the salamander: subsequent to the Cerro Grande fire, special efforts were made to provide Douglas fir logs as cover for salamanders.⁴³ Specific actions incorporated in BAER for the Las Conchas fire included aerial seeding of over 5,000 acres, aerial mulching of over 1,000 acres, road improvements, and hand treatment of cultural sites.⁴⁴

3.2 ANALYTIC APPROACH

79. Baseline conservation efforts for the salamander include the cost of measures that protect the salamander already planned to occur absent critical habitat designation, project modifications that will be made to avoid jeopardy to the species, and the administrative costs associated with considering jeopardy in section 7 consultations. Where possible, we estimate the cost of baseline conservation efforts using information provided by land managers and presented in existing forest management plans. Our analysis of baseline conservation efforts focuses on the existing USFS and VCNP forest restoration plans intended to improve the area's resilience to wildfires and other disturbances. Because the species was not previously listed, no consultation record exists for the species that can be used to inform the rate of likely future consultations. Instead, we reviewed records of historical severe wildland fires in the Jemez Mountains and discussed planned future actions with land managers to anticipate when consultations will occur.
80. Because, as detailed in Chapter 2 of this analysis, incremental impacts are anticipated to be limited to administrative costs, quantified incremental costs are limited to the portion of costs of the consultation attributed to consideration of adverse modification. We use the administrative costs model presented in Exhibit 2-1 to calculate these costs.
81. For future consultations that are expected to apply to both proposed critical habitat units, such as future consultations on VCNP's Landscape Restoration and Management Plan, we use the ratio of land owned by the land manager in a specific unit to total amount of land owned by the manager in both units. Specifically, 47 percent of proposed USFS land occurs in Unit 1, while 53 percent of proposed USFS land occurs in Unit 2. For the VCNP, 63 percent of land occurs in Unit 1, while 37 percent occur in Unit 2. These ratios are used to allocate future agency costs among proposed critical habitat units.

⁴¹ 2012 Proposed Rule, 77 FR 56489.

⁴² 2012 Proposed Rule, 77 FR 56489.

⁴³ 2012 Proposed Rule, 77 FR 56489.

⁴⁴ InciWeb. "Las Conchas Burned Area Emergency Response." Updated August 20, 2011. <http://inciweb.org/incident/2406/> Accessed on November 29, 2012.

3.3 BASELINE CONSERVATION EFFORTS

82. Extensive forest restoration plans exist for both the VCNP and the USFS to increase resilience of the forest to severe wildland fires, thus benefiting the salamander. These serve as the primary baseline protections for the salamander associated with fire and fire management, and are described below. The Service has stated that the following conservation efforts could be recommended as part of future consultations on fire management to avoid adverse modification of critical habitat:

- Implement actions on the landscape that reduce the risk of large-scale stand replacing wildfire;
- Maintain key salamander components (e.g., large, decomposing Douglas fir logs) when implementing fire use and forest management actions;
- Conduct studies to efficiently maintain high canopy cover while allowing for fire use and forest management actions; and,
- Determine and utilize least harmful chemicals for broad-scale use in salamander habitat (e.g., fire retardant).⁴⁵

83. Although the Service would recommend these actions to avoid adversely modifying critical habitat, the Service would also likely already recommend the same efforts to avoid jeopardizing the species. As such, these conservation efforts are considered to fall under the baseline for this analysis. Quantifying costs associated with these efforts is difficult, but short-term implementation of many of these efforts is not expected to increase project costs (e.g., area avoidance). While the overall effect of the action has the potential to result in a marginal increase in the risk of severe wildland fire if an untreated area catches fire, most fire prevention actions are expected to continue but in other areas. Therefore, the overall risk of wildfire should not be substantially increased.

3.3.1 SOUTHWEST JEMEZ MOUNTAINS COLLABORATIVE FOREST LANDSCAPE RESTORATION PROGRAM

84. The Southwest Jemez Mountains Landscape Restoration Program is a long-term collaborative effort with USFS, Bandelier, VCNP, the Service, and others to improve the resilience of ecosystems to recover from wildfires and other natural disturbance events in order to sustain healthy forests and watersheds for future generations.”⁴⁶ In 2010, the agencies proposed a series of forest treatments intended to make approximately 110,000 acres of the Jemez Ranger District in SFNF and surrounding areas less susceptible to undesirable, large-scale disturbances, such as high-severity wildfire, climate change, and insect invasions (Collaborative Forest Landscape Restoration Project, or “project”). Specific planned actions include reduction of tree density in forests, prescribed burns,

⁴⁵ Service, “New Mexico Ecological Services Field Office, Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical Habitat for the Jemez Mountains Salamander,” Memorandum to Industrial Economics, September 5, 2012.

⁴⁶Santa Fe National Forest and Valles Caldera National Preserve. “Southwest Jemez Mountains Collaborative Forest Landscape Restoration.” May 2010.

enhancement of native species, and the decommissioning of roads.⁴⁷ The Santa Fe National Forest has included the goal of reducing risk of high-intensity wildfire in salamander habitat, as a component of the plan.⁴⁸ Conservation actions that may benefit the salamander are considered part of the baseline of our analysis. The New Mexico Department of Agriculture expressed concern that the listing of the species and designation of critical habitat has the potential to slow work related to the program by adding additional bureaucratic steps and by using Federal funding that could go towards on-the-ground watershed restoration work.⁴⁹

85. The USFS selected the project to receive up to \$40 million over 10 years for treatments conducted beginning in 2010 (\$4 million per year).⁵⁰ This funding is anticipated to be expended through 2020.⁵¹ Our analysis assumes that \$12 million has already been spent between 2010 and 2013.⁵²

3.3.2 VALLES CALDERA NATIONAL PRESERVE/VCNP LANDSCAPE RESTORATION AND MANAGEMENT PLAN⁵³

86. The Valles Caldera Trust is a non-profit 501-c organization created by the Valles Caldera Preservation Act of 2000 to preserve and protect the historic 89,000-acre Baca Ranch in the Jemez Mountains. In 2002, management authority for the property, now called the Valles Caldera National Preserve, was transferred to the Trust, which is comprised of a nine-member board, including the Superintendent of Bandelier National Monument, the Forest Supervisor of SFNF, and seven members appointed by the U.S. government.⁵⁴
87. In 2010, the Valles Caldera Trust developed a 10-year Landscape Restoration and Management Plan “for the restoration and management of the forest, grassland, shrubland, and riparian ecosystems of the VCNP.”⁵⁵ As stated in the plan, “in its current condition the Preserve does not support the attainment of the purposes and goals for which **its** was established. Active restoration at the landscape scale is needed to sustain current native ecological systems and reduce future hazard to native diversity.”⁵⁶ Measures suggested in the plan include mechanical treatment of forest stands,

⁴⁷ USDA Forest Service Southwestern Region, “Proposed Action for Southwest Jemez Mountains Restoration, Santa Fe National Forest Sandoval County,” July 2012.

⁴⁸ 2012 Proposed Rule, 77 FR 56490

⁴⁹ Witte, Jeff M. New Mexico Department of Agriculture. “Public Comment RE: Jemez Mountain Salamander Proposal.” March 12, 2013.

⁵⁰ “\$40 Million grant awarded for collaborative forest restoration project in the SW Jemez Mountains,” News Release, Valles Caldera Trust, Valles Caldera National Preserve, USDA Forest Service, Santa Fe National Forest, August 19, 2010.

⁵¹ Email communication with M. Rodriguez, Valles Caldera National Preserve, November 29, 2012.

⁵² Email communication with M. Rodriguez, Valles Caldera National Preserve, November 29, 2012.

⁵³ Valles Caldera Trust, State of New Mexico, “Valles Caldera National Preserve Landscape Restoration and Management Plan: Purpose and Need—Proposed Action,” August 13, 2010.

⁵⁴ “About VCNP”, accessed at www.vallescaldera.gov

⁵⁵ Valles Caldera Trust, “Landscape Restoration and Management Plan,” July 2010.

⁵⁶ Valles Caldera Trust, “Landscape Restoration and Management Plan,” July 2010.

reintroduction of controlled burns, road management, and restoration of wetlands. The plan describes the importance of the Preserve to many species of wildlife, fish, and plants; however, it does not explicitly identify protective actions for the salamander. To the extent that planned actions are likely to be protective of salamander critical habitat from the threat of severe wildland fire, they are considered to be baseline impacts. Funding for the plan is shared with the USFS through its Southwest Jemez Mountains Collaborative Forest Landscape Restoration Program with the VCNP receiving approximately 40 percent of the funding discussed above. Our analysis does not separate the project funding by land owner, so VCNP baseline costs are included in the \$28 million discussed above.

3.3.3 THE BANDELIER NATIONAL MONUMENT

88. The National Park Service plans to release an updated fire management plan and environmental assessment for the Bandelier National Monument in 2013.⁵⁷ The fire management plan will consider the fact that decreased canopy cover and drier soil temperatures both threaten the salamander.

3.3.4 SANTA CLARA PUEBLO-TRIBAL FOREST PROTECTION ACT ACTIVITIES

89. The lands of the Santa Clara Pueblo (SCP) border the Southeastern Jemez Mountains Unit of proposed critical habitat. SCP reports that, pursuant to the Tribal Forest Protection Act (TFPA), it is currently discussing having the Pueblo assume co-management stewardship activities on some SFNF lands within proposed critical habitat areas. In particular, the Pueblo highlights three areas: a portion of the South Unit of the Upper Santa Clara Creek watershed), a small portion of the unit known as the Antlers, and part of the unit known as Cerro Toledo. TFPA-related projects include hazardous fuels reduction, creation of fuel breaks to in order to protect remnant unburned areas on Pueblo lands from fires coming off USFS lands, and ecological restoration.⁵⁸

3.3.5 CONSULTATION FORECAST

90. We anticipate that USFS and VCNP will conduct a formal consultation every 10 years on their respective restoration plans. For VCNP and USFS, given the large total amount of land each manages and the importance of fire management, we forecast that each of these consultations will be formal consultations for both land owners. NPS expects to consult with the Service on fire management plan. In addition, our analysis anticipates that a subsequent consultation will occur in 2023, 10 years after the release of the plan.⁵⁹ Additionally, because significant fire management activities occur in VCNP and USFS, we forecast an annual informal consultation for each land manager to consider yearly changes to fire management practices.

⁵⁷ Email communication with S. Fettig, Bandelier National Monument, National Parks Service, October 30, 2012.

⁵⁸ Tafoya, J. Bruce. Santa Clara Pueblo's Comments on the Proposed Rule, as revised, regarding Endangered Status and Designation of Critical Habitat for the Jemez Mountains Salamander and associated Draft Environmental Assessment and Draft Economic Analysis. March 13, 2013.

⁵⁹ Email communication with S. Fettig, Bandelier National Park, National Parks Service, October 30, 2012.

91. As described above, the USFS believes there is a 36 percent probability of a large fire occurring in a given year during the analytic time frame.⁶⁰ Therefore, our analysis assumes a 36 percent probability of an emergency consultation occurring in each year. We note that the future likelihood of catastrophic wildfire is uncertain. In total, we forecast 20.4 formal consultations and 40 informal consultations for fire management activities that are likely to occur under the baseline.
92. We anticipate that SCP TFPA activities will be included in the USFS consultations forecasted to occur every 10 years. The Pueblo expressed concern any modifications to fire management activities that affected areas of interest to the Pueblo could put tribal cultural and economic resources at risk.⁶¹
93. Using these assumptions, the net present value of baseline costs related to fire and fire management activities is \$12 million for Unit 1 and \$11 million for Unit 2, discounted at seven percent. Annualized costs, discounted at seven percent, are estimated to be \$1.1 million for Unit 1 and \$1 million for Unit 2. These costs are summarized in Exhibit 3-2. The vast majority of these costs can be associated with implementation of the Southwest Jemez Mountains Collaborative Restoration plan.

EXHIBIT 3-2. TOTAL ESTIMATED BASELINE IMPACTS TO FIRE MANAGEMENT ACTIVITIES, BY UNIT (2013-2032, \$2012, SEVEN PERCENT DISCOUNT RATE)

UNIT #	UNIT NAME	PRESENT VALUE	ANNUALIZED
1	Western Jemez Mountains Unit	\$12,000,000	\$1,100,000
2	Southeastern Jemez Mountains Unit	\$11,000,000	\$1,000,000
	Total	\$23,000,000	\$2,100,000
<p>Note: These costs include all fire management and landscape restoration funds spent under the Southwest Jemez Mountains Collaborative Restoration plan. These expenditures are targeted at efforts to increase the resiliency of the area from the effects of severe wildland fires. Thus, these efforts should benefit the salamander and its habitat. Entries may not sum to totals reported due to rounding. Estimates are rounded to two significant digits.</p>			

3.4 INCREMENTAL CONSERVATION EFFORTS RESULTING FROM DESIGNATION

94. Incremental costs resulting from the designation of critical habitat are anticipated to be limited to the additional administrative costs required to consider adverse modification during section 7 consultation. As discussed in Chapter 2 and based on information provided by USFS, we do not anticipate that additional project modifications to avoid

⁶⁰ 2012 Proposed Rule, 77 FR 56487.

⁶¹ Tafoya, J. Bruce. Santa Clara Pueblo's Comments on the Proposed Rule, as revised, regarding Endangered Status and Designation of Critical Habitat for the Jemez Mountains Salamander and associated Draft Environmental Assessment and Draft Economic Analysis. March 13, 2013.

adverse modification will occur that would not otherwise be expected to occur to avoid jeopardy.⁶²

95. If a catastrophic wildfire were to occur in critical habitat, it could potentially affect communities outside of the designation, including the Santa Clara Pueblo as well as ranching communities. In particular, the SCP is concerned that impacts on Pueblo resources could be harmed in a situation where “TFPA activities are curtailed due to the designation of critical habitat and if, as a result, additional stand replacement fires starting or burning through those National Forest/Valles Caldera lands jump onto unburned or replanted SCP lands.”⁶³ Prior fires have had significant detrimental effects on SCP lands and resources: “. . .our Pueblo was devastated by the Las Conchas fire of 2011. Roughly 16,000 acres of the forested lands in our Santa Clara Creek canyon—which is our spiritual sanctuary—were severely burned during the fire. Many of the traditional cultural properties in the canyon and culturally significant plants and herbs were damaged or destroyed and the fire has severely impacted the food sources upon which many wildlife species that are used or revered by us as a Pueblo for ceremonial purposes. To the extent that fire management activities are limited by the designation, impacts to these communities can be attributed to the designation.”⁶⁴ However, as stated above, incremental project modifications to fire management are not expected.
96. As described above, we anticipate a total of six formal consultations, 40 informal yearly consultations, as well as a 36 percent chance of an emergency consultation occurring in a given year, across both units and all land managers.
97. As shown in Exhibit 3-3, the net present value of incremental costs related to fire discounted at seven percent is \$60,000 for Unit 1 and \$57,000 for Unit 2. Annualized incremental costs also discounted at seven percent are \$5,300 for Unit 1 and \$5,000 for Unit 2.

EXHIBIT 3-3. TOTAL ESTIMATED INCREMENTAL IMPACTS TO FIRE MANAGEMENT ACTIVITIES, BY UNIT (2013-2032, \$2012, SEVEN PERCENT DISCOUNT RATE)

UNIT #	UNIT NAME	PRESENT VALUE	ANNUALIZED
1	Western Jemez Mountains Unit	\$60,000	\$5,300
2	Southeastern Jemez Mountains Unit	\$57,000	\$5,000
	Total	\$120,000	\$10,000
Note: Entries may not sum to totals reported due to rounding. Estimates are rounded to two significant digits.			

⁶² See Appendix C for more information on identifying incremental effects.

⁶³ Tafoya, J. Bruce. Santa Clara Pueblo’s Comments on the Proposed Rule, as revised, regarding Endangered Status and Designation of Critical Habitat for the Jemez Mountains Salamander and associated Draft Environmental Assessment and Draft Economic Analysis. March 13, 2013.

⁶⁴ See, for instance: Lucero, M.. San Diego Cattleman’s Association Public Comment. March 11, 2013.

3.5 CAVEATS TO ECONOMIC ANALYSIS OF IMPACTS TO FIRE MANAGEMENT ACTIVITIES

98. Exhibit 3-4 describes some of the key assumptions used in this analysis pertaining to fire management and the extent to which they may lead to under- or over-estimates of the potential incremental impacts of the proposed revised critical habitat designation.

EXHIBIT 3-4. KEY UNCERTAINTIES ASSOCIATED WITH THE ESTIMATED IMPACTS OF CRITICAL HABITAT DESIGNATION ON FIRE MANAGEMENT FOR THE SALAMANDER

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED INCREMENTAL IMPACTS
The Service will not request additional project modifications to address adverse modification beyond what is requested to avoid jeopardy.	May underestimate incremental impacts.	Unknown. To the extent that the Service requests additional project modifications to avoid adverse modification, additional incremental impacts may be incurred with some future section 7 consultation that are not captured in this analysis.
As calculated by the USFS, there is a 36 percent chance of an emergency consultation occurring in a given year.	Unknown. May overestimate or underestimate incremental impacts.	Minor. This assumption affects only the estimated administrative consultation costs.
One informal consultation on assorted fire management practices will occur per year for VCNP and USFS	Unknown. May overestimate or underestimate incremental impacts.	Minor. This assumption affects only the estimated administrative consultation costs. Depending on conditions, funding, and other factors, the amount of fire management may increase or decrease.
Costs of consultations can be divided between units based on ratios of areas.	Unknown. May overestimate or underestimate incremental impacts.	Minor. This assumption does not affect total costs, but the division of consultation costs between units.
All costs from collaborative restoration plans apply to salamander conservation.	May overestimate baseline impacts.	Not applicable to incremental impacts. To the extent that measures included in the plans do not provide baseline protection to the salamander, baseline costs of the plan could be substantially lower than estimated.

CHAPTER 4 | POTENTIAL ECONOMIC IMPACTS TO OTHER FEDERAL AND STATE LAND MANAGEMENT ACTIVITIES

KEY FINDINGS: OTHER FEDERAL AND STATE LAND MANAGEMENT ACTIVITIES

Quantified Impacts:

- We estimate a total of \$73,000 (\$6,400 annualized) in incremental costs to Federal and state land managers related to recreation, noxious weed control, grazing, and State fish hatchery operations over the next 20 years.
- The impacts are incremental administrative costs of future section 7 consultations of land management activities. That is, they reflect additional effort spent to consider potential effects on critical habitat, above and beyond the time spent addressing potential jeopardy to the salamander.
- Baseline costs related to other land management are estimated to be \$2 million (\$180,000 annualized). These costs include administrative costs of consultations associated with considering jeopardy as well as costs of extensive surveying for salamanders by the Santa Fe National Forest.

Key Uncertainties:

- At this time, the Service does not anticipate critical habitat designation will generate additional project modification requests. To the extent that additional project modifications to avoid adverse modification of critical habitat are requested of future projects, however, this analysis underestimates costs.

4.1 INTRODUCTION AND OVERVIEW OF ACTIVITIES

99. This chapter assesses the potential impacts of designating critical habitat for the Jemez Mountains salamander on Federal and State land management activities other than emergency fire response, fire management and restoration activities, which are discussed in Chapter 3. Activities discussed in this chapter include management of forest roads and trails for recreation, noxious weed control, grazing, and State fish hatchery operations. As discussed in Chapter 3, a number of land use planning documents exist for Federal lands in areas overlapping salamander critical habitat.⁶⁵ The overall goal of these plans is in generally in line with protecting salamander habitat, in that the plans seek to restore riparian habitat and reduce the threat of large-scale wildfires. However, the plans also include some measures that could potentially threaten salamander populations and habitat. This section describes current and planned activities on Federal and State lands in proposed critical habitat areas (other than fire management).

⁶⁵ USDA Forest Service Southwestern Region, "Proposed Action for Southwest Jemez Mountains Restoration, Santa Fe National Forest Sandoval County," DATE. Valles Caldera Trust, State of New Mexico, "Valles Caldera National Preserve Landscape Restoration and Management Plan: Purpose and Need—Proposed Action," August 13, 2010.

4.1.1 RECREATION

100. The Jemez Mountains are a popular location for outdoor recreation, including hiking, camping, hunting, and both downhill and cross-country skiing. Off-road vehicle use is allowed in some areas of SFNF. Visitors to Federal lands in proposed critical habitat area may utilize SFNF (approximately 1.3 million visitors per year),⁶⁶ Bandelier National Monument (approximately 200,000 visitors per year),⁶⁷ and the newly established VCNP (nearly 100,000 visitors per year).⁶⁸
101. The proposed rule states that “campgrounds and associated parking lots and structures have likely impacted the salamander’s habitat through modification of small areas by soil compaction and vegetation removal. Similarly, compaction of soil from hiking or mountain biking trails has modified a relatively small amount of habitat.”⁶⁹ While mountain bike and hiking trails affect relatively small amounts of habitat, “similar to OHV trails, deeply eroded mountain bike trails could act as barriers and entrap salamanders.”⁷⁰ USFS reports that most former recreational trails have already been moved out of essential salamander habitat as part of USFS efforts to protect the salamander as a result of the 2000 Salamander Conservation Agreement and Cooperative Management Plan.⁷¹ Regarding OHV use, the Service states that it considers “unmanaged OHV and motorcycle use to be a threat to the salamander, but with the implementation of the forthcoming management of motorized trails on the Santa Fe National Forest, the threat will be greatly reduced.”⁷²
102. In the southern part of proposed Unit 2 on USFS lands, there are a set of cross-country ski trails that are managed by a local private ski group. This group performs trail maintenance, which primarily includes brush clearing, but can include bulldozing of trails and downing of large trees.⁷³ These activities have the potential to pose threats to the species and its habitat. However, the Service estimates that past cross country trail maintenance activities have affected a total of less than five acres of salamander habitat.⁷⁴
103. Recreational use of VCNP lands in critical habitat areas is light. Most visitation to the Preserve is limited to existing roads, many of which are former logging roads. Some

⁶⁶ USDA Forest Service National Visitor Use Monitoring. Accessed on December 10, 2012 at <http://apps.fs.usda.gov/nrm/nvum/results/>

⁶⁷ National Park Service Annual Recreation Visits Report for 2006 to 2011. Accessed on December 10, 2012 at <https://irma.nps.gov/Stats/SSRSReports/System%20Wide%20Reports/5%20Year%20Annual%20Report%20By%20Park>

⁶⁸ Valles Caldera national Preserve. 2011. VCNP Annual Visitor Summary Report FY2011.

⁶⁹ 2012 Proposed Rule, 88 FR 56495.

⁷⁰ 2012 Proposed Rule, 88 FR 56495.

⁷¹ Personal communication with W. Amy, J. Wargo, and M. Orr, Santa Fe National Forest, United States Forest Service, November 2, 2012.

⁷² 2012 Proposed Rule, 88 FR 56494.

⁷³ 2012 Proposed Rule, 77 FR 56495; Personal communication with B. Parmenter and M. Rodriguez, Valles Caldera National Preserve, October 30, 2012.

⁷⁴ 2012 Proposed Rule, 77 FR 56495.

hiking occurs on such trails in Unit 2 on VCNP lands. No recreational ORV use is allowed in the Preserve. Hunters do use critical habitat; however, because vehicle use is limited, most hunting activity in critical habitat occurs on foot. In addition, many hunting seasons occur in months when the salamanders are underground.⁷⁵

104. Outside of paved areas, Bandelier NM lands are primarily used by hikers. Bicycles are only allowed on paved roads.⁷⁶ Hunting, ORV use, and grazing activities are not permitted on NPS lands.

4.1.2 GRAZING

105. Grazing activities occur in both the VCNP and the SFNF. Although the establishment of the Preserve did reduce grazing in the VCNP by 90 percent, grazing of approximately 500 to 700 animals still occurs in meadow areas within the preserve during part of the year.⁷⁷ In addition, some grazing occurs in SFNF in critical habitat areas.⁷⁸ However, because the Jemez Mountains salamander tends to occupy mountainous, forested areas, overlap of current grazing with the salamander's habitat is not extensive. However, regarding current livestock grazing practices in critical habitat areas, the proposed rule states: "Although some small-scale habitat modification is possible, livestock are managed to maintain a grassy forest understory. Therefore, we do not consider livestock grazing to be a current threat to the salamander's habitat, nor do we anticipate that it will be in the future."⁷⁹

4.1.3 NOXIOUS WEED MANAGEMENT

106. Both SFNF and VCNP practice noxious weed management.⁸⁰ Chemicals used for noxious weed control can threaten the salamander because the salamander breathes through its permeable skin.⁸¹ The use of herbicides to reduce invasive weed cover is a component of the VCNP Landscape Restoration and Management Plan.⁸²

⁷⁵ Personal communication with B. Parmenter and M. Rodriguez, Valles Caldera National Preserve, October 30, 2012.

⁷⁶ D.J. Lott. 2010. Superintendent's Compendium Of Designations, Closures, Permit Requirements and Other Restrictions Imposed Under Discretionary Authority. Bandelier National Monument. National Park Service.

⁷⁷ Valles Caldera Trust. Environmental Assessment: Multiple Use and Sustained Yield of Forage Resources. April 7, 2009. Stewardship Register. MUSY-Forage.

⁷⁸ Personal communication with W. Amy, J. Wargo, and M. Orr, Santa Fe National Forest, United States Forest Service, November 2, 2012.

⁷⁹ 2012 Proposed Rule, 88 FR 56495.

⁸⁰ Personal communication with B. Parmenter and M. Rodriguez, Valles Caldera National Preserve, October 30, 2012.

Personal communication with W. Amy, J. Wargo, and M. Orr, Santa Fe National Forest, United States Forest Service, November 2, 2012.

⁸¹ 2012 Proposed Rule, 88 FR 56497

⁸² Valles Caldera Trust, State of New Mexico, "Valles Caldera National Preserve Landscape Restoration and Management Plan: Purpose and Need—Proposed Action," August 13, 2010.

4.1.4 SEVEN SPRINGS FISH HATCHERY

107. Within proposed critical habitat Unit 1, the New Mexico Department of Game and Fish (NMDGF) owns 73 acres of land used for the Seven Springs Fish Hatchery. The Hatchery is located just off of State Highway 126 slightly north of the Seven Springs settlement. The hatchery raises Rio Grande cutthroat trout, a candidate species for listing under the Act, for distribution to lakes and streams.⁸³ In addition to operations related to the raising of fish, the hatchery expects to undertake fire prevention measures including brush thinning in the near future.⁸⁴

4.2 ANALYTIC APPROACH

108. Baseline conservation efforts for the salamander include the cost of existing measures that protect the salamander, project modifications that will be made to avoid jeopardy to the species, and the administrative costs associated with considering jeopardy in section 7 consultations. Where possible, we estimate the cost of baseline conservation efforts using information provided by land managers and presented in existing forest management plans.
109. Because, as detailed in Chapter 2 of this analysis, incremental impacts are anticipated to be limited to administrative costs, quantified incremental costs are limited to the portion of costs of the consultation attributed to consideration of adverse modification. We use the administrative costs model presented in Exhibit 2-1 to calculate these costs.
110. For future consultations that are expected to apply to both proposed critical habitat units, such as travel management plans, we use the ratio of land owned by the land manager in a specific unit to total amount of land owned by the manager in both units. Specifically, 47 percent of proposed USFS land occurs in Unit 1, while 53 percent of proposed USFS land occurs in Unit 2. For the VCNP, 63 percent of land occurs in Unit 1, while 37 percent occur in Unit 2. These ratios are used to allocate future agency costs among proposed critical habitat units.

4.3 BASELINE CONSERVATION EFFORTS

111. As detailed below, a number of conservation efforts exist that protect the salamander. Primarily, these efforts have taken place on USFS lands. This section describes protections that currently exist and are already planned that will be protective of salamander habitat.

⁸³ D. Williams. "More Fish, More Fun: Revitalized N.M. hatcheries see bright future." New Mexico Department of Game and Fish.

⁸⁴ Email communication with M.B. Sloane, New Mexico Department of Game and Fish, November 20, 2012.

4.3.1 2000 SALAMANDER CONSERVATION AGREEMENT AND COOPERATIVE MANAGEMENT PLAN

112. Prior to 1990, forest management activities on the SFNF included the alteration of Jemez Mountains salamander habitat by removing forest canopy and building roads.⁸⁵ In 1991, an interagency agreement delineated a conservation area for immediate protection of the salamander and its habitat. In 2000, the New Mexico Endemic Salamander Team, with representatives from the New Mexico Department of Game and Fish (NMDGF), the Service, the U.S. Geological Survey, and USFS developed a Cooperative Management Plan for the salamander. This plan was intended to serve as a basis for a Conservation Agreement to address management of the not-yet-listed Jemez Mountains salamander on USFS lands. This agreement, which was signed in 2000 by the NMDGF, USFS, and the Service included a goal to “prevent or alleviate management activity impacts that could degrade Jemez Mountains salamander habitat and cause declines at occupied sites.” USFS also agreed to add the species to its Regional Forester’s sensitive species list “to ensure that biological evaluations are conducted to determine effects of proposed projects within the Salamander Conservation Area.” The USFS considers the 2000 Plan limited in terms of its consideration of severe wildland fires as a threat.⁸⁶
113. According to the USFS, “over the course of the plan, the Forest Service consulted with the Endemic Salamander Team and implemented suggested mitigations to minimize impacts to the salamander on numerous projects.”⁸⁷ In particular, the USFS has identified at least 17 projects in which it has coordinated with the Endemic Salamander Team related to salamander concerns since 2001. These projects are described in Exhibit 4-1.

⁸⁵ Cooperative Management Plan for the Jemez Mountains Salamander (*Plethodon neomexicanus*) on lands administered by the Forest Service. January 2000.

⁸⁶ Garcia, Maria T. Supervisor’s Office, Santa Fe National Forest, US Forest Service. “Public Comment on Proposed Rule: Endangered and Threatened Wildlife and Plants: Status for Jemez Mountains Salamander and Proposed Designation of Critical Habitat.” November 9, 2012.

⁸⁷ Garcia, Maria T. Supervisor’s Office, Santa Fe National Forest, US Forest Service. “Public Comment on Proposed Rule: Endangered and Threatened Wildlife and Plants: Status for Jemez Mountains Salamander and Proposed Designation of Critical Habitat.” November 9, 2012.

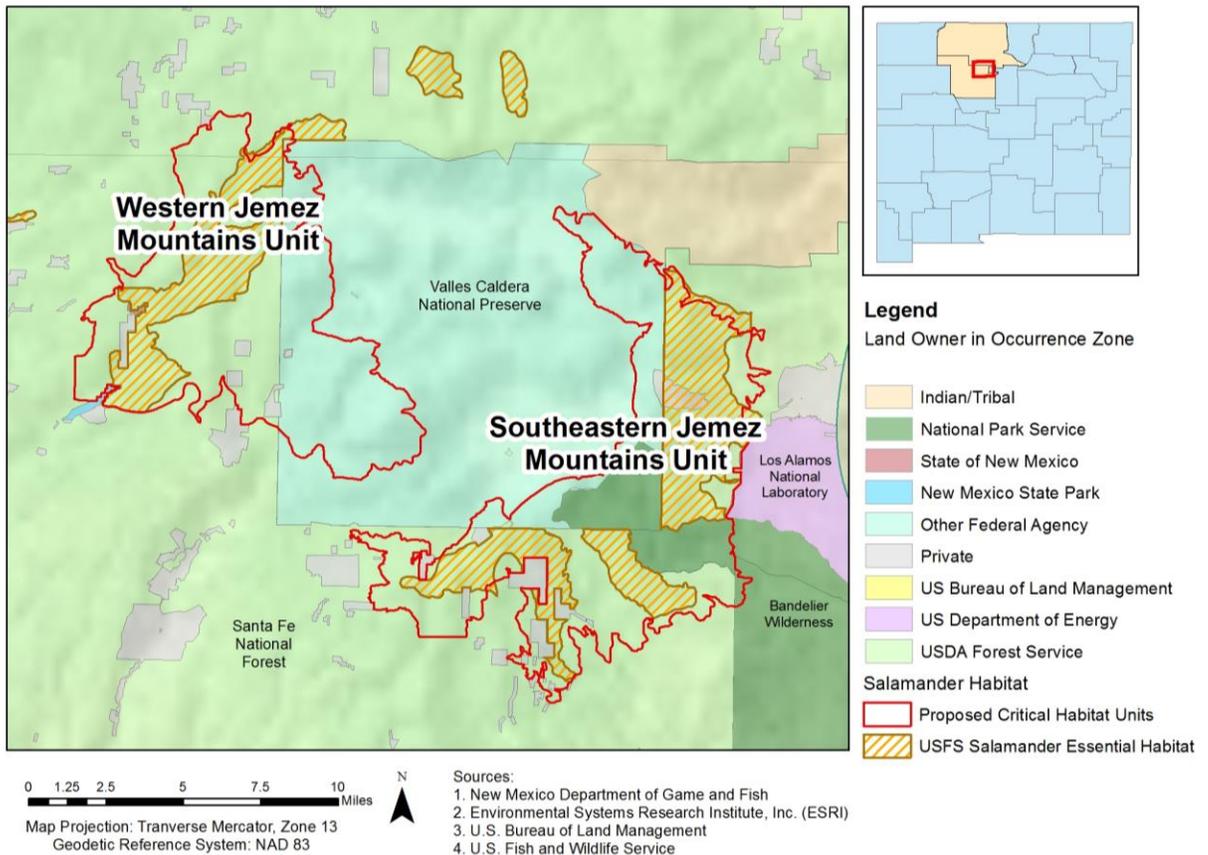
EXHIBIT 4-1. PAST USFS PROJECTS WITH COORDINATION WITH ENDEMIC SALAMANDER TEAM

PROJECT DESCRIPTION	DATE	DETAILS
Jemez Mountains Electric Coop power line maintenance	2012	Work did not occur before October 15
Las Conchas Hazard Tree Removal	-	-
Travel Management	-	Field visits with Endemic Salamander Team
Paliza Prescribed Burn	May 2011	Protection of downed Douglas fir logs and large stumps
NM Gas Pipeline	April 4, 2011	If salamanders are found during digging, they should be moved to a wet log
ARRA Project - Replacement of restroom at Seven Springs Picnic Area	September 2009	No adverse effects found
San Antonio watershed project	January 2010	Surveys did not detect the salamander
Seven Springs Timber Sale	April 2001	Project was not implemented
Bike event in Bear canyon	-	Project rejected because of concerns for Mexican spotted owl and salamander habitat
Peralta Grazing Allotment	August 2006	No disturbance of rock outcrops, woody debris piles, or Douglas fir logs
San Antonio Creek Stream Habitat Improvement Project		Project to thin trees in riparian areas along creek considered beneficial; suggested mitigations incorporated
Lakes Fire Salvage Sale	2002	Mitigations included working only on frozen ground and leaving certain trees behind
Springs development Alamo and Silva	2003	Surveys did not detect the salamander
Cochiti Mesa Fire Station construction	-	Site less likely to have salamander recommended
San Antonio Hot Springs trail rehabilitation	2002	Salamanders not present in the area
Redondo Campground Electric Line	April 2002	Past surveys did not detect salamander
Several WUI projects	-	Mitigations incorporated
Source: Garcia, Maria T. Supervisor's Office, Santa Fe National Forest, US Forest Service. "Public Comment on Proposed Rule: Endangered and Threatened Wildlife and Plants: Status for Jemez Mountains Salamander and Proposed Designation of Critical Habitat." November 9, 2012.		

114. Other aspects of the Cooperative Management Plan include conducting regular salamander surveys and studies, and officially designating an Essential Zone for the

salamander. As such, the USFS has recently been conducting annual salamander surveys in areas defined in the Plan as priority survey areas, survey areas, and essential habitat. The boundaries of proposed critical habitat largely overlap the already-defined Essential Zones and survey zones for salamanders defined on USFS lands (see Exhibit 4-2), and as such would appear not to require additional surveys by USFS.

EXHIBIT 4-2. PROPOSED CRITICAL HABITAT AND USFS ESSENTIAL HABITAT FOR THE SALAMANDER



115. However, the USFS expressed concerns that the proposed rule is broader in its description of habitat requirements for the salamander, specifically because it includes ponderosa pine forest as being essential to the salamander. USFS believes that the proposed rule could result in the requirement for USFS to conduct additional salamander surveys in additional habitat areas beyond areas currently surveyed, and that this effort could be costly.⁸⁸ USFS estimates that surveying for salamanders costs approximately \$40,000 for two weeks of intensive survey work. Surveys typically are conducted during

⁸⁸ Personal communication with W. Amy, J. Wargo, M. Orr, United States Forest Service, Santa Fe National Forest, November 2, 2012.

the rainy period between mid-July and September each year.⁸⁹ Thus, if surveys were required to be conducted throughout an eight-week period, we estimate that the SFNF would spend approximately \$160,000 each year to survey for salamanders. Because the purpose of the surveys is to locate the species itself, and many efforts are already being conducted, survey costs are included as part of baseline conservation costs.

4.3.2 RECREATION

116. SFNF recently completed its Travel Management Plan.⁹⁰ The USFS has already made efforts to reduce the impacts of travel management on the salamander and its habitat in Units 1 and 2. Trails and roads have been moved out of what was considered essential habitat prior to the listing and designation of the species. One goal of the SFNF's travel management strategy is to reduce the amount of roads allowing motorized use. Restriction of nonmotorized use of the forest is not expected. With regard to the salamander, the Travel Management Plan includes the following stipulation: "Unauthorized roads and trails that go through Jemez Mountain salamander habitat won't be published on the motor vehicle use map until they have been assessed for potential resource concerns and appropriate actions are taken to minimize effects to resources."⁹¹ In addition, the model adopted for evaluating alternatives explicitly considered salamander habitat in choosing the best alternative.⁹²
117. Issues pertaining to access to the Valles Caldera National Preserve are included in its Final Public Use and Access Plan. In weighing alternatives for access to the Preserve and locations for its visitor center, the Plan does consider salamander habitat with the intention of avoiding adverse effects to the salamander.⁹³
118. Our analysis anticipates that both SFNF and VCNP will consult on their travel management plans upon designation of critical habitat and again in 10 years. Costs of the portion of the consultation devoted to considering jeopardy will be considered part of the baseline.
119. In addition, our analysis forecasts consultations on recreation for the Bandelier National Monument to occur in 2013 and 2023.

⁸⁹ Personal communication with W. Amy, J. Wargo, M. Orr, United States Forest Service, Santa Fe National Forest, November 2, 2012.

⁹⁰ US Forest Service. 2012. Record of Decision for Travel Management on the Santa Fe National Forest. Santa Fe, New Mexico.

⁹¹ US Forest Service. 2012. Final Environmental Impact Statement for Travel Management on the Santa Fe National Forest. Santa Fe, New Mexico.

⁹² US Forest Service. 2012. Final Environmental Impact Statement for Travel Management on the Santa Fe National Forest. Santa Fe, New Mexico.

⁹³ Valles Caldera National Preserve. 2012. Final Public Access and Use Plan/Environmental Impacts Statement (EIS). June 11, 2012.

4.3.3 GRAZING

120. Grazing activities are outlined in the VCNP's Multiple Use and Sustained Yield (MUSY) Environmental Assessment. Given its historic use, the Preserve has ranch infrastructure in place that must be maintained to support continued grazing practices. In its existing plan for managing forage resources, the VCNP already makes efforts to protect the salamander from potential adverse effects of grazing practices. These efforts include an exclusion of range improvements during the wet period between July 1 and September 30 when the salamander ventures above ground. In addition, during placement of earthen tanks or water development construction, disturbance to salamander habitat components, including certain types of rock, woody debris, and decomposing Douglas fir logs, must be avoided.^{94,95} The VCNP's MUSY does recognize that some salamander mitigation may be necessary during the wet season when salamanders are active above ground.⁹⁶ As a result, we assume that VCNP to consult with the Service on range improvements in the preserve. We assume that consultations would take place in 2013 and 2023, and the costs of these consultations would be split equally between the two units. Grazing also occurs in the Santa Fe National Forest, though the SFNF does not expect the designation to have substantial impacts on these activities. In a public comment, the New Mexico Department of Agriculture points out that reduction of road access in the SFNF should be done in conjunction with grazing permittees in the area.⁹⁷ We assume that SFNF will undertake two forestwide formal consultation on grazing and range improvement during the time period for this analysis.⁹⁸

4.3.4 NOXIOUS WEED MANAGEMENT

121. The SFNF expects to consult with the Service on noxious weed treatment practices and their potential impacts to the salamander.⁹⁹ In addition, the VCNP also mentioned noxious weed control as an activity that would be potentially affected by the listing of the salamander.¹⁰⁰ We therefore assume that USFS and VCNP each will consult on their noxious weed management actions in 2013 and again in 2023, resulting in a total of four consultations.

⁹⁴ Personal communication with B. Parmenter and M. Rodriguez, Valles Caldera National Preserve, October 30, 2012.

⁹⁵ Valles Caldera Trust. Environmental Assessment: Multiple Use and Sustained Yield of Forage Resources. April 7, 2009. Stewardship Register. MUSY-Forage.

⁹⁶ Valles Caldera Trust. Environmental Assessment: Multiple Use and Sustained Yield of Forage Resources. April 7, 2009. Stewardship Register. MUSY-Forage.

⁹⁷ Witte, Jeff M. New Mexico Department of Agriculture. "Public Comment RE: Jemez Mountain Salamander Proposal." March 12, 2013.

⁹⁸ Personal communication with W. Amy, J. Wargo, and M. Orr, Santa Fe National Forest, United States Forest Service, November 2, 2012.

⁹⁹ Personal communication with W. Amy, J. Wargo, and M. Orr, Santa Fe National Forest, United States Forest Service, November 2, 2012.

¹⁰⁰ Personal communication with B. Parmenter and M. Rodriguez, Valles Caldera National Preserve, October 30, 2012.

4.3.5 SEVEN SPRINGS FISH HATCHERY

122. While the hatchery is state-run, it receives Federal funding through a grant from the Service under the Sport Fish Restoration Act.¹⁰¹ Therefore, we assume that the Service will conduct one internal formal consultation related to hatchery operations and potential impacts on the salamander every 10 years. In addition, the hatchery reports that it is planning to replace a pipeline from Calaveras Canyon to the hatchery.¹⁰² We assume that an additional formal consultation for this project will occur. Specific information on baseline project modifications that would occur due to section 7 consultation for the hatchery's operations are unavailable.

4.3.6 SPECIAL USE PERMITS

123. The SFNF is a popular destination for the filming of movies and for bike races. These activities typically require Special Use permits, and the SFNF anticipates that these actions could result in the need for future consultation on the salamander.¹⁰³ The analysis assumes that one informal consultation will occur every four years for the SFNF related to Special Use permits

4.3.7 SUMMARY OF BASELINE IMPACTS

124. Exhibit 4-3 summarizes the anticipated number of future consultations (17 formal, five informal) anticipated for Federal and State land management activities other than fire management. As presented in Exhibit 4-4, the present value of estimated baseline costs for the Jemez Mountains salamander is \$2,000,000 for both units, or \$180,000 annualized, discounted at seven percent.

¹⁰¹ Email communication with M. Sloane, New Mexico Department of Game and Fish, November 20, 2012.

¹⁰² Email communication with M. Sloane, New Mexico Department of Game and Fish, November 20, 2012.

¹⁰³ Personal communication with W. Amy, J. Wargo, and M. Orr, Santa Fe National Forest, United States Forest Service, November 2, 2012.

EXHIBIT 4-3. TOTAL NUMBER OF FORECAST CONSULTATIONS ON OTHER FEDERAL AND STATE LAND MANAGEMENT OVER 20 YEAR ANALYTIC TIME FRAME

ACTIVITY	LAND MANAGER	CONSULTATIONS FORECASTED (FORMAL)	CONSULTATIONS FORECASTED (INFORMAL)
Recreation	Santa Fe National Forest	2	0
	Valles Caldera National Preserve	2	0
	Bandelier National Monument	2	0
Grazing	Santa Fe National Forest	2	0
	Valles Caldera National Preserve	2	0
Noxious Weed Management	Santa Fe National Forest	2	0
	Valles Caldera National Preserve	2	0
Fish Hatchery Operations	New Mexico Department Of Game And Fish for actions funded through the Service's Sport Fishing program.	2	0
Pipeline Project		1	0
Special Use Permits	Santa Fe National Forest	0	5
Total		17	5

EXHIBIT 4-4. TOTAL ESTIMATED BASELINE IMPACTS TO OTHER FEDERAL AND STATE LAND MANAGEMENT BY UNIT (2013-2032, \$2012, SEVEN PERCENT DISCOUNT RATE)

UNIT #	UNIT NAME	PRESENT VALUE	ANNUALIZED
1	Western Jemez Mountains Unit	\$1,300,000	\$110,000
2	Southeastern Jemez Mountains Unit	\$780,000	\$69,000
	Total	\$2,000,000	\$180,000

Note: Entries may not sum to totals reported due to rounding. Estimates are rounded to two significant digits.

4.4 INCREMENTAL CONSERVATION EFFORTS

125. As summarized in Exhibit 4-4, across all Federal and State land management activities other than fire management, we expect a total of 17 formal consultations, as well as five informal consultations. Aside from the three consultations expected for the Seven Springs Fish Hatchery and the consultations undertaken by the Bandelier National Monument, we expect for consultations to consider both units concurrently.
126. As demonstrated in Exhibit 4-5, total estimated incremental impacts of the designation of proposed critical habitat for the Jemez Mountains salamander are estimated to be \$73,000 (present value discounted at seven percent) or \$6,400 annualized.

EXHIBIT 4-5. TOTAL ESTIMATED INCREMENTAL IMPACTS TO OTHER FEDERAL AND STATE LAND MANAGEMENT BY UNIT (2013-2032, \$2012, SEVEN PERCENT DISCOUNT RATE)

UNIT #	UNIT NAME	PRESENT VALUE	ANNUALIZED
1	Western Jemez Mountains Unit	\$36,000	\$3,200
2	Southeastern Jemez Mountains Unit	\$37,000	\$3,300
	Total	\$73,000	\$6,400
Note: Entries may not sum to totals reported due to rounding. Estimates are rounded to two significant digits.			

4.5 CAVEATS TO ECONOMIC ANALYSIS OF OTHER FEDERAL LAND MANAGEMENT ACTIVITIES

127. Exhibit 4-6 describes key assumptions used in this analysis pertaining to other Federal and State land management activities and the extent to which these assumptions may lead to under- or over-estimates of the potential incremental impacts of the proposed revised critical habitat designation.

EXHIBIT 4-6. KEY UNCERTAINTIES ASSOCIATED WITH THE ESTIMATED IMPACTS OF CRITICAL HABITAT DESIGNATION ON OTHER FEDERAL AND STATE LAND MANGEMENT ACTIVITIES FOR THE SALAMANDER

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
<p>The Service will not request additional project modifications to address adverse modification beyond what is requested to avoid jeopardy, except in some limited instances that cannot be predicted at this time.</p>	<p>May underestimate incremental impacts.</p>	<p>Unknown. To the extent that the Service requests additional project modifications to avoid adverse modification, additional incremental impacts may be incurred with each future section 7 consultation that are not captured in this analysis.</p>
<p>Formal consultations on plans will occur every 10 years.</p>	<p>Unknown. May overestimate or underestimate incremental impacts.</p>	<p>Minor. This assumption affects only the estimated administrative costs of consultation.</p>
<p>Special use permit consultations will occur once every four years.</p>	<p>Unknown. May overestimate or underestimate incremental impacts.</p>	<p>Minor. This assumption affects only the estimated administrative costs of informal consultations.</p>

CHAPTER 5 | POTENTIAL ECONOMIC IMPACTS TO OTHER ACTIVITIES, INCLUDING TRANSPORTATION AND DEVELOPMENT

KEY FINDINGS: TRANSPORTATION

Incremental Impacts:

- We estimate a total of \$71,000 (\$6,300 annualized) in costs to parties involved in transportation projects. These effects include yearly informal consultations on regular maintenance activities, forecasted consultations for projects yet to be planned, as well as consultation on one planned project to improve fish passage. Consultations related to residential development are not anticipated.
- The impacts are incremental administrative costs of future section 7 consultations on transportation. That is, they reflect additional effort spent to consider potential effects on critical habitat, above and beyond the time spent addressing potential jeopardy to the salamander.

Key Uncertainties:

- This analysis assumes NMDOT will participate in a yearly informal consultation on maintenance activities in each unit.
- This analysis assumes NMDOT will hold two consultations per unit in the next 20 years.
- At this time, the Service does not anticipate critical habitat designation will generate additional project modifications. To the extent that additional project modifications to avoid adverse modification of critical habitat are requested, however, this analysis underestimates costs.

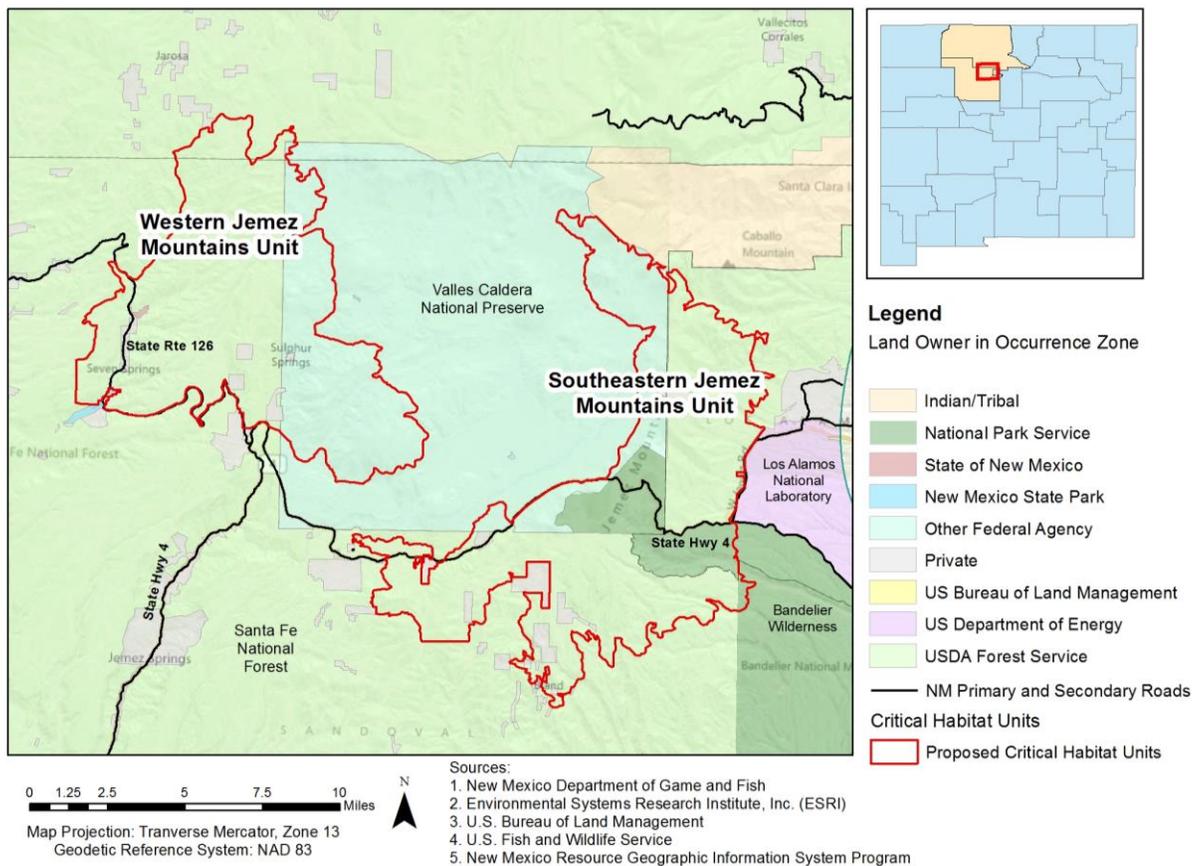
5.1 INTRODUCTION AND OVERVIEW OF ACTIVITIES

128. The proposed rule identifies transportation as a potential threat to critical habitat: “construction of roads and trails has historically eliminated or reduced the quality or quantity of salamander habitat, reducing blocks of native vegetation to isolated fragments, and creating a matrix of native habitat islands that have been altered by varying degrees from their natural state.”¹⁰⁴ As shown in Exhibit 5-1, two state highways intersect critical habitat. State Route 126 crosses the Western Jemez Mountains Unit (Unit 1) in the Seven Springs Area. State Highway 4 intersects the Southeastern Jemez Mountains Unit (Unit 2). State Highway 501 is located near the east border of the Southeastern Jemez Mountains Unit, though a buffer area exists between the road and the critical habitat unit. These roads are primarily managed by the New Mexico Department of Transportation (NMDOT); however, the U.S. Department of Transportation’s the Federal Highways Administration (FHWA) also funds and carries out projects on these

¹⁰⁴ 2012 Proposed Rule, 88 FR 56493.

roads that are not managed by the NMDOT. NMDOT conducts routine mowing and vegetation removal on the sides of roads to maintain clear lines of sight. During the winter months, runoff from salting activities could potentially affect the salamander and its habitat.¹⁰⁵ The Central Federal Lands Highway Division of FHWA also manages projects occurring on these routes. Examples of past projects carried out by the FHWA include a road reconstruction project on NM 126, which was completed earlier in 2012.^{106,107} Three percent of proposed critical habitat is privately owned, consisting primarily of small inholdings, as shown in Exhibit 5-1.¹⁰⁸

EXHIBIT 5-1. OVERVIEW OF PROPOSED CRITICAL HABITAT WITH IMPORTANT ROADS



¹⁰⁵ Personal communication with Jennifer Hyre, NMDOT, November 7, 2012.

¹⁰⁶ New Mexico Department of Transportation. 2012. New Mexico Department of Transportation Statewide Transportation Improvement Plan FFY 2012-2015 Amendment 3.

¹⁰⁷ Email communication with T. Puto, Federal Highway Administration Central Federal Lands Highway Division, November 29, 2012.

¹⁰⁸ Personal communication with M. Hill, Long Range Senior Planner, Sandoval County Department of Planning and Zoning, December 7, 2012.

5.2 ANALYTIC APPROACH

129. Baseline conservation efforts for the salamander include the cost of existing measures that protect the salamander, project modifications that will be made to avoid jeopardy to the species, and the administrative costs associated with considering jeopardy in section 7 consultations. Where possible, we estimate the cost of baseline conservation efforts using information provided by land managers and presented in existing forest management plans.
130. Because, as detailed in Chapter 2 of this analysis, incremental impacts are anticipated to be limited to administrative costs, quantified incremental costs are limited to the portion of costs of the consultation attributed to consideration of adverse modification. We use the administrative costs model presented in Exhibit 2-1 to calculate these costs.
131. As mentioned above, two main roads transect proposed critical habitat: NM 126 through Unit 1 and NM 4 through Unit 2. Costs of transportation related consultations will be assigned to the project road's corresponding unit.

5.3 BASELINE CONSERVATION EFFORTS FOR TRANSPORTATION AND DEVELOPMENT

132. The FHWA has one project planned in the future along the border of proposed critical habitat on NM 126. The project's goal is to improve fish passage through the removal of existing culverts and replacement with pipes with natural substrate or open span bridges.¹⁰⁹
133. The Service has stated that the following conservation efforts could be recommended as part of future consultations on transportation to avoid adverse modification of critical habitat:
- Reduce the size or configuration of the proposed project to avoid reduce, or eliminate the effects to critical habitat;
 - Mitigate the effects to the species in critical habitat by increasing permanent protection within the same watershed;
 - Move the project so that it does not affect designated critical habitat; and
 - Offer recommendations to modify the action that would maintain important habitat features to the salamander within the action area.¹¹⁰

Although the Service would recommend these actions to avoid adversely modifying critical habitat, the Service would also likely already recommend the same efforts to

¹⁰⁹ Email communication with J. Berna, Federal Highway Administration central Federal Highway Division, November 29, 2012.

¹¹⁰ Service, "New Mexico Ecological Services Field Office, Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical Habitat for the Jemez Mountains Salamander," Memorandum to Industrial Economics, September 5, 2012.

avoid jeopardizing the species. As such, these conservation efforts are considered to fall under the baseline for this analysis.

134. NMDOT states that although it does not have projects planned for either road in the current Statewide Transportation Improvement Plan it would be reasonable to assume that there would be one improvement project for each road requiring consultation at some point in the twenty year timeframe.^{111,112} In addition, we assume that these maintenance activities have a Federal nexus.
135. Thus, to be conservative, we forecast that two projects will occur for each road during the 20-year time frame with the first in 2016, the first year beyond the scope of the existing STIP, and the next in 2026, 10 years later. Although it is possible that these consultations would result in project modifications related to jeopardy, available information is not sufficient to quantify these costs. While it may be that NMDOT will not need to consult on routine mowing and salting activities, uncertainty exists about whether a consultation may be required.^{113,114} Again, to be conservative, our analysis anticipates that an informal consultation will occur in each unit every year related to routine maintenance activities.
136. In terms of projects managed by the FHWA, the analysis identified the single project for improvement of fish passage. While this project is expected to occur on the border of proposed critical habitat and not directly in it, we conservatively expect the FHWA to undergo section 7 consultation with the Service. We expect this consultation to occur in 2013. Costs of the consultation associated with considering jeopardy will be considered baseline impacts.
137. Sandoval County reports that there are currently no applications for new construction of residential development on private lands in proposed critical habitat areas. Furthermore, given the remoteness of these inholdings, future development is not anticipated in the foreseeable future. As a result, this analysis does not include estimates of costs associated with consultations related to residential development activities.
138. As shown in Exhibit 5-2, total baseline impacts to transportation are estimated to be \$209,000 (present value discounted at seven percent). These costs annualized are estimated to be \$18,800.

¹¹¹ New Mexico Department of Transportation. 2012. Statewide Transportation Improvement Plan FFY 2012-2015 Amendment 3.

¹¹² Personal communication with Jennifer Hyre, NMDOT, November 7, 2012.

¹¹³ Personal communication with Jennifer Hyre, NMDOT, November 7, 2012.

¹¹⁴ Personal communication with M. Christman, US Fish and Wildlife Service, November 7, 2012

EXHIBIT 5-2. TOTAL ESTIMATED BASELINE IMPACTS TO TRANSPORTATION BY UNIT (2013-2032, \$2012, SEVEN PERCENT DISCOUNT RATE)

UNIT #	UNIT NAME	PRESENT VALUE	ANNUALIZED
1	Western Jemez Mountains Unit	\$110,000	\$10,000
2	Southeastern Jemez Mountains Unit	\$99,000	\$8,800
	Total	\$210,000	\$19,000
Note: Entries may not sum to totals reported due to rounding. Estimates are rounded to two significant digits.			

5.4 INCREMENTAL CONSERVATION EFFORTS RESULTING FROM DESIGNATION

139. Incremental impacts on transportation projects are limited to the administrative costs of the five consultations related to the consideration of adverse modification. As explained in Section 5.3, we expect two formal consultations in each unit to occur in the analytic timeframe on products managed by NMDOT, and an additional consultation for the fish passage improvement project in Unit 1. In addition, the analysis forecasts a yearly informal consultation to consider routine maintenance activities for each unit.

140. As shown in Exhibit 5-3, total estimated incremental costs of the designation are \$71,000 (net present value discounted at seven percent.) These costs annualized are estimated to be \$6,300.

EXHIBIT 5-3. TOTAL ESTIMATED INCREMENTAL IMPACTS TO TRANSPORTATION BY UNIT (2013-2032, \$2012, SEVEN PERCENT DISCOUNT RATE)

UNIT #	UNIT NAME	PRESENT VALUE	ANNUALIZED
1	Western Jemez Mountains Unit	\$38,000	\$3,400
2	Southeastern Jemez Mountains Unit	\$33,000	\$2,900
	Total	\$71,000	\$6,300
Note: Entries may not sum to totals reported due to rounding. Estimates are rounded to two significant digits.			

5.5 CAVEATS TO ECONOMIC ANALYSIS OF IMPACTS TO OTHER ACTIVITIES

141. Exhibit 5-4 describes some of the key assumptions used in this analysis pertaining to transportation and the extent to which they may lead to under- or over-estimates of the potential incremental impacts of the proposed revised critical habitat designation.

EXHIBIT 5-4. KEY UNCERTAINTIES ASSOCIATED WITH THE ESTIMATED INCREMENTAL IMPACTS OF CRITICAL HABITAT DESIGNATION FOR THE SALAMANDER ON TRANSPORTATION

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
The Service will not request additional project modifications to address adverse modification beyond what is requested to avoid jeopardy, except in some limited instances that cannot be predicted at this time.	May underestimate incremental impacts.	Possibly major. To the extent that the Service requests additional project modifications to avoid adverse modification, additional incremental impacts may be incurred with each future section 7 consultation.
NMDOT will participate in a yearly informal consultation on maintenance activities in each unit.	Unknown. May overestimate or underestimate incremental impacts.	Minor. This assumption affects only the estimated administrative costs of informal consultations.
FHWA project to improve fish passage will occur in 2013	May overestimate incremental impacts.	Minor. This assumption affects only the timing of the project. Effect on incremental impacts will be limited to slight differences in discounted net present value of administrative costs of the consultation.
NMDOT will hold two consultations per unit in the next 20 years. The first consultation in each unit will be in 2016 and the second will occur in 2026.	Unknown. May overestimate or underestimate incremental impacts.	Minor. This assumption affects only the estimated administrative costs of informal consultations. To the extent that the number of projects or timing of projects differs, slight differences to incremental costs will exist.

CHAPTER 6 | ECONOMIC BENEFITS OF CRITICAL HABITAT DESIGNATION FOR THE SALAMANDER

142. As discussed in the previous chapters, this analysis does not anticipate that the designation of critical habitat will result in additional conservation for the salamander. As a result, no changes in economic activity or land or water management are expected to result from critical habitat designation. Absent changes in land or water management, no incremental economic benefits are forecast to result from designation of critical habitat for the salamander. The information in this section is therefore provided to offer context for the analysis.
143. The primary intended benefit of critical habitat is to support the conservation of threatened and endangered species, such as the salamander. Thus, attempts to develop monetary estimates of the benefits of this proposed critical habitat designation would focus on the public's willingness to pay to achieve the conservation benefits to the salamander resulting from this designation. The published economics literature provides multiple examples of species and habitat valuation studies.¹¹⁵ No studies were identified, however, that evaluated conservation of the Jemez Mountains salamander.
144. Quantification and monetization of species conservation benefits requires information on the incremental change in the probability of salamander conservation that is expected to result from the designation. In this case, we refer to the change in conservation probability that is distinct and separate from the change in conservation probability associated with the listing (i.e., the change that results from the specific conservation efforts that would not be undertaken absent the designation). As described in this report, modifications to future projects are unlikely beyond the baseline given the extensive baseline protections already provided to the species and the characteristics of the specific projects projected to occur over the 20-year timeframe of the analysis.

¹¹⁵ See, for example: Giraud, Kelly, Branka Turcin, John Loomis, and Joseph Cooper. 2002. Economic Benefit of the Protection Program for the Stellar Sea Lion. *Marine Policy* 26: 451-458; Jakobsson, Kristin M. and Andrew K. Dragun. 2001. The Worth of a Possum: Valuing Species with the Contingent Valuation Method. *Environmental and Resource Economics* 19:211-227; Kotchen, Matthew J. and Stephen D. Reiling. 2000. Environmental Attitudes, Motivations, and Contingent Valuation of Nonuse Values: A Case Study Involving Endangered Species. *Ecological Economics* 32: 93-107; Loomis, John and Earl Ekstrand. 1997. Economic Benefits of Critical Habitat for the Mexican Spotted Owl: A Scope Test Using a Multiple-Bounded Contingent Valuation Survey. *Journal of Agricultural and Resource Economics* 22(2): 356-366; Richardson, Leslie and John Loomis. 2009. The Total Economic Value of Threatened, Endangered and Rare Species: An Updated Meta-Analysis. *Ecological Economics* 68: 1535-1548; Stanley, Denise L. 2005. Local Perception of Public Goods: Recent Assessments of Willingness-to-Pay for Endangered Species. *Contemporary Economic Policy* 23(2): 165-179.

145. As a result of actions taken to preserve endangered and threatened species, such as habitat management, various other benefits may accrue to the public. Species conservation efforts may result in improved environmental quality, which in turn may have collateral human health or recreational use benefits. In addition, conservation efforts undertaken for the benefit of a threatened or endangered species may enhance shared habitat for other wildlife. Such benefits may result from modifications to projects, or may be collateral to such actions. For example, critical habitat designation may change water quality standards in a habitat area. This in turn may generate improvements in human or ecological health. In the case of critical habitat designation for the salamander, however, changes in species and habitat conservation efforts are not expected. Ancillary benefits are therefore unlikely given that no changes in behavior to protect such resources are anticipated to result from the designation.

REFERENCES

16 U.S.C. §1533(b)(2).

16 U.S.C. 1532.

2012 Proposed Rule, 77 FR 56486.

2012 Proposed Rule, 77 FR 56487.

2012 Proposed Rule, 77 FR 56487-56488.

2012 Proposed Rule, 77 FR 56489.

2012 Proposed Rule, 77 FR 56490

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APPENDIX A | SMALL BUSINESS ANALYSIS AND ENERGY IMPACTS ANALYSIS

146. This appendix considers the extent to which incremental impacts from critical habitat designation may be borne by small entities and the energy industry. The analysis presented in Section A.1 is conducted pursuant to the RFA as amended by the SBREFA of 1996. The energy analysis in Section A.2 is conducted pursuant to Executive Order No. 13211.
147. The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts resulting from the proposed critical habitat designation. The incremental impacts of the rulemaking are most relevant for the small business and energy impacts analyses because they reflect costs that may be avoided or reduced based on decisions regarding the composition of the final rule. Any baseline impacts associated with the listing of the salamander and other Federal, State, and local regulations and policies are expected to occur regardless of the outcome of this rulemaking.

A.1 SBREFA ANALYSIS

148. When a Federal agency proposes regulations, the RFA requires the agency to prepare and make available for public comment an analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions as defined by the RFA).¹¹⁶ No initial regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have significant economic impact on a substantial number of small entities. To assist in this process, this appendix provides a screening level analysis of the potential for salamander critical habitat to affect small entities.
149. To ensure broad consideration of impacts on small entities, the Service has prepared this small business analysis without first making the threshold determination in the proposed rule regarding whether the proposed critical habitat designation could be certified as not having a significant economic impact on a substantial number of small entities. This small business analysis will therefore inform the Service's threshold determination.

¹¹⁶ 5 U.S.C. § 601 et seq.

IMPACTS TO SMALL ENTITIES

150. The designation of critical habitat for the salamander is unlikely to directly affect any small entities. As described in the main text of this report, 97 percent of land in the designation is Federally owned. Anticipated incremental impacts in proposed critical habitat are primarily related to 37 formal consultations and 45 informal consultations on fire management and other Federal land management activities (comprising approximately 99 percent of the annual anticipated incremental costs of the designation). The remaining forecast impacts are anticipated to be conducted for road and highway maintenance projects. Little to no impact to third parties is expected associated with these activities. For this reason, this analysis finds little to no impacts to small entities as a result of critical habitat designation for the salamander.

A.2 ENERGY IMPACTS

151. Pursuant to Executive Order 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.” This proposed rule does not represent such an action. The supply, distribution, and use of energy will not be affected by the designation of critical habitat.

APPENDIX B | SENSITIVITY OF RESULTS TO DISCOUNT RATE

152. This appendix summarizes the costs of salamander conservation quantified in Chapter 4 of this report. It presents impacts assuming an alternative real discount rate of three percent (the main text of the report assumes a real discount rate of seven percent). These results are presented in Exhibits B-1 through B-5.
153. This appendix also summarizes undiscounted impacts by year for each economic activity. These details are provided in accordance with OMB guidelines for developing benefit and cost estimates. OMB directs the analysis to: “include separate schedules of the monetized benefits and costs that show the type and timing of benefits and costs, and express the estimates in this table in constant, undiscounted dollars.”¹¹⁷ These results are presented in Exhibits B-6 through B-8.

EXHIBIT B-1. TOTAL ESTIMATED BASELINE IMPACTS, BY UNIT (2013-2032, \$2012, DISCOUNTED AT THREE PERCENT)

UNIT	UNIT NAME	PRESENT VALUE BASELINE IMPACTS	ANNUALIZED BASELINE IMPACTS
1	Western Jemez Mountains Unit	\$15,000,000	\$990,000
2	Southeastern Jemez Mountains Unit	\$14,000,000	\$910,000
	Total	\$29,000,000	\$1,900,000

EXHIBIT B-2. TOTAL ESTIMATED INCREMENTAL IMPACTS, BY UNIT (2013-2032, \$2012, DISCOUNTED AT THREE PERCENT)

UNIT	UNIT NAME	PRESENT VALUE INCREMENTAL IMPACTS	ANNUALIZED INCREMENTAL IMPACTS
1	Western Jemez Mountains Unit	\$170,000	\$11,000
2	Southeastern Jemez Mountains Unit	\$160,000	\$11,000
	Total	\$330,000	\$22,000

¹¹⁷ Office of Management and Budget, Circular A-4, September 17, 2003, p. 18. The reference to “constant” dollars indicates that the effects of general price level inflation (the tendency of all prices to increase over time) should be removed through the use of an inflation adjustment index.

EXHIBIT B-3. ESTIMATED BASELINE IMPACTS TO FIRE MANAGEMENT ACTIVITIES, BY UNIT (2013-2032, \$2012, DISCOUNTED AT THREE PERCENT)

UNIT	UNIT NAME	PRESENT VALUE BASELINE IMPACTS	ANNUALIZED BASELINE IMPACTS
1	Western Jemez Mountains Unit	\$13,000,000	\$870,000
2	Southeastern Jemez Mountains Unit	\$13,000,000	\$840,000
	Total	\$26,000,000	\$1,700,000

EXHIBIT B-4. ESTIMATED INCREMENTAL IMPACTS TO FIRE MANAGEMENT ACTIVITIES, BY UNIT (2013-2032, \$2012, DISCOUNTED AT THREE PERCENT)

UNIT	UNIT NAME	PRESENT VALUE INCREMENTAL IMPACTS	ANNUALIZED INCREMENTAL IMPACTS
1	Western Jemez Mountains Unit	\$80,000	\$5,200
2	Southeastern Jemez Mountains Unit	\$74,000	\$4,800
	Total	\$150,000	\$10,000

EXHIBIT B-5. ESTIMATED BASELINE IMPACTS TO OTHER FEDERAL AND STATE LAND MANAGEMENT ACTIVITIES, BY UNIT (2013-2032, \$2012, DISCOUNTED AT THREE PERCENT)

UNIT	UNIT NAME	PRESENT VALUE BASELINE IMPACTS	ANNUALIZED BASELINE IMPACTS
1	Western Jemez Mountains Unit	\$1,700,000	\$42,000
2	Southeastern Jemez Mountains Unit	\$1,000,000	\$42,000
	Total	\$2,700,000	\$84,000

EXHIBIT B-6. ESTIMATED INCREMENTAL IMPACTS TO OTHER FEDERAL AND STATE LAND MANAGEMENT ACTIVITIES, BY UNIT (2013-2032, \$2012, DISCOUNTED AT THREE PERCENT)

UNIT	UNIT NAME	PRESENT VALUE INCREMENTAL IMPACTS	ANNUALIZED INCREMENTAL IMPACTS
1	Western Jemez Mountains Unit	\$42,000	\$2,700
2	Southeastern Jemez Mountains Unit	\$42,000	\$2,800
	Total	\$84,000	\$5,500

EXHIBIT B-7. ESTIMATED BASELINE IMPACTS TO TRANSPORTATION, BY UNIT (2013-2032, \$2012, DISCOUNTED AT THREE PERCENT)

UNIT	UNIT NAME	PRESENT VALUE BASELINE IMPACTS	ANNUALIZED BASELINE IMPACTS
1	Western Jemez Mountains Unit	\$150,000	\$9,700
2	Southeastern Jemez Mountains Unit	\$130,000	\$8,700
	Total	\$280,000	\$18,000

EXHIBIT B-8. ESTIMATED INCREMENTAL IMPACTS TO TRANSPORTATION, BY UNIT (2013-2032, \$2012, DISCOUNTED AT THREE PERCENT)

UNIT	UNIT NAME	PRESENT VALUE INCREMENTAL IMPACTS	ANNUALIZED INCREMENTAL IMPACTS
1	Western Jemez Mountains Unit	\$49,000	\$3,200
2	Southeastern Jemez Mountains Unit	\$44,000	\$2,900
	Total	\$94,000	\$6,100

EXHIBIT B-9. UNDISCOUNTED ESTIMATED INCREMENTAL IMPACTS (2013-2032, \$2012)

UNIT	YEAR(S)	COST
FIRE MANAGEMENT		
1	2013, 2023	\$10,000
1	2014-2022, 2024-2032	\$4,600
2	2013, 2023	\$13,000
2	2014-2022, 2024-2032	\$3,800
OTHER FEDERAL AND STATE LAND MANAGEMENT		
1	2013	\$23,000
1	2017, 2021, 2025, 2029	\$1,100
1	2023	\$22,000
2	2013	\$25,000
2	2017, 2021, 2025, 2029	\$1,300
2	2023	\$19,000
TRANSPORTATION		
1	2013, 2016, 2026	\$7,400
1	2014, 2015, 2017-2025, 2027-2032	\$2,400
2	2013-2015, 2017-2025, 2027-2032	\$2,400
2	2016, 2026	\$7,400

APPENDIX C

INCREMENTAL EFFECTS MEMORANDUM TO IEC

TO: Industrial Economics Corporation

FROM: Field Supervisor, New Mexico Ecological Services Field Office

SUBJECT: Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical Habitat for the Jemez Mountains Salamander

Introduction

This document provides information for an economic analysis of the proposed critical habitat designation for the Jemez Mountains salamander (*Plethodon neomexicanus*).

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

Determining the economic impacts of critical habitat designation involves evaluating the "without critical habitat" baseline versus the "with critical habitat" scenario. Economic impacts of a critical habitat designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline (without critical habitat) and the designated critical habitat (with critical habitat) may include, but are not limited to, changes in land or resource use, environmental quality, or time and effort expended on administrative and other activities by Federal landowners or action agencies, and in some instances, State and local governments or private third parties where there is a Federal nexus. These are the "incremental effects" that serve as the basis for the economic analysis.

One of the important functions of this memorandum is to provide detailed information about the differences between actions required to avoid jeopardy, versus actions that may be required to avoid adverse modification. The information provided below is intended to identify the possible differences for the Jemez Mountains salamander under the different section 7 standards.

Background

We are proposing to list the Jemez Mountains salamander as an endangered species and to designate approximately 90,789 acres (ac) (36,741 hectares (ha)) of critical habitat in two units. These units are currently occupied by the Jemez Mountains salamander. The proposed critical habitat designation includes lands owned or managed by Federal entities, including the U.S. Forest Service, the Valles Caldera National Preserve, Bandelier National Monument, as well as some private lands. Most of these lands are subject to forest management, including use of fire to meet natural resource objectives. The use of fire can include (1) naturally ignited wildfires used to accomplish specific resource management objectives and (2) prescribed fires ignited by management actions to meet specific objectives. Forest management can also include fire suppression; vegetation modification to reduce the risk of large-scale, stand-replacing wildfire; recreational use; mining; livestock grazing; and transportation projects. The areas being proposed include both above ground and below ground critical habitat components.

Baseline Analysis (without Critical Habitat)

The following discussion describes the existing regulatory circumstances that are in effect or anticipated without critical habitat. In the baseline scenario, section 7 of the Endangered Species Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of the Jemez Mountains salamander.

How is jeopardy defined and determined for this species?

“Jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). Jeopardy requires that both the likelihood of survival and recovery in the wild be appreciably reduced. Direct injury or death of the Jemez Mountain salamanders will be unusually hard to detect because they spend the majority of their time below ground. As a result, in most cases (other than overcollection, for example) there will be no visual evidence of dead or injured salamanders. Furthermore, the Jemez Mountains salamander relies on habitat conditions for physiological functions such as breathing, gas exchange through the skin, and normal behavior such as breeding and feeding. Therefore, any action that reduces habitat quality by either warming the habitat or drying the habitat, or both, or reduces the timing or duration that the species can be active above ground reduces individual and population survival and reduces opportunities for recovery.

Activities occurring within occupied salamander habitat could impact the quality of habitat and influence the survivability of salamanders. How significant that loss is overall to the species will depend on such things as the amount of area

where warming or drying or both occur, the extent of departure from preferred temperature and moisture conditions, or the departure from timing and duration salamanders can be active above ground. Additionally, actions that make salamander habitat unusable for the species (e.g. contamination, development, creating barriers between below ground and above ground habitat) can also reduce the population survival and recovery in the wild. When enough occupied areas of adequate size and distribution remain and are protected, then the probability of the species surviving is high. When a location is lost or reduced in size and habitat quality is reduced to the point where species survival at that site is low and where that loss occurs where remaining numbers, size, and distribution of protected locations are not enough to provide for recovery, then the action has jeopardized the listed species in the wild.

What types of project impacts could potentially result in jeopardy?

In the case of the Jemez Mountains salamander, we may use habitat as a proxy for the number of individuals taken because they spend the bulk of their time underground, and so it is not possible to determine the population size at a particular location or across the range of the species. It is difficult to survey for this species because they are small, elusive, and only some unknown proportion is active above ground during the summer monsoonal rains, when relatively warmer and wet conditions moisten the habitat above ground, typically from July through September). The concept of using habitat as a proxy for species numbers was upheld in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004), as amended by 387 F.3d 968 (9th Cir. Wash., Oct. 28, 2004). Because this species is reliant upon cool moist habitat for physiological function, actions that could potentially result in a jeopardy determination for the Jemez Mountains salamander are those that are large in scale and result in warmer and drier habitat conditions. Actions that are large in scale and could result in warmer or drier or both habitat conditions could include forest thinning, logging, salvage logging, some types of prescribed burning, or fire use. In addition, jeopardy may occur if an action results in a reduction in quantity of salamander habitat to the point where the likelihood of species survival is low, or where known populations are significantly fragmented or destroyed.

What types of project modifications are currently recommended or will likely be recommended by the Service to avoid jeopardy?

Because the Jemez Mountains salamander is not yet listed under the Endangered Species Act of 1973, as amended, no consultations have been conducted. In the future, we may recommend project modifications to reduce the effect of the proposed action to a level where it would not impact the species' numbers, reproduction, or distribution so that the likelihood of survival and recovery in the wild would not be appreciably reduced. Recommended modifications could include, but are not limited to, the following: (1) maintain key habitat components to provide adequate moisture and temperature regimes; (2) relocate

the project to an area outside of occupied salamander habitat; (3) minimize the use of chemicals in terrestrial habitats; and/or (4) monitor for salamanders on site before or while construction or other activities occur within occupied salamander habitat areas.

Federal agencies and other project proponents that are likely to consult with the Service under section 7 without Critical Habitat

Federal agencies that would likely go through the section 7 consultation process without critical habitat include the U.S. Forest Service and the Valles Caldera National Preserve for forest management, use of wildfire or prescribed fire, post-fire rehabilitation or resource management actions, livestock grazing, road construction or removal, development for recreational purposes, fire retardant use, and pesticide use; Bandelier National Monument for resource management, fire use, and potential recreational development actions; and the Service when we consider issuing section 10(a)(1)(B) permit applications.

Service administrative effort for section 7 consultations without critical habitat

We estimate that without critical habitat, we would conduct approximately 10 informal and 3 formal consultations per year.

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

New Mexico State law provides some protection to the salamander. The salamander was reclassified by the State of New Mexico from threatened to endangered in 2005 (NMDGF 2005, p. 2); however, the species still lacks a State recovery plan. This designation provides protection under the New Mexico Wildlife Conservation Act of 1974 (i.e., State Endangered Species Act) (19 NMAC 33.6.8) by prohibiting direct take of the species without a permit issued from the State. The New Mexico Wildlife Conservation Act defines “take” or “taking” as harass, hunt, capture, or kill any wildlife or attempt to do so (17 NMAC 17.2.38). In other words, New Mexico’s classification as an endangered species only conveys protection from collection or harm to the animals themselves without a permit. New Mexico’s statutes are not designed to address habitat protection, indirect effects, or other threats to these species. There is no provision for formal consultation process to address the habitat requirements of the species or how a proposed action may affect the needs of the species. Because most of the threats to the species are from effects to habitat, protecting individuals, without addressing habitat threats, will not ensure the salamander’s long-term conservation and survival.

A Cooperative Management Plan and Conservation Agreement were completed in 2000 by the New Mexico Endemic Salamander Team. These documents were intended to be a mechanism to provide for conservation and protection in lieu of listing the species under the Endangered Species Act, as amended (U.S. General

Accounting Office 1993, p 9). The goal of these non-regulatory documents was to "...provide guidance for the conservation and management of sufficient habitat to maintain viable populations of the species" (NMEST 2000, p. i.). However, they have been ineffective in preventing the ongoing loss of salamander habitat, and they are not expected to prevent further declines of the species. The intent of the agreement was to protect the salamander and its habitat on lands administered by the U.S. Forest Service; however, there have been projects that have negatively affected the species. The Cooperative Management Plan and Conservation Agreement have been unable to prevent ongoing loss of habitat, and they are not expected to prevent further declines of the species. They do not provide adequate protection for the salamander or its habitat.

Some protection for the salamander may be provided in areas where occupied salamander habitat overlaps with the Mexican Spotted Owl or its designated critical habitat in the Jemez Mountains.

Adverse Modification Analysis

The following discussion describes the regulatory circumstances that are anticipated with the proposed designation of critical habitat for the Jemez Mountains salamander. Once critical habitat is designated, section 7 of the Act also requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat.

How is adverse modification defined and determined for these species?

The Service is currently working to update the regulatory definition of adverse modification since it was invalidated by a prior court ruling, *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, No. 03-35279. In the meantime, we will rely on guidance provided by the Director's December 9, 2004, Memorandum, *Application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act*. The Director's memo explains that the conclusion for a section 7 analysis of a Federal action is to determine if the "critical habitat would remain functional (or retain the current ability for the primary constituent elements to be functionally established) to serve the intended conservation role for the species..." (p. 3).

Drawing from *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, cited above, and the Director's December 2004 memo, we have developed the following working definition for adverse modification. Adverse modification of critical habitat means an action that, directly or indirectly, adversely alters the primary constituent elements (PCEs) of the physical or biological features that are essential to the conservation of the species or habitat quality (or the ability of PCEs to be functionally established) such that the ability of the critical habitat unit to function and serve its conservation (recovery) role is appreciably reduced.

Regarding critical habitat for the Jemez Mountains salamander, we may call adverse modification when an action has an effect that would appreciably diminish the functionality of an area to meet recovery, such as either drying the habitat, raising the temperature of the habitat, or removing the habitat altogether. An adverse modification analysis would take into account the role of the critical habitat in the particular area in question, the quality and distribution of other critical habitat areas that are already protected, and the total habitat needed for the species' recovery. Taking into consideration habitat that is "already protected" is appropriate because only habitat that is protected is likely to serve its continued conservation role for the species.

What types of project impacts could we potentially call adverse modifications?

Actions that may result in adverse modification of critical habitat may occur when the effects of the proposed action:

- (1) Would reduce the quality of the critical habitat unit, degrade the quality of the PCEs, or preclude the ability of the PCEs to be established, or
- (2) Make it so a given unit can no longer contribute to the recovery of the species when taking into consideration the environmental baseline of the critical habitat.

What would we ask people to do to avoid adverse modification?

As discussed above, the salamander is reliant upon habitat for all life functions, and salamander numbers and populations are difficult to measure. Therefore, we may use habitat as a proxy for the number of individuals taken during a jeopardy consultation as described above. The same factual information concerning impacts to habitat would also be considered in determining whether adverse modification of critical habitat is likely to occur.

To avoid adverse modification and jeopardy to the species, recommended project modifications could include the following: (1) reduce the size or configuration of the proposed project to avoid, reduce, or eliminate the effects to critical habitat; (2) mitigate the effects to the species in critical habitat by increasing permanent protection within the same watershed; (3) move the project so that it does not affect designated critical habitat and/or (4) offer recommendations to modify the action that would maintain important habitat features to the salamander within the action area.

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

We expect that the same agencies and types of projects would go through the section 7 consultation process with or without critical habitat. We estimate that

the same number of projects would likely undergo consultation with critical habitat as without.

How much administrative effort does or will the Service expend to address adverse modification in its section 7 consultations due to critical habitat being designated? Estimate the difference compared to baseline.

We expect an increase in administrative costs associated with the critical habitat designation because each consultation will take more time to complete due to the additional adverse modification analysis. Specifically, we estimate that it would take both a GS-13 and GS-11 biologist about 8 hours per week each to address adverse modification with critical habitat as compared to approximately 4 hours per week without critical habitat during the life of a consultation (up to 135 days). The extent of private lands is relatively small and isolated. Therefore, it is unknown at this time whether there will be any additional work associated with habitat conservation plans.

Conclusion

What is the difference between jeopardy and adverse modification for the Jemez Mountains salamander?

In the case of the Jemez Mountains salamander, we may use habitat as a proxy for the number of individuals taken and thus we anticipate that a jeopardy analysis and an adverse modification analysis would be the same. The concept of using habitat as a proxy for species numbers was upheld in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004), as amended by 387 F.3d 968 (9th Cir. Wash., Oct. 28, 2004). We anticipate that both a jeopardy analysis and an adverse modification analysis would focus on the effects of a proposed project's impacts to the physical features, PCEs, or other habitat characteristics determined by the Secretary to be essential for the conservation of the species in areas designated as critical habitat.

In addition, we would analyze impacts to the capability of the critical habitat unit to maintain its conservation (recovery) role and function for the species. This analysis takes into account the effects of a direct or indirect alteration that appreciably diminishes the value of critical habitat for either the survival or recovery of a listed species. In the case of this species, the following could result in a jeopardy or an adverse modification determination: (1) reduction in quality or quantity of above ground habitat through decreased moisture conditions or increased temperatures; (2) reduction in quality or quantity of above ground habitat such that the timing or duration salamanders are able to be active above ground is reduced or altered; (3) alteration or loss of rocky substrate with interstitial spaces that provides cover, shelter, or foraging habitat; and (4) loss of access between underground and above ground habitats. It is important to note that activities occurring outside of the areas designated as critical habitat could

also diminish the value of critical habitat and will be included in the adverse modification analysis.

What types of actions might the Service recommend pursuant to a section 7 consultation to avoid destruction or adverse modification of critical habitat that are different than those for avoiding jeopardy?

As described above, if we determine that an action adversely modifies critical habitat we anticipate that we would also determine that the action would jeopardize the species. We therefore anticipate that the actions we might recommend to avoid adverse modification would be the same as those for avoiding jeopardy.

Specific recommendations to avoid destruction or adverse modification of critical habitat and to avoid jeopardy include the following: (1) implement actions on the landscape that reduce the risk of large-scale, stand replacing wildfire; (2) maintain key salamander components (e.g. large decomposing Douglas fir logs) when implementing fire use and forest management actions; (3) conduct studies to efficiently maintain high canopy cover while allowing for fire use and forest management actions; and (4) determine and utilize least harmful chemicals for broadscale use in salamander habitat (e.g. fire retardant).

Literature Cited

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