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ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THREE COLORADO PLANTS

Final | June 7, 2012

prepared for:

U.S. Fish and Wildlife Service

4401 N. Fairfax Drive

Arlington, VA 22203

prepared by:

Industrial Economics, Incorporated

2067 Massachusetts Avenue

Cambridge, MA 02140

617/354-0074

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LIST OF ACRONYMS AND ABBREVIATIONS

Act	Endangered Species Act
BBC	BBC Research & Consulting
BLM	Bureau of Land Management
BMP	Best Management Practices
CDNR	Colorado Department of Natural Resources
CDOT	Colorado Department of Transportation
CEQA	California Environmental Quality Act
CNAP	Colorado Natural Areas Program
COGCC	Colorado Oil & Gas Conservation Commission
DEA	Draft Economic Analysis
DOI	U.S. Department of the Interior
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
HCP	Habitat Conservation Plan
IEc	Industrial Economics, Incorporated
NAICS	North American Industry Classification System
NEPA	National Environmental Policy Act
NOA	Notice of Availability
NSO	No surface occupancy
OMB	U.S. Office of Management and Budget
ORV	Off-road vehicles
OXY	OXY USA
RFA	Regulatory Flexibility Act
RMA	Risk Management Association
RMP	Resource Management Plan
ROW	Right of Way

SBA	Small Business Administration
SBREFA	Small Business Regulatory Enforcement Fairness Act
Service	U.S. Fish and Wildlife Service
STIP	Statewide Transportation Improvement Program
Three Colorado Plants	The Parachute beardtongue, DeBeque phacelia, and Pagosa skyrocket
USFS	U.S. Forest Service

EXECUTIVE SUMMARY

1. The purpose of this report is to evaluate the potential economic impacts associated with the designation of critical habitat for three Colorado plant species - *Ipomopsis polyantha* (Pagosa skyrocket), *Penstemon debilis* (Parachute beardtongue), and *Phacelia submutica* (DeBeque phacelia) (hereafter, "three Colorado plants"). This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service (Service).

OVERVIEW OF THE PROPOSED CRITICAL HABITAT

2. The U.S. Fish and Wildlife Service (Service) listed Pagosa skyrocket as endangered and Parachute beardtongue and DeBeque phacelia as threatened on July 27, 2011, concurrent with the publication of the Proposed Rule for designation of critical habitat for the species.[1,2] Based on 2011 plant survey results, the Service revised the area proposed as critical habitat for Pagosa skyrocket and DeBeque phacelia. The revised proposed critical habitat areas are described the Notice of Availability (NOA) for this draft economic analysis. This analysis considers the economic effects of designating the proposed revised critical habitat as presented in the NOA.

3. The Service is proposing to designate a total of 17 units encompassing approximately 54,280 acres as critical habitat for all three species.[3] The proposed critical habitat designation includes four units totaling 9,641 acres for Pagosa skyrocket, four units totaling 19,155 acres for Parachute beardtongue, and nine units totaling 25,484 acres for DeBeque phacelia. The Service is considering 674 acres for exclusion from critical habitat designation for the Parachute beardtongue.[4] The proposed critical habitat for the three Colorado plants is located in Archuleta, Garfield, and Mesa Counties, Colorado.[5] We refer to the area proposed as critical habitat collectively as the "study area" for this analysis. The study area is organized into 17 "units" as shown in Exhibits ES-1 and ES-2.

4. This final economic analysis analyzes the proposed revised designation as described in the proposed rule. This analysis does not reflect changes to the proposed critical habitat

[1] Final Listing Rule (2011), 76 FR 45054 *et seq*.

[2] Email communication with Fish and Wildlife Service biologist, January 31, 2012.

[3] Proposed Critical Habitat Rule (2011), 76 FR 45078-45128.

[4] These areas are being considered for exclusion under the "other relevant factor" provisions of section 4(b)(2) of the Act. These areas are preserved as part of the Mount Callahan and Mount Callahan Saddle Natural Areas and "there is a reasonable expectation that the conservation management strategies and actions will be implemented for the foreseeable future" (76 FR 45102).

[5] Proposed Critical Habitat Rule (2011), 76 FR 45078-45128.

designation made in the final rule. Consequently, description of the habitat designation in the final rule may differ from maps and figures presented in this analysis.[6]

5. The three Colorado plants thrive in very specific habitats. Pagosa skyrocket is specific to Mancos shale soils at elevations of 6,725 to 7,776 feet. Pagosa skyrocket plants are found in sparsely vegetated areas along the margins of Ponderosa pine forests and extending into adjacent grassland or shrublands. Parachute beardtongue is found on unstable oil shale soils with little other vegetation at elevations of 5,600 to 9,229 feet. DeBeque phacelia is found only in clay soils on the Atwell and Shire members of the Wasatch Formation at elevations of 5,080 to 7,100 feet. DeBeque phacelia plants are found on clay barrens with little other vegetation.[7] Of the critical habitat units proposed for the Pagosa skyrocket, two are occupied and two are unoccupied, for the Parachute Beardtongue two are occupied and two are unoccupied, and for the DeBeque phacelia all units are occupied.[8] For all three species, within the occupied units between the actual occupied areas there are interspaces of unoccupied habitat.[9]

6. This analysis considers economic impacts of conservation efforts for the three Colorado plants and their habitat associated with the following activities: 1) oil and gas development, 2) transportation projects, 3) agriculture and grazing, 4) recreation, and 5) active species management. The analysis estimates economic impacts to these activities from 2012 (expected year of the final designation of critical habitat) to 2031 (20 years from the expected critical habitat designation). Forecast impacts are organized into two categories according to "without critical habitat" and "with critical habitat" scenarios. The "without critical habitat" scenario represents the baseline for the analysis, considering protections already accorded the three Colorado plants; for example, under the Federal listing and other Federal, State, and local regulations. The "with critical habitat" scenario describes the incremental impacts expected to result from the designation of critical habitat for the species. That is, the reported incremental conservation efforts and associated economic impacts are those expected to occur specifically because of the designation of critical habitat for the three Colorado plants. This information on incremental impacts 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.[10]

[6] For a detailed discussion of public comments on the draft economic analysis and associated responses, refer to the responses to public comment section of the final rule.

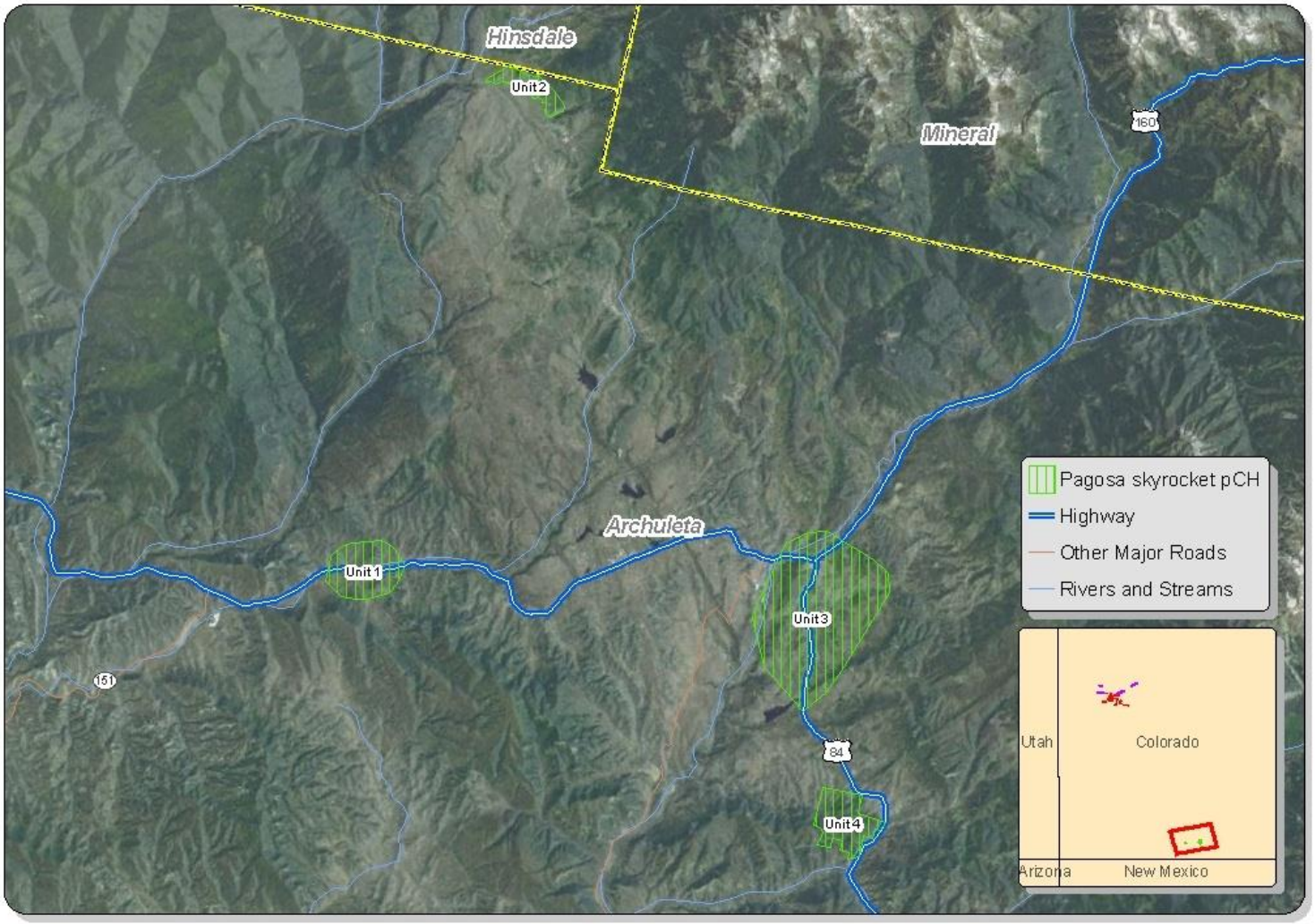
[7] Proposed Critical Habitat Rule (2011), 76 FR 45079.

[8] Proposed Critical Habitat Rule (2011), 76 FR 45087-45088.

[9] Proposed Critical Habitat Rule (2011), 76 FR 45079.

[10] 16 U.S.C. §1533(b)(2).

EXHIBIT ES-1. PROPOSED CRITICAL HABITAT FOR THE PAGOSA SKYROCKET



Sources:
1. US Fish and Wildlife Service, Western Colorado Field Office
2. Colorado Department of Natural Resources, Colorado Natural Areas Program
2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA

1:210,000 0 2.5 5 Miles

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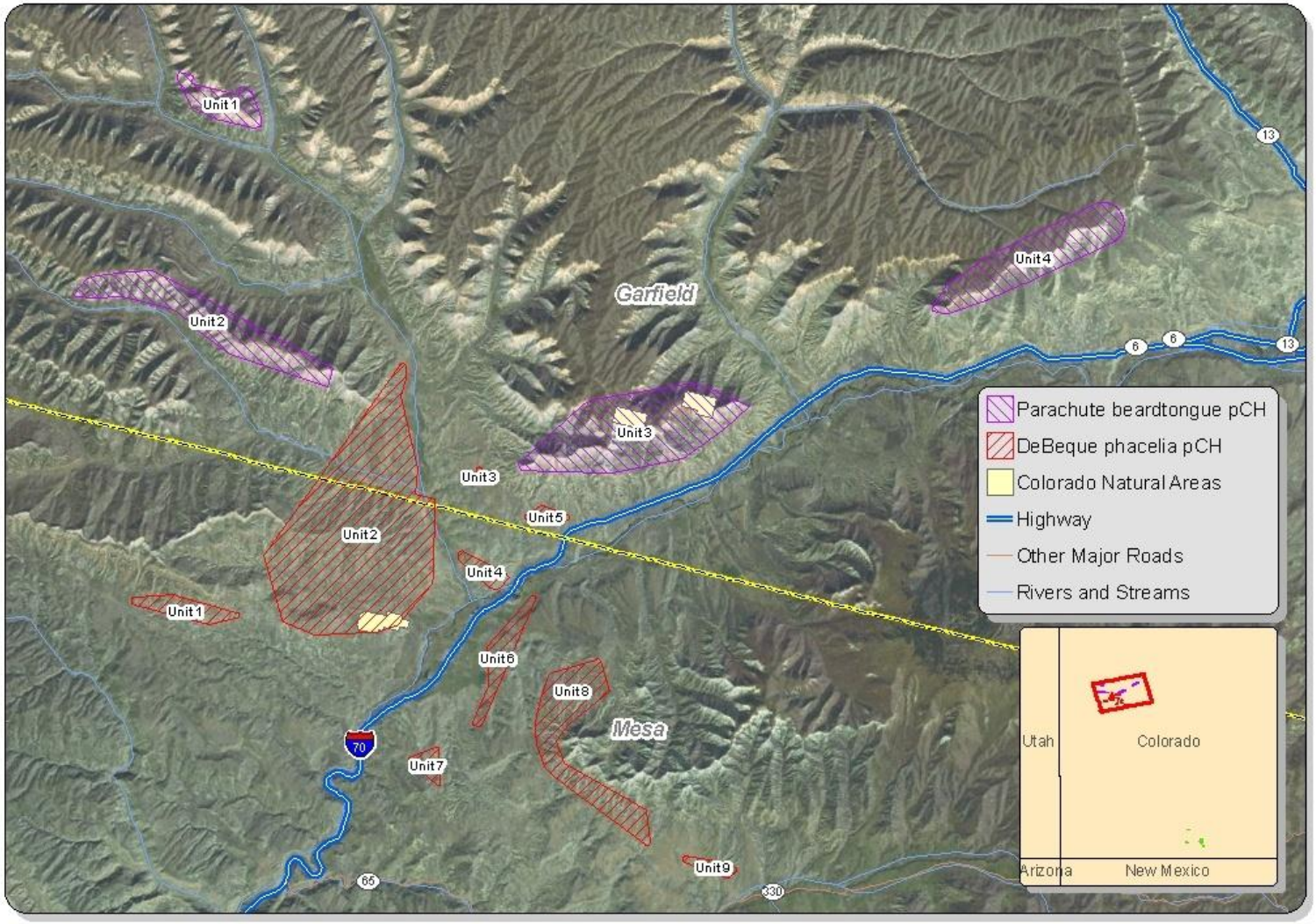
EXHIBIT ES-2. PROPOSED CRITICAL HABITAT FOR THE PARACHUTE BEARDTONGUE AND DEBEQUE PHACELIA



Sources:
1. US Fish and Wildlife Service, Western Colorado Field Office
2. Colorado Departement of Natural Resources, Colorado Natural Areas Program
2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA

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KEY FINDINGS

7. The key findings of this economic analysis are summarized in the text box below. Exhibit ES -2 presents the baseline and incremental impacts of conservation efforts for the three Colorado plants and their habitat. Baseline and incremental impacts are presented by unit and activity in Exhibits ES-4 and ES-5, respectively. Impacts by activity are discussed in more detail below.

KEY FINDINGS

- Over the next 20 years, potential baseline impacts in areas proposed for designation are estimated to be $3.85 million to $9.81 million, assuming a seven percent discount rate. Baseline impacts in areas considered for exclusion are estimated to be $2.36 million.
- Over the next 20 years, potential incremental impacts of designating critical habitat in the areas proposed for designation are estimated to be $967,000 to $14.8 million, assuming a seven percent discount rate. Incremental costs associated with the designation of critical habitat for each of the plants are:
    - $27,700 for Pagosa skyrocket;
    - $70,600 to $1.12 million for Parachute beardtongue; and
    - $868,000 to $13.6 million for DeBeque phacelia.
- Impacts to oil and gas development represent 90 to 99 percent of the incremental costs associated with the proposed designation of critical habitat. Impacts to agriculture and grazing, recreation, and transportation projects combined represent less than ten percent of the incremental impacts in both scenarios analyzed.
- The range in potential future impacts reflects significant uncertainty about the level and distribution of future oil and gas development, characteristics of future conservation recommendations, and costs associated with these recommendations. In particular, the costs applied in this analysis are specific to Parachute beardtongue; costs associated with DeBeque phacelia may be lower given the gentler terrain surrounding the plant.

8. A key factor affecting this analysis is where the Service would consult in the baseline and incremental scenarios and what project modification would be requested during consultation. In occupied units for the three Colorado plants, absent critical habitat designation, the Service would recommend that consultation occurs within pollinator habitat (i.e., within 100 meters of known DeBeque phacelia occurrences and 1,000 meters of known Pagosa skyrocket and Parachute beardtongue occurrences).[11] Therefore, consultations on projects occurring within these specified buffers would result from the listing and all costs, except for a portion of the administrative costs associated with addressing the potential for the project to adversely modify critical habitat, would occur in the baseline scenario.

9. Project modifications requested during consultation differ depending on the distance from an occurrence of the plant. Specifically, for all three Colorado plants, the Service expects to request the most stringent measures within 100 meters of a plant occurrence. For Pagosa skyrocket and Parachute beardtongue moderate measures would be requested from 100 to 300 meters and measures to protect pollinators and habitat would be requested beyond 300 meters.[12]

[11] U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011.

[12] Email communication from U.S. Fish and Wildlife Service biologist, December 7, 2011.

EXHIBIT ES-3 SUMMARY OF TOTAL IMPACTS (2012 - 2031, 2012 DOLLARS)

	BASELINE IMPACTS				INCREMENTAL IMPACTS			
	3% DISCOUNT RATE		7% DISCOUNT RATE		3% DISCOUNT RATE		7% DISCOUNT RATE	
	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
AREAS PROPOSED FOR DESIGNATION								
Present Value	$4,230,000	$12,400,000	$3,850,000	$9,810,000	$1,100,000	$19,900,000	$967,000	$14,800,000
Annualized	$276,000	$807,000	$340,000	$866,000	$71,900	$1,300,000	$85,300	$1,300,000
AREAS CONSIDERED FOR EXCLUSION								
Present Value		$3,190,000		$2,360,000		$0		$0
Annualized		$211,000		$208,000		$0		$0

EXHIBIT ES-4 BASELINE IMPACTS BY UNIT AND ACTIVITY (2012 DOLLARS, ASSUMING A SEVEN PERCENT DISCOUNT RATE)

UNIT NUMBER	UNIT NAME	OIL & GAS - LOW	OIL & GAS - HIGH	TRANSPORTATION	AGRICULTURE & GRAZING	RECREATION	SPECIES MANAGEMENT	SUBTOTAL - LOW	SUBTOTAL - HIGH
AREAS PROPOSED FOR DESIGNATION									
PAGOSA SKYROCKET									
1	Dyke	$0	$0	$2,480,000	$0	$0	$0	**$2,480,000**	**$2,480,000**
2	O'Neal Hill Special Botanical Area	$0	$0	$0	$0	$0	$0	**$0**	**$0**
3	Pagosa Springs	$0	$0	$883,000	$0	$0	$0	**$883,000**	**$883,000**
4	Eight Mile Mesa	$0	$0	$0	$0	$0	$0	**$0**	**$0**
Subtotal		**$0**	**$0**	**$3,360,000**	**$0**	**$0**	**$0**	$3,360,000	$3,360,000
PARACHUTE BEARDTONGUE									
1	Brush Mountain	$0	$0	$0	$0	$0	$0	**$0**	**$0**
2	Cow Ridge	$0	$0	$0	$0	$0	$0	**$0**	**$0**
3	Mount Callahan	$3,580	$60,400	$0	$0	$6,380	$0	**$9,950**	**$66,800**
4	Anvil Points	$10,000	$170,000	$0	$0	$6,380	$0	**$16,400**	**$176,000**
Subtotal		**$13,600**	**$230,000**	**$0**	**$0**	**$12,800**	**$0**	$26,400	$243,000
DEBEQUE PHACELIA									
1	Sulphur Gulch	$18,600	$314,000	$0	$4,790	$3,190	$0	**$26,600**	**$322,000**
2	Pyramid Rock	$196,000	$3,300,000	$0	$4,790	$3,190	$11,100	**$215,000**	**$3,320,000**
3	Roan Creek	$10,000	$170,000	$0	$0	$0	$0	**$10,000**	**$170,000**
4	DeBeque	$31,500	$531,000	$0	$4,790	$3,190	$0	**$39,400**	**$539,000**
5	Mount Logan	$0	$0	$0	$4,790	$6,380	$0	**$11,200**	**$11,200**
6	Ashmead Draw	$31,400	$530,000	$0	$4,790	$3,190	$0	**$39,300**	**$538,000**
7	Baugh Reservoir	$5,060	$85,400	$0	$4,790	$3,190	$0	**$13,000**	**$93,300**
8	Horsethief Mountain	$65,000	$1,100,000	$0	$4,790	$29,400	$0	**$99,200**	**$1,130,000**
9	Anderson Gulch	$4,580	$77,400	$0	$0	$0	$0	**$4,580**	**$77,400**
Subtotal		**$362,000**	**$6,110,000**	**$0**	**$33,500**	**$51,800**	**$11,100**	$458,000	$6,200,000
Total		**$375,000**	**$6,340,000**	**$3,360,000**	**$33,500**	**$64,500**	**$11,100**	$3,850,000	$9,810,000
AREAS CONSIDERED FOR EXCLUSION									
PARACHUTE BEARDTONGUE									
3	Mount Callahan – Natural Areas		$2,240,000	$0	$0	$0	$113,000		$2,360,000

Notes: Totals may not sum due to rounding; no range estimated in areas considered for exclusion because the number of future wells and associated costs are known with reasonable certainty.

EXHIBIT ES-5 INCREMENTAL IMPACTS BY UNIT AND ACTIVITY (2012 DOLLARS, ASSUMING A SEVEN PERCENT DISCOUNT RATE)

UNIT NUMBER	UNIT NAME	OIL & GAS - LOW	OIL & GAS - HIGH	TRANSPORTATION	AGRICULTURE & GRAZING	RECREATION	SPECIES MANAGEMENT	SUBTOTAL - LOW	SUBTOTAL - HIGH
AREAS PROPOSED FOR DESIGNATION									
PAGOSA SKYROCKET									
1	Dyke	$0	$0	$9,370	$0	$0	$0	**$9,370**	**$9,370**
2	O'Neal Hill Special Botanical Area	$0	$0	$0	$0	$7,500	$0	**$7,500**	**$7,500**
3	Pagosa Springs	$0	$0	$3,330	$0	$0	$0	**$3,330**	**$3,330**
4	Eight Mile Mesa	$0	$0	$0	$0	$7,500	$0	**$7,500**	**$7,500**
Subtotal		**$0**	**$0**	**$12,700**	**$0**	**$15,000**	**$0**	$27,700	$27,700
PARACHUTE BEARDTONGUE									
1	Brush Mountain	$11,600	$195,000	$0	$0	$0	$0	**$11,600**	**$195,000**
2	Cow Ridge	$35,500	$599,000	$0	$0	$0	$0	**$35,500**	**$599,000**
3	Mount Callahan	$10,900	$184,000	$0	$0	$2,130	$0	**$13,000**	**$186,000**
4	Anvil Points	$8,470	$143,000	$0	$0	$2,130	$0	**$10,600**	**$145,000**
Subtotal		**$66,400**	**$1,120,000**	**$0**	**$0**	**$4,250**	**$0**	$70,600	$1,120,000
DEBEQUE PHACELIA									
1	Sulphur Gulch	$37,300	$629,000	$0	$1,590	$1,060	$0	**$39,900**	**$632,000**
2	Pyramid Rock	$627,000	$10,600,000	$0	$1,590	$1,060	$0	**$630,000**	**$10,600,000**
3	Roan Creek	$398	$6,720	$0	$0	$0	$0	**$398**	**$6,720**
4	DeBeque	$13,100	$221,000	$0	$1,590	$1,060	$0	**$15,800**	**$224,000**
5	Mount Logan	$0	$0	$0	$1,590	$2,130	$0	**$3,720**	**$3,720**
6	Ashmead Draw	$44,700	$755,000	$0	$1,590	$1,060	$0	**$47,400**	**$757,000**
7	Baugh Reservoir	$18,200	$307,000	$0	$1,590	$1,060	$0	**$20,800**	**$310,000**
8	Horsethief Mountain	$60,200	$1,020,000	$0	$43,600	$5,820	$0	**$110,000**	**$1,070,000**
9	Anderson Gulch	$1,150	$19,500	$0	$0	$0	$0	**$1,150**	**$19,500**
Subtotal		**$802,000**	**$13,500,000**	**$0**	**$53,200**	**$13,300**	**$0**	$868,000	$13,600,000
Total		**$868,000**	**$14,700,000**	**$12,700**	**$53,200**	**$32,500**	**$0**	$967,000	$14,800,000
AREAS CONSIDERED FOR EXCLUSION									
PARACHUTE BEARDTONGUE									
3	Mount Callahan – Natural Areas		$0	$0	$0	$0	$0		$0

Notes: Totals may not sum due to rounding; no range estimated in areas considered for exclusion because the number of future wells and associated costs are known with reasonable certainty.

SUMMARY OF BASELINE IMPACTS

10. Baseline impacts in areas proposed for designation are estimated to be $4.23 million to $12.4 million ($276,000 to $807,000 on an annualized basis), assuming a three percent discount rate, or $3.85 million to $9.81 million ($340,000 to $866,000 on an annualized basis), assuming a seven percent discount rate. Baseline impacts in areas considered for exclusion are estimated to be $3.19 million ($211,000 on an annualized basis), assuming a three percent discount rate, or $2.36 million ($208,000 on an annualized basis), assuming a seven percent discount rate.

11. Impacts to oil and gas development represent 10 percent of the total baseline impacts in areas proposed for designation in the low cost scenario and 65 percent of baseline impacts in the high cost scenario. This difference is due to uncertainty surrounding the level of future oil and gas development. Impacts to transportation activities represent 87 percent of total baseline impacts in areas proposed for designation in the low cost scenario and 34 percent of baseline impacts in the high cost scenario. Impacts to recreation, active species management, and agriculture and grazing each represent less than two percent of the total baseline impacts in both scenarios. In areas considered for exclusion, impacts to oil and gas development represent 95 percent of the total baseline costs; impacts to active species management make up the remaining five percent.

12. In the low cost scenario, proposed Unit 1 for Pagosa skyrocket has the highest baseline impacts (64 percent of total), followed by proposed Unit 3 for Pagosa skyrocket (23 percent of total) and proposed Unit 2 for DeBeque phacelia (six percent of total). In the high cost scenario, proposed Unit 2 for DeBeque phacelia has the highest baseline impacts (34 percent of total), followed by proposed Unit 1 for Pagosa skyrocket (25 percent of total) and proposed Unit 8 for DeBeque phacelia (12 percent of total).

Oil and Gas

13. Baseline impacts to oil and gas development range from $375,000 to $6.34 million, assuming a seven percent discount rate. This large range is due to uncertainty regarding the level and distribution of future oil and gas development. Consequently, this analysis employs two methods to determine the number and location of future drilling activity on federally-owned lands:

    - **BBC Data (Low Estimate):** Our low estimate relies on projections of future drilling activity provided by a private consulting firm located in Denver, Colorado, called BBC Research and Consulting. In a 2008 report prepared for the Associated Governments of Northwest Colorado, BBC provides annual projections of wells drilled, by county, from 2005 through 2035.[13,14] Following this method, the analysis estimates that 90 wells will be drilled on federally-managed lands without a no surface occupancy (NSO) stipulation in the study area over the next 20 years. Using an estimate of 20 wells per multi-well pad, the

[13] BBC Research & Consulting. April 4, 2008. *Northwest Colorado Socioeconomic Analysis and Forecasts*. Prepared for the Associated Governments of Northwest Colorado.

[14] Personal communication with Doug Jeavons, BBC Research and Consulting. Data received via email on November 7, 2011.

assumption that will yield the lowest costs for this low estimate scenario, will yield 4.52 well pads projected to be constructed over the time period of this analysis.

- **COGCC Data (High Estimate):** The second method uses data on past drilling activity from the Colorado Oil and Gas Conservation Commission (COGCC) to forecast future rates and locations of wells.[15] Using these data, the analysis estimates that 203 wells will be drilled within federally-managed lands without an NSO stipulation in the study area over the next 20 years. Using an estimate of two wells per multi-well pad, the assumption that will yield the highest costs for this high estimate scenario, will yield 102 well pads projected to be constructed over the timeframe of our analysis.

The analysis recognizes that the number of actual wells drilled, and the density of wells per well pad, could vary greatly due to changing economic conditions and technology innovations.

14. Baseline impacts to oil and gas development are also expected within areas considered for exclusion. These baseline impacts are estimated to be $2.21 million, assuming a seven percent discount rate. These costs are associated with implementation of best management practices (BMPs) under OXY USA's (OXY's) agreement with the Colorado Natural Areas Program (CNAP).

Other Activities

15. Baseline impacts to transportation projects are estimated to be $3.36 million, assuming a seven percent discount rate. These impacts are associated with three future transportation projects occurring on US 160 within Pagosa Skyrocket proposed Units 1 and 3. Baseline impacts to agriculture and grazing are estimated to be $33,500, assuming a seven percent discount rate. These impacts are associated with a BLM programmatic consultation on their grazing activities. Baseline impacts to recreation activities are estimated to be $64,500, assuming a seven percent discount rate. These impacts are associated with the construction of fencing to prevent off-road vehicles (ORVs) from accessing DeBeque phacelia populations and consultation with the Service on these fencing projects as well as consultation with BLM on their travel management plans. Baseline impacts to active species management activities are estimated to be $11,100, assuming a seven percent discount rate. Additionally, baseline impacts of $113,000 are expected in the areas considered for exclusion related to active species management. These impacts are associated with management of the plants and their habitat within three Colorado Natural Areas.

SUMMARY OF INCREMENTAL IMPACTS

16. Incremental impacts associated with the proposed critical habitat designation are estimated to range from $1.10 million to $19.9 million ($71,900 to $1.30 million on an annualized basis), assuming a three percent discount rate, or $967,000 to $14.8 million

[15] Colorado Oil and Gas Conservation Commission (COGCC). Colorado Well Starts Since 1988. Data received via email from Tom Kerr, November 4, 2011.

($85,300 to $1.30 million on an annualized basis), assuming a seven percent discount rate, over the next 20 years.

17. The largest contributor to the incremental costs is impacts to oil and gas development, which represent 90 percent of incremental impacts in the low cost scenario and 99 percent of impacts in the high cost scenario. In the low cost scenario, impacts to agriculture and grazing represent five percent of the total incremental impacts, impacts to recreation represent three percent, and impacts to transportation represent one percent. In the high cost scenario, impacts to these three activities represent less than one percent of the total incremental impacts each. There are no estimated incremental impacts to active species management activities.

18. In the low cost scenario, proposed Unit 2 for DeBeque phacelia has the highest incremental impacts (65 percent of total), followed by proposed Unit 8 for DeBeque phacelia (11 percent of total) and proposed Unit 6 for DeBeque phacelia (five percent of total). In the high cost scenario, these same three units (proposed Units 2, 8, and 4 for DeBeque phacelia) have the highest incremental impacts with 72 percent, seven percent, and five percent of the total incremental impacts, respectively.

Oil and Gas

19. Incremental impacts to oil and gas development range from $868,000 to $14.7 million, assuming a seven percent discount rate. These impacts are related to future oil and gas development that occurs in areas greater than 100 meters from known DeBeque phacelia occurrences and greater than 1,000 meters from known Parachute beardtongue occurrences. Similar to the baseline impacts, the large range in incremental impacts is due to uncertainty regarding the level and distribution of future oil and gas development.

Other Activities

20. Incremental impacts to transportation projects are estimated to be $12,700, assuming a seven percent discount rate. Incremental impacts to recreation activities are estimated to be $32,500, assuming a seven percent discount rate. The incremental impacts to transportation and recreation activities are limited to the administrative cost of consultation. Incremental impacts to agriculture and grazing are estimated to be $53,200, assuming a seven percent discount rate. These costs are associated with construction of cattle fencing that would not have been constructed absent critical habitat designation and consultation on BLM's grazing activities.

KEY SOURCES OF UNCERTAINTY

21. Several sources of uncertainty may affect the results of this analysis. The key sources of uncertainty are summarized below.

- **Oil and Gas Development:** The most significant source of uncertainty in this analysis is the level and distribution of future oil and gas development. Uncertainty exists in the number and location of future wells as well as the possibility for future oil shale exploration and mining. In addition, the characteristics of future

conservation recommendations are uncertain, as well as the costs associated with those conservation recommendations. In particular, the costs applied in this analysis are specific to Parachute beardtongue; costs associated with DeBeque phacelia may be lower given the gentler terrain surrounding the plant.

- **Other Activities:** There also exists uncertainty regarding the other activities that may be impacted through consultation with the Service on the three Colorado plants. In particular, it is uncertain whether activities on private land will have a Federal nexus that necessitates consultation. Additionally, uncertainty exists regarding the nature of future conservation recommendations for other activities and whether costs associated with these recommendations will be similar to those for oil and gas development projects.

ORGANIZATION OF THIS REPORT

22. This report is organized into five chapters. Chapter 1 provides background on the proposed critical habitat rule. Chapter 2 discusses the framework employed in the analysis. Chapter 3 describes the baseline and incremental impacts to oil and gas activities and Chapter 4 discusses the baseline and incremental impacts to other activities. Chapter 5 provides a brief discussion of potential benefits of the designation. Finally, four appendices to this report highlight the distributional impacts, summarize results at a three percent discount rate and undiscounted impacts, and provide information from the Service related to the potential for changes in conservation following critical habitat designation.

CHAPTER 1 | INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

1. This chapter provides an overview of the proposed critical habitat for *Ipomopsis polyantha* (Pagosa skyrocket), *Penstemon debilis* (Parachute beardtongue), and *Phacelia submutica* (DeBeque phacelia) (hereafter, "three Colorado plants"). It includes a summary of past legal actions that relate to the current proposal, a description of the area proposed for designation, and a discussion of threats to the proposed critical habitat. The information contained in this chapter provides a context for the analysis. All official definitions and proposed critical habitat boundaries are provided in the Proposed Rule.[16]

1.1.1 PREVIOUS FEDERAL ACTIONS

2. The three Colorado plants were listed under the Endangered Species Act (the Act) on July 27, 2011 concurrent with the publication of the Proposed Rule for designation of critical habitat for the species.[17,18] Based on 2011 plant survey results, the Service revised the area proposed as critical habitat for Pagosa skyrocket and DeBeque phacelia. The revised proposed critical habitat areas are described the Notice of Availability (NOA) for this draft economic analysis. This analysis considers the economic effects of designating the proposed revised critical habitat as presented in the NOA.

1.1.2 PROPOSED CRITICAL HABITAT DESIGNATION

3. The Service proposes to designate a total of 17 units encompassing approximately 54,280 acres as critical habitat for the species.[19] The proposed rule includes four units totaling 9,641 acres for Pagosa skyrocket, four units totaling 19,155 acres for Parachute beardtongue, and nine units totaling 25,484 acres for DeBeque phacelia.[20]. The Service is considering 674 acres for exclusion from critical habitat designation for the Parachute beardtongue.[21] The proposed critical habitat for the three Colorado plants is located in Archuleta, Garfield, and Mesa Counties, Colorado.[22]

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[16] Proposed Critical Habitat Rule (2011), 76 FR 45078-45128.

[17] Final Listing Rule (2011), 76 FR 45054 *et seq*.

[18] Proposed Critical Habitat Rule (2011), 76 FR 45078-45128.

[19] Email communication with Fish and Wildlife Service biologist, January 31, 2012.

[20] None of the units for the three species overlap.

[21] These areas being considered for exclusion under the "other relevant factor" provisions of section 4(b)(2) of the Act. These areas are preserved as part of the Mount Callahan and Mount Callahan Saddle Natural Areas and "there is a reasonable expectation that the conservation management strategies and actions will be implemented for the foreseeable future" (76 FR 45102).

[22] *Ibid*.

4. This final economic analysis analyzes the proposed revised designation as described in the proposed rule. This analysis does not reflect changes to the proposed critical habitat designation made in the final rule. Consequently, description of the habitat designation in the final rule may differ from maps and figures presented in this analysis.[23]

5. Pagosa skyrocket is specific to Mancos shale soils at elevations of 6,725 to 7,776 feet. The Pagosa skyrocket plants are found in sparsely vegetated areas along the margins of Ponderosa pine forests and extending into adjacent grassland or shrublands. Parachute beardtongue is found on unstable shale soils with little other vegetation at elevations of 5,600 to 9,229 feet. DeBeque phacelia is found only in clay soils on the Atwell and Shire members of the Wasatch Formation at elevations of 5,080 to 7,100 feet. DeBeque phacelia are found on clay barrens with little other vegetation.[24] Of the critical habitat units proposed for the Pagosa skyrocket, two are occupied and two are unoccupied; for the Parachute Beardtongue two are occupied and two are unoccupied; and for the DeBeque phacelia all units are occupied.[25] For all three species, within the occupied units, interspaces of unoccupied habitat exist between the actual plant locations.[26]

6. Exhibit 1-1 presents the geographical extent of the proposed designation for the Pagosa skyrocket and Exhibit 1-2 presents the geographic extent of the proposed designation for Parachute beardtongue and DeBeque phacelia. Exhibit 1-3 summarizes land ownership and occupancy for the proposed critical habitat units. Overall, approximately 70 percent of the proposed critical habitat for the three Colorado plants is located on federally-owned lands, 29 percent is located on privately-owned lands, and one percent is located on both State and county lands.

7. The majority of proposed critical habitat for Pagosa skyrocket is located on privately-owned lands (73 percent), 18 percent is located on federally-owned lands, and less than ten percent is located on State and county lands. On the other hand, the majority of proposed critical habitat for the Parachute beardtongue and DeBeque phacelia are located on federally-owned land (73 percent for Parachute beardtongue and 86 percent for DeBeque phacelia). For the Parachute beardtongue, the remaining 27 percent of the designation is located on privately-owned lands. For DeBeque phacelia, 13 percent of the designation is located on privately-owned lands and one percent is located on state-owned lands.

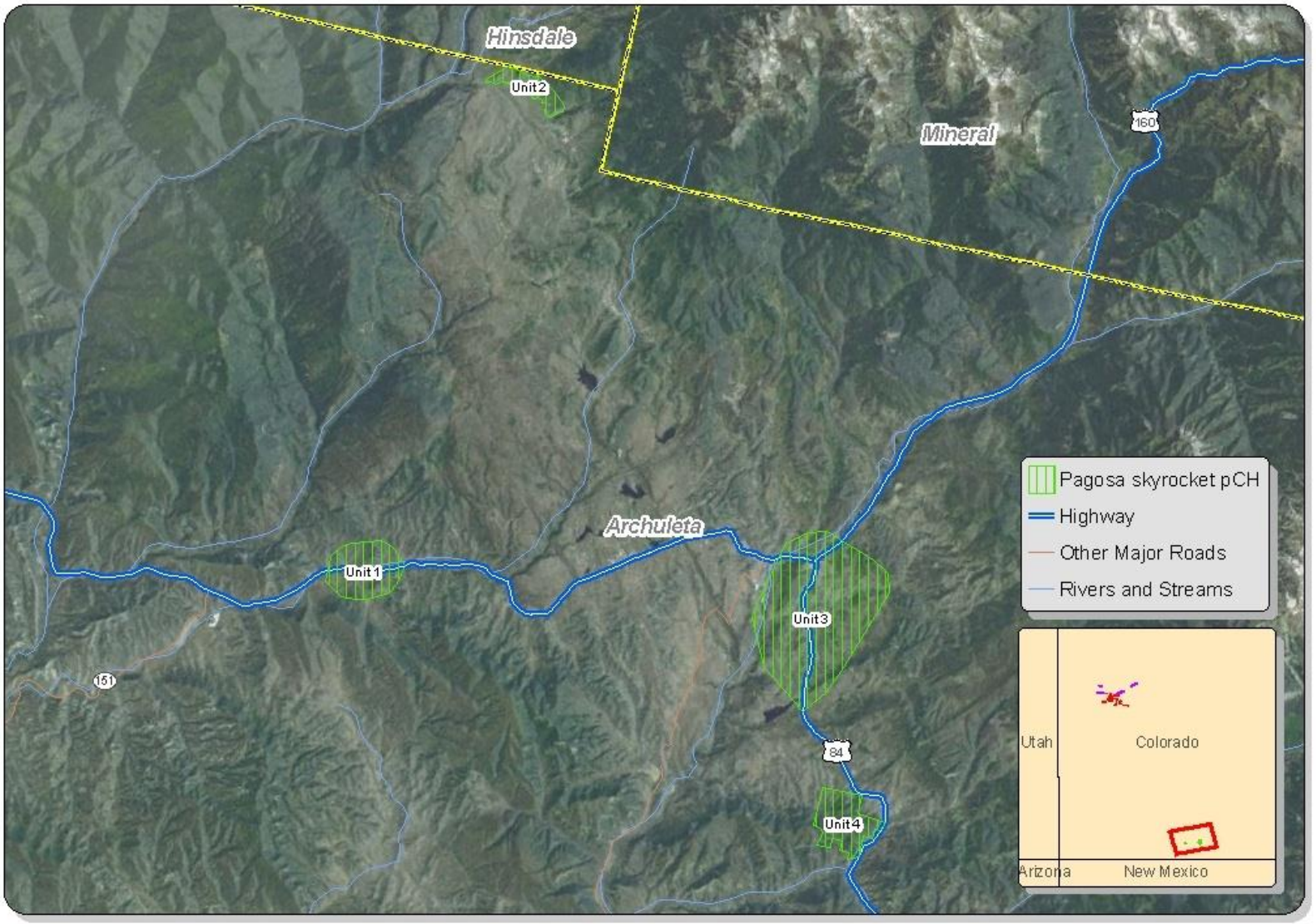
[23] For a detailed discussion of public comments on the draft economic analysis and associated responses, refer to the responses to public comment section of the final rule.

[24] Proposed Critical Habitat Rule (2011), 76 FR 45079.

[25] Proposed Critical Habitat Rule (2011), 76 FR 45087-45088.

[26] Proposed Critical Habitat Rule (2011), 76 FR 45079.

EXHIBIT 1-1. PROPOSED CRITICAL HABITAT FOR THE PAGOSA SKYROCKET



Sources:
1. US Fish and Wildlife Service, Western Colorado Field Office
2. Colorado Departement of Natural Resources, Colorado Natural Areas Program
2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA

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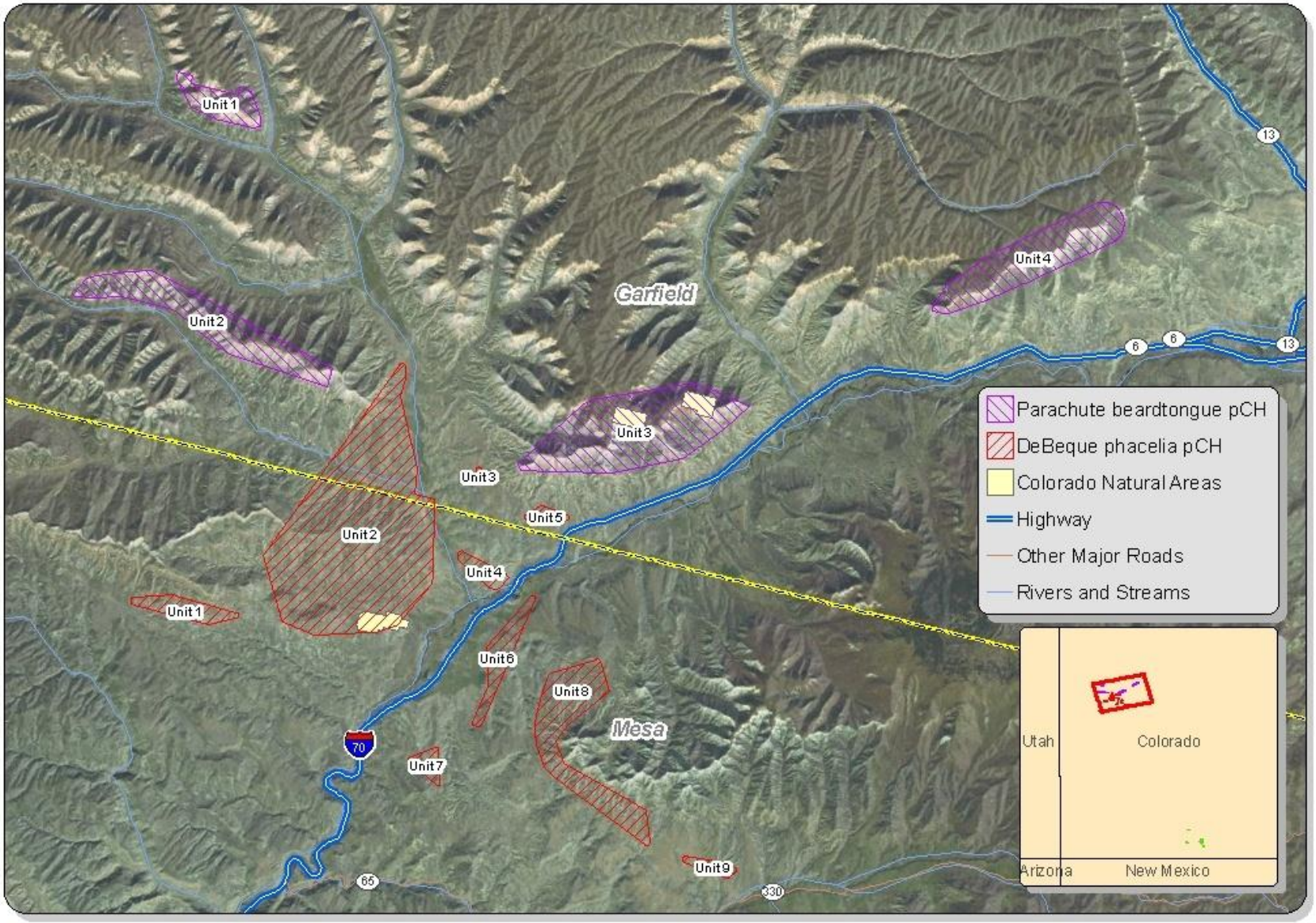
EXHIBIT 1-2. PROPOSED CRITICAL HABITAT FOR THE PARACHUTE BEARDTONGUE AND DEBEQUE PHACELIA



Sources:
1. US Fish and Wildlife Service, Western Colorado Field Office
2. Colorado Departement of Natural Resources, Colorado Natural Areas Program
2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA

1:260,000 0 3.5 7 Miles

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EXHIBIT 1-3. LANDOWNERSHIP WITHIN PROPOSED CRITICAL HABITAT UNITS BY SUBUNIT

UNIT NUMBER	UNIT NAME	CURRENTLY OCCUPIED?	PROPOSED CRITICAL HABITAT (ACRES)				
			FEDERAL	STATE	COUNTY/ LOCAL	PRIVATE	TOTAL
PAGOSA SKYROCKET							
1	Dyke	Yes	42	13	5	1,415	**1,475**
2	O'Neal Hill Special Botanical Area	No	564	0	0	0	**564**
3	Pagosa Springs	Yes	0	188	617	5,652	**6,456**
4	Eight Mile Mesa	No	1,146	0	0	0	**1,146**
Total			**1,752**	**201**	**622**	**7,067**	**9,641**
PARACHUTE BEARDTONGUE							
1	Brush Mountain	No	1,437	0	0	0	**1,437**
2	Cow Ridge	No	4,819	0	0	0	**4,819**
3	Mount Callahan	Yes	4,338	0	0	3,675	**8,013**
4	Anvil Points	Yes	3,424	0	0	1,461	**4,885**
Total			**14,018**	0	0	**5,136**	**19,155**
DEBEQUE PHACELIA							
1	Sulphur Gulch	Yes	1,046	0	0	0	**1,046**
2	Pyramid Rock	Yes	15,429	0	0	1,892	**17,321**
3	Roan Creek	Yes	2	0	0	52	**54**
4	DeBeque	Yes	401	0	0	129	**530**
5	Mount Logan	Yes	242	0	0	35	**277**
6	Ashmead Draw	Yes	1,110	0	0	166	**1,276**
7	Baugh Reservoir	Yes	169	0	0	261	**430**
8	Horsethief Mountain	Yes	3,614	0	0	594	**4,209**
9	Anderson Gulch	Yes	0	192	0	149	**341**
Total			**22,013**	**192**	**0**	**3,278**	**25,484**
GRAND TOTAL			**37,783**	**393**	**622**	**15,481**	**54,280**
PERCENT			**70%**	**1%**	**1%**	**29%**	**100%**

Source: Proposed Critical Habitat Rule (2011), 76 FR 45093-45096.
Note: Totals may not sum due to rounding.

1.2 ECONOMIC ACTIVITIES CONSIDERED IN THIS ANALYSIS

8. Based on a review of the Proposed Rule and discussion with the Service, the following economic activities are identified as potential threats to the three Colorado plants and their habitat within the boundaries of proposed critical habitat.

(1) **Energy Development:** Energy development; including oil and gas extraction, mine reclamation, and associated infrastructure; is a major threat to Parachute beardtongue and DeBeque phacelia.[57] The soil conditions needed by the species are easily disturbed, as the soil surface structure is fragile. Blading of the top few inches of soil during well pad and access road construction, pipeline installation, and construction of associated facilities changes the soil structure, thereby threatening the species.[58] In addition, the operation of wells could potentially impact the species through dust generation, loss of pollinator habitat, spills of produced water or other drilling wastes, and unintentional trampling by employees and contractors.[59] Road traffic on unpaved access roads during both construction and operation of wells and facilities increases dust emissions, which can affect plant photosynthesis, affect gas and water exchange, clog plant pores, and increase leaf temperature, leading to decreased plant vigor and growth.[60] In addition, the construction of well pads, access roads, pipelines, and associated facilities may lead to habitat fragmentation, which can disrupt plant-pollinator interactions and predator-prey interactions, alter seed germination percentages, and result in low fruit set.[61]

(2) **Transportation Projects:** Transportation projects represent a threat to all three plant species. Due to its distribution within highway right-of-ways (ROWs), Pagosa skyrocket is threatened by transportation projects such as construction of new access roads or acceleration lanes and bike path installation or maintenance. Additionally, planting of exotic grasses along roadsides may prevent Pagosa skyrocket plants from growing.[62] Transportation projects on unpaved roads within the proposed critical habitat for Parachute beardtongue may threaten the plants and their habitat. Similarly, the majority of the roads located in the proposed critical habitat for DeBeque phacelia are unpaved. Road construction can cause blading of the top few inches of soil which may disturb, damage or remove seed banks.[63] Vehicles and their drivers can crush plants and disturb the shale slopes where the plants grow. And road maintenance prevents reclamation of the habitat.[64]

[57] Proposed Critical Habitat Rule (2011), 76 FR 85079.

[58] Final Listing Rule (2011), 76 FR 45071.

[59] Final Listing Rule (2011), 76 FR 45064.

[60] *Ibid.*

[61] Proposed Critical Habitat Rule (2011), 76 FR 45090.

[62] Final Listing Rule (2011), 76 FR 45059.

[63] Final Listing Rule (2011), 76 FR 45071.

[64] Final Listing Rule (2011), 76 FR 45065-45066.

(3) **Agriculture and Grazing:** Pagosa skyrocket does not tolerate intensive livestock grazing. Destruction of flowering Pagosa skyrocket plants, rosettes and seeds due to heavy livestock use is a significant threat.[65] Ungulate grazing is also listed as a threat to DeBeque phacelia and its seed bank.[66]

(4) **Recreation**. Recreation is listed as a threat to Pagosa skyrocket and DeBeque phacelia. Light recreation, including hunting, road running, horseback riding, dispersed camping, and firewood gathering threatens Pagosa skyrocket.[67] Off-road vehicle (ORV) recreation threatens DeBeque phacelia.[68] Roads constructed for use in energy development allow increased ORV access to the slopes that support DeBeque phacelia habitat on Bureau of Land Management (BLM) land. ORV tires can change the soil structure needed by both species through surface disturbance and can have a negative effect on seed banks, where seeds can remain dormant for at least five years.[69]

9. The Proposed Rule also identifies residential and commercial development as threats to Pagosa skyrocket and DeBeque phacelia. While development activities constitute a threat to the species, a Federal nexus triggering consultation for these activities is unlikely. The Service believes that few activities on non-Federal lands will have a Federal nexus; exceptions may include highway maintenance and construction, agricultural activities carried out under a Federal assistance programs, and low income housing projects.[70] In this analysis, we assume that residential development and agricultural activities on non-Federal lands will not have a Federal nexus because Federal grants for projects in the study area are unlikely, and Federal permits are not required (e.g., projects are unlikely to affect waters of the U.S., necessitating a permit from the U.S. Army Corps of Engineers). In addition, no Federal nexus is likely for recreation activities on non-Federal land. Therefore, this analysis focuses on impacts to activities on Federal lands, including energy development, grazing, and recreation; and impacts to transportation projects on Federal or non-Federal lands receiving Federal funding. These activities are addressed in Chapters 3 and 4 of this analysis.

10. The Proposed Rule also identifies the spread of nonnative vegetation as a threat to Pagosa skyrocket in Units 1 and 3, and DeBeque phacelia in all nine units. In general, conservation measures to address the threat of nonnative vegetation are included in consultations on activities such as oil and gas development. In this way the spread of nonnative vegetation is included in the economic analysis, but it will not be addressed as a separate activity.

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[65] Final Listing Rule (2011), 76 FR 45060.

[66] Proposed Critical Habitat Rule (2011), 76 FR 45096-45098.

[67] Proposed Critical Habitat Rule (2011), 76 FR 45094.

[68] Proposed Critical Habitat Rule (2011), 76 FR 45096-45098.

[69] Final Listing Rule (2011), 76 FR 45071.

[70] U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011.

1.3 ORGANIZATION OF THE REPORT

11. The remainder of this report is organized into four additional chapters and four appendices. Chapter 2 discusses the framework employed in the analysis, while Chapters 3 and 4 quantify the baseline protections currently afforded the plants and the incremental impacts resulting from the designation of critical habitat. Chapter 5 provides a brief discussion of potential benefits of the designation. We estimate the distributional impacts to small entities and the energy industry in Appendix A. A complete list of the remaining chapters and deliverables is provided below.

Chapter 2 – Framework for Analysis

Chapter 3 – Potential Economic Impacts to Energy Development

Chapter 4 – Potential Economic Impacts to Other Activities

Chapter 5 – Potential Economic Benefits

Appendix A – Small Business and Energy Impacts Analyses

Appendix B – Three Percent Discount Rate Exhibits

Appendix C – Undiscounted Impacts by Economic Activity

Appendix D – Information from the U.S. Fish and Wildlife Service Regarding Potential Changes in Conservation for Three Colorado Plants Following Designation of Critical Habitat

CHAPTER 2 | FRAMEWORK FOR THE ANALYSIS

12. The purpose of this analysis is to estimate the economic impact of actions taken to protect the three Colorado plants and their habitat. This analysis examines the impacts of restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the proposed critical habitat area. 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 Colorado plants; for example, under the Federal listing and other Federal, State, and local regulations. The "with critical habitat" scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts are those not expected to occur absent the designation of critical habitat for the Colorado plants. The analysis forecasts both baseline and incremental impacts likely to occur after the proposed critical habitat is finalized.

13. This information is intended to assist the Secretary of the DOI in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.[71] In addition, this information allows the Service to address the requirements of Executive Orders 12866 (as amended by Executive Order 13563) and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).[72]

14. This chapter describes the framework for this analysis. It first describes 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. We then define 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

15. This analysis examines the impacts of restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the proposed critical habitat area. The U.S. Office of Management and Budget's (OMB) has produced guidelines for

[71] 16 U.S.C. §1533(b)(2).

[72] 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 Pub Law No. 104-121.

conducting economic analysis of regulations. These guidelines direct Federal agencies to measure the costs of a regulatory action against a baseline, which it defines as the "best assessment of the way the world would look absent the proposed action."[73] In other words, the baseline includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat. Impacts that are incremental to that baseline (i.e., occurring over and above existing constraints) are attributable to the proposed regulation. Significant debate has occurred regarding whether assessing the impacts of the Service's proposed regulations using this baseline approach is appropriate in the context of critical habitat designations.

16. In 2001, the U.S. Tenth Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable co-extensively to other causes.[74] 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 [Endangered Species Act]."[75]

17. 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.[76] For example, in the March 2006 ruling that the August 2004 critical habitat rule for the Peirson's milk-

[73] OMB, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

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

[75] *Ibid.*

[76] In explanation of their differing conclusion, later decisions note that in *New Mexico Cattle Growers*, the U.S. Tenth Circuit Court of Appeals 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.

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 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 [Endangered Species Act] 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.'"[77]

18. More recently, in 2010, the U.S. Ninth Circuit Court of Appeals came to similar conclusions during its review of critical habitat designations for the Mexican spotted owl and 15 vernal pool species.[78] Plaintiffs in both cases requested review by the Supreme Court, which declined to hear the cases in 2011.

19. In order to address the divergent opinions of the courts and provide the most complete information to decision-makers, this economic analysis reports both:

    The baseline impacts of protections afforded the three Colorado plants absent critical habitat designation; and

    The estimated incremental impacts precipitated specifically by the designation of critical habitat for the species.

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

20. 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.[79] 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 function of the critical habitat unit in question. To assist us in evaluating these likely impacts, the Service developed a

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

[78] 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).

[79] *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004); *Sierra Club v. U. S. Fish and Wildlife Service*, 245 F.3d 434 (5th Cir. 2001).

memorandum characterizing the effects of critical habitat designation over and above those associated with the listing (see Appendix D). A detailed description of the methodology used to define baseline and incremental impacts is provided later in this chapter.

2.2 CATEGORIES OF POTENTIAL ECONOMIC EFFECTS OF SPECIES CONSERVATION

21. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the three Colorado plants and their habitat. 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 three Colorado plants conservation efforts.

22. This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of species conservation efforts unduly burden a particular group or economic sector. For example, while conservation efforts may have a 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

23. 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 three Colorado plants, 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.[80]

24. 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 will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost because the landowner or manager's time

[80] 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.

and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

25. 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 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

26. 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.[81] This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

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

27. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be affected by future species conservation efforts.[82] In addition, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation efforts on the energy industry and its customers.[83]

Regional Economic Effects

28. 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

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

[82] 5 U.S.C. §§601 *et seq*.

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

represent the relationship between a change in one sector of the economy (e.g., expenditures by recreators) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreators). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

29. 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.

30. Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

2.3 ANALYTIC FRAMEWORK AND SCOPE OF THE ANALYSIS

31. This analysis identifies those economic activities most likely to threaten the three Colorado plants and their habitat and, where possible, quantifies the economic impact to avoid or minimize such threats within the boundaries of the study area (the geographic boundaries of the study area are described later in this Chapter). This section provides a description of the methodology used to separately identify baseline impacts and incremental impacts stemming from the proposed designation of critical habitat for the three Colorado plants. This evaluation of impacts in a "with critical habitat designation" versus a "without critical habitat designation" framework effectively measures the net change in economic activity associated with the proposed rulemaking.

2.3.1 IDENTIFYING BASELINE IMPACTS

32. 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 Act, as well as under other Federal, State and local laws and guidelines. This "without critical habitat designation" 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.

33. 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. Enforcement actions taken in response to violations of the Act are not included in this analysis. This analysis does, however, estimate the costs of these baseline protections.

Section 7 of Act, absent critical habitat designation, requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species. Consultations under the jeopardy standard result in administrative costs, as well as impacts of conservation efforts resulting from consideration of this standard. Baseline administrative costs of section 7 consultation are summarized later in Exhibit 2-3.

Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[84] The economic impacts associated with this section manifest themselves in sections 7 and 10. While incidental take permits are not issued for plant species such as the three Colorado plants, the Service is obligated to ensure that proposed activities adequately minimize impacts to the species.

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.[85] The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately avoided or minimized. 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. While HCPs are not developed solely for plant species, if listed plants occur in the area subject to the HCP, the Service must consider whether the proposed activities may adversely affect or jeopardize the continued existence of the plant species. There are currently no HCPs that include the three Colorado plants as covered species.

34. 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 or State

[84] 16 U.S.C. 1532.

[85] U.S. Fish and Wildlife Service, "Habitat Conservation Plans Under the Endangered Species Act," April 2011, accessed at http://www.fws.gov/endangered/esa-library/pdf/hcp.pdf.

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

35. This analysis also 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.

36. When critical habitat is designated, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (in addition to considering whether the actions are likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations, and the additional impacts of implementing conservation efforts (i.e., reasonable and prudent alternatives) resulting from the protection of critical habitat are the direct compliance costs of designating critical habitat. These costs are not in the baseline and are considered incremental impacts of the rulemaking.

37. Incremental impacts may be the direct compliance costs associated with additional effort for consultations, reinitiated consultations, new consultations occurring specifically because of the designation, and additional conservation efforts that would not have been requested under the jeopardy standard. Additionally, incremental impacts may include indirect impacts resulting from reaction to the potential designation of critical habitat (e.g., implementing flycatcher 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 perceptional effects on markets.

38. Exhibits 2-1 and 2-2 depict the decision analysis regarding whether an impact should be considered incremental. To inform the economic analysis, the Service provided a memorandum describing its expected approach to conservation for the three Colorado plants following critical habitat designation (Appendix D). Specifically, the Service's memorandum provides information on how the Service intends to address projects that might lead to adverse modification of critical habitat as distinct from projects that may jeopardize the species. Whether an activity is likely to be subject to incremental impacts depends largely on two factors: (1) whether a Federal nexus exists compelling consultation under section 7 of the Act; and (2) proximity to known occurrences of the plants.

39. For other listed plant species, the Service has recommended that section 7 consultations be conducted at various distances from the actual footprint of a plant. In occupied units for the three Colorado plants, absent critical habitat designation, the Service would

recommend that consultation occurs within pollinator habitat (i.e., within 100 meters of known DeBeque phacelia occurrences and 1,000 meters of known Pagosa skyrocket and Parachute beardtongue occurrences).[86] Within these buffers the Service believes that an adverse modification finding would be concurrent with a jeopardy finding "because conservation of the species includes considerations of habitat, adverse modification and jeopardy analyses would be concurrent and impossible to separate."[87] Therefore, consultations on projects occurring within these specified buffers would result from the listing and all costs, except for a portion of the administrative costs associated with addressing the potential for the project to adversely modify critical habitat, would occur in the baseline scenario.

40. Project modifications requested during consultation differ depending on the distance from an occurrence of the plant. Specifically, for all three Colorado plants, the Service expects to request the most stringent measures within 100 meters of a plant occurrence. For Pagosa skyrocket and Parachute beardtongue moderate measures would be requested from 100 to 300 meters and measures to protect pollinators and habitat would be requested beyond 300 meters. Stringent measures include surveys, monitoring, temporary fencing, sedimentation control, limiting access routes to construction sites, dust abatement, noxious weed management, and re-vegetation. Moderate measures include those listed above with the exception of monitoring and the caveat that sedimentation control would only be asked for if the disturbance is located upslope. Measures to protect pollinators and habitat requested beyond 300 meters include noxious weed management and re-vegetation.[88]

41. In addition, for Parachute beardtongue, all impacts to oil and gas activities within the Mount Callahan and Mount Callahan Saddle Colorado Natural Areas are considered baseline. The privately-owned lands within these Natural Areas were designated specifically to allow the Colorado Natural Areas Program (CNAP) to assist the landowner in protecting Parachute beardtongue. Within these areas, best management practices related to oil and gas development have been designed to conserve the species and protect its habitat.[89] These management practices would occur absent critical habitat and thus are attributable to the baseline scenario.

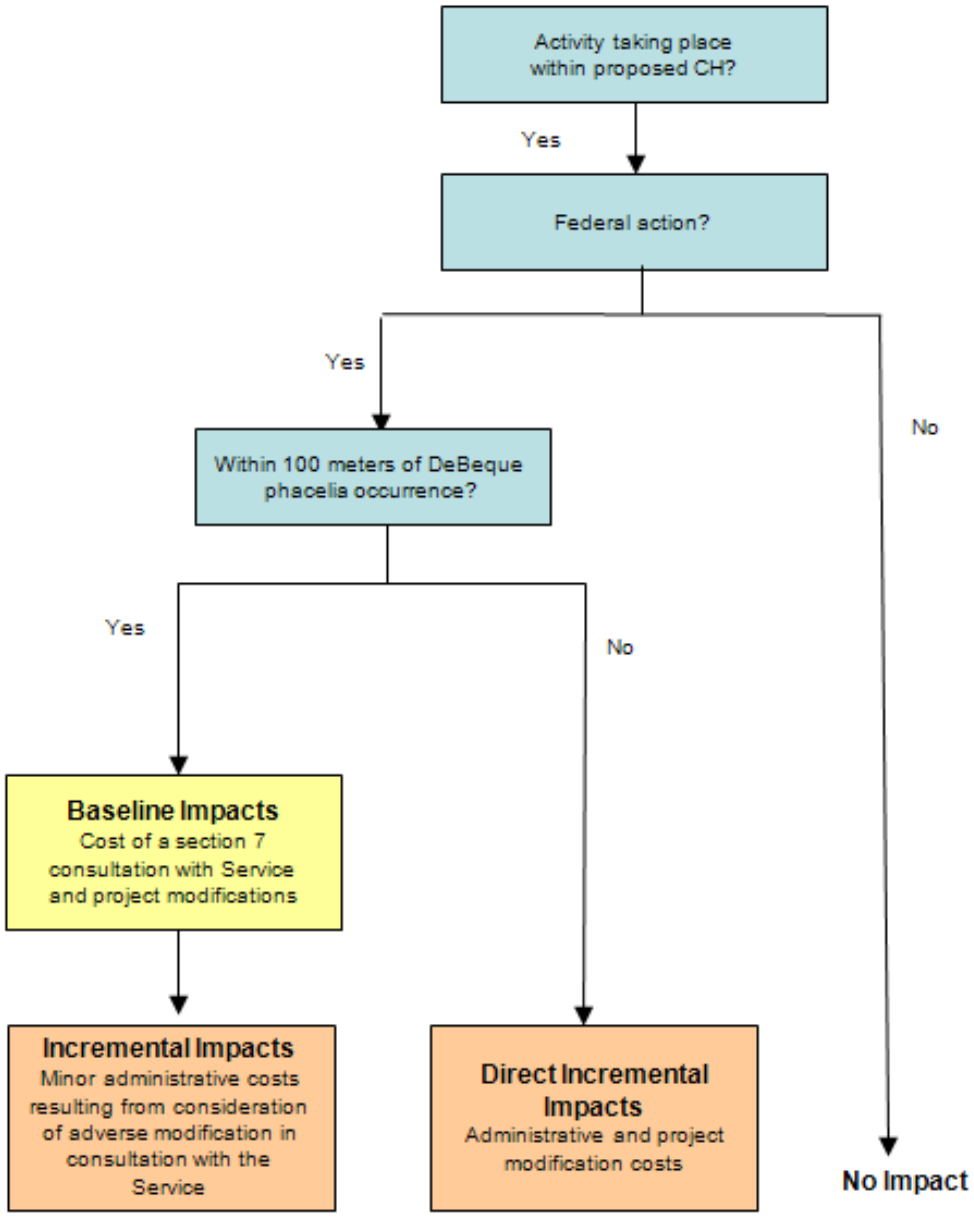
[86] U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011.

[87] *Ibid.*

[88] Email communication from U.S. Fish and Wildlife Service biologist, December 7, 2011.

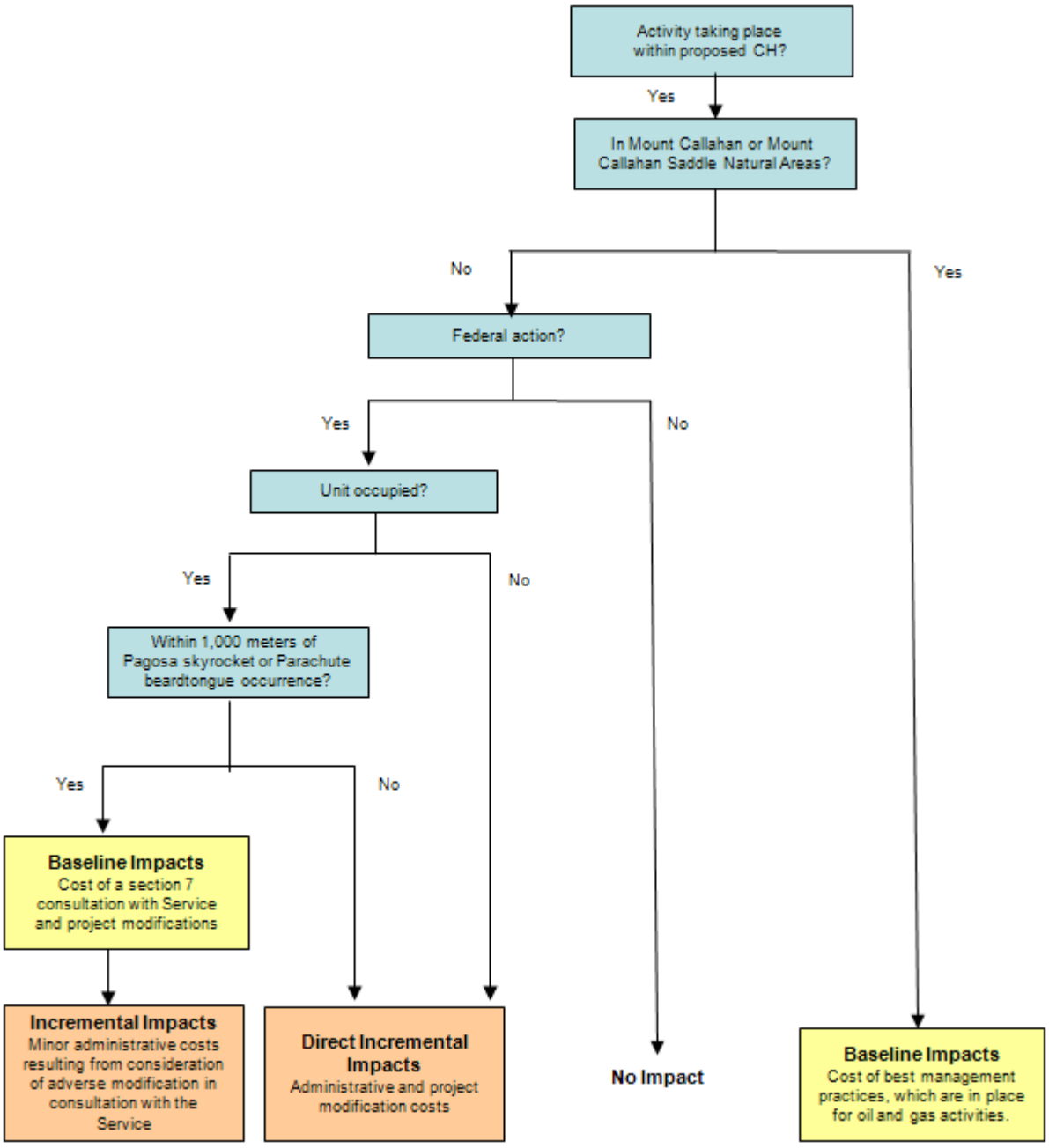
[89] Proposed Critical Habitat Rule (2011), 76 FR 45101.

EXHIBIT 2-1. STEPS TO IDENTIFY AND SEPARATE BASELINE AND INCREMENTAL IMPACTS FOR DEBEQUE PHACELIA



Source: U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011 (see Appendix A).

EXHIBIT 2-2. STEPS TO IDENTIFY AND SEPARATE BASELINE AND INCREMENTAL IMPACTS FOR PAGOSA SKYROCKET AND PARACHUTE BEARDTONGUE



Source: U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011 (see Appendix A).

Direct Impacts

42. 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.[61]

43. 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. In some cases, consultations will involve the Service and another Federal agency only, such as the U.S. Army Corps of Engineers. Often, they will also include a third party involved in projects with a permitted entity, such as the recipient of a Clean Water Act section 404 permit.

44. During a 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 proposed critical habitat. Communication between these parties may occur via written letters, e-mail, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, and the potential effects to the species and designated critical habitat associated with the proposed activity, the Federal agency, and whether there is a private applicant involved.

45. Section 7 consultations with the Service may be either informal or formal. *Informal consultation*s consist of discussions between the Service, the Action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat, and are designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a *formal consultation* is required if the Action agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in the Service's determination in its Biological Opinion of whether the action is likely to jeopardize a species or adversely modify critical habitat, and recommendations to minimize those impacts. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

Administrative Section 7 Consultation Costs

46. Parties involved in section 7 consultations include the Service, a Federal "action agency," and in some cases, a private entity involved in the project or land use activity. The action agency (i.e., the Federal action necessitating the consultation) serves as the liaison with the Service. While consultations are required for activities that involve a Federal action

[61] 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.

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 adversely modify critical habitat. Administrative efforts for consultation may therefore result in both baseline and incremental impacts.

47. In general, where critical habitat is designated concurrently with the listing of the species, two different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:

1. **Additional effort to address adverse modification in a new consultation -** New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the listing issues. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.
2. **Incremental consultation resulting entirely from critical habitat designation -** Critical habitat designation may trigger additional consultations that may not occur absent the designation (e.g., for an activity for which adverse modification may be an issue, while jeopardy is not, or consultations resulting from the new information about the location of species habitat provided by the designation). Such consultations may, for example, be triggered in critical habitat areas that are not occupied by the species. All associated administrative and project modification costs of these consultations are considered incremental impacts of the designation.

48. The administrative costs of these consultations vary depending on the specifics of the project. One way to address this variability is to show a range of possible costs of consultation, as it may not be possible to predict the 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 of consultation. For simplicity, the average of the range of costs in each category is applied in this analysis (see Exhibit 2-3).

Section 7 Conservation Effort Impacts

49. 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, 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 (incremental consultations), impacts of all associated conservation efforts are assumed to be incremental impacts of the designation.

Identifying Direct Incremental Impacts for the Three Colorado Plants

50. In the case of the three Colorado plants, the types of conservation efforts requested by the Service are not expected to change due to critical habitat designation. The Service anticipates that during consultation "although independent analyses are made for jeopardy and adverse modification, most measures necessary to avoid adverse modification of critical habitat would avoid jeopardy as well."[62] As a result, critical habitat designation will not change the types of conservation efforts recommended by the Service.

51. In some geographic areas, however, potential adverse modification from land use threats may be an issue where jeopardy is not. Critical habitat is therefore expected to broaden the scope of projects to which the conservation efforts are applied. Specifically, the designation of critical habitat will require projects within the following two areas to apply plant conservation efforts, where they otherwise would not have been requested:

- In unoccupied critical habitat units for Pagosa Skyrocket and Parachute beardtongue; and
- In occupied critical habitat units where the project footprint is located more than 100 meters from known DeBeque phacelia occurrences and 1,000 meters from known Pagosa skyrocket and Parachute beardtongue occurrences.

These situations are discussed in greater detail below.

52. All impacts to projects with a Federal nexus in Pagosa skyrocket and Parachute beardtongue unoccupied units are considered to result from the designation. The Service states that within these units "section 7 consultation would not otherwise have been necessary, unless surveys found plants that were previously unknown."[63] Therefore, the consultation and all associated conservation effort would be considered incremental impacts of the critical habitat designation.

53. As discussed above, projects occurring within 100 meters of known DeBeque phacelia occurrences and 1,000 meters of known Pagosa skyrocket and Parachute beardtongue occurrences would result from the listing and all costs are considered baseline. Projects that occur outside of the specified buffers would not consult absent critical habitat designation and therefore all costs associated with the consultation would be considered incremental impacts.

[62] U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011

[63] U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011.

EXHIBIT 2-3. RANGE OF ADMINISTRATIVE CONSULTATIONS COSTS (2011 DOLLARS)

BASELINE ADMINISTRATIVE COSTS OF CONSULTATION					
CONSULTATION TYPE	**SERVICE**	**FEDERAL AGENCY**	**THIRD PARTY**	**BIOLOGICAL ASSESSMENT**	**TOTAL COSTS**
CONSULTATION CONSIDERING JEOPARDY (DOES NOT INCLUDE CONSIDERATION OF ADVERSE MODIFICATION)					
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
INCREMENTAL ADMINISTRATIVE COSTS OF CONSULTATION					
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
ADDITIONAL EFFORT TO ADDRESS ADVERSE MODIFICATION IN A NEW CONSULTATION (ADDITIVE WITH BASELINE COSTS, SHOWN ABOVE, OF CONSIDERING JEOPARDY)					
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.

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.

Indirect Impacts

54. The designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal action 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:

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, such as the California Environmental Quality Act (CEQA). In cases where these impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation. There are no State or local laws in Colorado which would be triggered by the critical habitat designation for the three Colorado plants.

Time Delays. Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the need to reinitiate the section 7 consultation process and/or compliance with other laws triggered by the designation. To the extent that delays result from the designation, they are considered indirect, incremental impacts of the designation.

Regulatory Uncertainty or Stigma - Government agencies and affiliated private parties who consult with the Service under section 7 may face uncertainty concerning whether reasonable and prudent alternatives 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.

2.3.3 BENEFITS

55. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.[64] OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*.

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

Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.[65]

56. 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.[66] *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.*

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

2.3.4 GEOGRAPHIC SCOPE OF THE ANALYSIS

58. Economic impacts of three Colorado plants conservation are considered across the entire area proposed critical habitat designation, as defined in Chapter 1. Results are presented by proposed critical habitat unit.

2.3.5 ANALYTIC TIME FRAME

59. Ideally, the time frame of this analysis would be based on the expected time period over which the critical habitat regulation is 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). Recent guidance from OMB indicates that "if a regulation has no predetermined sunset provision, the agency will need to choose the endpoint of its analysis on the basis of a judgment about the foreseeable future."[67] The "foreseeable future" 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

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

[66] *Ibid.*

[67] The 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.

affected projects and will look out over a 20-year time horizon for most activities. OMB supports this time frame stating that "for most agencies, a standard time period of analysis is ten to 20 years, and rarely exceeds 50 years."[68] Based on available data, this analysis considers economic impacts to activities from 2012 (expected year of final critical habitat designation) though 2031.

2.4 INFORMATION SOURCES

60. 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 the Service's section 7 consultation records, as well as data on baseline land use obtained from State and county planning authorities. A complete list of references is provided at the end of this document.

[68] *Ibid.*

CALCULATING PRESENT VALUE AND ANNUALIZED IMPACTS

This analysis compares economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of economic impacts of past or future costs to present value terms requires the following: a) past or projected future costs of critical habitat designation; and b) the specific years in which these impacts have been or are expected to be incurred. With these data, the present value of the past or future stream of impacts (PV_c) from year t to T is measured in 2012 dollars according to the following standard formula:

$$PV_c = \sum_{t}^{T} \frac{C_t}{(1+r)^{t-2012}}$$

C_t = cost of Colorado plant critical habitat conservation efforts in year t

r = discount rate[a]

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

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

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

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

CHAPTER 3 | POTENTIAL ECONOMIC IMPACTS TO OIL AND GAS ACTIVITIES

3.1 INTRODUCTION

61. The Proposed Rule identifies oil and gas activities as a threat to the three Colorado plants' critical habitat in all four units for the Parachute beardtongue and all nine units for the DeBeque phacelia.[69] Oil and gas development includes a variety of activities within the proposed critical habitat that may affect the three Colorado plants. These activities include well pad and road construction and use, pipeline installation, and construction of associated facilities. Oil and gas extraction from Federal lands requires a permit with the Federal agency who owns the land or the underlying mineral rights. Because critical habitat will be designated concurrently with the listing of these species, no section 7 consultations related to the listing have occurred previously.

62. This chapter describes potential future economic impacts to oil and gas activities resulting from conservation efforts for the three Colorado plants and their habitat in the study area. The remainder of the chapter is divided into four parts, including:

- A summary of our findings;
- Background information on the oil and gas industry in Colorado and threats posed by the industry to the species and their habitat;
- Estimates of potential future impacts on the oil and gas industry associated with conservation of the three Colorado plants and their habitat. This portion of the analysis assigns future costs to either the baseline or the critical habitat designation itself (incremental impacts of the rule); and
- Key sources of uncertainty.

3.2 SUMMARY OF IMPACTS TO OIL AND GAS ACTIVITIES IN PROPOSED CRITICAL HABITAT

63. Significant uncertainty surrounds the estimates of future impacts to the oil and gas industry in this analysis. The primary source of uncertainty is the number and location of future drilling sites and pipeline installation expected to occur within the proposed critical habitat. Contributing factors to this uncertainty include:

- **Changes in the rate of oil and gas well development activities.** The specific location of future exploration and drilling will be closely tied to the geology of the area, the state of the economy, and political decisions. Various land managers

[69] Proposed critical habitat (2011), 76 FR 45078-45128.

indicate that it is difficult to predict the level of future oil and gas activity.[70,71,72,73,74,75]

- **Unknown level of oil shale mining and exploration.** While old oil shale mines exist within Parachute beardtongue habitat, oil shale mining is not imminently economically feasible in the region.[76,77] The likelihood and level of oil shale exploration and mining in the future are uncertain. BBC Research & Consulting (BBC) predicts that if feasible, oil shale mining will not occur until at least 2018.[78]
- **The inherent unpredictability of oil and gas markets and economic conditions.** Rates of future drilling are likely to be generally tied to the price of oil, and will be influenced by other economic conditions. However, the future price of oil and global economic conditions are unknown.

64. This analysis employs two methods to determine the number and location of future drilling activity on federally-owned lands:

(1) **BBC Data (Low Estimate).** Our low estimate relies on projections of future drilling activity provided by a private consulting firm located in Denver, Colorado, called BBC Research and Consulting. In a 2008 report prepared for the Associated Governments of Northwest Colorado, BBC provides annual projections of wells drilled, by county, from 2005 through 2035.[79,80] Following this method, the analysis estimates that 90 wells will be drilled on federally-managed lands without a no surface occupancy (NSO) stipulation in the study area over the next 20 years. Using an estimate of 20 wells per multi-well pad, the assumption that will yield the lowest costs for this low estimate scenario, will yield 4.52 well pads projected to be constructed over the time period of this analysis.

(2) **COGCC Data (High Estimate).** The second method uses data on past drilling activity from the Colorado Oil and Gas Conservation Commission (COGCC) to

[70] Personal communication with Anna Lincoln at the Bureau of Land Management Grand Junction Field Office on October 26, 2011.

[71] Personal communication with Colin Ewing at the Bureau of Land Management Grand Junction Field Office on October 27, 2011.

[72] Personal communication with David Francomb at the White River National Forest on October 26, 2011.

[73] Personal communication with Barry Johnston at the Grand Mesa Uncompahgre National Forest on October 12, 2011.

[74] Personal communication with Sara Brinton at the U.S. Forest Service Pagosa Ranger District on October 19, 2011.

[75] Personal communication with Carla DeYoung at the Bureau of Land Management on October 12, 2011.

[76] Personal communication with Anna Lincoln at the Bureau of Land Management Grand Junction Field Office on October 26, 2011.

[77] Personal communication with the U.S. Fish and Wildlife Service, Three Colorado Plants Kick-off Call on August 24, 2011.

[78] BBC Research & Consulting. April 4, 2008. *Northwest Colorado Socioeconomic Analysis and Forecasts*. Prepared for the Associated Governments of Northwest Colorado.

[79] BBC Research & Consulting. April 4, 2008. *Northwest Colorado Socioeconomic Analysis and Forecasts*. Prepared for the Associated Governments of Northwest Colorado.

[80] Personal communication with Doug Jeavons, BBC Research and Consulting. Data received via email on November 7, 2011.

forecast future rates and locations of wells.[81] Using these data, the analysis estimates that 203 wells will be drilled within federally-managed lands without an NSO stipulation in the study area over the next 20 years. Using an estimate of two wells per multi-well pad, the assumption that will yield the highest costs for this high estimate scenario, will yield 102 well pads projected to be constructed over the timeframe of our analysis.

The analysis recognizes that the number of actual wells drilled, and the density of wells per well pad, could vary greatly due to changing economic conditions and technology innovations. The sources of uncertainty in our estimates are described in more detail in Section 3.5.

65. We apply these two methods to federally-managed areas of proposed critical habitat for the Parachute beardtongue and DeBeque phacelia. Within the two Colorado natural areas, Mount Callahan and Mount Callahan Saddle, we use data provided by the OXY, which has plans to drill in these areas. OXY predicts that it will develop three multi-well pads within these areas pursuant to existing agreements with the State of Colorado.[82]

66. The Service has stated that it will most likely recommend: (1) less land use within critical habitat; (2) redesign of projects to avoid particularly important areas to the species; (3) integration of "best management practices" to protect habitat; and (4) provision of conservation measures to improve and protect habitat within the unit.[83] Specific conservation efforts for extraction activities may include:

- Surveys;
- Monitoring;
- Fencing;
- Sedimentation control;
- Limiting access routes;
- Dust abatement;
- Noxious weed management;
- Re-vegetation; and
- Nonnative weed control.[84]

67. We estimate that additional costs will be incurred associated with each future well drilled within the proposed critical habitat to accommodate concerns for the three Colorado plants and their habitat. Following the methodology outlined in Chapter 2, we assume that impacts associated with projects within 100 meters of known DeBeque phacelia occurrences and 1,000 meters of known Parachute beardtongue occurrence are considered

[81] Colorado Oil and Gas Conservation Commission (COGCC). Colorado Well Starts Since 1988. Data received via email from Tom Kerr, November 4, 2011.

[82] Personal communication with Chris Clark, OXY USA WTP LP, December 22, 2011.

[83] U.S. Fish and Wildlife Service. "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011.

[84] Personal communication with Gina Glenne at the U.S. Fish and Wildlife Service, December 12, 2011.

likely to occur regardless of critical habitat designation (i.e., in the baseline), while costs associated with projects outside of these buffers or within unoccupied units are assumed to result solely from the designation.

68. Typical unit costs of the above conservation efforts were provided by OXY. It is important to note that OXY's experience is related to costs associated with conservation efforts for the Parachute beardtongue. Costs associated with conservation efforts for DeBeque phacelia may differ from those for Parachute beardtongue due to differences in their habitat. While Parachute beardtongue is found on unstable shale soils along windy shale ridges, DeBeque phacelia is found along low, rolling hills that are not as windy.[85] Costs associated with conservation measures for DeBeque phacelia may be less than those for Parachute beardtongue because the plant is found in areas generally more hospitable to oil and gas drilling.

69. Importantly, we do not forecast impacts to oil and gas activity where both the surface and the mineral rights are privately-owned. If neither the surface nor the minerals are federally-owned then no Federal agency will be involved in the permitting of oil and gas activities and thus a Federal nexus compelling section 7 consultation with the Service does not exist. Furthermore, because the Act does not prohibit the "take" of plants, entities with projects on private lands are unlikely to develop an HCP.[86]

70. Under the baseline scenario, total costs associated with potential future drilling efforts in the areas proposed for designation are estimated to range from $375,000 to $6.34 million ($33,100 to $559,000 on an annualized basis), assuming a seven percent discount rate. Incremental impacts of critical habitat designation in areas proposed for designation are estimated to range from $868,000 to $14,700,000 million ($76,600 to $1,290,000 on an annualized basis), assuming a seven percent discount rate. The majority of these costs are expected to be borne by oil and gas lessees, but may be passed on to mineral owners through reduced lease, royalty, or bonus payments. In areas considered for exclusion, baseline costs are estimated to be $2.24 million ($198,000 on an annualized basis), assuming a seven percent discount rate; we do not anticipate incremental impacts in these areas.

[85] Personal communication with U.S. Fish and Wildlife Service biologist, February 21, 2012.

[86] An HCP is developed in pursuit of an incidental take permit, issued under section 10 of the Act.

EXHIBIT 3-1. ESTIMATED IMPACTS TO OIL AND GAS ACTIVITIES (2012-2031, 2012 DOLLARS, ASSUMING A SEVEN PERCENT DISCOUNT RATE)

	BASELINE IMPACTS		INCREMENTAL IMPACTS	
	BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)	BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)
Present Value	$375,000	$6,340,000	$868,000	$14,700,000
Annualized	$33,100	$559,000	$76,600	$1,290,000
WITHIN AREA CONSIDERED FOR EXCLUSION				
Present Value		$2,240,000		$0
Annualized		$198,000		$0

3.3 BACKGROUND

71. According to Service documents, threats posed by oil and gas development to the three plants' critical habitat may include:

- Changes in soil structure;
- Dust generation;
- Loss of pollinator habitat;
- Habitat fragmentation;
- Spills of produced water or other drilling wastes; and
- Unintentional trampling by employees and contractors.[87]

3.3.1 INDUSTRY CONCERN

72. The oil and gas industry has expressed concern that critical habitat designation for the Parachute beardtongue and DeBeque phacelia could lead to reduced oil and gas production. A letter from the Western Energy Alliance, which comprises 400 companies, indicates that the group expects time delays and restrictions on oil and gas development and other activities in the Piceance Basin.[88] In addition, multiple oil and gas companies submitted public comments on the Draft Economic Analysis (DEA) expressing concern that the proposed critical habitat will create further delays in resource extraction and, when combined with the current restrictions placed on oil and gas development on Federal lands, may potentially prohibit oil and gas development within certain portions of the proposed critical habitat that overlap existing and prospective oil and gas fields. The concerns raised by specific oil and gas companies are discussed below.

[87] Proposed Critical Habitat Rule (2011), 76 FR 45078-45128.

[88] Kimball, Spencer. Public comment, September 26, 2011. Western Energy Alliance, Denver, CO.

OXY

73. OXY owns approximately 3,810 acres of land in proposed Unit 3 and holds oil and gas leases on 382 acres of land within proposed Unit 4 for Parachute beardtongue. The company has entered into two agreements with the CNAP designating 680 acres of OXY-owned land in proposed Unit 3 as natural areas.[89] OXY has expressed concern that that development of their mineral rights may be unnecessarily delayed and complicated by the designation of critical habitat, which could lead to reduced domestic energy production in the Cascade Creek Area and reduced revenues for OXY.[90] The company has plans to develop 15 future multi-well pads in Unit 3, three of which will be located in the current Natural Areas, and at least one future pad in Unit 4. It estimates that if the Service restricts oil and gas development within the proposed critical habitat such that the development of hydrocarbon resources within these areas becomes uneconomical, OXY would be unable to recover hydrocarbon resources worth over $2 billion in Unit 3 and $200 million in Unit 4.[91]

Black Hills Exploration and Production

74. Black Hills Exploration and Production indicated that the designation of critical habitat makes it more difficult to carry out activities within the proposed critical habitat area, partially due to the expenses of surveys and documents required by the Service under section 7. The company notes that in order to completely move projects out of the proposed critical habitat area would mean conducting explorations, which would be an extraordinary expense compared to using already discovered resources.[92]

75. Black Hills' comment on the DEA notes that overlapping seasonal restrictions make certain oil and gas activities, such as drilling and seismic exploration, nearly impossible on certain lands leased by BLM for most of the year. The company is concerned that further restrictions placed on oil and gas development due to the critical habitat designation for the three Colorado plants will result in lost drilling locations and potentially lost oil and gas reserves.[93] Black Hills estimates that if oil and gas extraction is prohibited on Federal lands within the proposed critical habitat for DeBeque phacelia impacts to the company could be 13 to 26 times as great as the high-end impacts presented in this economic analysis.[94,95]

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[89] Personal communication with Chris Clark, OXY USA WTP LP, December 22, 2011.

[90] Bievers, Jennifer. Public comment. September 26, 2011. OXY USA WTP LP and its affiliates, Denver, CO.

[91] Personal communication with Chris Clark, OXY USA WTP LP, December 22, 2011.

[92] Personal Communication with Jessica Donahue, Black Hills Exploration Production. November 2, 2011.

[93] Public Comment submitted by Beatty and Wozniak, P.C. on behalf of Black Hills Exploration and Production, Inc., "Notice of Revised Proposal of Critical Habitat, 77 Fed. Reg. 18,157 (March 27, 2012), Proposed Designation of Critical Habitat for the Phacelia Submutica (DeBeque Phacelia)," April 26, 2012.

[94] *Ibid.*

[95] Estimates provided by Black Hills represent the total economic value of the company's planned future drilling activity within the proposed critical habitat for DeBeque phacelia. The location of the planned well pads was not provided and therefore it is unclear whether these impacts would be considered baseline or incremental of the critical habitat

Bill Barrett Corporation

76. In their public comment on the DEA, Bill Barrett Corporation expresses concerns similar to those of Black Hills. In particular, the company believes that, when combined with current restrictions on oil and gas development on Federal lands, the designation of critical habitat for Parachute beardtongue may result in significant lost oil and gas production. In addition, Bill Barrett Corporation believes that the methods used in this analysis to forecast the level of future oil and gas development are flawed and the resulting estimates of the number of wells drilled is too low.[96] This analysis relies on the best publically available data on future oil and gas development. If more wells are likely to be drilled over the next 20 years, then the impacts presented in this analysis are understated.

77. Bill Barrett Corporation estimates that impacts associated with conservation measures requested during section 7 consultation on wells either within or accessed through proposed Unit 4 for Parachute beardtongue would be 27 times greater than the high-end impacts presented for Unit 4 in this analysis.[97] In addition, if wells within or accessed through Unit 4 cannot be drilled, Bill Barrett Corporation estimates that lost royalty and tax revenue for Federal, State, and local governments would be upwards of three orders of magnitude larger than the high-end impacts for Unit 4 presented in this analysis.[98,99]

78. In response to these concerns, the Service states that it is more likely to recommend a series of project modifications that will allow for work within critical habitat, rather than complete avoidance of critical habitat.[100] For example, within the Mount Callahan and Mount Callahan Saddle Natural Areas, oil and gas development activities are currently allowed and conducted following Best Management Practices (BMPs) and Conservation Measures developed by OXY and the State of Colorado despite the presence of Parachute beardtongue populations. As described later in this chapter, many of these BMPs and Conservation Measures mirror those that the Service states it will request in critical

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designation. In addition, it appears that these values to not account for costs associated with extraction of these resources and therefore overstate the actual economic impact associated with these lost resources.

[96] Public Comment submitted by Beatty and Wozniak, P.C. on behalf of Bill Barrett Corporation, "Notice of Revised Proposal of Critical Habitat, 77 Fed. Reg. 18,157 (March 27, 2012), Proposed Designation of Critical Habitat for the Phacelia Submutica (DeBeque Phacelia)," April 26, 2012.

[97] Bill Barrett Corporation's analysis does not differentiate between baseline and incremental impacts and appears to assume that all future well pads are constructed in 2012. An analysis assuming an equal likelihood that well pads will be constructed over the 20-year time period of this analysis and applying a seven percent discount rate results in present value baseline costs in Unit 4 for Parachute beardtongue 22 times greater than the high-end costs presented in this analysis and incremental costs eight times greater.

[98] Public Comment submitted by Beatty and Wozniak, P.C. on behalf of Bill Barrett Corporation, "Notice of Revised Proposal of Critical Habitat, 77 Fed. Reg. 18,157 (March 27, 2012), Proposed Designation of Critical Habitat for the Phacelia Submutica (DeBeque Phacelia)," April 26, 2012.

[99] Bill Barrett Corporation does not differentiate between baseline and incremental impacts.

[100] U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011.

habitat areas. We therefore do not anticipate that drilling will be precluded due to the designation of critical habitat.

3.3.2 LAND MANAGERS

79. Federal land managers within proposed critical habitat for the three Colorado plants currently manage for the species in various ways. Future oil and gas activities on federally-managed land will have a Federal nexus and therefore land managers will need to consult with the Service prior to issuing permits for mineral extraction activities. Below we describe the expected activities and impacts within the federally-managed lands in the proposed critical habitat and the two natural areas that are being considered for exclusion.

Bureau of Land Management (BLM) Grand Junction Field Office

80. BLM's Grand Junction Field Office manages proposed Unit 1, Unit 2, and 20 percent of Federal lands in Unit 3 for Parachute beardtongue. For DeBeque phacelia, the Grand Junction Field Office manages proposed Unit 1, 89 percent of Unit 2, three percent of Unit 3, 76 percent of Unit 4, 88 percent of Unit 5, 86 percent of Unit 6, 66 percent of Unit 7 and 34 percent of Unit 8. Oil and gas resources are currently managed through the Field Office's 1987 RMP. The Field Office is in the process of revising its RMP, and draft RMP is expected to be released in the fall of 2012.[101] The 1987 RMP designates areas as either open to leasing without stipulations, open to leasing with stipulations, or close to leasing. In total 653,868 acres are open to leasing without stipulations, 667,733 acres are open to leasing with stipulations (including 132,078 acres with an NSO stipulation), and 117,790 acres are closed to leasing.[102] The proposed critical habitat units for Parachute beardtongue and DeBeque phacelia located on BLM lands managed by the Grand Junction Field Office include areas covered by NSO stipulation as outlined in the 1987 RMP. Lands covered by NSO stipulations cannot contain roads, buildings, well pads, or pipelines. Therefore, these lands will not contain oil and gas development that poses a threat to the plants, and we do not include these areas in our oil and gas development projections.

Parachute beardtongue

81. The Grand Junction Field Office believes that occurrences of Parachute beardtongue are unlikely to be directly impacted by oil and gas activities as the plants grow on very steep, shaley slopes.[103] Oil shale mining is the most prominent threat; however, there has only been one instance of oil shale mining activity within the proposed critical habitat for the Parachute beardtongue managed by the Grand Junction Field Office. Additionally, most of the oil shale mining is located north of the proposed critical habitat. The Grand

[101] U.S. Bureau of Land Management, Grand Junction Field Office, Resource Management Planning, accessed by http://www.blm.gov/co/st/en/fo/gjfo/rmp.html on February 17, 2012.

[102] U.S. Bureau of Land Management, Grand Junction Field Office, January 1987, Resource Management Plan and Record of Decision, accessed by http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp/archived/grand_junction.html on February 22, 2012.

[103] Personal communication with Anna Lincoln. BLM Grand Junction Field Office. October 26, 2011.

Junction Field Office notes that although oil shale mining represents a threat to the species, mining activity is difficult to predict and is generally not considered an imminent threat within the proposed critical habitat. [104]

DeBeque phacelia

82. Similar to the Parachute beardtongue, the Grand Junction Field Office believes that while future drilling activity is likely within DeBeque phacelia proposed critical habitat, projects are unlikely to directly impact the plants due to their preference to grow on steep slopes where it is very difficult to construct drilling pads.[105] In the past, the Grand Junction Field Office has asked oil and gas lease holders to conduct surveys, restrict project and survey timing, and place wells with special attention to currently and historically occupied areas in order to avoid impact to the DeBeque phacelia.[106] BLM believes that the costs of moving projects to avoid the plants are generally small because the plants occur in small pockets, usually on steep slopes where it is difficult to develop.[107]

Bureau of Land Management (BLM) Colorado River Valley Field Office

83. The BLM Colorado River Valley Field Office manages 80 percent of Federal lands in Unit 3 and 70 percent of Unit 4 for the Parachute beardtongue. Oil and gas resources are currently managed through the Field Office's revised 1988 RMP, which is currently in the process of being revised, and the 2006 Roan Plateau RMP Amendment. In September 2011, the Field Office published a draft revised RMP which is meant to replace the 1988 revised RMP. The 1988 revised RMP designates lands as either open or closed to oil and gas leasing. Areas open to oil and gas leasing are either open or closed to oil and gas surface occupancy.[108] The preferred alternative included in the 2011 draft revised RMP designates 55,600 acres as closed to fluid minerals leasing and 651,400 acres as open to fluid minerals leasing. Of the acres open to fluid minerals leasing, 134,300 acres are open with a NSO stipulation.[109]

84. The 2006 Roan Plateau RMP Amendment covers oil and gas development on Federal lands within a 73,602-acre planning area. More than half of the planning area (38,470 acres) is designated with an NSO stipulation meant to protect steep slopes, fish and wildlife habitat, reviews from I-70 and surrounding towns, and rare plants. In addition,

[104] Personal communication with Anna Lincoln. BLM Grand Junction Field Office. October 26, 2011.

[105] Personal communication with Colin Ewing. BLM Grand Junction Field Office. October 27, 2011.

[106] Personal communication with Anna Lincoln. BLM Grand Junction Field Office. October 26, 2011.

[107] Personal communication with Colin Ewing. BLM Grand Junction Field Office. October 27, 2011.

[108] U.S. Bureau of Land Management, Colorado River Valley Field Office, 1988, Record of Decision and Resource Management Plan, accessed by http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp/archived/ glenwood_springs.html on February 22, 2012.

[109] U.S. Bureau of Land Management, Colorado River Valley Draft Resource Management Plan Revision, accessed by http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp/kfo-gsfo/crv.html on February 17, 2012.

30,833 acres of the planning area is covered by Controlled Surface Use stipulations, which allow BLM to determine where and when a disturbance can occur.[110]

85. The proposed critical habitat units for Parachute beardtongue located on BLM lands managed by the Colorado River Valley Field Office include areas covered by NSO stipulations as outlined in the revised 1988 RMP and 2006 Roan Plateau RMP. These lands will not contain oil and gas development that poses a threat to the plant and therefore we do not include these areas in our oil and gas development projections

86. The Field Office is aware of one population of Parachute beardtongue located in an area that is leased for oil and gas development without an NSO stipulation. The Colorado Field Office believes future pipeline construction is likely in the areas it manages. The Field Office does not know where the future pipelines will be located, but generally tries to keep them adjacent to existing roads.[111]

White River National Forest

87. The U.S. Forest Service (USFS) manages 29 percent of Unit 8 for the DeBeque phacelia. The 2002 Land and Resource Management Plan included monitoring of the DeBeque phacelia every five years due to concern related to the species.[112] Since the DeBeque phacelia was listed as a sensitive species, its habitat has been within a research natural area. In theory, oil and gas development is restricted in research natural areas; however, some land within the natural area for DeBeque phacelia has been leased for oil and gas development. If these leases are not developed within ten years they will expire, but if drilling occurs then the lease will exist in perpetuity.[113] In their current leases, the White River National Forest generally includes a stipulation that projects can be moved up to 600 feet to avoid sensitive species, but this may not be enough to avoid all impacts to the proposed critical habitat.

88. Oil and Gas leasing activity within the White River National Forest is currently guided by the 1993 Oil and Gas Leasing Environmental Impact Statement (EIS). The 1993 EIS designates lands with known oil and gas potential as either available or unavailable for oil and gas leasing. Areas available for oil and gas leasing are subject to supplemental lease stipulations, including NSO stipulations which apply to 409,240 acres within the National Forest.[114] Per the 1993 EIS, oil and gas leases within the proposed critical habitat for the

[110] U.S. Bureau of Land Management, Colorado State Office, March 13, 2008, BLM News Release: BLM's Roan Plateau Plan Moves Forward, accessed by http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp/roan_plateau.html on May 23, 2012.

[111] Personal communication with Carla DeYoung, BLM Colorado River Valley Field Office. October 12, 2011.

[112] USDA Forest Service, Rocky Mountain Region. 2002. Land and Resource Management Plan – 2002 Revision.

[113] Personal communication with John Proctor, White River National Forest. October 25, 2011.

[114] U.S. Forest Service, White River National Forest, December 1993, Oil and Gas Leasing Final Environmental Impact Statement Record of Decision, accessed by http://www.fs.usda.gov/detail/whiteriver/home/?cid=STELPRDB5183245 on February 22, 2012.

DeBeque phacelia must include an NSO stipulation.[115] Therefore, we do not expect any future oil and gas development that will harm the plant within the areas managed by the White River National Forest, and do not include these areas in our oil and gas development projections. It should be noted that the USFS is in the process of revising this EIS. The USFS believes that the revised EIS will continue to include NSO stipulations for all leases within areas proposed for critical habitat designation.[116]

Grand Mesa Uncompahgre National Forest

89. USFS manages 23 percent of Unit 8 for DeBeque phacelia within the Grand Mesa Uncompahgre National Forest. Currently only inactive oil and gas leases exist within proposed critical habitat.[117] The 1993 Grand Mesa Uncompahgre and Gunnison National Forests Oil and Gas Leasing EIS indicates that oil and gas leases within "sensitive areas," including the proposed critical habitat area for DeBeque phacelia, must include an NSO stipulation.[118] Therefore, we do not expect any future oil and gas development that will harm the plant within the areas managed by Grand Mesa Uncompahgre National Forest, and do not include these areas in our oil and gas development projections.

O'Neal Hill Special Botanical Area

90. The O'Neal Hill Special Botanical Area, which is managed by the Pagosa Ranger District of the USFS, encompasses 50 percent of Unit 2 for the Pagosa skyrocket. No oil and gas development currently exists within the Pagosa skyrocket habitat and USFS staff believes that the area is unsuitable for development.[119] Because oil and development is not precluded in this area, we have nonetheless included this area as potentially developable this analysis.

Mount Callahan and Mount Callahan Saddle Natural Areas

91. The Mount Callahan and Mount Callahan Saddle Natural Areas, which are being considered for exclusion, are managed by OXY and make up eight percent of Unit 3 of the Parachute beardtongue proposed critical habitat. "OXY presently conducts oil and gas development within the Natural Areas pursuant to the provisions of a 2008 CNAP agreement that includes the use of best management practices and conservation measures protecting [Parachute beardtongue] populations, while permitting continued development subject to the restrictions set forth in the CNAP agreement."[120] OXY's future plans

[115] U.S. Forest Service, White River National Forest, December 1993, Stipulations on Available Land for Oil and Gas Leasing, Final EIS, West Half, Appendix E, accessed by http://www.fs.usda.gov/detail/whiteriver/home/?cid=STELPRDB5183245 on February 22, 2012.

[116] Personal communication with John Proctor, White River National Forest. October 25, 2011.

[117] Personal communication with Barry Johnston, Grand Mesa, Uncompahgre National Forest. October 12 and 21, 2011.

[118] U.S. Forest Service, Grand Mesa, Uncompahgre, and Gunnison National Forest, April 1993, Oil and Gas Leasing Stipulation Map Final, West Half, accessed by http://www.fs.usda.gov/detail/gmug/landmanagement/planning/?cid=fsbdev7_003229 on February 22, 2012.

[119] Personal communication with Sara Brinton, Pagosa Ranger District/Field Office. October 26, 2011.

[120] Personal communication with Chris Clark, OXY USA WTP LP, December 22, 2011.

include development of three future multi-well pads within the currently existing Natural Areas.[121]

3.3.3 POTENTIAL FOR FUTURE OIL AND GAS EXPLORATION AND DEVELOPMENT IN COLORADO

92. Since 2003, natural gas development has increased and energy has become a major part of northwest Colorado's economy. BBC predicts that gas drilling activity will increase through 2015 and then remain stable through 2035. BBC also notes that the geographic focus of gas development will shift north, leading to shifts from Garfield to Rio Blanco County, or away from the proposed critical habitat of the Parachute beardtongue and DeBeque phacelia in Mesa and Garfield Counties. Exhibit 3-2 provides detail on the number of predicted wells to be drilled in each county. Production in both Mesa and Garfield Counties is expected to decline significantly over the next 20 years, or over the time frame of this analysis. In 2006, approximately 3,900 wells existed in Garfield County. The industry expects that development will continue to progress in Garfield County with about 1,000 wells drilled per year for 10 to 15 years. Following this rate of growth, a total of 15,000 to 20,000 wells are predicted to be drilled by 2023. By 2026, drilling is expected to cease in both Garfield and Mesa Counties as development moves northward.[122]

93. While BBC predicts a decline in oil and gas development beginning in 2016, COGCC believes that the past five years of well drilling activity are a good indicator of the rate of future development. Thus, it projects that future drilling activity will hold steady at a constant rate. COGCC's prediction is based in part on the fact that pipelines did not exist in northwest Colorado before 2005 and therefore development of this resource is just beginning.[123]

94. Potential oil shale development in northwest Colorado is even more unpredictable. BBC indicates that development depends on: (1) the level of world oil production and reserves from conventional sources and existing unconventional sources; (2) changes in world oil demand; and (3) whether research discovers methods to address technical, economic and environmental challenges associated with oil shale.[124] Given this uncertainty, and based on our conversations with Federal land managers (e.g., BLM staff at the Grand Junction Field Office), we assume oil shale development is unlikely in proposed critical habitat during the timeframe of our analysis.

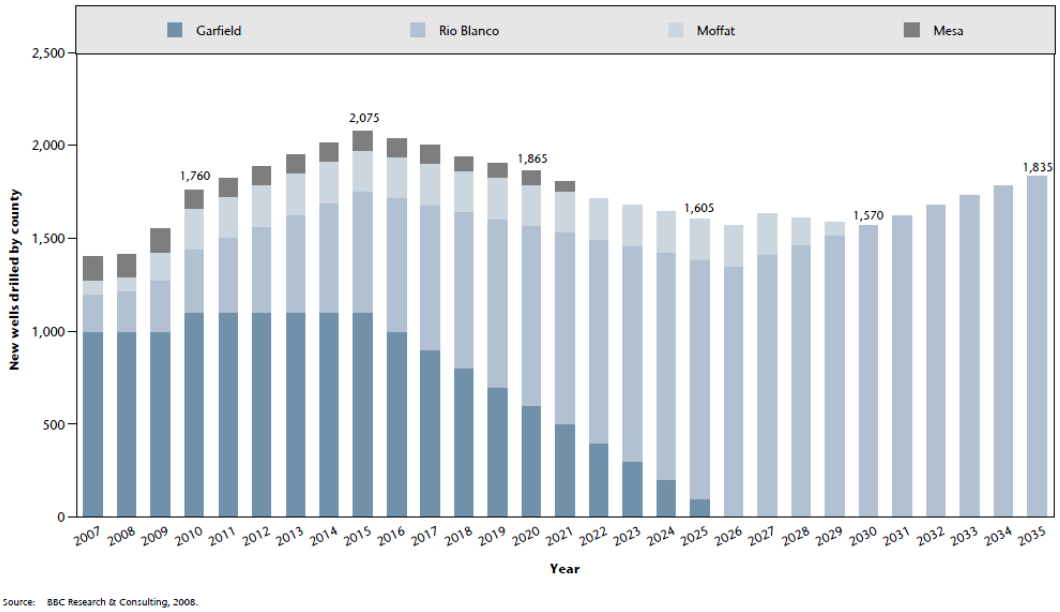
[121] *Ibid.*

[122] BBC Research & Consulting. April 4, 2008. Northwest Colorado Socioeconomic Analysis and Forecasts. Denver, CO.

[123] Personal communication with Tom Kerr, Colorado Oil and Gas Conservation Commission, November 4, 2011.

[124] BBC Research & Consulting. April 4, 2008. *Northwest Colorado Socioeconomic Analysis and Forecasts.* Prepared for the Associated Governments of Northwest Colorado.

EXHIBIT 3-2. NUMBER OF NAURAL GAS WELLS PROJECTED TO BE DRILLED IN NORTHWEST COLORADO 2007-2035



Source: BBC Research & Consulting, 2008.

3.3.4 PAST OIL AND GAS DRILLING ACTIVITY IN PROPOSED CRITICAL HABITAT AREAS

95. Proposed critical habitat areas have experienced some drilling activity over the past 61 years (1950-2011), but overall, well-drilling activity in the study area comprises a small portion (less than one percent) of the total well drilling activity in the counties containing proposed critical habitat for the DeBeque phacelia and Parachute beardtongue.[125] Proposed critical habitat areas also comprise a small portion of the overall land area in these counties. As shown in Exhibit 3-3, since 1950, 50 wells have been drilled in the study area and an additional 35 wells were identified but never begun. Exhibit 3-4 depicts the location of prior (1950-2011) drilling activity in the area surrounding the proposed critical habitat for the DeBeque phacelia and Parachute beardtongue.

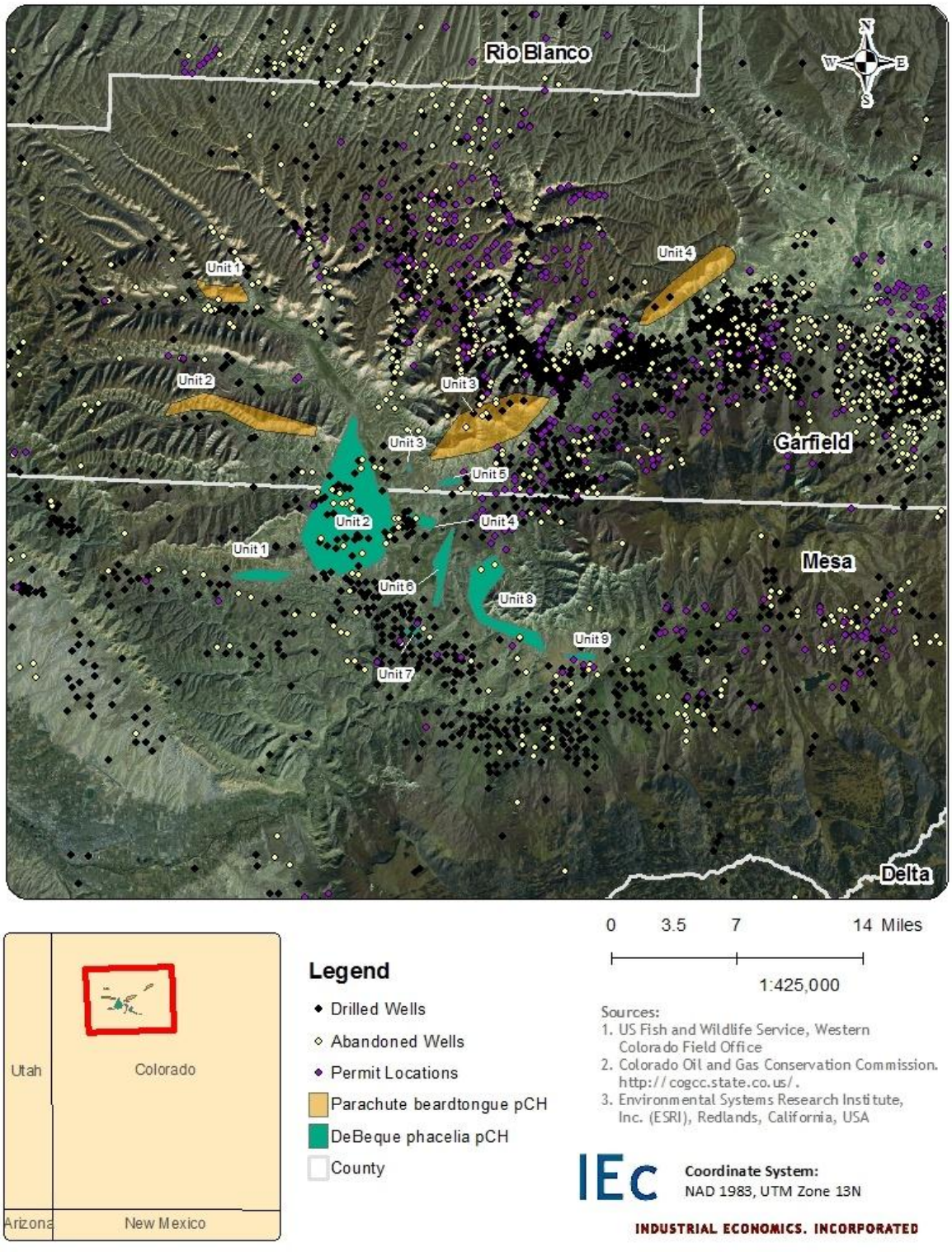
[125] Colorado Oil and Gas Conservation Commission (COGCC). August 3, 2011.

EXHIBIT 3-3. NUMBER OF PAST OIL AND GAS WELLS DRILLED IN STUDY AREA (1950-2011)

SPECIES	UNIT	WELLS DRILLED	ABANDONED WELLS
DeBeque phacelia	2	33	15
	4	1	1
	7	4	0
	8	1	4
	Subtotal	**39**	**20**
Parachute beardtongue	1	1	0
	3	13	12
	4	3	0
	Subtotal	**17**	**12**
Total		**56**	**32**

Note: Wells drilled include all wells with a spud date, or when drilling was commenced, while abandoned wells include all wells with no spud date.
Source: Colorado Oil and Gas Conservation Commission. August 3, 2011.

EXHIBIT 3-4. OIL AND GAS WELLS DRILLED IN 1950-2011 IN DEBEQUE PHACELIA AND PARACHUTE BEARDTONGUE PROPOSED CRITICAL HABIT



3.4 ESTIMATING IMPACTS TO THE OIL AND GAS INDUSTRY

96. To assess the past and potential future impacts to the oil and gas industry, this analysis proceeds through the following steps:

1. First, we consider how future regulation of habitat for DeBeque phacelia and Parachute beardtongue will affect oil and gas activities, and estimate costs of compliance on a per well pad basis.
2. Next, we estimate the level of future oil and gas development (i.e., well drilling) activity that is expected to occur in each unit within the study area over the next 20 years.
3. Finally, we estimate total costs of compliance with anticipated future conservation efforts for each unit in the study area.

3.4.1 LIKELY MODIFICATIONS RELATED TO OIL AND GAS DEVELOPMENT ACTIVITIES

97. Exhibit 3-5 summarizes potential recommendations that may be requested by the Service during section 7 consultations on oil and gas development activities and their estimated per project cost. The costs included in Exhibit 3-5 were estimated by OXY for multi-well pads that could have up to 20 wells each and are based on the company's agreement with CNAP regarding the Mount Callahan and Mount Callahan Saddle Natural Areas.[126] These costs represent the additional cost of undertaking the stated activity because of the plants and/or their habitat. Many of the listed project modification may be requested absent the plants or their habitat, but additional effort is necessary due to the listing or designation.

98. As described in Section 2.3.1, project modifications requested during future section 7 consultation are likely to vary depending on the distance of the project from an occurrence of one of the plants. All measures described below would be requested for projects located within 100 meters of a Parachute beardtongue or DeBeque phacelia occurrence. No measures will be requested for projects that fall more than 100 meters from a DeBeque phacelia occurrence. For Parachute beardtongue, moderate measures (all measures listed in Exhibit 3-5, except monitoring) would be requested for project located between 100 and 300 meters of a plant occurrence. Beyond 300 meters of a Parachute beardtongue occurrence, noxious weed control, re-vegetation, and maintenance of project modifications during operation of wells would be requested.[127]

99. In addition to the project modifications requested during section 7 consultation, oil and gas companies expect to incur some indirect costs associated with the listing of the plants and designation of critical habitat. Specifically, companies expect to incur additional costs during preparation of their NEPA assessment and development and implementation of their stormwater pollution prevention plans.

[126] Personal communication with Chris Clark, OXY USA WTP LP, December 22, 2011.

[127] Email communication from U.S. Fish and Wildlife Service biologist, December 7, 2011.

100. Following the methodology outlined in Section 2-3, we assume that impacts associated with projects within 100 meters of known DeBeque phacelia occurrences and 1,000 meters of known Parachute beardtongue occurrence are considered likely to be incurred regardless of critical habitat designation (i.e., in the baseline), while costs associated with projects outside of these buffers or within unoccupied units are assumed to result solely from the designation.

EXHIBIT 3-5. POTENTIAL PER PROJECT MODIFICATIONS AND COSTS FOR OIL AND GAS ACTIVITIES IN CRITICAL HABITAT AREAS (2012 DOLLARS)

CONSERVATION EFFORT	PARACHUTE BEARDTONGUE				DEBEQUE PHACELIA	
	WITHIN 100 M (BASELINE)	100 TO 300 M (BASELINE)	300 TO 1,000 M (BASELINE)	BEYOND 1,000 M (INCREMENTAL)	WITHIN 100 M (BASELINE)	BEYOND 100 M (BASELINE)
(1) Survey project area for species prior to development	$7,000	$7,000	N/A	N/A	$7,000	N/A
(2) Monitor activities during construction, drilling and completion, and closure of wells – requires hiring a qualified environmental coordinator to be on site	$205,000	N/A	N/A	N/A	$205,000	N/A
(3) NEPA Review –time to prepare assessment of need for NEPA review, including consultant support	$71,500	$71,500	$71,500	$71,500	$71,500	$71,500
(4) Design well pad and supporting infrastructure to avoid areas important to the species and their habitat – may require re-engineering placement of pad and infrastructure in less desirable locations	$45,500	$45,500	N/A	N/A	$45,500	N/A
(5) Construct temporary and permanent fencing and display signage to ensure that contractors and construction workers stay out of sensitive areas	$45,000	$45,000	N/A	N/A	$45,000	N/A
(6) Control for noxious weeds, either by hand spraying or weeding by hand	$69,000	$69,000	$69,000	$69,000	$69,000	N/A
(7) Dust controls, including watering roads and using MgCl or a substitute	$351,000	$351,000	N/A	N/A	$351,000	N/A
(8) Sedimentation control – additional engineering controls to re-route storm water and reduce erosion	$260,000	$260,000	N/A	N/A	$260,000	N/A
(9) Stormwater pollution prevention – includes effort to implement stormwater pollution prevention plan*	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000
(10) Re-vegetation – re-seeding to enhance current plant populations or populate unoccupied units	$30,000	$30,000	$30,000	$30,000	$30,000	N/A
(11) Additional administrative effort, including pre-consultation meeting(s), obtaining requisite approvals, and BMP/project modification maintenance*	$60,000	$60,000	$60,000	$60,000	$60,000	$15,000**
Total Cost Per Multi-Well Pad	**$1,310,000**	**$1,100,000**	**$396,000**	**$396,000**	**$1,310,000**	**$252,000**

Source: Personal communication with Chris Clark, OXY USA WTP LP, December 22, 2011; Personal communication with OXY USA WTP LP, February 15, 2012.
Notes:
N/A = Not applicable, these project modifications would not be requested
*These costs include annual operational maintenance costs that will be incurred over the assumed 30 year life of a well.
**Costs associated with projects beyond 100 m of DeBeque phacelia do not include BMP/project modification maintenance costs as the Service will not recommend any conservation measures in these areas.

101. Some additional costs are expected for OXY well pad development in the Natural Areas. OXY expects that there will be additional costs associated with obtaining consultant support for BMP development prior to well pad construction activities. OXY expects to review the BMPs currently outlined in their CNAP Agreement for each new well pad location.[127] OXY estimates that the cost of consultant support for BMP development is $10,000 per project.[128]

102. In addition to the project modification costs described in Exhibit 3-5, time delays associated with consultation may be considered an indirect impact of the listing and/or designation of critical habitat. Time delays may occur due to: increased administrative burden, requirement to survey for plants, and redesign of well pad and associated infrastructure requested by the Service. These extra steps may add time to the drilling process within the proposed critical habitat. The extent of possible delay is not known and therefore the impact of time delay is not quantified in this analysis.

103. If project modifications requested by the Service discourage companies from making bids for leases within the critical habitat area, then mineral owners could suffer lost lease revenues. If resource production is curtailed due to conservation efforts, then mineral owners could receive fewer royalties. However, the Service has indicated that it is unlikely to recommend the exclusion of oil and gas activities from critical habitat areas. In addition, when a section 7 nexus exists, the owner of the mineral rights is generally the U.S. government. Finally, it appears likely that the oil and gas industry would be able to successfully access resources located inside critical habitat by moving outside of areas immediately adjacent to plants. Thus, while more expensive to access, the resources appear unlikely to be made inaccessible by conservation efforts for the three plants.

3.4.2 NUMBER OF FUTURE WELL PADS IN THE STUDY AREA

104. This section attempts to forecast the number of oil and gas wells that will be drilled within critical habitat over the next 20 years. We employ two methods of determining these costs. One method uses projections of wells drilled from BBC's 2008 report and the other uses data on wells drilled between 2006 and 2010 as an indicator of future activity. Two methods are used due to the uncertainties associated with predicting the intensity and location of future oil and gas development. In general, the oil and gas industry and its operations are influenced by economic, political, technological, and ecological factors. The prices of oil and gas determine the marginal revenue that oil and gas companies earn, and thus the amount of money they are willing to invest in specific ventures. Depending on the market, prices for these commodities can affect where oil and gas companies choose to allocate their resources.

105. This analysis uses the following methodology to estimate the number of future wells that may be drilled within the study area over the next 20 years:

[127] Personal communication with OXY USA WTP LP, February 15, 2012.

[128] Personal communication with Chris Clark, OXY USA WTP LP, December 22, 2011.

METHOD USING BBC PROJECTIONS	METHOD USING COGCC DATA
1. Take estimates of future wells drilled from BBC's projections for Mesa and Garfield Counties for the timeframe of this analysis (2012 through 2031).	1. Use number of wells drilled in Mesa and Garfield counties from 2006 through 2010 to find the average annual rate of wells drilled. Apply this average annual rate to the timeframe of this analysis (2012 through 2031).
2. Calculate the area within Garfield and Mesa Counties that lies within the Uinta, Piceance, and Paradox Basins and is not subject to an NSO stipulation.	
3. Use annual number of wells drilled (found in Step 1) and area where potential drilling occurs (found in Step 2) to determine the number of wells drilled per acre in each year, assuming an even distribution of wells drilled across the counties within the three listed basins.	
4. Calculate the area within proposed critical habitat by unit that has Federal surface or mineral rights, lies within the Uinta, Piceance, and Paradox Basins, and is not subject to an NSO stipulation.	
5. Apply annual, per acre rate of wells drilled (found in Step 3) to areas subject to a Federal nexus (found in Step 4) to determine the number of wells drilled in each year by unit of proposed critical habitat for Parachute beardtongue and DeBeque phacelia.	

BBC Data (Low Estimate)

106. Our first method relies on projections of future drilling activity obtained from BBC. In a 2008 report for the Associated Governments of Northwest Colorado, BBC provides annual projections of wells drilled by county from 2005 through 2035.[129,130] These projections overestimate drilling in the near term due to the economic recession and the shift of focus in natural gas development towards Pennsylvania.[131] However, drilling rates are starting to increase again and more recent projections of future drilling activity do not exist.[132] These per county annual rates of wells drilled are combined with information on the total area of Garfield and Mesa Counties within Uinta, Piceance and Paradox Basins to calculate a per-acre estimate of wells drilled by year from 2012 through 2031. These rates are applied to acres with a Federal nexus within Parachute beardtongue and DeBeque phacelia proposed critical habitat that fall within the Uinta, Piceance, and Paradox Basins and do not have an NSO stipulation.

[129] BBC Research & Consulting. April 4, 2008. *Northwest Colorado Socioeconomic Analysis and Forecasts.* Prepared for the Associated Governments of Northwest Colorado.

[130] Personal communication with Doug Jeavons, BBC Research and Consulting. Data received via email on November 7, 2011.

[131] *Ibid.*

[132] Personal communication with Jane Whitt, Associated Governments of Northwest Colorado, November 3, 2011.

COGCC Data (High Estimate)

107. For this method, we assume that the rate of wells drilled from 2006 to 2010 is indicative of future drilling activity. Since 2003, the industry has represented a major sector of the economy.[133] We rely on the most recently available well drilling data, as the COGCC believes recent drilling rates best reflect likely future levels of activity.[134] Data on drilling activity over the past five years is used to determine an annual rate of development by county. We assume that all future drilling activity in Mesa and Garfield counties will occur within the Uinta, Piceance and Paradox Basins since drilling is not expected in mountainous regions outside these basins.[135,136] Assuming an even distribution of future drilling activity over the areas within these basis, we calculate an annual per acre rate of drilling. We apply this rate to the acres with a Federal nexus within Parachute beardtongue and DeBeque phacelia proposed critical habitat that fall within the Uinta, Piceance, and Paradox Basins and do not have an NSO stipulation.

108. While we have data from COGCC going back to 1950, a variety of factors skew trends which make averaging over long periods inadequate. Since minimal oil and gas development existed in this region prior to 2003, using drilling rates before this period would likely lead us to underestimate of future oil and gas development.[137] Therefore, this analysis relies on the most recent five years of data to project future drilling. While relying on only five years of data captures less variability in economic and political conditions, we believe that these data more accurately captures industry growth due to the oil and gas sector's success after 2003.

Projected Number of Wells and Pads on Federally-managed Land

109. Following the methods outlined above, this analysis estimates that 90 wells are likely to be drilled on lands with a Federal nexus in proposed critical habitat areas where oil and gas development is not precluded over the next 20 years using the BBC projections, and 203 wells are likely to be drilled using the COGCC data. We use these projections to determine this number of multi-well pads that will be necessary to support this level of activity.

110. In the low cost estimate scenario, we assume that 20 wells will be drilled per multi-well pad. Combined with the BBC projections, this assumption leads to an estimate of 4.52 well pads developed over the next 20 years. In the high cost estimate scenario, we assume that two wells will be drilled per multi-well pad. Using the COGCC projections, this assumption leads to an estimate of 102 well pads developed over the next 20 years. These results are summarized in Exhibit 3-6. The analysis recognizes, however, that past

[133] BBC Research & Consulting. April 4, 2008. *Northwest Colorado Socioeconomic Analysis and Forecasts.* Prepared for the Associated Governments of Northwest Colorado.

[134] Colorado Oil and Gas Conservation Commission (COGCC). Colorado Well Starts Since 1988. Data received via email from Tom Kerr, November 4, 2011.

[135] USGS. 2011. National Oil and Gas Assessment, Viewed at: http://energy.usgs.gov/OilGas/AssessmentsData/NationalOilGasAssessment.aspx on November 7, 2011.

[136] Personal communication with Debra Higley, USGS, November 7, 2011.

[137] Personal communication with Tom Kerr, Colorado Oil and Gas Conservation Commission, November 1, 2011.

records of well drilling activity may not accurately reflect likely locations of future well drilling sites. Data on precise locations of future drilling interest areas, however, were not available.

EXHIBIT 3-6. ESTIMATED NUMBER OF FUTURE WELLS AND PADS WITHIN FEDERALLY-MANAGED PROPOSED CRITICAL HABITAT, 2012-2031

SPECIES	UNIT	UNIT NAME	NUMBER OF WELLS		NUMBR OF MULTI-WELL PADS	
			BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)	BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)
Parachute beardtongue	1	Brush Mountain	<1	1.66	<1	<1
	2	Cow Ridge	2.26	5.09	<1	2.54
	3	Mount Callahan	<1	2.01	<1	1.01
	4	Anvil Points	1.18	2.66	<1	1.33
	Subtotal		**5.07**	**11.4**	**<1**	**5.71**
DeBeque Phacelia	1	Sulphur Gulch	4.00	9.00	<1	4.50
	2	Pyramid Rock	65.0	146	3.25	73.1
	3	Roan Creek	<1	<1	<1	<1
	4	DeBeque	1.90	4.26	<1	2.13
	5	Mount Logan	0	0	0	0
	6	Ashmead Draw	4.98	11.2	<1	5.60
	7	Baugh Reservoir	1.87	4.21	<1	2.11
	8	Horsethief Mountain	7.15	16.10	<1	8.04
	9	Anderson Gulch	<1	<1	<1	<1
	Subtotal		**85.4**	**192**	**4.27**	**96.0**
Total			**90**	**203**	**4.52**	**102**

Notes:

(1) Estimates assume an even distribution of wells drilled across counties and within the Uinta, Piceance, and Paradox Basins. We use well projections by county from BBC and COGCC data. We calculate the proportion of land area within federally-managed lands within proposed critical habitat and use these proportions to determine the number of future wells.

(2) Areas within Grand Mesa Uncompahgre Forest are excluded from Unit 8 of DeBeque phacelia proposed critical habitat as stipulations prevent oil and gas drilling within these areas.

Sources:

(1) BBC Research & Consulting. April 4, 2008. Northwest Colorado Socioeconomic Analysis and Forecasts. Prepared for the Associated Governments of Northwest Colorado.

(2) Colorado Oil and Gas Conservation Commission (COGCC). Colorado Well Starts Since 1988. Data received via email from Tom Kerr, November 4, 2011.

(3) U.S. Fish and Wildlife Service. Shapefiles. Received August 10, 2012 and February 10, 2012.

(4) U.S. Bureau of Land Management, Geospatial Data and Metadata: Statewide GIS Layers for BLM Colorado, accessed by http://www.blm.gov/co/st/en/BLM_Programs/geographical_sciences/gis/metadata.html on February 22, 2012.

Well Pad Development in Natural Areas

111. In addition to the future wells anticipated on federally-managed lands, this analysis includes costs associated with multi-well pad development in the Mount Callahan and Mount Callahan Saddle Natural Areas. Although these areas are privately owned, and therefore do not have a Federal nexus, OXY will incur baseline costs associated with implementing BMPs and conservation efforts undertaken to protect populations of Parachute beardtongue. OXY's future plans include development of three multi-well pads within the currently existing Natural Areas.[138,139] Because the timing of future well pad development in these areas is unknown, we assign each year equal probability of experiencing these costs.

3.4.3 PROJECTED FUTURE COSTS WITHIN THE STUDY AREA, BASELINE AND INCREMENTAL

112. Anticipated costs to conduct conservation efforts for DeBeque phacelia and Parachute beardtongue on a per-pad basis are described above in Section 3.4.1. Section 3.4.2 presents the number of anticipated multi-well pad development projects in each critical habitat unit over the next 20 years. This section combines these estimates and the administrative costs of consultation to arrive at a total cost associated with consultation for each unit in the study area. Administrative costs are estimated on a per project basis where development of one multi-well pad is considered to be a single project. Our low-end cost estimate uses the BBC projections of future wells drilled and the assumption that 20 wells will be drilled per multi-well pad. Our high-end cost estimate uses the COGCC projections of future wells drilled and assumes that two wells will be drilled per multi-well pad. These costs are summarized in Exhibit 3-7.

[138] Personal communication with Chris Clark, OXY USA WTP LP, December 22, 2011.

[139] In total OXY has plans to develop 15 future multi-well pads in Unit 3, three of which will be located in the current Natural Areas, and at least one future pad in Unit 4. The 12 well pads outside the current Natural Areas are located on privately-owned property. This analysis assumes that there will be no Federal nexus for oil and gas development on privately-owned land and thus no need for consultation with the Service. Therefore, there will be no impacts associated with the development of the additional 12 well pads outside of the Natural Areas.

EXHIBIT 3-7. ESTIMATED IMPACTS TO OIL AND GAS ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMES A SEVEN PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS		INCREMENTAL COSTS	
			BBC METHOD (LOW ESTIMATE)	COGCC METHOD (HIGH ESTIMATE)	BBC METHOD (LOW ESTIMATE)	COGCC METHOD (HIGH ESTIMATE)
Parachute beardtongue	1	Brush Mountain	$0	$0	$11,600	$195,000
	2	Cow Ridge	$0	$0	$35,500	$599,000
	3	Mount Callahan	$3,580	$60,400	$10,900	$184,000
	4	Anvil Points	$10,000	$170,000	$8,470	$143,000
	Subtotal		**$13,600**	**$230,000**	**$66,400**	**$1,120,000**
DeBeque Phacelia	1	Sulphur Gulch	$18,600	$314,000	$37,300	$629,000
	2	Pyramid Rock	$196,000	$3,300,000	$627,000	$10,600,000
	3	Roan Creek	$10,000	$170,000	$398	$6,720
	4	DeBeque	$31,500	$531,000	$13,100	$221,000
	5	Mount Logan	$0	$0	$0	$0
	6	Ashmead Draw	$31,400	$530,000	$44,700	$755,000
	7	Baugh Reservoir	$5,060	$85,400	$18,200	$307,000
	8	Horsethief Mountain	$65,000	$1,100,000	$60,200	$1,020,000
	9	Anderson Gulch	$4,580	$77,400	$1,150	$19,500
	Subtotal		**$362,000**	**$6,110,000**	**$802,000**	**$13,500,000**
Total			**$375,000**	**$6,340,000**	**$868,000**	**$14,700,000**
Annualized			**$33,100**	**$559,000**	**$76,600**	**$1,290,000**
AREAS CONSIDERED FOR EXCLUSION						
Parachute beardtongue	3	Mount Callahan		$2,240,000		$0
Total				**$2,240,000**		**$0**
Annualized				**$198,000**		**$0**

3.5 SOURCES OF UNCERTAINTY

113. Several sources of uncertainty related to future oil and gas activity may affect the results of this analysis. Below, we summarize these factors and their potential effects on this analysis:

- **Number and location of future wells:** This analysis relies on past well drilling data and projections of future wells by county to predict the number and location of future wells. Future well drilling activity may be different than the past or what is currently expected for a number of reasons, including:
  - Changing economic conditions, including the price of oil and gas;
  - Changing political atmosphere; and
  - Discovery of formations for oil and gas prospects can lead to additional exploration and increased activity.[141]
- **Oil shale exploration and mining:** Future oil shale activity is possible, but not likely in the imminent future. Potential activity depends on:
  - Changing levels of world oil production and reserves from conventional and unconventional sources;
  - Changing world oil demand; and
  - Changing technology use for oil and gas development activities, which enable oil and gas companies to access previously unattainable oil and gas reserves, in particular oil shale reserves.
- **Nature of future conservation recommendations:** In the past, the Service has recommended a variety of conservation recommendations for oil and gas activities within habitat of the three plants. These conservation recommendations have included avoidance of the species for pipeline installation and other oil and gas development, but not necessarily avoidance of the habitat altogether. The Service provided a memo describing likely future conservation recommendations, which is the basis for the project modification assumptions in this analysis along with past recommendations.
- **Cost of future conservation measures:** The cost estimates for the conservation measure applied in this analysis were provided by OXY. It is important to note that OXY's experience is related to costs associated with conservation efforts for the Parachute beardtongue. Costs associated with conservation efforts for DeBeque phacelia may differ from those for Parachute beardtongue due to differences in their habitat. Costs associated with conservation measures for DeBeque phacelia may be less than those for Parachute beardtongue given the gentler terrain surrounding the plant.
- **Who bears the costs:** This analysis assumes that all costs related to conservation recommendations will be borne by the oil and gas companies. To

[141] Personal communication with Tom Kerr, Colorado Oil and Gas Conservation Commission, November 1, 2011.

the extent that costs may be passed along to mineral owners through reduced lease, royalty, or bonus payments or that adverse perceptions (i.e., stigma) associated with critical habitat result in voluntary avoidance of critical habitat areas by oil and gas companies, mineral-rights owners may also be affected.

- **Need for section 7 consultation:** We assume that only projects on federally-managed lands will require consultation with the Service. Projects on privately-owned land may have a federal nexus if they require a permit from the U.S. Army Corps of Engineers under section 402 of the Clean Water Act. If projects on privately-owned land have a federal nexus, this analysis may underestimate costs related to oil and gas activities.

CHAPTER 4 | POTENTIAL ECONOMIC IMPACTS TO OTHER ACTIVITIES

114. This chapter considers potential economic impacts to transportation projects, agriculture and grazing, and recreation activities. In addition, this chapter discusses active species and habitat management occurring within the proposed critical habitat. Details on the projected baseline and incremental impacts to each of these four activities are provided in Section 4.1 to 4.4.

4.1 IMPACTS TO TRANSPORTATION PROJECTS

115. Transportation projects, including paved and unpaved road construction and maintenance, represent a threat to all three Colorado plants. CDOT is responsible for over 9,000 miles of highway and 3,400 bridges in Colorado.[142] Most of the projects undertaken by CDOT involve a Federal nexus through use of Federal transportation funds. We assume that all transportation projects undertaken by CDOT and intersecting the study area will require formal consultation with the Service.

116. The proposed critical habitat for Parachute beardtongue and DeBeque phacelia is located within Region 3 and the proposed critical habitat for Pagosa skyrocket is located within Region 5. CDOT notes that it has never undertaken a project within the proposed critical habitat for the DeBeque phacelia and Parachute beardtongue. The proposed critical habitat for these two species is located in remote areas that do not intersect any highways that would receive Federal transportation funds; therefore, CDOT does not expect to conduct any future projects within these areas.[143] For this reason, the transportation analysis will focus on economic impacts of the proposed critical habitat for the Pagosa skyrocket.

117. CDOT has adopted a Statewide Transportation Plan, which was most recently amended in May 2011.[144] The Statewide Transportation Plan is implemented by programming priority projects into the short-tem, 6-year Statewide Transportation Improvement Program (STIP). STIP contains capital and non-capital transportation project proposed for funding under Title 23 (highways) and Title 49 (transit) of the U.S. Code as well as all regionally significant transportation projects requiring an action by the Federal Highway Administration or the Federal Transit Administration. The most recent STIP covers fiscal

[142] Colorado Department of Transportation, "About CDOT," accessed by http://www.coloradodot.info/about on November, 7, 2011.

[143] Personal communication with Jeff Peterson, CDOT, October 24, 2011.

[144] Colorado Department of Transportation, "2035 Statewide Transportation Plan Amendment," May 2011.

years 2012 through 2017.[145] This STIP includes two projects within the proposed critical habitat for the Pagosa skyrocket: US 160 safety improvements west of Pagosa Springs and US 160 surface treatment west of Pagosa Springs.

118. The US 160 safety improvements project falls within proposed Unit 1 for the Pagosa skyrocket. This project is partially federally-funded and is expected to occur within fiscal years 2012 and 2013.[146] This analysis assumes that consultation on this project will occur in 2012 prior to the start of the project. The US 160 surface treatment project is also located within proposed Unit 1 for the Pagosa skyrocket. This project is partially federally-funded and is expected to occur within fiscal year 2014.[147]

119. In addition to the two projects described above, CDOT has indicated future plans to widen US 160 in the vicinity of the intersection with US 84. Widening will be necessary to accommodate future growth of Pagosa Springs.[148] This project is located in proposed Unit 3 for the Pagosa Skyrocket. Because this project is not included in the 6-year STIP, we know that it will occur after 2017. We conservatively assume that it will occur in 2018. We assume that this project will receive Federal funding and there will therefore be a Federal nexus necessitating consultation.

120. Following the methodology outlined in Section 2.3, we assume that impacts associated with projects within 1,000 meters of known Pagosa skyrocket occurrences are considered likely to be incurred regardless of critical habitat designation (i.e., in the baseline), while costs associated with projects outside of these buffers or within unoccupied units are assumed to result solely from the designation. All three of the CDOT projects along US 160 take place within 1,000 meters of a known Pagosa skyrocket occurrence, therefore all impacts associated with consultation are considered baseline except for the administrative costs associated with considering adverse modification.

121. As described in Section 2.3.1, project modifications requested during consultation differ depending on the distance from an occurrence of the plant. For Pagosa skyrocket, the Service expects to request the most stringent measures within 100 meters of a plant occurrence, moderate measures from 100 to 300 meters, and measures to protect pollinators and habitat beyond 300 meters. Stringent measures include surveys, monitoring, temporary fencing, sedimentation control, limiting access routes to construction sites, dust abatement, noxious weed management, and re-vegetation. Moderate measures include those listed above with the exception of surveying, monitoring, and the caveat that sedimentation control would only be asked for if the disturbance is located upslope. Measures to protect pollinators and habitat requested beyond 300 meters include noxious weed management and re-vegetation.[149]

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[145] Colorado Department of Transportation, "Statewide Transportation Improvement Program: Fiscal Years 2012 – 2017," May 2011.

[146] *Ibid.*

[147] *Ibid.*

[148] Personal communication with Jeff Peterson, CDOT, October 24, 2011.

[149] Email communication from U.S. Fish and Wildlife Service biologist, December 7, 2011.

122. The US 160 safety improvement project and the US 160 surface treatment project fall within areas located 100 meters, 100 to 300 meters, and beyond 300 meters from known Pagosa skyrocket occurrences. While the project footprint for the US 160 widening project is not yet defined, the area surrounding the US 160/US 84 intersection contains all three of the project modification zones. Because all three projects contain areas within 100 meters of known plant occurrences, we conservatively assume that the Service would request the most stringent conservation measures within the entire project disturbance area.

123. The project modifications requested by the Service during section 7 consultation on transportation projects are expected to be similar to those requested for oil and gas development projects. These project modifications include surveying, monitoring, construction of temporary fencing, noxious weed control, dust control, sedimentation control, and re-vegetation. CDOT was not able to provide data on costs associated with measures that they have undertaken in the past for Pagosa skyrocket, such as surveying.[150] Therefore, we assume that the per-project costs are similar to those experienced by the oil and gas industry and presented earlier in Exhibit 3-5. In total, project modifications requested to avoid jeopardy for projects located within 100 meters of known plant occurrences are estimated to cost $1,250,000 per project.[151]

124. We note that the costs used for oil and gas projects may overestimate the actual cost of project modifications for transportation projects. We compared the per-project costs applied in this analysis to the costs of project modifications applied in the Economic Analysis of Critical Habitat Designation for Preble's Meadow Jumping Mouse, another listed species with designated critical habitat in Colorado.[152] Common project modifications for road and bridge construction projects that impact Preble's meadow jumping mouse riparian habitat include directional boring (to minimize ground-level disturbance), providing connectivity of habitat across highways by installing ledges in piping and culverts, purchasing mitigation land, activity timing restrictions, on-site monitoring of construction activities, and habitat restoration and enhancement. For this analysis, CDOT indicated that many of these modifications do not represent a significant cost component and do not affect project implementation.[153] While some of the project modifications for the three Colorado plants differ from those for Preble's meadow jumping mouse due in part to their differing habitats, this past analysis provides an indication that costs associated with project modifications for transportation projects may be less than those for oil and gas projects.

125. The estimated impacts to transportation activities are summarized in Exhibit 4-1. In total, we estimate that over 20 years the present value baseline costs associated with protections for the three Colorado plants may be $3.36 million or $297,000 on an annualized basis,

[150] Personal communication with Jeff Peterson, CDOT, October 24, 2011.

[151] Personal communication with Chris Clark, OXY USA WTP LP, December 22, 2011.

[152] Industrial Economics, Inc., "Economic Analysis of Critical Habitat Designation for Preble's Meadow Jumping Mouse," November 19, 2010, prepared for U.S. Fish and Wildlife Service.

[153] Personal communication, A. Michael, FWS, and J. Peterson, CODOT, December 15, 2009.

assuming a seven percent discount rate. The incremental cost associated with the designation of the proposed critical habitat for the three Colorado plants may be $12,700 or $1,120 annualized, assuming a seven percent discount rate.

EXHIBIT 4-1. ESTIMATED IMPACTS TO TRANSPORTATION ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMING A SEVEN PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS	INCREMENTAL COSTS
Pagosa Skyrocket	1	Dyke	$2,480,000	$9,370
	2	O'Neal Hill Special Botanical Area	$0	$0
	3	Pagosa Springs	$883,000	$3,330
	4	Eight Mile Mesa	$0	$0
Total			**$3,360,000**	**$12,700**
Annualized			**$297,000**	**$1,120**

4.2 IMPACTS TO AGRICULTURE AND GRAZING

126. In general, no Federal nexus exists for agriculture and grazing activities on private lands. Therefore, this section considers the impact to permitted agriculture and grazing on federally-managed lands. The BLM Grand Junction Field Office states that grazing may impact DeBeque phacelia within the lands that they manage.[154] Similarly, the BLM Colorado River Valley Field Office indicates that limited grazing may occur on two grazing allotments located within the proposed DeBeque phacelia critical habitat.[155] Areas within the proposed critical habitat for the Parachute beardtongue that are managed by the BLM Colorado River Valley Field Office are not grazed because the land is too steep.[156] Currently, these two BLM Field Offices are engaged in consultation with the Service on their grazing activities. This programmatic consultation will cover the DeBeque phacelia and its critical habitat as well as two other listed plants.[157]

127. The Service does not expect to limit the overall level of grazing, measured in animal unit months (AUMs), due to the plant or its habitat. Instead, the Service anticipates that it may recommend project modifications meant to limit animal congregation as part of the grazing consultation with BLM. These project modifications could include moving salt blocks and water sources outside of critical habitat areas.[158] Costs associated with such project modifications are unknown. This analysis includes the administrative cost of this programmatic consultation in 2012. The cost of the consultation is spread evenly over the seven proposed critical habitat units for the DeBeque phacelia where BLM manages

[154] Personal communication with A. Lincoln, BLM Grand Junction FO, October 26, 2011.

[155] Personal communication with C. DeYoung, BLM Colorado River Valley FO, October 12, 2011.

[156] *Ibid.*

[157] Personal communication with U.S. Fish and Wildlife Service biologist, February 10, 2012.

[158] *Ibid.*

land – Units 1, 2, 4, 5, 6, 7, and 8. BLM has committed $28,000 to conduct this consultation.[159] We assume that 75 percent of this effort is necessary to consider jeopardy to the species and 25 percent represents the additional effort to address adverse modification. In addition, we include the administrative costs borne by the Service as summarized in Exhibit 2-3.

128. In addition to the potential direct impact on permitted grazing activities described above, there may be indirect impacts on the management of White River National Forest and Grand Mesa National Forest. Both National Forests manage lands within proposed Unit 8 for DeBeque phacelia. Although grazing is not permitted within either of the National Forests, animals grazing on adjacent BLM land often pass onto Forest lands threatening the plant and its habitat.[160,161] The White River National Forest believes that the designation of critical habitat would warrant installing a new fence that would keep grazing animals off of Forest land. We estimate the installation of this fence will cost $30,000.[162] The Grand Mesa National Forest estimates that installing a one-mile fence on its land would cost $12,000.[163] We assume that these fences will be installed in 2012 and that the costs associated with installation are an indirect incremental impact of the critical habitat designation.

129. The estimated impacts to agriculture and grazing activities are summarized in Exhibit 4-2. In addition to the costs included in this exhibit there may be some costs associated with project modifications included in the programmatic consultation on BLM grazing activities. In total, we estimate that over 20 years the present value baseline costs associated with protections for the three Colorado plants would be $33,500 or $2,960 annualized, assuming a seven percent discount rate. We estimate that the incremental cost associated with the designation of the proposed critical habitat for the three Colorado plants would be $53,200 or $4,690 annualized, assuming a seven percent discount rate.

[159] Written communication with U.S. Fish and Wildlife Service biologist, January 31, 2012.

[160] Personal communication with J. Proctor, White River National Forest, October 12, 2011.

[161] Personal communication with J. Grode, Grand Valley District of the Forest Service in Grand Junction, October 27, 2011.

[162] Personal communication with J. Proctor, White River National Forest, October 12, 2011.

[163] Personal communication with J. Grode, Grand Valley District of the Forest Service in Grand Junction, October 27, 2011.

EXHIBIT 4-2. ESTIMATED IMPACTS TO AGRICULTURE AND GRAZING ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMING A SEVEN PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS	INCREMENTAL COSTS
DeBeque phacelia	1	Sulphur Gulch	$4,790	$1,590
	2	Pyramid Rock	$4,790	$1,590
	3	Roan Creek	$0	$0
	4	DeBeque	$4,790	$1,590
	5	Mount Logan	$4,790	$1,590
	6	Ashmead Draw	$4,790	$1,590
	7	Baugh Reservoir	$4,790	$1,590
	8	Horsethief Mountain	$4,790	$43,600
	9	Anderson Gulch	$0	$0
Total			**$33,500**	**$53,200**
Annualized			**$2,960**	**$4,690**

4.3 IMPACTS TO RECREATION

130. Recreation is listed as a threat to Pagosa skyrocket and DeBeque phacelia. A variety of recreation activities take place within federally-managed lands including hunting, camping, and ORV use. The expected impacts to recreation activities are discussed below.

131. The BLM Colorado River Valley Field Office's recently published draft Resources Management Plan (RMP) includes a travel management plan which designates all lands as either open, limited, or closed to OHV use. None of the proposed critical habitat areas fall within the open category, which allows for unrestricted OHV use. Proposed critical habitat Unit 3 for Parachute beardtongue and Unit 5 for DeBeque phacelia include areas designated as limited-use where travel must be restricted to meet specific resource objectives.[164] Inspection of the proposed travel routes indicates that travel within the proposed critical habitat areas will be limited to administrative motorized use authorized by BLM and foot/horse recreation.[165] Therefore, OHV use is not expected to be a threat to the plants on land managed by the BLM Colorado River Valley Field Office in the future.

132. Similarly, the BLM Grand Junction Field Office is in the process of revising its RMP, including its travel management plan. The draft RMP is expected to be released in the

[164] U.S. Bureau of Land Management, Colorado River Valley Draft Resource Management Plan Revision, accessed by http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp/kfo-gsfo/crv.html on February 17, 2012.

[165] U.S. Bureau of Land Management, Alternative B Travel Routes in Zone A, accessed by http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/crvfo/rmp_vol_1_chapter3.Par.49388.File.dat/O-02_CRVFO_AltA_Zone_A.pdf on February 17, 2012.

fall of 2012.[166] The Grand Junction Field Office's existing travel management plan allows for OHV use within many of the proposed critical habitat areas for the DeBeque phacelia.[167] As the draft revised plan has not been released, it is not clear how travel management may change within the proposed critical habitat areas in the future.

133. The Service will consult with both BLM Field Offices on their RMP's. This consultation will include a review of the draft travel management plans. It is expected to cost BLM approximately $20,000 to conduct each consultation.[168] We assume that 75 percent of this effort is necessary to consider jeopardy to the species and 25 percent represents the additional effort to address adverse modification. In addition, we include the administrative costs borne by the Service as summarized in Exhibit 2-3.

134. We include the administrative costs associated with consultation on the Colorado River Valley Field Office's draft RMP in 2012. These costs are spread evenly across the proposed units managed by the Colorado River Valley Field Office – Units 3 and 4 for the Parachute beardtongue and Unit 5 for the DeBeque phacelia. All of these units are currently occupied by the plants, therefore all administrative costs, except for a portion which represents the additional effort to address adverse modification of critical habitat, are considered baseline impacts. As OHV use is not likely to continue in the future within areas managed by the Colorado River Valley Field Office, the Service is not likely to recommend any project modifications related to OHV use in this consultation.

135. We include the administrative costs associated with consultation on the Grand Junction Field Office draft RMP in 2013. These costs are spread evenly across the proposed units managed by this Field Office – Units 1, 2, 4, 6, 7, and 8 for DeBeque phacelia. All of these units are currently occupied by the plants, therefore all administrative costs, except for a portion which represents the additional effort to address adverse modification of critical habitat, are considered baseline impacts. At this time it is unclear whether OHV use will continue within areas managed by the Grand Junction Field Office. If OHV use continues, the Service may recommend project modifications such as placement of signs or installation of fencing meant to minimize OHV disturbance of areas occupied by the plants.[169] The need for and potential cost of future project modifications is unknown and therefore not included in this analysis.

136. The Grand Mesa National Forest and White River National Forest currently allow ORV recreation within proposed Unit 8 for DeBeque phacelia. The Forests are planning to install fencing to keep ORVs away from known DeBeque phacelia occurrences.[170] The Grand Mesa National Forest is planning to install fencing in two locations at a cost of

[166] U.S. Bureau of Land Management, Grand Junction Field Office, Resource Management Planning, accessed by http://www.blm.gov/co/st/en/fo/gjfo/rmp.html on February 17, 2012.

167 U.S. Bureau of Land Management, Grand Junction Travel Management, accessed by http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/grand_junction_field/maps.Par.55057.File.dat/Transportation.pdf on February 17, 2012.

[168] Written communication with U.S. Fish and Wildlife Service biologist, January 31, 2012.

[169] Written communication with U.S. Fish and Wildlife Service biologist, January 31, 2012.

[170] Personal communication with J. Grode, Grand Valley District of the Forest Service in Grand Junction, October 27, 2011.

$3,000 per location.[171] We assume that the White River National Forest will also install fencing in two locations. We also assume that the Forest Service will need to consult with the Service on these activities. We anticipate that two informal consultations will occur to cover these activities. A formal level of effort will not be necessary as these projects are meant to benefit the plant. Proposed Unit 8 is occupied by the species, therefore all costs except for a portion of the administrative costs associated with considering adverse modification are considered baseline.

137. Areas managed by the U.S. Forest Service within proposed critical habitat Units 2 and 4 for Pagosa skyrocket are used by a variety of recreators. Recreation in the O'Neal Hill Special Botanical Area located in Unit 2 includes hiking, motorized vehicle use, and horseback riding.[172] Currently recreation is dispersed through-out the Botanical Area and no trails are maintained. Similarly, unauthorized hiking and camping takes place within the San Juan National Forest in Unit 4.[173] In the future the Forest Service may need to consult with the Service on these recreation activities. We assume that a formal consultation on recreation activities will take place in 2012. Units 2 and 4 are unoccupied by the species and therefore all costs associated with this consultation are considered incremental impacts of the critical habitat designation. The project modifications requested during consultation may include limiting motorized vehicles to designated routes and installing roadside signs to identify especially sensitive areas.[174] In addition, the Service may suggest formalizing trail systems and camp areas for non-mechanized recreation.[175] The costs associated with these project modifications are unknown, but because the proposed unit is unoccupied, all costs would be considered incremental.

138. The estimated impacts to recreation activities are summarized in Exhibit 4-3. In total, we estimate that over 20 years the present value baseline costs associated with protections for the three Colorado plants would be $64,500 or $5,690 annualized, assuming a seven percent discount rate. The incremental cost associated with the designation of the proposed critical habitat for the three Colorado plants would be $32,500 or $2,870 annualized, assuming a seven percent discount rate.

[171] *Ibid.*

[172] Personal communication with S. Brinton, U.S. Forest Service Pagosa Ranger District/Field Office, October 19, 2011.

[173] Personal communication with U.S. Fish and Wildlife Service biologist, February 10, 2012.

[174] U.S. Fish and Wildlife Service, Biological Opinion for amending the Bureau of Land Management Uncompahgre Basin and San Juan-San Miguel Resource Management Plans to limit motorized and mechanized travel to existing routes, Consultation 65413-2009-F-0101, August 11, 2009.

[175] Personal communication with U.S. Fish and Wildlife Service biologist, February 10, 2012.

EXHIBIT 4-3. ESTIMATED IMPACTS TO RECREATION ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMING A SEVEN PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS	INCREMENTAL COSTS
Pagosa Skyrocket	1	Dyke	$0	$0
	2	O'Neal Hill Special Botanical Area	$0	$7,500
	3	Pagosa Springs	$0	$0
	4	Eight Mile Mesa	$0	$7,500
	Subtotal		**$0**	**$15,000**
Parachute beardtongue	1	Brush Mountain	$0	$0
	2	Cow Ridge	$0	$0
	3	Mount Callahan	$6,380	$2,130
	4	Anvil Points	$6,380	$2,130
	Subtotal		**$12,800**	**$4,250**
DeBeque phacelia	1	Sulphur Gulch	$3,190	$1,060
	2	Pyramid Rock	$3,190	$1,060
	3	Roan Creek	$0	$0
	4	DeBeque	$3,190	$1,060
	5	Mount Logan	$6,380	$2,130
	6	Ashmead Draw	$3,190	$1,060
	7	Baugh Reservoir	$3,190	$1,060
	8	Horsethief Mountain	$29,400	$5,820
	9	Anderson Gulch	$0	$0
	Subtotal		**$51,800**	**$13,300**
Total			**$64,500**	**$32,500**
Annualized			**$5,690**	**$2,870**

4.4 ACTIVE SPECIES MANAGEMENT

139. Land managers within the areas proposed for designation have managed for the species prior to their listing on July 27, 2011 and expect to continue these management activities. Examples of past management activities include roadside fence installation by BLM and the Colorado Department of Natural Resources (CDNR) at Pyramid Rock Natural Area, management and monitoring of Parachute beardtongue by BLM at Anvil Points Mine during reclamation activities, and surveying for Pagosa skyrocket by BLM and USFS within Unit 1.[176]

140. Future management for the plants is expected within the three designated Colorado Natural Areas. CDNR has an agreement with BLM to manage land within the Pyramid

[176] Written communication with U.S. Fish and Wildlife Service biologist, January 31, 2012.

Rock Natural Area located within proposed Unit 2 for DeBeque phacelia. CDNR is assisting BLM with qualitative monitoring of DeBeque phacelia within the Pyramid Rock.[177] The annual monitoring efforts totals approximately 30 hours at a cost of $21/hour. Management of this agreement with BLM and organization of the monitoring requires approximately 10 hours at a cost of $35/hour.[178]

141. CDNR also has an agreement with OXY to assist in management of the Mount Callahan and Mount Callahan Saddle Natural Areas within proposed Unit 3 for Parachute beardtongue. These areas are being considered for exclusion from critical habitat. On average over the last three years, CDNR staff have spent approximately 200 hours per year at a cost of $35/hour on management of these two Natural Areas[179] Management has included development of BMPs for oil and gas development, the designation of the Mount Callahan Saddle Natural Area, and monitoring of transects. The monitoring effort is estimated to require 140 hours at $21/hour.[180] We assume that this level of monitoring and management will continue to occur over the next 20 years.

142. In addition, BLM has several ongoing monitoring efforts for the species within areas that they manage.[181] We expect these efforts to continue in the future, but the level of future effort and cost involved is not known. Therefore, we do not include costs associated with BLM's monitoring in this analysis, but note that these costs could be baseline impacts associated with management of the plants.

143. All costs associated with active species management are baseline costs. These practices were established before the designation of critical habitat and are expected to continue in the absence of critical habitat. The estimated impacts of active species management activities are summarized in Exhibit 4-4. In total, we estimate that over 20 years the present value baseline costs associated with active management of the three Colorado plants would be $11,100 or $980 annualized, assuming a seven percent discount rate. In areas considered for exclusion, the present value baseline costs associated with active species management would be $113,000 or $9,940 annualized, assuming a seven percent discount rate.

[177] Personal communication with B. Kurzel, Colorado Department of Natural Resources, October 24, 2011.

[178] *Ibid.*

[179] *Ibid.*

[180] *Ibid.*

[181] Written communication with U.S. Fish and Wildlife Service biologist, January 31, 2012.

EXHIBIT 4-4. ESTIMATED IMPACTS TO ACTIVE SPECIES MANAGEMENT ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMING A SEVEN PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS	INCREMENTAL COSTS
DeBeque phacelia	1	Sulphur Gulch	$0	$0
	2	Pyramid Rock	$11,100	$0
	3	Roan Creek	$0	$0
	4	DeBeque	$0	$0
	5	Mount Logan	$0	$0
	6	Ashmead Draw	$0	$0
	7	Baugh Reservoir	$0	$0
	8	Horsethief Mountain	$0	$0
	9	Anderson Gulch	$0	$0
Total			**$11,100**	**$0**
Annualized			**$980**	**$0**
AREAS CONSIDERED FOR EXCLUSION				
Parachute beardtongue	3	Mount Callahan	$113,000	$0
Total			**$113,000**	**$0**
Annualized			**$9,940**	**$0**

CHAPTER 5 | POTENTIAL ECONOMIC BENEFITS

5.1 INTRODUCTION

144. The primary intended benefit of critical habitat is to support conservation of threatened and endangered species, such as the three Colorado plants. Various economic benefits, measured in terms of social welfare or regional economic performance, may also result from species and habitat conservation. The benefits of species and habitat conservation can be placed into two broad categories: (1) those associated with the primary goal of species conservation (i.e., direct benefits), and (2) those additional beneficial services that derive from the habitat conservation measures but are not the purpose of the Act (i.e., ancillary benefits, such as reducing downstream water treatment costs).

145. Because a purpose of the Act is to provide for the conservation of endangered and threatened species, the benefits of actions taken under the Act are often measured in terms of the value placed by the public on species preservation (e.g., avoidance of extinction, and/or increase in a species' population). Such social welfare values for a species may reflect both use and non-use values for the species. Use values derive from a direct use for a species, such as commercial harvesting or recreational wildlife-viewing opportunities. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist (e.g., existence or bequest values).

146. As a result of actions taken to preserve endangered and threatened species, such as habitat management, various other benefits may accrue to the public. Conservation measures for species and habitat may result in improved environmental quality, which in turn may have collateral human health or recreational use benefits. In addition, conservation measures 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, a section 7 consultation may result in avoiding the use of pesticides or herbicides within the habitat area. A reduction in the release of the chemicals may benefit water quality, and may also provide collateral benefits of preserving habitat for other species occupying these areas.

5.2 QUANTIFYING DIRECT ECONOMIC BENEFITS OF CRITICAL HABITAT DESIGNATION FOR THE THREE COLORADO PLANTS

147. Quantification and monetization of species conservation benefits requires information on the incremental change in the probability of three Colorado plants conservation that is expected to result from the designation. No studies exist that provide such information for this species. Even if this information existed, the published valuation literature does

not support monetization of incremental changes in conservation probability for these species.

148. Specifically, economists apply a variety of methodological approaches in estimating both use and nonuse values for species and for habitat improvements, including stated preference and revealed preference methods. Stated preference techniques include the contingent valuation method and conjoint analysis or contingent ranking methods. In simplest terms, these methods employ survey techniques, asking respondents to state what they would be willing to pay for a resource or for programs designed to protect that resource. A substantial literature has developed that describes the application of this technique to the valuation of natural resource assets.

149. More specific to use values for species or habitats, revealed preference techniques examine individuals' behavior in markets in response to changes in environmental or other amenities (i.e., people "reveal" their value by their behavior). For example, travel cost models are frequently applied to value access to recreational opportunities, as well as to value changes in the quality and characteristics of these opportunities. Basic travel cost models are rooted in the idea that the value of a recreation resource can be estimated by analyzing the travel and time costs incurred by individuals visiting the site. Another revealed preference technique is hedonic analysis, which is often employed to determine the effect of specific site characteristics on property values.

150. Numerous published studies estimate individuals' willingness to pay to protect endangered species.[182] The economic values reported in these studies reflect various groupings of benefit categories (including both use and non-use values). For example, these studies assess public willingness to pay for wildlife-viewing opportunities, for the option for seeing or experiencing the species in the future, to assure that the species will exist for future generations, and simply knowing a species exists, among other values. This literature, however, addresses a relatively narrow range of species and circumstances compared to the hundreds of species and habitats that are the focus of the Act. Specifically, existing studies focus primarily on large mammal, bird, and fish species, and generally do not report values for incremental changes in the probability of species conservation and recovery.[183] Importantly for this analysis, we are not aware of any published studies that estimate the value the public places on preserving these three plant species.

151. An ideal study for use in valuing the use and non-use values that may derive from critical habitat designation for the three Colorado plants would be specific to the species, the

[182] See, for example, Richardson, L. and J. Loomis. March 2009. The Total Economic Value of Threatened, Endangered, and Rare Species: An Updated Meta-Analysis. Ecological Economics 68(5): 1535-1548.

[183] One exception is the Richardson and Loomis (2009) study referenced in the previous footnote. The authors developed a model to estimate the value of critical habitat designations based on a meta-analysis of 31 studies published between 1985 and 2005. The model generates composite willingness to pay values for species conservation based on an estimate of the percent change in species population likely to result from the critical habitat designation. However, none of the underlying studies estimate values for plant species. Thus, even if information about the change in the populations of the three Colorado plants likely to result from the designation were available, the appropriateness of the application of this model to plant species is questionable.

policy question at hand (economic benefits specifically of the critical habitat designation), and the relevant population holding such values (e.g., citizens of Colorado or of the U.S.). No such study has been undertaken to date.

152. Absent primary research specific to the policy question, resource management decisions can often be informed by applying the results of existing valuation research to a new policy question -- a process known to economists as benefit transfer. Benefit transfer involves the application of unit value estimates, functions, data, and/or models from existing studies to estimate the benefits associated with the resource under consideration.

153. OMB has written guidelines for conducting credible benefit transfers. The important steps in the OMB guidance are: (1) specify the value to be estimated for the rulemaking; and (2) identify appropriate studies to conduct benefits transfer based on the following criteria:

- The selected studies should be based on adequate data, sound and defensible empirical methods and techniques.
- The selected studies should document parameter estimates of the valuation function.
- The study and policy contexts should have similar populations (e.g., demographic characteristics). The market size (e.g., target population) between the study site and the policy site should be similar.
- The good, and the magnitude of change in that good, should be similar in the study and policy contexts.
- The relevant characteristics of the study and policy contexts should be similar.
- The distribution of property rights should be similar so that the analysis uses the same welfare measure (i.e., if the property rights in the study context support the use of willingness-to-accept measures while the rights in the rulemaking context support the use of willingness-to-pay measures, benefits transfer is not appropriate).
- The availability of substitutes across study and policy contexts should be similar.

154. According to these criteria, no existing studies are available for transfer of value estimates to the current policy question in order to quantify the value the public would place on actions taken to enhance probability of conservation and recovery of the three plant species.

5.3 POTENTIAL BASELINE AND INCREMENTAL BENEFITS OF CONSERVATION EFFORTS FOR THE THREE COLORADO PLANTS

155. This section describes the categories of benefits potentially resulting from three Colorado plants conservation efforts within the study area. Exhibit 5-1 summarizes potential benefits associated with the specific conservation efforts for the three Colorado plants described in Chapters 3 and 4 of this report. The first column summarizes the

conservation efforts for the three Colorado plants by land use activity. The second column identifies potential categories of ancillary benefits that may derive from implementation of these conservation efforts. A description of these categories of benefits is provided below. The final column of the exhibit identifies the units in which baseline or incremental benefits may occur.

156. The categories of economic benefit that may derive from conservation efforts for the three Colorado plants described in this report include:

- **Educational benefits:** Surveying and monitoring of project sites for the three Colorado plants confers educational benefits in that more is known about the species and where populations exist. This knowledge could help direct future conservation efforts.
- **Increase visibility:** Dust control measures may improve visibility, leading to physical and economic benefits in both residential and recreation settings. Benefits of residential visibility relate to the impact of visibility changes on an individual's daily life (e.g., at home, at work, and while engaged in routine recreational activities). Benefits of recreational visibility relate to the impact of visibility changes manifested at parks and wilderness areas that are expected to be experienced by recreational visitors.
- **Improve air quality:** Dust control measures may reduce particulate matter in the air, improving overall air quality. Air quality improvements may in turn have human health benefits.
- **Improve water quality:** Implementation of a storm water pollution prevention plan and sedimentation controls may reduce adverse impacts to downstream water quality. Improved water quality may reduce water treatment costs, and have human or ecological health benefits.

157. Based on the suite of project modifications described in Chapters 3 and 4, conservation efforts for the three Colorado plants are not expected to result in the creation of open space. The Service has indicated that oil and gas, and other development activities, may proceed with the implementation of these measures. Thus, the preservation of open space is not included as a potential benefit of the listing or critical habitat designation.

158. The extent to which the education value of critical habitat designation improves the efficacy of future conservation effort for the species is significantly uncertain. The value of these educational benefits would in turn be improved probability of conservation and recovery for these species. For the reasons described above, available data are not available to monetize this educational benefit.

159. In addition to these categories of potential benefit, all of the conservation efforts described in Exhibit 5-1 are related to the broader conservation and recovery of the species. All conservation efforts therefore relate to the maintenance or enhancement of the use and non-use value (e.g., existence value) that the public may hold specifically for the three Colorado plants. Further, many of the conservation efforts undertaken for the three Colorado plants may also result in improvements to ecosystem health, such as

reduced nonnative species, reduced habitat fragmentation, and habitat conservation, which are shared by other, coexisting species. The maintenance or enhancement of use and non-use values for these other species, or for biodiversity in general, may also result from these conservation efforts for the three Colorado plants.

EXHIBIT 5-1. CONSERVATION EFFORTS FOR THE THREE COLORADO PLANTS AND POTENTIAL ASSOCIATED ANCILLARY BENEFITS

CONSERVATION EFFORT	POTENTIAL ASSOCIATED BENEFITS	UNITS APPLIED	
		BASELINE BENEFIT	INCREMENTAL BENEFIT
OIL AND GAS			
Dust management	• Increase visibility • Improve air quality	Parachute beardtongue - Units 3 and 4 DeBeque phacelia - Units 1 through 8	Parachute beardtongue - Units 1 through 4 DeBeque phacelia - Units 1 through 8
Surveying/Monitoring	• Educational benefits	Parachute beardtongue - Units 3 and 4 DeBeque phacelia - Units 1 through 8	Parachute beardtongue - Units 1 through 4 DeBeque phacelia - Units 1 through 8
Stormwater pollution prevention and sedimentation control	• Improved water quality	Parachute beardtongue - Units 3 and 4 DeBeque phacelia - Units 1 through 8	Parachute beardtongue - Units 1 through 4 DeBeque phacelia - Units 1 through 8
TRANSPORTATION			
Dust management	• Increase visibility • Improve air quality	Pagosa skyrocket - Units 1 and 3	Incremental impacts limited to administrative
Surveying/Monitoring	• Educational benefits	Pagosa skyrocket - Units 1 and 3	Incremental impacts limited to administrative
Stormwater pollution prevention and sedimentation control	• Improved water quality	Pagosa skyrocket - Units 1 and 3	Incremental impacts limited to administrative

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5 U.S.C. §§601 *et seq*.

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APPENDIX A | SMALL BUSINESS ANALYSIS AND ENERGY IMPACTS ANALYSIS

160. 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 Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA). Information for this analysis was gathered from the Small Business Administration (SBA), the Service, and from interviews with stakeholders contacted in the development of the economic analysis. The energy analysis in Section A.2 is conducted pursuant to Executive Order No. 13211.

161. The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts resulting from the proposed revised 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 three Colorado plants and other Federal, State, and local regulations and policies are expected to occur regardless of the outcome of this rulemaking.

A.1 SBREFA ANALYSIS

162. When a Federal agency proposes a regulation, 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).[183] 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 the three Colorado plants critical habitat designation to affect small entities.

163. 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 revised 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.

[183] 5 U.S.C. §§ 601 et seq.

A.1.1 DESCRIPTION AND TYPES OF SMALL ENTITIES TO WHICH THE RULE WILL APPLY

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

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

Small Business - Section 601(3) of the RFA defines a small business as having the same meaning as small business concern under section 3 of the Small Business Act. This includes any firm that is independently owned and operated and is not dominant in its field of operation. The SBA has developed size standards to carry out the purposes of the Small Business Act, and those size standards can be found in 13 CFR 121.201. The size standards are matched to North American Industry Classification System (NAICS) industries. The SBA definition of a small business applies to a firm's parent company and all affiliates as a single entity.

Small Governmental Jurisdiction - Section 601(5) defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000. Special districts may include those servicing irrigation, ports, parks and recreation, sanitation, drainage, soil and water conservation, road assessment, etc. When counties have populations greater than 50,000, those municipalities of fewer than 50,000 can be identified using population reports. Other types of small government entities are not as easily identified under this standard, as they are not typically classified by population.

Small Organization - Section 601(4) defines a small organization as any not-for-profit enterprise that is independently owned and operated and not dominant in its field. Small organizations may include private hospitals, educational institutions, irrigation districts, public utilities, agricultural co-ops, etc.

166. The courts have held that the RFA/SBREFA requires Federal agencies to perform a regulatory flexibility analysis of forecast impacts to small entities that are directly regulated. In the case of *Mid-Tex Electric Cooperative, Inc., v. Federal Energy Regulatory Commission (FERC),* FERC proposed regulations affecting the manner in which generating utilities incorporated construction work in progress in their rates. The generating utilities that expected to be regulated were large businesses; however, their customers -- transmitting utilities such as electric cooperatives -- included numerous small entities. In this case, the court agreed that FERC simply authorized large electric

generators to pass these costs through to their transmitting and retail utility customers, and FERC could therefore certify that small entities were not directly impacted within the definition of the RFA.[184]

167. Similarly, *American Trucking Associations, Inc. v. Environmental Protection Agency* addressed a rulemaking in which EPA established a primary national ambient air quality standard for ozone and particulate matter.[185] The basis of EPA's RFA/SBREFA certification was that this standard did not directly regulate small entities; instead, small entities were indirectly regulated through the implementation of State plans that incorporated the standards. The court found that, while EPA imposed regulation on States, it did not have authority under this rule to impose regulations directly on small entities, and therefore small entities were not directly impacted within the definition of the RFA.

168. The SBA in its guidance on how to comply with the RFA recognizes that consideration of indirectly affected small entities is not required by the RFA, but encourages agencies to perform a regulatory flexibility analysis even when the impacts of its regulation are indirect.[186] "If an agency can accomplish its statutory mission in a more cost-effective manner, the Office of Advocacy [of the SBA] believes that it is good public policy to do so. The only way an agency can determine this is if it does not certify regulations that it knows will have a significant impact on small entities even if the small entities are regulated by a delegation of authority from the Federal agency to some other governing body."[187]

169. The regulatory mechanism through which critical habitat protections are enforced is section 7 of the Act, which directly regulates only those activities carried out, funded, or permitted by a Federal agency. By definition, Federal agencies are not considered small entities, although the activities they may fund or permit may be proposed or carried out by small entities. Given the SBA guidance described above, this analysis considers the extent to which this designation could potentially affect small entities, regardless of whether these entities would be directly regulated by the Service through the proposed rule or by a delegation of impact from the directly regulated entity. Although businesses affected indirectly are considered, this analysis considers only those entities for which impact would not be measurably diluted.

170. This screening analysis is based on the estimated incremental impacts associated with the proposed rulemaking as described in Chapters 3 and 4. Incremental costs of critical habitat designation quantified in this analysis are due to:

- Project modifications associated with future oil and gas development;

[184] 773 F. 2d 327 (D.C. Cir. 1985).

[185] 175 F. 3d 1027, 1044 (D.C. Cir. 1999).

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

[187] *Ibid.*, pg. 21.

- Fencing costs associated with grazing; and
- Administrative consultation costs related to oil and gas, grazing, transportation, and recreation activities.

171. Fencing will be undertaken by the USFS, which, by definition, is not a small entity. The agencies involved in consultation on grazing, transportation, and recreation activities include BLM, the Federal Highway Administration, CDOT, USFS, and O'Neal Hill Special Botanical Area. These entities are Federal and State agencies that, by definition, are not small entities. Thus this screening analysis focuses on impacts to oil and gas activities, which may be experienced by small entities.

A.1.2 POTENTIAL IMPACTS TO OIL AND GAS DEVELOPMENT ACTIVITIES

172. The analysis expects conservation efforts for the three plants to affect companies that are involved with drilling for oil and gas and that lease or plan to lease Federal lands. Although the Service predicts that drilling activity will not be precluded by the designation, it anticipates requesting that drilling companies undertake project modifications to reduce potential impacts to the habitat. The costs of implementing these project modifications are one impact of the regulation. In addition, affected companies will incur administrative costs associated with the section 7 consultation process.

173. In Exhibit A-1, we report the population of potentially affected small entities within the three counties encompassing our study area. In each county, we use data obtained from Dun and Bradstreet to identify the total number of entities, and the proportion of those entities that meet the SBA's definition of a "small" entity, in three industry categories. These categories include: crude petroleum and natural gas extraction (NAICS 211111); natural gas liquid extraction (NAICS 211112); and drilling oil and gas wells (NAICS 213111). We did not identify any natural gas liquid extraction firms in these counties. For the other two categories, small entities comprise approximately 60 percent of the total entities in the industry in these counties.[188]

174. Exhibit A-2 describes the number of small oil or gas drilling companies likely to be affected on an annual basis and the potential average annualized impacts of critical habitat designation per small entity. Using the data and analysis presented in Chapter 3, we assume that each year, between 0.23 and 5.1 projects are undertaken in the study area (total number of projects divided by 20 years). We multiply these projected projects by the percentage of small entities in the counties, or approximately 60 percent, to identify the annual number of projects likely to be undertaken by small entities (0.14 to 3.06 projects annually).

175. Some of these projects will only incur incremental administrative costs because they are located close to existing plants. In these cases, the project modification costs will be

[188] We note that entities not based in these counties may operate there. For example, OXY, which plans to drill in Garfield County, is the fourth-largest oil and gas exploration and production company in the United States and has operations worldwide (as viewed at ww.oxy.com/Pages/Home.aspx on January 12, 2012). This company may not be captured by Dun and Bradstreet as an entity operating in the study area. However, by limiting our analysis to the counties encompassing the study area, we understate the population of potentially affected entities, resulting in an overstatement of the proportion of affected entities in the industry. We also note that OXY is not a small entity.

incurred regardless of the designation of critical habitat. Projects experiencing the highest annual incremental costs are located in unoccupied areas. We multiply the per project costs in these unoccupied areas by the total number of annual projects undertaken by small entities and then divide by the number of affected small entities to estimate per entity costs. These impacts are then compared to average annual sales per small business in the sector. **On average, annual incremental impacts per small drilling company represent 0.01 to 0.27 percent of small developers' annual average sales.**

176. In summary, less than two to four small entities may be affected annually by the proposed rule. These entities will likely experience costs equivalent to less than one percent of annual revenues. Importantly, these estimates assume each well pad is drilled by a separate entity. In the case that one small company drills more well pads than predicted, impacts to that company are underestimated, and the annual number of affected entities is overstated.

EXHIBIT A-1. SMALL ENTITIES IN THE OIL AND GAS DEVELOPMENT INDUSTRY IN ARCHULETTA, GARFIELD, AND MESA COUNTIES

ACTIVITY	INDUSTRY (NAICS CODES)	COUNTY	SMALL ENTITY SIZE STANDARD*	TOTAL NUMBER OF SMALL ENTITIES IN THE COUNTY	SMALL ENTITIES AS A PERCENTAGE OF TOTAL ENTITIES IN THE COUNTY
Oil and Gas Development	Crude Petroleum and Natural Gas Extraction (211111)	Archuletta	500 employees	1	50%
		Garfield		2	29%
		Mesa		4	33%
	Natural Gas Liquid Extraction (211112)	Archuletta		0	0%
		Garfield		0	0%
		Mesa		0	0%
	Drilling Oil and Gas Wells (213111)	Archuletta	$7.0 million	0	0%
		Garfield		5	100%
		Mesa		14	82%

Source:
Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers," on December 9, 2011.
*Small business thresholds are defined by the Small Business Administration.

EXHIBIT A-2. ESTIMATED OIL AND GAS IMPACTS IN PROPOSED CRITICAL HABITAT

COUNTY	ANNUAL AFFECTED PROJECTS UNDERTAKEN BY SMALL ENTITIES		ANNUAL AFFECTED SMALL ENTITIES		ANNUAL INCREMENTAL COSTS PER ENTITY		AVERAGE ANNUAL SALES PER SMALL ENTITY	INCREMENTAL IMPACT ON SMALL ENTITIES AS A PERCENT OF TOTAL SALES	
	BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)	BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)	BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)		BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)
Archuletta	0	0	0	0	$0	$0		N/A	N/A
Garfield	0.03	0.71	1	1	$708	$15,900	$6,510,000	0.01%	0.24%
Mesa	0.11	2.40	1	3	$2,380	$17,800		0.04%	0.27%

Notes:

(1) Number of affected entities is assumed to be the same as the number of affected projects (well pads) rounded up to the next highest integer.

(2) Annualized impacts are used over a 20 year time period.

(3) Average annual sales are estimated using Risk Management Association (RMA), *Annual Statement Studies: Financial Ratio Benchmarks 2011 to 2012*, 2011. For each NAICS code, RMA provides the net sales and the number of entities falling within several sales categories: $0 to $500,000, $500,000 to $2 million, $2 to $10 million, or $10 to $50 million. Based on the number of entities and total net sales falling within each sales category, we developed an estimate of the weighted average net sales (revenues) per small entity.

A.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY

177. Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all Federal agencies "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy."[190]

178. The Office of Management and Budget provides guidance for implementing this Executive Order, outlining nine outcomes that may constitute "a significant adverse effect" when compared with the regulatory action under consideration:

> Reductions in crude oil supply in excess of 10,000 barrels per day;
>
> Reductions in fuel production in excess of 4,000 barrels per day;
>
> Reductions in coal production in excess of 5 million tons per year;
>
> Reductions in natural gas production in excess of 25 million thousand cubic feet per year;
>
> Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;
>
> Increases in energy use required by the regulatory action that exceed the thresholds above;
>
> Increases in the cost of energy production in excess of one percent;
>
> Increases in the cost of energy distribution in excess of one percent; or
>
> Other similarly adverse outcomes.[191]

179. As described in Chapter 3, critical habitat designation for the three Colorado plants is anticipated to affect oil and gas activities. However, the Service states that it is more likely to recommend a series of project modifications that will allow for work within critical habitat, rather than complete avoidance of critical habitat.[192] Therefore, reductions in oil and natural gas production are not anticipated. Furthermore, given the small fraction of projects affected, less than one to approximately two per year, project modification costs are not anticipated to increase the cost of energy production or distribution in the Unites States in excess of one percent. Thus, none of the nine threshold levels of impact listed above is exceeded.

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

[191] *Ibid.*

[192] U.S. Fish and Wildlife Service, "Comments on How the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Proposed Critical Habitat Designation." August 12, 2011.

APPENDIX B | THREE PERCENT DISCOUNT RATE EXHIBITS

180. This appendix summarizes the costs of three Colorado plant conservation efforts quantified in Chapters 3 and 4 of this report applying an alternative real discount rate of three percent (the main text of the report applies a real discount rate of seven percent). This analysis employs standard discounting techniques to calculate the present value of economic impacts that are expected to occur at different points in time. Consistent with the main analysis, this appendix focuses on quantified estimates of economic impacts to development and transportation activities within the proposed revised critical habitat area.

EXHIBIT B-1. ESTIMATED IMPACTS TO OIL AND GAS ACTIVITIES (2012-2031, 2012 DOLLARS, ASSUMING A THREE PERCENT DISCOUNT RATE)

	BASELINE IMPACTS		INCREMENTAL IMPACTS	
	BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)	BBC DATA (LOW ESTIMATE)	COGCC DATA (HIGH ESTIMATE)
Present Value	$437,000	$8,570,000	$1,010,000	$19,800,000
Annualized	$28,500	$559,000	$66,000	$1,290,000
WITHIN AREA CONSIDERED FOR EXCLUSION				
Present Value		$3,030,000		$0
Annualized		$198,000		$0

EXHIBIT B-2. ESTIMATED IMPACTS TO OIL AND GAS ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMING A THREE PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS		INCREMENTAL COSTS	
			BBC METHOD (LOW ESTIMATE)	COGCC METHOD (HIGH ESTIMATE)	BBC METHOD (LOW ESTIMATE)	COGCC METHOD (HIGH ESTIMATE)
Parachute beardtongue	1	Brush Mountain	$0	$0	$13,500	$264,000
	2	Cow Ridge	$0	$0	$41,300	$810,000
	3	Mount Callahan	$4,170	$81,700	$12,700	$248,000
	4	Anvil Points	$11,700	$229,000	$9,860	$193,000
	Subtotal		**$15,900**	**$311,000**	**$77,300**	**$1,510,000**
DeBeque Phacelia	1	Sulphur Gulch	$21,700	$425,000	$43,400	$851,000
	2	Pyramid Rock	$228,000	$4,470,000	$730,000	$14,300,000
	3	Roan Creek	$11,700	$229,000	$463	$9,080
	4	DeBeque	$36,600	$718,000	$15,300	$299,000
	5	Mount Logan	$0	$0	$0	$0
	6	Ashmead Draw	$36,500	$716,000	$52,100	$1,020,000
	7	Baugh Reservoir	$5,890	$115,000	$21,200	$415,000
	8	Horsethief Mountain	$75,700	$1,480,000	$70,100	$1,370,000
	9	Anderson Gulch	$5,340	$105,000	$1,340	$26,300
	Subtotal		**$421,000**	**$8,260,000**	**$934,000**	**$18,300,000**
Total			**$437,000**	**$8,570,000**	**$1,010,000**	**$19,800,000**
Annualized			**$28,500**	**$559,000**	**$66,000**	**$1,290,000**
AREAS CONSIDERED FOR EXCLUSION						
Parachute beardtongue	3	Mount Callahan		$3,030,000		$0
Total				**$3,030,000**		**$0**
Annualized				**$198,000**		**$0**

EXHIBIT B-3. ESTIMATED IMPACTS TO TRANSPORTATION ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMING A THREE PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS	INCREMENTAL COSTS
Pagosa Skyrocket	1	Dyke	$2,570,000	$9,710
	2	O'Neal Hill Special Botanical Area	$0	$0
	3	Pagosa Springs	$1,110,000	$4,190
	4	Eight Mile Mesa	$0	$0
Total			**$3,680,000**	**$13,900**
Annualized			**$240,000**	**$907**

EXHIBIT B-4. ESTIMATED IMPACTS TO AGRICULTURE AND GRAZING ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMING A THREE PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS	INCREMENTAL COSTS
DeBeque phacelia	1	Sulphur Gulch	$4,790	$1,590
	2	Pyramid Rock	$4,790	$1,590
	3	Roan Creek	$0	$0
	4	DeBeque	$4,790	$1,590
	5	Mount Logan	$4,790	$1,590
	6	Ashmead Draw	$4,790	$1,590
	7	Baugh Reservoir	$4,790	$1,590
	8	Horsethief Mountain	$4,790	$43,600
	9	Anderson Gulch	$0	$0
Total			**$33,500**	**$53,200**
Annualized			**$2,190**	**$3,470**

EXHIBIT B-5. ESTIMATED IMPACTS TO RECREATION ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMING A THREE PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS	INCREMENTAL COSTS
Pagosa Skyrocket	1	Dyke	$0	$0
	2	O'Neal Hill Special Botanical Area	$0	$7,500
	3	Pagosa Springs	$0	$0
	4	Eight Mile Mesa	$0	$7,500
	Subtotal		**$0**	**$15,000**
Parachute beardtongue	1	Brush Mountain	$0	$0
	2	Cow Ridge	$0	$0
	3	Mount Callahan	$6,380	$2,130
	4	Anvil Points	$6,380	$2,130
	Subtotal		**$12,800**	**$4,250**
DeBeque phacelia	1	Sulphur Gulch	$3,190	$1,060
	2	Pyramid Rock	$3,190	$1,060
	3	Roan Creek	$0	$0
	4	DeBeque	$3,190	$1,060
	5	Mount Logan	$6,380	$2,130
	6	Ashmead Draw	$3,190	$1,060
	7	Baugh Reservoir	$3,190	$1,060
	8	Horsethief Mountain	$29,400	$5,820
	9	Anderson Gulch	$0	$0
	Subtotal		**$51,800**	**$13,300**
Total			**$64,500**	**$32,500**
Annualized			**$4,210**	**$2,120**

EXHIBIT B-6. ESTIMATED IMPACTS TO ACTIVE SPECIES MANAGEMENT ACTIVITIES BY UNIT (2012-2031, 2012 DOLLARS, ASSUMING A THREE PERCENT DISCOUNT RATE)

SPECIES	UNIT	UNIT NAME	BASELINE COSTS	INCREMENTAL COSTS
DeBeque phacelia	1	Sulphur Gulch	$0	$0
	2	Pyramid Rock	$15,000	$0
	3	Roan Creek	$0	$0
	4	DeBeque	$0	$0
	5	Mount Logan	$0	$0
	6	Ashmead Draw	$0	$0
	7	Baugh Reservoir	$0	$0
	8	Horsethief Mountain	$0	$0
	9	Anderson Gulch	$0	$0
Total			$15,000	$0
Annualized			$980	$0
AREAS CONSIDERED FOR EXCLUSION				
Parachute beardtongue	3	Mount Callahan	$152,000	$0
Total			**$152,000**	**$0**
Annualized			**$9,940**	**$0**

APPENDIX C | UNDISCOUNTED IMPACTS BY ECONOMIC ACTIVITY

181. This appendix 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."[193] Exhibits C-1 through C-5 summarize potential undiscounted incremental impacts to oil and gas development and other activities (as described in Chapters 3 and 4).

[193] 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 C-1 UNDISCOUNTED BASELINE AND INCREMENTAL IMPACTS TO OIL AND GAS ACTIVITIES BY UNIT AND YEAR (2012-2031, 2012 DOLLARS)

SPECIES	UNIT	UNIT NAME	YEAR(S)	BASELINE COSTS		INCREMENTAL COSTS	
				IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)	IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)
Parachute beardtongue	1	Brush Mountain	2012-2015	$0	$0	$1,710	$17,200
			2016	$0		$1,560	
			2017	$0		$1,420	
			2018	$0		$1,240	
			2019	$0		$1,100	
			2020	$0		$959	
			2021	$0		$782	
			2022	$0		$568	
			2023	$0		$426	
			2024	$0		$284	
			2025	$0		$142	
			2026-2031	$0		$0	
	2	Cow Ridge	2012-2015	$0	$0	$5,230	$52,800
			2016	$0		$4,800	
			2017	$0		$4,360	
			2018	$0		$3,810	
			2019	$0		$3,380	
			2020	$0		$2,940	
			2021	$0		$2,400	
			2022	$0		$1,740	
			2023	$0		$1,310	
			2024	$0		$872	
			2025	$0		$436	
			2026-2031	$0		$0	
	3	Mount Callahan	2012-2015	$528	$5,330	$1,600	$16,200
			2016	$484		$1,470	
			2017	$440		$1,340	
			2018	$385		$1,170	
			2019	$341		$1,040	
			2020	$297		$902	
			2021	$242		$735	
			2022	$176		$535	
			2023	$132		$401	

SPECIES	UNIT	UNIT NAME	YEAR(S)	BASELINE COSTS		INCREMENTAL COSTS	
				IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)	IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)
			2024	$88		$267	
			2025	$44		$134	
			2026-2031	$0		$0	
	4	Anvil Points	2012-2015	$1,480	$15,000	$1,250	$12,600
			2016	$1,360		$1,150	
			2017	$1,230		$1,040	
			2018	$1,080		$911	
			2019	$957		$807	
			2020	$834		$703	
			2021	$679		$573	
			2022	$494		$416	
			2023	$370		$312	
			2024	$247		$208	
			2025	$123		$104	
			2026-2031	$0		$0	
DeBeque Phacelia	1	Sulphur Gulch	2012-2015	$2,750	$27,700	$5,500	$55,500
			2016	$2,520		$5,040	
			2017	$2,290		$4,580	
			2018	$2,000		$4,010	
			2019	$1,770		$3,550	
			2020	$1,540		$3,090	
			2021	$1,260		$2,520	
			2022	$915		$1,830	
			2023	$686		$1,370	
			2024	$458		$916	
			2025	$229		$458	
			2026-2031	$0		$0	
	2	Pyramid Rock	2012-2015	$28,900	$291,000	$92,500	$934,000
			2016	$26,500		$84,800	
			2017	$24,100		$77,100	
			2018	$21,000		$67,400	
			2019	$18,600		$59,700	
			2020	$16,200		$52,000	
			2021	$13,200		$42,400	
			2022	$9,620		$30,800	
			2023	$7,220		$23,100	

SPECIES	UNIT	UNIT NAME	YEAR(S)	BASELINE COSTS		INCREMENTAL COSTS	
				IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)	IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)
			2024	$4,810		$15,400	
			2025	$2,410		$7,710	
			2026-2031	$0		$0	
	3	Roan Creek	2012-2015	$1,480	$15,000	$59	$593
			2016	$1,360		$54	
			2017	$1,230		$49	
			2018	$1,080		$43	
			2019	$956		$38	
			2020	$833		$33	
			2021	$679		$27	
			2022	$494		$20	
			2023	$370		$15	
			2024	$247		$10	
			2025	$123		$5	
			2026-2031	$0		$0	
	4	DeBeque	2012-2015	$4,640	$46,900	$1,930	$19,500
			2016	$4,260		$1,770	
			2017	$3,870		$1,610	
			2018	$3,380		$1,410	
			2019	$3,000		$1,250	
			2020	$2,610		$1,090	
			2021	$2,130		$886	
			2022	$1,550		$644	
			2023	$1,160		$483	
			2024	$774		$322	
			2025	$387		$161	
			2026-2031	$0		$0	
	5	Mount Logan	2012-2015	$0	$0	$0	$0
			2016	$0		$0	
			2017	$0		$0	
			2018	$0		$0	
			2019	$0		$0	
			2020	$0		$0	
			2021	$0		$0	
			2022	$0		$0	
			2023	$0		$0	

SPECIES	UNIT	UNIT NAME	YEAR(S)	BASELINE COSTS		INCREMENTAL COSTS	
				IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)	IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)
			2024	$0		$0	
			2025	$0		$0	
			2026-2031	$0		$0	
	6	Ashmead Draw	2012-2015	$4,630	$46,700	$6,590	$66,600
			2016	$4,240		$6,040	
			2017	$3,860		$5,490	
			2018	$3,370		$4,810	
			2019	$2,990		$4,260	
			2020	$2,600		$3,710	
			2021	$2,120		$3,020	
			2022	$1,540		$2,200	
			2023	$1,160		$1,650	
			2024	$771		$1,100	
			2025	$386		$549	
			2026-2031	$0		$0	
	7	Baugh Reservoir	2012-2015	$746	$7,530	$2,680	$27,100
			2016	$684		$2,460	
			2017	$621		$2,230	
			2018	$544		$1,950	
			2019	$482		$1,730	
			2020	$419		$1,510	
			2021	$342		$1,230	
			2022	$249		$894	
			2023	$186		$670	
			2024	$124		$447	
			2025	$62		$223	
			2026-2031	$0		$0	
	8	Horsethief Mountain	2012-2015	$9,580	$96,800	$8,880	$89,700
			2016	$8,790		$8,140	
			2017	$7,990		$7,400	
			2018	$6,990		$6,480	
			2019	$6,190		$5,740	
			2020	$5,390		$5,000	
			2021	$4,390		$4,070	
			2022	$3,190		$2,960	
			2023	$2,400		$2,220	

SPECIES	UNIT	UNIT NAME	YEAR(S)	BASELINE COSTS		INCREMENTAL COSTS	
				IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)	IMPACT (BBC DATA - LOW ESTIMATE)	IMPACT (COGCC DATA - HIGH ESTIMATE)
			2024	$1,600		$1,480	
			2025	$799		$740	
			2026-2031	$0		$0	
AREAS CONSIDERED FOR EXCLUSION							
Parachute beardtongue	3	Mount Callahan	2012-2031	$198,000		$0	

EXHIBIT C-2 UNDISCOUNTED BASELINE AND INCREMENTAL IMPACTS TO TRANSPORTATION ACTIVITIES BY UNIT, YEAR, AND IMPACT SOURCE (2012-2031, 2012 DOLLARS)

SPECIES	UNIT	YEAR(S)	IMPACT	DESCRIPTION
BASELINE				
Pagosa skyrocket	1	2012	$1,310,000	Project modifications associated with US 160 safety improvements
			$15,000	Consultation cost associated with US 160 safety improvements
		2014	$1,310,000	Project modifications associated with US 160 surface treatment
			$15,000	Consultation cost associated with US 160 surface treatment
	3	2018	$1,310,000	Project modifications associated with US 160 widening
			$15,000	Consultation cost associated with US 160 widening
INCREMENTAL				
Pagosa skyrocket	1	2012	$5,000	Consultation cost associated with US 160 safety improvements
	1	2014	$5,000	Consultation cost associated with US 160 surface treatment
	3	2018	$5,000	Consultation cost associated with US 160 widening

EXHIBIT C-3 UNDISCOUNTED BASELINE AND INCREMENTAL IMPACTS TO AGRICULTURE AND GRAZING ACTIVITIES BY UNIT, YEAR, AND IMPACT SOURCE (2012-2031, 2012 DOLLARS)

SPECIES	UNIT	YEAR(S)	IMPACT	DESCRIPTION
BASELINE				
DeBeque phacelia	1,2,4,5,6,7,8	2012	$33,500	BLM Programmatic grazing consultation cost
INCREMENTAL				
DeBeque phacelia	8	2012	$30,000	White River National Forest fence installation
		2012	$12,000	Grand Mesa National Forest fence installation
DeBeque phacelia	1,2,4,5,6,7,8	2012	$11,200	BLM Programmatic grazing consultation cost

EXHIBIT C-4 UNDISCOUNTED BASELINE AND INCREMENTAL IMPACTS TO RECREATION ACTIVITIES BY UNIT, YEAR, AND IMPACT SOURCE (2012-2031, 2012 DOLLARS)

SPECIES	UNIT	YEAR(S)	IMPACT	DESCRIPTION
BASELINE				
DeBeque phacelia and Parachute beardtongue	DeBeque phacelia Unit 5 and Parachute beardtongue Units 3 and 4	2012	$6,360	BLM Colorado River Valley Field Office RMP consultation cost
DeBeque phacelia	1,2,4,6,7,8	2013	$3,190	BLM Grand Junction Field Office RMP consultation cost
DeBeque phacelia	8	2012	$6,000	Grand Mesa National Forest ORV fencing
			$7,130	Grand Mesa National Forest ORV fencing consultation costs
			$6,000	White River National Forest ORV fencing
			$7,130	White River National Forest ORV fencing consultation costs
INCREMENTAL				
DeBeque phacelia and Parachute beardtongue	DeBeque phacelia Unit 5 and Parachute beardtongue Units 3 and 4	2012	$2,130	BLM Colorado River Valley Field Office RMP consultation cost
DeBeque phacelia	1,2,4,6,7,8	2013	$1,060	BLM Grand Junction Field Office RMP consultation cost
Pagosa skyrocket	2 and 4	2012	$7,500	U.S. Forest Service recreation consultation
DeBeque phacelia	8	2012	$2,380	Grand Mesa National Forest ORV fencing consultation costs
			$2,380	White River National Forest ORV fencing consultation costs

EXHIBIT C-5 UNDISCOUNTED BASELINE AND INCREMENTAL IMPACTS TO SPECIES MANAGEMENT ACTIVITIES BY UNIT, YEAR, AND IMPACT SOURCE (2012-2031, 2012 DOLLARS)

SPECIES	UNIT	YEAR(S)	IMPACT	DESCRIPTION
BASELINE				
DeBeque phacelia	2	2012-2031	$980	Pyramic Rock Management
AREAS CONSIDERED FOR EXCLUSION				
BASELINE				
Parachute Beardtongue	3	2012-2031	$9,940	Mount Callahan and Mount Callahan Saddle Management

APPENDIX D | INFORMATION FROM THE U.S. FISH AND WILDLIFE SERVICE REGARDING POTENTIAL CHANGES IN CONSERVATION FOR THREE COLORADO PLANTS FOLLOWING DESIGNATION OF CRITICAL HABITAT

Comments on how the Draft Economic Analysis Should Estimate Incremental Costs for *Ipomopsis polyantha* (Pagosa skyrocket), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*) Critical Habitat Designation

August 12, 2011

Introduction

The purpose of this document is to identify the incremental economic impacts associated with this designation of critical habitat that will occur beyond those economic impacts associated with the listing of *Ipomopsis polyantha* (Pagosa skyrocket), *Penstemon debilis* (Parachute beardtongue), and *Phacelia submutica* (DeBeque phacelia). These incremental economic impacts may occur, 1) in the unlikely event that we would make an adverse modification finding and not a jeopardy finding during our section 7 consultation process, 2) when surveys in critical habitat identify that the appropriate primary constituent elements but where the species is not located within 3,280 feet (ft) (1000 meters (m)) for *Ipomopsis polyantha* and *Penstemon debils* and within 328 ft (100 m) of *Phacelia submutica*, and 3) in unoccupied critical habitat units. In addition, we recognize that this critical habitat designation may trigger the section 7 consultation process where previously, entities would otherwise have been unaware that consultation was necessary. We do not consider this lack of awareness here in our incremental economic impact analysis.

For actions located on Federal lands, or subject to consultation through a Federal nexus or action (e.g. Federal funds), a jeopardy analysis for any of these species would look at the magnitude of a project's impacts relevant to the population(s) across the species' entire range. Furthermore, the jeopardy analysis would focus on effects to the species' reproduction, numbers, or distribution. In contrast, an adverse modification analysis would focus on a project's impacts to the physical features (primary constituent elements), or other habitat characteristics in areas determined by the Secretary to be essential for the conservation of the species, and analyze impacts to the capability of the critical habitat unit to maintain its conservation role and function for the species.

The long-term probability of the survival and recovery of these three plants is dependent upon the protection of existing populations sites; the potential to create new sites (for *Ipomopsis polyantha* and *Penstemon debilis*); the maintenance of ecological functions within these sites, including connectivity within and between sites in close geographic proximity to one another; to provide habitat for pollinators (for *Ipomopsis polyantha* and *Penstemon debilis*), and keeping these areas free of major habitat disturbing activities. This critical habitat designation works towards this survival and recovery of these three plant species.

The Species

IPOMOPSIS POLYANTHA (PAGOSA SKYROCKET)

The proposed critical habitat units for *Ipomopsis polyantha* are considered essential to the conservation of this species. Two of the four proposed units are currently occupied by *I. polyantha*. The two occupied units are entirely on non-Federal lands and the two unoccupied units are on U.S. Forest Service lands. In proposing critical habitat units, we have identified specific areas that are: 1) within suitable soils and the appropriate elevational range of *I. polyantha* in Colorado, 2) are essential to the conservation of the species, and 3) contain the habitat features essential to the long-term conservation of *I. polyantha*. Because two populations do not offer adequate redundancy for the survival and recovery of *I. polyantha*, we have determined that unoccupied areas are essential for the conservation of the species. Two additional units proposed to be designated are currently unoccupied by *I. polyantha*. We consider these units essential for the conservation of the species and believe the unoccupied units contain the primary constituent elements in the appropriate quantity and spatial arrangement sufficient to support the life-history needs of the species.

Units occupied by *Ipomopsis polyantha* at the time of listing were determined using location information from the Colorado Natural Heritage Program, the U.S. Forest Service, location information from our files, research efforts and consulting firms. Based on criteria developed by the CNHP, sites were classified into discrete populations if they were within 2 miles (mi) (3 kilometers (km)) of one another. We then created minimum convex polygons around each population and added a 3,280-ft- (1,000-m)-wide area for pollinator habitat as discussed in our proposal. For currently unoccupied units, we identified two areas where Mancos shale geology intersected with Federal ownership. We delineated these areas by following the Federal land management boundary, and identifying suitable habitats based on species and area experts' input and aerial imagery.

Ipomopsis polyantha is known from only two populations. Both populations are specific to Mancos shale soils at elevations of 6,725 to 7,776 ft (2,050 to 2,370 m) in Archuleta County. Plants are found in sparsely vegetated areas along the margins of *Pinus ponderosa* (Ponderosa pine) forests and extending into the adjacent grassland or shrublands. Based on the specific physical and biological features identified: suitable plant community and competition levels, suitable Mancos shale soils, suitable climate and elevation, habitat for pollinators which are required for reproduction, and an appropriate disturbance regime, we developed the following primary constituent elements:

(i) *Mancos shale soils*
(ii) *Elevation and climate*. Elevations from 6,400 to 8,100 ft (1,950 to 2,475 m) and current climatic conditions similar to those that historically occurred around Pagosa Springs, Colorado. Climatic conditions include suitable precipitation; cold, dry springs; and winter snow.
(iii) *Plant Community*

a. Suitable native plant communities (as described in b. below) with small (less than 100 ft^2 (10 m^2) or larger (several hectares or acres) barren areas with less than 20 percent plant cover in the actual barren areas.
b. Appropriate native plant communities, although these communities may not be like they were historically because they have already been altered. Therefore, the species can be found in areas where only the potential for the appropriate native plant community exists. For example, Ponderosa pine forests may have been cut or areas that had native vegetation may have been scrapped. Native habitats and plants are desirable; however, because of the state of the habitat, altered habitats including some nonnative invasive species should not be discounted. These plant communities include:
    i. Barren shales,
    ii. Open montane grassland (primarily Arizona fescue) understory at the edges of open Ponderosa pine, or
    iii. Clearings within the ponderosa pine and Rocky Mountain juniper and Utah juniper and oak communities.

(iv) *Habitat for pollinators*

a. Pollinator ground and twig nesting areas. Habitats suitable for a wide array of pollinators and their life history and nesting requirements. A mosaic of native plant communities generally would provide for this diversity.
b. Connectivity between areas allowing pollinators to move from one site to the next within each population.
c. Availability of other floral resources; this would include other flowering plant species that provide nectar and pollen for pollinators. Grass species do not provide resources for pollinators.
d. To conserve and accommodate these pollinator requirements, we have identified a 3,280-ft (1,000-m) area beyond occupied habitat to conserve the pollinators essential for reproduction.

(v) *Appropriate disturbance regime*

a. Appropriate disturbance levels—Light to moderate, or intermittent or discontinuous.
b. Naturally maintained disturbances through soil erosion or human maintained disturbances that can include light grazing, occasional ground clearing, and other disturbances that are not severe or continual.

PENSTEMON DEBILIS (PARACHUTE BEARDTONGUE)

The proposed critical habitat units for *Penstemon debilis* are considered essential to the conservation of this species. Two of the four proposed units are currently occupied by *P. debilis*. In proposing critical habitat units, we have identified specific areas that are: 1) within suitable soils and the appropriate elevational range of *P. debilis* in Colorado, 2) are essential to the conservation of the species, and 3) contain the habitat features essential to the long-term conservation of *P. debilis*. Because two populations do not offer adequate redundancy for the survival and recovery of *P. debilis*, we have determined that unoccupied areas are essential for the conservation of the species. Two additional units proposed to be designated are currently unoccupied by *P. debilis*. We consider these units essential for the conservation of the species

and believe the unoccupied units contain the primary constituent elements in the appropriate quantity and spatial arrangement sufficient to support the life-history needs of the species.

Units occupied by *Penstemon debilis* at the time of listing were determined using location information from the Colorado Natural Heritage Program, the Bureau of Land Management, the Colorado Natural Areas Program, location information from our files, and a consulting firm. Based on criteria developed by the CNHP, sites were classified into six discrete populations. We then created minimum convex polygons around each population and added a 3,280-ft (1,000-m)-wide area for pollinator habitat as discussed in our proposal. We also identified potential habitat by intersecting the geological formations, appropriate elevations, suitable soil types, with the "Rocky Mountain cliff and canyon" landcover classification. From this potential habitat analysis we took the two continuous bands of potential habitat that include the areas where *Penstemon debilis* is currently found and added them to our existing polygons, including pollinator habitat. We did this by again creating a minimum convex polygon. This condensed all known populations into two currently occupied units. For currently unoccupied units, we identified two areas where our potential habitat was intersected with Federal ownership. The boundaries of these unoccupied units are clipped to our potential habitat layer and the Federal ownership layer.

Penstemon debilis is specific to oil shale cliffs of the Parachute Creek Member and the Lower Part of the Green River Formation at elevations of 5,600 to 9,229 ft (1,707 to 2,813 m). Plants are found on unstable shale soils with little other vegetation. The other vegetation comprises primarily other plant species endemic (known only) to the oil shale. Based on the specific physical and biological features identified: suitable plant community and competition levels, suitable elevation, suitable slopes, suitable soils, suitable climate, habitat for pollinators which are required for reproduction, and an appropriate disturbance regime, we developed the following primary constituent elements:

(i) *Suitable Soils and Geology.*
   a. Parachute Member and the Lower part of the Green River Formation, although soils outside these formations would be suitable for pollinators.
   b. Appropriate soil morphology characterized by a surface layer of small to moderate shale channers (small flagstones) that shift continually due to the steep slopes and below a weakly developed calcareous, sandy to loamy layer with 40 to 90 percent coarse material.

(ii) *Elevation and climate*. Elevations from 5,250 to 9,600 ft (1,600 to 2,920 m). Climatic conditions similar to those of the Mahogany Bench, including suitable precipitation and temperatures.

(iii) *Plant Community*
   a. Barren areas with less than 10 percent plant cover.
   b. Presence of other oil shale endemics, including *Mentzelia rhizomata*, *Thalictrum heliophilum*, *Astragalus lutosus*, *Lesquerella parviflora*, *Penstemon osterhoutii*, and *Festuca dasyclada*.

(iv) *Habitat for pollinators*
   a. Pollinator ground and twig nesting habitats. Habitats suitable for a wide array of pollinators and their life history and nesting requirements. A mosaic of native plant communities generally would provide for this diversity (see *Plant*

Community above). These habitats can include areas outside of the soils identified in *Suitable Soils and Geology*.

b. Connectivity between areas allowing pollinators to move from one population to the next within units.

c. Availability of other floral resources. This would include other flowering plant species that provide nectar and pollen for pollinators. Grass species do not provide resources for pollinators.

d. To conserve and accommodate these pollinator requirements, we have identified a 3,280-ft (1,000-m) area beyond occupied habitat to conserve the pollinators essential for reproduction.

(v) *High levels of natural disturbance*

a. Very little or no soil formation.

b. Slow to moderate, but constant, downward motion of the oil shale that maintains the habitat in an early successional state.

PHACELIA SUBMUTICA (DEBEQUE PHACELIA)

The proposed critical habitat units for *Phacelia submutica* are considered essential to the conservation of this species. All units are within the geographical range of the species and are currently occupied by *P. submutica*.

Units occupied by *Phacelia submutica* at the time of listing were determined using location information from the Colorado Natural Heritage Program, the Colorado Native Plant Society, the Bureau of Land Management, the U.S. Forest Service, the Colorado Natural Areas Program, location information from our files, and consulting firms. These locations were classified into discrete element occurrences or populations if they were within 1.2 mi (2 km) and were not separated by unsuitable habitat, based on criteria developed by the Colorado Natural Heritage Program. We then created minimum convex polygons around each population and added a 328 ft (100 m) wide area to account for indirect effects. We then clipped these units to an existing habitat model to remove areas with unsuitable habitat.

Phacelia submutica is known only from clay soils on the Atwell and Shire members of the Wasatch Formation at elevations of 5,080 to 7,100 ft (1,548 to 2,157 m). The plants are found on clay barrens with little other vegetation. Surrounding these barren areas is a landscape of *Juniperus* spp. (juniper), *Artemisia* spp. (sagebrush), *Atriplex* spp. (saltbush), and nonnative invasive *Bromus tectorum* (cheatgrass). Plants may not emerge in a given year due to adverse climatic conditions. Based on the specific physical and biological features identified: suitable plant community and competition levels, suitable elevation, suitable topography, suitable soils, suitable climate, habitat for reproduction and maintenance of the seed bank, and an appropriate disturbance regime, we developed the following primary constituent elements:

(i) *Suitable Soils and Geology*

a. Atwell Gulch and Shire members of the Wasatch formation.

b. Within these larger formations, small areas (from 10 to 1,000 ft^2 (1 to 100 m^2)) on colorful exposures of chocolate to purplish brown, light to dark charcoal gray, and tan clay soils are especially important. These small areas are slightly different in texture and color than the similar surrounding soils. Occupied sites are characterized by

alkaline (pH range from 7 to 8.9) soils with higher clay content than similar nearby unoccupied soils.

c. Clay soils that shrink and swell dramatically upon drying and wetting and are likely important in the maintenance of the seed bank.

(ii) *Topography*. Moderately steep slopes, benches, and ridge tops adjacent to valley floors. Occupied slopes range from 2 to 42 degrees with an average of 14 degrees.

(iii) *Elevation and climate*

a. Elevations from 4,600 to 7,450 ft (1,400 to 2,275 m).

b. Climatic conditions similar to those around DeBeque, Colorado, including suitable precipitation and temperatures. Annual fluctuations in moisture (and probably temperature) greatly influences the number of *Phacelia submutica* individuals that grow in a given year and are thus able to set seed and replenish the seed bank.

(iv) *Plant Community*

a. Small (from 10 to 1,000 ft^2 (1 to 100 m^2)) barren areas with less than 20 percent plant cover in the actual barren areas.

b. Presence of appropriate associated species that can include (but are not limited to) the natives *Grindelia fastigiata, Eriogonum gordonii*, *Monolepis nuttalliana*, and *Oenothera caespitosa*. If sites become dominated by *Bromus tectorum* or other invasive nonnative species, they should not be discounted because *Phacelia submutica* may still be found there.

c. Appropriate plant communities within the greater pinyon–juniper woodlands that include:

(i) Clay badlands within the mixed salt desert scrub, or

(ii) Clay badlands within big sagebrush shrublands.

(v) Maintenance of the Seed Bank and Appropriate Disturbance Levels

a. Within suitable soil and geologies (see *Suitable Soils and Geology* above), undisturbed areas where seed banks are left undamaged.

b. Areas with light disturbance when dry and no disturbance when wet. Clay soils are relatively stable when dry but are extremely vulnerable to disturbances when wet.

Consultation History

To date, no section 7 consultations have occurred for *Ipomopsis polyantha*, *Penstemon debilis*, or *Phacelia submutica* because these species will not be listed under the Endangered Species Act until August 26th, 2011. No conferences (a substitute for consultation during the time a species' is proposed for listing) occurred while these species were proposed for listing. These critical habitat maps represent the first maps of the species' distribution widely published by the Service.

Incremental Economic Costs

It is unknown, but we expect few activities, on non-Federal lands, will have a Federal nexus (e.g. federal funding or permits) allowing for U.S. Fish and Wildlife Service (Service) involvement through the section 7 process and in requiring conservation measures. Exceptions may include highway maintenance and construction activities (particularly within habitat for *Ipomopsis polyantha*), some agricultural assistance programs, and some low income housing projects (again, particularly within habitat for *Ipomopsis polyantha*).

In Colorado, for our other listed plant species without critical habitat, we recommend that section 7 consultations be conducted at various distances from the actual footprints of plants (currently between 328 and 1,968 ft (100 and 600 m)). We try to recommend these distances based on the best available information on impacts (both direct and indirect), habitat requirements, the potential for genetic exchange, and pollinator requirements. Because of this proposed critical habitat designation, these recommended distances will not be necessary. If we were not proposing critical habitat, we expect that our recommended consultation distances would be the same as the pollinator habitat distances (3,280 ft (1,000 m) for both *Ipomopsis polyantha* and *Penstemon debilis*) or indirect impacts (328 ft (100 m) for *Phacelia submutica*) as identified through this critical habitat designation. These distances would be from occupied habitat. In contrast, this designation lumped all known occupied habitat into a population (using a minimum convex polygon) all and then used the 3,280 ft (1000 m) or 328 ft (100 m) pollinator habitat or indirect effects areas around these populations.

For the two unoccupied critical habitat units for *Ipomopsis polyantha* and the two unoccupied units for *Penstemon debilis* no section 7 consultation would otherwise be necessary. All four of these units are entirely on Federal lands. Here we address the activities that could occur in these units.

- *Ipomopsis polyantha* Unit 2, O'Neal Hill Special Botanical Area – Roughly half of the acreage of this unit falls within the Special Botanical Area. Within this portion of the unit livestock grazing does not occur. Areas outside the Special Botanical Area are open to livestock grazing although the use is light. Two roads run through or immediately adjacent to the site. Low levels of recreation and hunting occur at the site. Weed control occurs at the site. Utility lines are also a possibility in the future.
- *Ipomopsis polyantha* Unit 4, Eight Mile Mesa – Currently the livestock allotment on this parcel is vacant. The U.S. Forest Service expects to keep this livestock allotment vacant into the future but this vacancy is not guaranteed. Other activities that do and could occur on the property include controlled burns and thinning projects to reduce fuel loads, weed control, the eventual establishment of trails through the area, fire suppression, recreational use, and firewood gathering.
- *Penstemon debilis* Unit 1, Brush Mountain – This unit is in an area rich in both natural gas and oil shale resources. The bulk of the unit is extremely steep making resource extraction difficult. Other uses occur at low intensity because of the abundance of cliffs in the area. All flat areas would be potentially used for natural gas and oil shale resources as well as livestock and recreational use. We are aware of one abandoned oil well location within this unit. Some small two track roads run through this unit.
- *Penstemon debilis* Unit 2, Cow Ridge – This unit is in an area rich in both natural gas and oil shale resources. The bulk of the unit is extremely steep making resource extraction difficult. Other uses occur at low intensity because of the abundance of cliffs in the area. All flat areas would be potentially used for natural gas and oil shale resources as well as livestock and recreational use. We are unaware of any current oil and gas extraction efforts within the unit. Some small two track roads run through this unit.

In consultations on projects where impacts are proposed for these plants' habitat, a determination of adverse modification would usually be coincident to a jeopardy determination for the same action. Although independent analyses are made for jeopardy and adverse modification, most measures necessary to avoid adverse modification of critical habitat would avoid jeopardy as well. The incremental cost differences of these consultations will likely be limited to administrative costs.

Under limited circumstances, it may be possible to differentiate between measures implemented to minimize impacts to individuals and to avoid jeopardy to the species range-wide, and measures implemented to minimize impacts to habitat characteristics (primary constituent elements) and avoid adverse modification of critical habitat. For most temporary and almost all permanent impacts, the Service, in coordination with the lead Federal agency, recommends compensatory habitat creation or enhancement, and protection. For impacts to genetic exchange, we again would look to determine if the impacts are temporary or permanent. Permanent impacts would look at issues such as limiting connectivity between populations, habitat fragmentation, or impacts to habitat requirements of insect pollinators. Conservation measure recommended by the Service will protect or enhance habitat features described as primary constituent elements within the proposed critical habitat designations. In critical habitat, compensatory measures should be within the same critical habitat unit to ensure that the unit would continue to serve its recovery function within the larger critical habitat designation. In such circumstances, higher cost of some measures could be attributable to minimizing impacts to the designation of critical habitat.

Due to the difference in the scope of a critical habitat unit and the entire range of these species, in rare instances even after measures to minimize and compensate for impacts of a project are pursued, we may determine that a project would not jeopardize these species but would result in adverse modification of critical habitat. Any costs of implementing reasonable and prudent alternatives associated with such a consultation would be incremental costs beyond those attributable to these species being listed.

Of particular concern when analyzing impacts to the primary constituent elements is the extent and location of a project within a critical habitat unit. Projects that (1) significantly impact the features essential (see the primary constituent elements above) for the survival of the species or (2) sever or fragment a critical habitat unit may result in adverse modification if the impacts affect the ability of that unit to continue to function and support occupancy. For example, loss of pasturelands dominated by nonnative species may not result in a determination of adverse modification, while significant losses of shale barrens central to a population of *Ipomopsis polyantha* or actions causing fragmentation of habitat in a unit, is more likely to generate determination of adverse modification if not offset by conservation actions.

If we determine that an adverse modification finding may be likely, we would suggest changes to the project or reasonable and prudent alternatives to eliminate or reduce the impacts. These measures or alternatives may range from modifying the development project such that (1) less land use would occur within critical habitat; (2) a project would be redesigned to avoid specific areas important to these species; (3) incorporating a range of "best management practices" to

protect species' habitat; and (4) providing conservation measures to enhance and protect habitat within the same critical habitat unit.

In summary, although the outcomes of individual consultations under section 7 of the Endangered Species Act will vary, we believe a reasonable method to determine the potential incremental impacts of this proposed critical habitat designation is to address the likelihood of the following:

- In areas where uncertainty exists over whether one of these plants is currently present at a specific site and there is resultant uncertainty as to whether a proposed project is likely to adversely affect one of these species, the existence of critical habitat may make this point moot and result in section 7 consultation and associated costs where it could potentially otherwise be avoided. This is especially true for *Phacelia submutica* where the plant may not emerge in a given area during a given year because of adverse climatic conditions thereby making uncertainty over habitat being occupied greater.

- Some specific project sites within the limits of critical habitat units may be in habitat not occupied by these plants and adverse effects to critical habitat may occur in areas where adverse effects to the plants would not otherwise be concluded. In such cases, costs related to section 7 consultation could be attributed to the designation of critical habitat. This is especially true in areas with primary constituent elements that are more than 1000 meters from known *Ipomopsis polyantha* or *Penstemon debilis* sites and in areas more than 100 meters from known *Phacelia submutica* sites.

- We are proposing to designate two unoccupied critical habitat units for *Ipomopsis polyantha* and two unoccupied units for *Penstemon debilis*. At all four of these unoccupied units section 7 consultations would not otherwise have been necessary, unless surveys found plants that were previously unknown.

- In rare instances a project would not jeopardize the plants but would result in adverse modification of critical habitat. The costs of implementing reasonable and prudent alternatives would be attributable to critical habitat.

To IEc from the U.S. Fish and Wildlife Service, Region 6, October 4, 2011:

There are certain instances a federal action would not jeopardize plants (*Ipomopsis polyantha*, *Penstemon debilis* or *Phacelia submutica*) but would result in an adverse modification of critical habitat. The jeopardy standard is species-centric. Habitat effects are considered, but in the context of how those effects are likely to reduce the reproduction, numbers, or distribution of the listed species. Whereas, the adverse modification standard is habitat-centric, and its application involves an assessment of effects to habitat designated as critical habitat in the context of how the primary constituent elements and the intended recovery function of the critical habitat are likely to be affected. Application of the adverse modification standard does not consider the effects of an action on the reproduction, numbers, or distribution of the listed species for which the critical habitat was designated.

- It is possible that an adverse modification finding might be made in the absence of a jeopardy finding at unoccupied critical habitat units. We expect an adverse modification finding could be made if an action or multitude of actions led to meaningful ground disturbance, making designated critical habitat areas unusable as potential introduction sites for the plants in the future. Within the unoccupied units, certain areas will be more suitable for introductions than others. A loss of these more suitable sites with the primary constituent elements would weigh heavier than the less suitable sites within the units.

- Both the jeopardy and adverse modification definitions include the recovery of species. Therefore, within 1000 meters of *Ipomopsis polyantha* and *Penstemon debilis* plants and within 100 meters of *Phacelia submutica* plants we expect that any adverse modification finding to the habitat would be concurrent with any jeopardy finding to the species. Because conservation of the species includes considerations of habitat, adverse modification and jeopardy analyses would be concurrent and impossible to separate.

- Outside of the 1000 and 100 meter buffers, there is the possibility for an adverse modification finding in the absence of a jeopardy finding. An adverse modification finding might result if the appropriate primary constituent elements are present and the habitat to be deemed essential for recovery of the species. An action that would cause a large ground disturbance, or a multitude of smaller projects that impacted habitat, could lead to an adverse modification finding. Another possibility is if an action within critical habitat could cause significant impacts to gene flow within the critical habitat unit/population. An example of this would be a wide linear disturbance. Like with the unoccupied critical habitat units, we expect this scenario to be very unlikely because these areas outside of buffered areas will be less important to the recovery of the species than those areas inside the buffers.