

**DRAFT ECONOMIC ANALYSIS
OF CRITICAL HABITAT DESIGNATION
FOR THE PREBLE'S MEADOW JUMPING MOUSE**

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EXECUTIVE SUMMARY

1. The purpose of this report is to identify and analyze potential economic impacts associated with consultations under section 7 of the Endangered Species Act (Act) or activities affecting proposed critical habitat for the Preble's meadow jumping mouse (*Zapus hudsonius preblei*). This report was prepared by Industrial Economics, Incorporated for the U.S. Fish and Wildlife Service's (Service) Division of Economics.
2. Section 4(b)(2) of the Act requires the Service to designate critical habitat on the basis of the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

Framework for the Analysis

3. The focus of this economic analysis is on section 7 of the Act, which requires Federal agencies to insure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. Federal agencies are required to consult with the Service whenever they propose an action that may affect a listed species or its designated critical habitat. Aside from the protection that is provided under section 7, the Act does not provide other forms of protection to lands designated as critical habitat. Because consultation under section 7 only applies to activities that are carried out, permitted, or funded by a Federal agency, the designation of critical habitat will not afford any additional protections for species with respect to strictly private activities.
4. This analysis recognizes the difficulty in differentiating between consultations that result from the listing of the species (i.e., jeopardy) and consultations that result from the presence of critical habitat (i.e., adverse modification). By quantifying the potential impacts associated with all future section 7 impacts in or near proposed critical habitat, the analysis ensures that any critical habitat impacts that may occur co-extensively with the listing of the species are not overlooked. As a result, this analysis likely overstates the regulatory activity under section 7 attributable to designation of critical habitat.
5. The designation, or proposed designation, of critical habitat may affect private entities with no Federal nexus, and therefore no section 7 responsibilities under the Act. For example, landowners may develop Habitat Conservation Plans (HCPs) under section 10 of the Act in order to comply with section 9.¹ Some landowners may also develop HCPs in the hopes of

¹ Under section 10 of the Act, an incidental take permit is required when non-Federal activities will result in "take" of a threatened or endangered species. An HCP must accompany each incidental take permit application. The purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. The HCP attempts to counterbalance potential harmful effects that a proposed activity may have on a species, while allowing the otherwise lawful activity to proceed. As such, HCPs

having their lands excluded from a critical habitat designation. In order to conduct a full analysis of all of the economic impacts of a critical habitat designation, this analysis considers the costs associated with the completion of HCPs for the PMJM, as these may be motivated by the proposed critical habitat designation, and are therefore attributable to the critical habitat designation.

6. In 2001 and 2002, the Service adopted special regulations pursuant to section 4(d) of the Act for the Preble's meadow jumping mouse (PMJM). These regulations provide exemption from take provisions under section 9 of the Act for certain activities related to rodent control, ongoing agricultural activities, landscape maintenance, perfected water rights, certain noxious weed control, and ditch maintenance activities.² The regulations were implemented to provide the landowner time to prepare an HCP and apply for an incidental take permit (under section 10) in order to comply with section 9 of the Act.³ However, the special regulations will expire in May, 2004, at which time landowners will be subject to the section 9 prohibitions against take. The costs related to sections 9 and 10 of the Act are addressed in section 6.8 and Appendix B.

Key Findings

Major Effects of the Proposed Rule

7. Estimates of the economic impact associated with the implementation of section 7 for the PMJM range from \$74 million to \$172 million over ten years (or \$7 million to \$17 million annually).⁴ While a range of activities may incur section 7 impacts, 82 percent of the costs are expected to stem from potential project modifications, administrative consultations and technical assistance costs associated with residential and related development projects, and less than one percent of costs are expected to stem from agricultural activities in areas proposed for designation. The remainder of the costs are associated with transportation, national fire plans, utilities, recreation, bank stabilization, and activities at the Warren Air Force Base and Rocky Flats Environmental Technology site.

Costs Associated with Residential and Related Development Activity in Colorado

are generally developed to meet the requirements of section 10 of the Act.

² U.S. Fish and Wildlife Service, "Endangered and Threatened Wildlife and Plants; Final Special Regulations for the Preble's Meadow Jumping Mouse," 66 *FR* 28125, May 22, 2001; and U.S. Fish and Wildlife Service, "Endangered and Threatened Wildlife and Plants; Amended Special Regulations for the Preble's Meadow Jumping Mouse," 67 *FR* 61531, October 1, 2002.

³ Endangered and Threatened Wildlife and Plants; Final Special Regulations for the Preble's Meadow Jumping Mouse, 66 *FR* 99, May 22, 2001.

⁴ These estimates have been converted to present values using a seven percent discount rate and include impacts that are co-extensive with other aspects of section 7 of the Act (see Exhibit 7-3)

8. Residential and related development that takes place on private lands and involves Federal funding, permitting, or authorization is the activity most likely to result in consultations in the proposed critical habitat area. Impacts to residential and related development projects are expected to result from administrative costs associated with the consultation process, costs of project delays, and costs of mitigative measures to protect habitat. Over 98 percent of these costs are borne by third parties (i.e., the landowner, the land developer, or the housing consumer). Predicting which parties bear the cost of these measures is difficult. Given the availability of *substitute* housing sites in the study area, total residential development (i.e., the number of new housing units constructed) is not likely to decline as a result of the critical habitat designation for the PMJM. It is likely, however, that project delays and required project modifications will result in some impacts (or increased costs) either to the landowner, the land developer, or (possibly) the housing consumer. For example, if the full measure of these costs is borne by the landowner in an area designated as critical habitat, then the value of the land is likely to decrease; that is, the seller will receive a lower price under the designation than without the designation for the same land. Alternatively, if the full measure of these costs is borne by the land developer, then the total dollar *profits* to the developer could decrease by approximately six percent to 30 percent.⁵ Thus, in this scenario the developer experiences lower profit margins, but the price to the home buyer remains the same. In the event that the housing consumer bears the full measure of these cost impacts, the purchaser could experience a 1.5 percent increase in home prices, albeit with a potential concurrent increase in amenities, including more open space or larger lot size.⁶ It is important to note, however, that these amenities may be offset by *disamenities*, including a decrease in actual home size (i.e., in square footage). This analysis suggests that consumers in the immediate area surrounding the critical habitat are not likely to experience an increase in home prices.
9. Although the distribution of costs across landowners, developers, and homebuyers is difficult to predict, the effects of these potential shifts in land values, developer profits, and housing prices represent the overall change in social welfare resulting from the proposed rule. In other words, these shifts represent changes in producer and consumer surplus.

Costs Associated with Possible Changes in Agricultural Activity in Wyoming

10. For the PMJM in Wyoming, the proposed critical habitat designation is expected to have a modest impact on agriculture land use. The proposed critical habitat designations for the PMJM will affect private landowners in Wyoming if a Federal nexus exists with respect to their farming and ranching operations.⁷ Agriculture activities typically do not involve a Federal nexus because most are not authorized, permitted or funded by a Federal agency. Even if a landowner's agriculture operation includes a Federal nexus, resulting in a section

⁵ This calculation can be found in Section 4, page 4-23.

⁶ Ibid.

⁷ However, the designation, or proposed designation, of critical habitat may affect private entities with no Federal nexus, and therefore no section 7 responsibilities under the Act. These impacts are discussed in section 6-8 of this analysis.

7 consultation with the Service, the Service is not likely to stop or change the on-going agriculture activity because agriculture activities typically do not result in “adverse modification” of critical habitat.⁸

11. When special regulation 4(d) expires in May, 2004, landowners will no longer be exempt from section 9 prohibitions against take, and the full impacts of section 9 take may be felt by those agricultural operators in southeast Wyoming operating without an incidental take permit (section 10 of the Act). Sections 9 and 10 of the Act apply to all landowners with PMJM on their property.

Costs Associated with Other Activities

12. Other activities that may be affected by the proposed critical habitat designation include road and bridge construction and maintenance, National Forest fire plans, utilities, recreation on Forest Service lands, bank stabilization, and activities at the Warren Air Force Base and Rocky Flats Environmental Technology Site. It is likely several consultations will also occur on Federal lands included in the designation, such as grazing and recreation permits on U.S. Forest Service (USFS) and Bureau of Land Management (BLM) lands. Additionally, several Federal agencies may consult with the Service on their planned activities as well as activities involving Federal funding, permitting, or authorization, including the Army Corps of Engineers (ACOE), U.S. Department of the Interior, BLM, U.S. Department of Agriculture (USDA), USFS, Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA), U.S. Department of Defense (DOD), and the Department of Energy (DOE). Road and bridge construction and maintenance consultation costs are the largest component of these other costs (\$10 million and \$18 million over the next ten years). These costs account for most of the costs in Wyoming.

Benefits Associated with Protection of the Area Proposed as Critical Habitat

13. Certain categories of benefit may derive from the listing of the PMJM and the designation of critical habitat. Survival and recovery of the species may lead to benefits such as enhanced existence values. Protecting the PMJM habitat may produce benefits such as preservation of habitat suitable for recreational uses, habitat improvement for other species, and the preservation of existing open space. Insufficient information exists to quantify the benefits of habitat protection. However, studies published in the economics literature attempt to estimate the impacts of open space on adjacent or nearby properties using hedonic property valuation techniques. While these studies do not predict the effect of PMJM habitat protection on property values in Wyoming or Colorado, they do support the notion that preservation of open space may generate benefits to the public.

⁸ Adverse modification is defined as “a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.” 50 CFR 402.02; Personal communication with Biologists, U.S. Fish and Wildlife Service, Cheyenne Field Office and Colorado Ecological Services Field Office, 2002.

Summary

14. Exhibit ES-1 provides a summary of the total estimated consultation, technical assistance and project modification costs associated with the listing and proposed critical habitat designation for the PMJM by activity over the next ten-years. These cost estimates are a function of the assumed number of consultations and project modifications, including mitigation costs for development and road activities in Colorado and landfill remediation work on the Warren Air Force Base in Wyoming, along with per effort costs for these activities. The low and the high scenarios are driven by uncertainty in estimating future consultations and associated project modification costs.

Exhibit ES-1

**ESTIMATED TOTAL ECONOMIC COSTS OF PROPOSED DESIGNATION BY STATE
(TEN YEARS)**

Activity	No. of Formal/ Informal Consultations	Informal Consultation	Formal Consultation	Project Modifications	Total Costs
WYOMING					
Agriculture	6/54	\$358,000	\$203,000 to \$242,000	unknown	\$561,000 to \$600,000
Transportation	60/128	\$447,000 to \$1,981,000	\$930,000 to \$1,530,000	\$6,990,000	\$8,367,000 to \$10,501,000
National Fire Plan	1/0	n/a	\$13,000 to \$21,000	\$0	\$13,000 to \$21,000
Warren Air Force Base	0/28-31	\$64,000 to \$391,000	n/a	\$730,000	\$794,000 to \$1,121,000
Utilities	4.3/8.7	\$31,000 to \$135,000	\$67,000 to \$110,000	unknown	\$97,000 to \$245,000
Recreation	All	n/a	n/a	n/a	n/a
Bank Stabilization	2.3/4.7	\$16,000 to \$72,000	\$36,000 to \$59,000	unknown	\$52,000 to \$131,000
Technical Assistance					\$403,000 to \$889,000
Subtotal	73.6/223.4-226.4	\$916,000 to \$2,937,000	\$1,248,000 to \$1,962,000	\$7,720,000	\$10,287,000 to \$13,508,000
COLORADO					
Development	93/80	\$280,000 to \$1,240,000	\$3,578,000 to \$4,345,000	\$53,580,000 to \$135,922,000	\$57,438,000 to \$141,507,000
Transportation	65/41	\$144,000 to \$636,000	\$1,008,000 to \$1,657,000	\$488,000 to \$4,875,000	\$1,639,000 to \$7,168,000
National Fire Plan	41-61/0	n/a	\$517,000 to \$1,306,000	\$0	\$517,000 to \$1,306,000
Utilities	79/0	n/a	\$1,225,000 to \$2,015,000	unknown	\$1,225,000 to \$2,015,000
Rocky Flats Environmental Technology Site	0/0	unknown	unknown	\$1,440,000 to \$1,920,000	\$1,440,000 to \$1,920,000
Recreation	2/0	n/a	\$25,000 to \$43,000	\$0	\$25,000 to \$43,000
Bank Stabilization	26/0	n/a	\$388,000 to \$638,000	unknown	\$388,000 to \$638,000
Technical Assistance					\$1,472,000 to \$3,452,000
Subtotal	326/121	\$424,000 to \$1,876,000	\$6,740,000 to \$10,003,000	\$55,508,000 to \$142,717,000	\$64,143,000 to \$158,047,000
TOTAL	399.6/347.4	\$1,340,000 to \$4,812,000	\$7,988,000 to \$11,965,000	\$63,228,000 to \$150,437,000	\$74,430,000 to \$171,554,000

Note: Totals may not sum due to rounding.

Source: Based on past consultation records and conversations with Federal agencies potentially affected by the proposed critical habitat designation.

15. Exhibit ES-2 provides a more detailed summary of the total estimated consultation, technical assistance and project modification costs likely to be associated with the listing and proposed critical habitat designation for the PMJM by unit, organized by state, over the next ten-years. As this exhibit illustrates, most of the estimated costs for Wyoming are expected to be associated with road and bridge construction and maintenance (78 percent). In Colorado, more than 89 percent of the estimated costs are expected to be associated with residential and related development. Most of these costs are in units SP12 and A1, together comprising approximately 77 percent of the estimated total cost of the designation.
16. Exhibit ES-3 provides an overview of the total section 7 costs associated with the listing and designation of critical habitat for the PMJM by state, over a ten year period.
17. Exhibit ES-4 presents the key assumptions of this economic analysis, as well as the potential direction of bias introduced by each assumption. For example, the analysis assumes that the frequency of consultations will continue at historical rates in the future. There is, however, some indication that consultation and technical assistance efforts may decline in the future, reducing the ultimate cost of the designation.

Exhibit ES-2

**TOTAL SECTION 7 COSTS ASSOCIATED WITH THE LISTING OF AND DESIGNATION OF CRITICAL HABITAT FOR THE PMJM BY UNIT
(TEN YEARS)**

Units	No. of Formal/ Informal Consultations	Informal Consultation	Formal Consultation	Project Modification Costs	Total Costs^a
WYOMING					
NP1	10.33/22.46	\$89,000 to \$313,000	\$176,000 to \$284,000	\$999,000	\$1,329,000 to \$1,741,000
NP2	9.33/22.46	\$90,000 to \$316,000	\$176,000 to \$284,000	\$999,000	\$1,328,000 to \$1,739,000
NP3	12/41.8	\$206,000 to \$480,000	\$219,000 to \$328,000	\$999,000	\$1,496,000 to \$1,968,000
NP4	9.23/21.26	\$86,000 to \$298,000	\$146,000 to \$235,000	\$999,000	\$1,241,000 to \$1,553,000
NP5	12.33/41.46	\$204,000 to \$475,000	\$209,000 to \$311,000	\$999,000	\$1,519,000 to \$2,022,000
SP1	8.8/19.7	\$77,000 to \$281,000	\$139,000 to \$224,000	\$999,000	\$1,221,000 to \$1,517,000
SP2	1/33	\$71,000 to \$422,000	\$16,000 to \$26,000	\$730,000	\$825,000 to \$1,195,000
SP3	10.6/24.2	\$93,000 to \$351,000	\$167,000 to \$270,000	\$999,000	\$1,328,000 to \$1,773,000
Subtotal	73.62/226.34	\$916,000 to \$2,937,000	\$1,248,000 to \$1,962,000	\$7,720,000	\$10,287,000 to \$13,508,000
COLORADO					
SP3	14/2	\$7,000 to \$31,000	\$218,000 to \$358,000	\$240,000 to \$643,000	\$517,000 to \$1,156,000
SP4	31.5/2	\$11,000 to \$47,000	\$389,000 to \$752,000	\$163,000 to \$649,000	\$676,000 to \$1,716,000
SP5	29.5/2	\$7,000 to \$31,000	\$358,000 to \$701,000	\$113,000 to \$539,000	\$582,000 to \$1,516,000
SP6	28.5/2	\$7,000 to \$31,000	\$343,000 to \$676,000	\$88,000 to \$485,000	\$532,000 to \$1,413,000
SP7	27.5/2	\$7,000 to \$31,000	\$327,000 to \$651,000	\$63,000 to \$430,000	\$494,000 to \$1,340,000
SP8	17/8	\$28,000 to \$124,000	\$263,000 to \$433,000	\$290,000 to \$753,000	\$664,000 to \$1,504,000
SP9	0/0	unknown	unknown	\$1,440,000 to \$1,920,000	\$1,440,000 to \$1,920,000
SP10	17/2	\$7,000 to \$31,000	\$263,000 to \$433,000	\$290,000 to \$753,000	\$623,000 to \$1,365,000
SP11	32/15	\$53,000 to \$233,000	\$538,000 to \$855,000	\$1,113,000 to \$3,445,000	\$1,859,000 to \$4,898,000
SP12	45.37/20	\$70,000 to \$310,000	\$1,109,000 to \$1,525,000	\$10,383,000 to \$27,025,000	\$11,778,000 to \$29,368,000
SP13	12.37/5	\$18,000 to \$78,000	\$304,000 to \$413,000	\$3,105,000 to \$8,010,000	\$3,484,000 to \$8,635,000
A1	70.37/60	\$210,000 to \$930,000	\$2,628,000 to \$3,208,000	\$38,223,000 to \$98,065,000	\$41,493,000 to \$103,216,000
Subtotal	326/121	\$424,000 to \$1,876,000	\$6,740,000 to \$10,003,000	\$55,508,000 to \$142,717,000	\$64,143,000 to \$158,047,000
TOTAL	399.6/347.4	\$1,340,000 to \$4,812,000	\$7,988,000 to \$11,965,000	\$63,228,000 to \$150,437,000	\$74,430,000 to \$171,554,000

^a Technical assistance costs are allotted by unit based on the distribution of formal and informal consultations. These costs are included in Total Costs only.

Note: Totals may not sum due to rounding.

Exhibit ES-3		
PRESENT VALUE TOTAL SECTION 7 COSTS (TEN YEARS)		
	Total Section 7 Costs	
	Low	High
Wyoming Total Activity Costs	\$10,290,000	\$13,510,000
Colorado Total Activity Costs	\$64,140,000	\$158,040,000
TOTAL COST	\$74,430,000	\$171,550,000
Present Value (7%)	\$52,280,000	\$120,500,000
Annualized (7%)	\$7,440,000	\$17,160,000
<p>Note: This table presents nominal costs as well as the discounted present value of total costs based on a seven percent discount rate with the assumption that total costs are distributed evenly over the ten-year period. Discounted costs are then annualized assuming that total costs will be evenly distributed across the ten-year period.</p>		

Exhibit ES-4	
CAVEATS TO THE ECONOMIC ANALYSIS	
Key Assumption	Effect on Cost Estimate
The rate of formal and informal consultations will not decrease over time.	++
The presence of other threatened and endangered species (i.e., Ute ladies' tresses orchid, Colorado butterfly plant, etc.) has no influence on consultation/project modification costs.	+
All future developments will be part of either large-scale residential and related or small scale developments subject to consultation.	++
As part of their planning efforts, developers will not account for prospective processing delays or will incur additional costs to avoid delays.	+++
There are no social welfare benefits from the preservation of open space (potentially reflected by increased home values on properties located near mitigation lands).	++
The historic occurrence and cost of project modifications are good predictors of future consultation costs.	?
The characteristics of historic residential and related developments are good indicators of the characteristics of future developments: number of units per development, median home price, etc.	?
Density of future development will remain the same following project modifications resulting from critical habitat.	?
Substitute development lots exist to offset development units lost within critical habitat areas.	-
Private ranchers will seek Federal funding for agricultural improvements, disaster relief, and voluntary conservation activities.	+
<p>- : This assumption may result in an underestimate of real costs. + : This assumption may result in an overestimate of real costs. Multiple "+" keys refer to the magnitude of effect anticipated. ? : This assumption has an unknown effect on estimates.</p>	

18. In July 2002, the U.S. Fish and Wildlife Service (the Service) proposed designating critical habitat for the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) on approximately 57,446 acres in Wyoming (Albany, Converse, Laramie and Platte counties), and Colorado (Boulder, Douglas, El Paso, Jefferson, Larimer, Teller and Weld counties). The purpose of this report is to identify and analyze potential economic impacts associated with consultations under section 7 of the Endangered Species Act (the Act) on activities affecting proposed critical habitat for the Preble's Meadow Jumping Mouse (PMJM). This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the Service's Division of Economics.
19. Section 4(b)(2) of the Act requires that the Service base the designation of critical habitat upon the best scientific and commercial data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas as critical habitat, provided the exclusion will not result in extinction of the species.
20. Under the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to jeopardize the continued existence of the species. The Service defines jeopardy as any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat is currently construed as any direct or indirect alteration that appreciably diminishes the value of critical habitat for conservation of a listed species.

1.1 Description of Species and Habitat⁹

21. The PMJM is a small rodent with a long tail, large hind feet, and long hind legs. The tail is bicolored, lightly-furred, and typically twice as long as the body. The PMJM has a distinct, dark, broad stripe on its back that runs from head to tail and is bordered on either side by gray to orange-brown fur. The hair on the back of jumping mice appears coarse compared to other mice. The underside hair is white and much finer in texture. Total length of adult PMJM mice is approximately 7 to 10 inches, and tail length is 4 to 6 inches. The

⁹ Information on the PMJM and its habitat is taken from the U.S. Fish and Wildlife Service, *Proposed Designation of Critical Habitat for the Preble's Meadow Jumping Mouse*, July 17, 2002 (67 FR 137).

average weight in the active season is 18 grams. Upon emergence from hibernation, adult PMJM mice can weigh as little as 14 grams. Through late August and into mid-September, PMJM adults ready for hibernation typically weigh 25 to 34 grams.

22. The PMJM is a member of the family Dipodidae (jumping mice) with four living genera, two of which, *Zapus* and *Napaeozapus*, are found in North America. The PMJM is now recognized as one of 12 subspecies of meadow jumping mouse.
23. In determining which areas to propose as critical habitat, the Service must consider those physical and biological features that are essential to the survival and recovery of the species. The following are the primary constituent elements the Service has identified as critical to the survival of the PMJM:
 - A pattern of dense riparian vegetation consisting of grasses, forbs, and shrubs in areas along rivers and streams that provide open water during the PMJM active season;
 - Adjacent floodplains and vegetated uplands with limited human disturbance; and
 - Dynamic geomorphological and hydrological processes typical of systems within the range of the PMJM.

1.2 Proposed Critical Habitat

24. The Service has proposed critical habitat designation for the PMJM encompassing 57,446 acres found along 657.5 miles of rivers and streams in Colorado and Wyoming. The proposed critical habitat for the PMJM includes approximately 237.2 miles of rivers and streams and 20,054 acres of land in Wyoming and approximately 420.3 miles of rivers and streams and 37,392 acres of land in Colorado. Lands proposed as critical habitat are under Federal, State, local government, and private ownership. None of the proposed lands fall under Tribal ownership. Proposed habitat in Wyoming spans the counties of Albany, Converse, Laramie and Platte. Proposed habitat in Colorado spans the counties of Boulder, Douglas, El Paso, Jefferson, Larimer, Teller and Weld. Approximately 16,050 acres, or roughly 27.9 percent, are located on federally-owned or managed lands; 4,128 acres (7.2 percent) on land owned or managed by state agencies; and 37,267 acres (64.9 percent) on permitted land or on land managed by local authorities.
25. A more detailed description of each critical habitat unit is provided in Exhibit 1-1.

**Exhibit 1-1
DESCRIPTION OF CRITICAL HABITAT UNITS**

Unit	Description	Size (acres)	State	County
NP1 Cottonwood Creek	This unit is located in the northwestern portion of the species' range. The unit contains both public and private land, including Federal land that is part of the Medicine Bow-Routt National Forest. Private lands in this area are used extensively for grazing and haying.	2,284	Wyoming	Albany Platte Converse
NP2 Horseshoe Creek	This unit encompasses the northern most portion of the species range, and is the northern most unit in the North Platte River Drainage. The entire unit is located on Federal lands within the Medicine Bow-Routt National Forest.	377	Wyoming	Albany Converse
NP3 Chugwater Creek	This unit encompasses the western portions of the species' range in Wyoming. Land in this unit is primarily owned by private entities, with small portions of state ownership.	9,416	Wyoming	Albany Laramie Platte
NP4 Friend Creek and Murphy Canyon	This unit is located in the northwestern portion of the species' range. The unit is primarily located on Federal lands within the Medicine Bow-Routt National Forest, with small parcels of intervening non-Federal lands.	1,689	Wyoming	Albany
NP5 Horse Creek	This unit is the southern most unit in the North Platte River Drainage. Land within this unit is primarily owned by private entities, with small portions of state ownership.	4,373	Wyoming	Laramie
SP1 Lodgepole Creek and Upper Middle Lodgepole Creek	This unit is the northern most unit located in the South Platte River Drainage, and extends into the southwestern portion of the species' range in Wyoming. Land in this unit is almost entirely private. A small portion of the unit is located on Federal lands within the Medicine Bow-Routt National Forest.	654	Wyoming	Laramie
SP2 F.E. Warren Air Force Base/Crow Creek	This unit encompasses the southwestern portion of the species range in Wyoming. The entire unit is located on Federal lands within the F.E. Warren Air Force Base.	331	Wyoming	Laramie

**Exhibit 1-1
DESCRIPTION OF CRITICAL HABITAT UNITS**

Unit	Description	Size (acres)	State	County
SP3 Lone Tree Creek	This is the only unit located in Wyoming and Colorado. The subunits of Lone Tree Creek Wyoming and Lone Tree Creek Colorado contain both public and private lands. The subunit of Lone Creek Colorado also includes a portion of Interstate Highway 25.	974	Wyoming & Colorado	Laramie Weld
SP4 North Fork Cache La Poudre River	This unit is the northern most unit in Colorado not shared with Wyoming. The unit contains both public and private lands. Federal lands include portions of the Arapaho-Roosevelt National Forest, and state lands include the Lone Pine State Wildlife Area. Large private landowners include the Livermore Valley Landowners.	8,206	Colorado	Larimer
SP5 Cache La Poudre River Watershed	This unit is located in the northwestern portion of the species' range in Colorado. The unit is primarily located on Federal lands within the Arapaho-Roosevelt National Forest and Cache La Poudre Wilderness.	4,725	Colorado	Larimer
SP6 Buckhorn Creek	This unit is located in the northwestern portion of the species' range in Colorado. This area contains both public and Federal lands. Federal lands comprise portions of the Arapaho-Roosevelt National Forest.	3,798	Colorado	Larimer
SP7 Cedar Creek	This unit is located in the northwestern portion of the species' range in Colorado. The unit is centered on Federal lands within the Arapaho-Roosevelt National Forest. The unit also contains some non-Federal lands.	624	Colorado	Larimer
SP8 South Boulder Creek	This unit is located in the central portion of the species' range in Colorado. A substantial portion is owned by the City of Boulder Open Space and Mountain Parks. The unit also includes some Federal and private lands.	699	Colorado	Boulder
SP9 Rocky Flats Environmental Technology Site	This unit is located in the central portion of the species' range in Colorado. The entire unit is located on Federal lands within the Department of Energy's Rocky Flats Environmental Technology Site. After the closure of Rocky Flats, the property will be transferred to the Service and become part of the National Wildlife Refuge System.	1,059	Colorado	Jefferson

**Exhibit 1-1
DESCRIPTION OF CRITICAL HABITAT UNITS**

Unit	Description	Size (acres)	State	County
SP10 Ralston Creek	This unit is located in the central portion of the species' range in Colorado. The unit contains Federal, non-Federal, public, and private lands, including the Golden Gate Canyon State Park, White Ranch County Park, and lands owned by Denver Water. Substantial private interest is represented by the Cotter Corporation's Schwartzwalder Mine.	698	Colorado	Jefferson
SP11 Cherry Creek	This unit is located in the southwestern portion of the species' range in Colorado. The unit contains both public and private lands. Public lands include Castlewood Canyon State Recreation Area and Douglas County's Green Mountain Ranch.	1,738	Colorado	Douglas
SP12 West Plum Creek	This unit is located in the southern portion of the species' range. The unit contains Federal, non-Federal, public, and private lands. Federal lands include portions of the Pike-San Isabel National Forest and the Chatfield State Recreation Area (managed by the Army Corps of Engineers). Non-Federal lands include the Colorado Division of Wildlife's Woodhouse Ranch property.	8,080	Colorado	Douglas
SP13 Platte River	This unit is located in the southeastern portion of the species' range. The unit is located primarily on Federal lands, with intervening non-Federal lands. Federal lands include Pike-San Isabel National Forest.	4,168	Colorado	Jefferson Douglas
A1 Arkansas River Drainage	This unit is the southern most unit of the species' range. The unit is primarily located on private lands. A small portion of the unit is located on Federal land within the Pike-San Isabel National Forest. Development pressure is extremely high and is expected to be the major concern in this unit.	3,110	Colorado	El Paso

1.3 Framework and Methodology

1.3.1 Framework for Analysis

26. This section describes the framework used to analyze costs associated with the proposed designation of critical habitat. The analysis examines activities taking place both within and adjacent to the proposed area. It estimates impacts based on activities that are “reasonably foreseeable,” including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis bases estimates on activities that are likely to occur within a ten-year time frame, the traditional time frame used in the majority of the Service's previous economic analyses of proposed critical habitat designation.
27. Two types of costs are discussed in the analysis: (1) costs that are a direct result of the protections provided by section 7 of the Act; and (2) costs that result from actions by stakeholders pursuant to sections 9 and 10 of the Act to avoid take of the PMJM. The framework for defining each of these categories is described below.

Effects of the Proposed Rule

28. The focus of this economic analysis is on section 7 of the Act, which requires Federal agencies to insure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. Federal agencies are required to consult with the Service whenever they propose a discretionary action that may affect a listed species or its designated critical habitat.
29. This analysis identifies land use activities within or in the vicinity of those areas being proposed for critical habitat that are likely to be affected by section 7 of the Act. To do this, the analysis evaluates a “without section 7” scenario and compares it to a “with section 7” scenario. The “without section 7” scenario constitutes the baseline of this analysis. It represents the level of protection currently afforded the species under the Act, absent section 7 protective measures, and includes other Federal, state, and local laws. The “with section 7” scenario identifies land use activities likely to involve a Federal nexus that may affect the species or its designated critical habitat, which accordingly have the potential to be subject to future consultations under section 7 of the Act.
30. This analysis recognizes the difficulty in differentiating between consultations that result from the listing of the species (i.e., jeopardy) and consultations that result from the presence of critical habitat (i.e., adverse modification). By quantifying the potential impacts associated with all section 7 impacts in or near proposed critical habitat, the analysis ensures that any critical habitat impacts that may occur co-extensively with the listing of the species are not overlooked. As a result, this analysis likely overstates the regulatory activity under section 7 attributable to designation of critical habitat.

31. The designation, or proposed designation, of critical habitat may affect private entities with no Federal nexus, and therefore no section 7 responsibilities under the Act. For example, landowners may develop a Habitat Conservation Plan (HCP) under section 10 of the Act in order to comply with section 9.¹⁰ Some landowners may develop HCPs in the hopes of having their lands excluded from a critical habitat designation. In order to conduct a full analysis of all of the economic impacts of a critical habitat designation, this analysis considers the costs associated with completion of HCPs for the PMJM, as these may be motivated by the proposed critical habitat designation, and are therefore attributable to the critical habitat designation.
32. The Service issued regulations that apply the section 9 prohibition against “take” to threatened wildlife, and the regulations for threatened species also provide that a “special rule” under section 4(d) of the Act can be tailored for a particular threatened species. Pursuant to this authority, the Service adopted special regulations for the PMJM in 2001 and 2002. Specifically, these regulations provide exemption from take provisions under section 9 for certain activities related to rodent control, ongoing agricultural activities, landscape maintenance, perfected water rights, certain noxious weed control, and ditch maintenance activities.¹¹ These special regulations will expire on May 22, 2004, at which time landowners will be subject to the section 9 prohibitions against take.
33. The expiration of the 4(d) special regulations may impose costs on landowners who will no longer be exempt from section 9 prohibitions against take. Specifically, landowners may experience increased costs to haying and grazing, and irrigation ditch maintenance activities that will be subject to the section 9 prohibitions against take once the 4(d) special regulation expires. The potential impacts to landowners associated with these agricultural operations once the 4(d) special regulation expires in May 2004 is presented in Appendix B.

1.3.2 Methodological Approach

34. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts of designation related to the implementation of section 7. The methodology consists of:

- Determining the current and projected economic activity within and around

¹⁰ Under section 10 of the Act, an incidental take permit is required when non-Federal activities will result in “take” of a threatened or endangered species. An HCP must accompany each incidental take permit application. The purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. The HCP attempts to counterbalance potential harmful effects that a proposed activity may have on a species, while allowing the otherwise lawful activity to proceed. As such, HCPs are generally developed to meet the requirements of section 10 of the Act, and thus the costs associated with HCPs are generally distinct from those associated with a designation.

¹¹ U.S. Fish and Wildlife Service, “Endangered and Threatened Wildlife and Plants; Final Special Regulations for the Preble’s Meadow Jumping Mouse,” 66 *FR* 28125, May 22, 2001; and U.S. Fish and Wildlife Service, “Endangered and Threatened Wildlife and Plants; Amended Special Regulations for the Preble’s Meadow Jumping Mouse,” 67 *FR* 61531, October 1, 2002.

the proposed critical habitat area;

- Considering how current and future activities that take place or will likely take place on Federal and private land could adversely affect proposed critical habitat;
- Identifying whether such activities taking place on privately-owned property within the proposed critical habitat boundaries are likely to involve a Federal nexus;
- Evaluating the likelihood that identified Federal actions and non-Federal actions having a Federal nexus will require consultations under section 7 of the Act and, in turn, that such consultations will result in modifications to projects;
- Determining the benefits that may be associated with the designation of critical habitat; and
- Assessing the extent to which critical habitat designation will create costs for small businesses as a result of modifications or delays to projects.

1.4 Information Sources

35. The primary sources of information for this report were communications with personnel from the Service, as well as potentially affected Federal agencies, counties, and private landowners. Specifically, communication with personnel from the Service's Colorado and Wyoming Field Offices, Army Corps of Engineers' (ACOE) Colorado and Wyoming Field Offices, Colorado and Wyoming Natural Resources Conservation Service (NRCS) offices, Rocky Flats Environmental Technology Site, Personnel at the Pike-San Isabel, Arapahoe-Roosevelt, and Medicine Bow-Routt National Forests, Colorado and Wyoming Department of Transportation offices (CODOT and WYDOT), Federal Highway Administration (FHWA) in Colorado, Wheatland Irrigation District, Farm Service Agency in Wyoming, F.E. Warren Air Force Base in Wyoming, Federal Energy Regulatory Commission (FERC) in Wyoming, El Paso County, Douglas County, Boulder County, Jefferson County, the Nature Conservancy, SWCA Environmental Consultants, and local developers and private landowners. Publicly available data were also used to augment the analysis.

36. This section discusses the socioeconomic characteristics of areas proposed as critical habitat for the PMJM. In addition, this section provides relevant information about regulations and requirements that exist in the baseline (i.e., the "without section 7" scenario) that are likely to impact activities that may be affected by the proposed designation.

2.1 Socioeconomic Profile of the Critical Habitat Areas

37. This section discusses key economic and demographic information for the eleven counties with areas either proposed for critical habitat or considered important for the conservation of the PMJM in Colorado and Wyoming. County-level data are provided as context for the discussion of potential economic impacts due to section 7 and to illuminate trends that may influence these impacts.¹²

2.1.1 Wyoming

38. This section summarizes key economic and demographic information for the four Wyoming counties with areas proposed for critical habitat designation for the PMJM. Because most of the proposed critical habitat designations are in rural, agricultural areas, the description focuses on the agricultural activities that may be affected by section 7 implementation.
39. Critical habitat has been proposed for portions of Albany, Converse, Laramie, and Platte Counties in southeastern Wyoming. These four counties have a total population of 134,100 persons, or about 27 percent of the total Wyoming population of 494,400 persons in 2001.¹³ The population of the four-county area has increased by about nine percent since the 1990 Census. Most of this growth has been in and around the State Capital of Cheyenne in Laramie County.
40. The majority of the four-county area's population resides in Cheyenne (population 53,200) and Laramie (population 31,300), the home of the University of Wyoming in Albany

¹² Population summaries are derived primarily from: U.S. Census Bureau, accessed at <http://quickfacts.census.gov/qfd/index.html> and <http://www.census.gov/epcd/cbp/view/cbpview.html>, July 30-31, 2002, August 1, 2002; and county websites.

¹³ Population estimates are by the Economic Analysis Division of the Wyoming Department of Administration, accessed at <http://eadiv.state.wy.us/pop/ctyest.ntm>.

County. Cheyenne and Laramie have relatively diversified economies based upon state government, transportation, trade and services, finance, and light manufacturing. The remainder of the four-county area is largely rural with small communities interspersed among farms and ranches. Some industrial activity is located in rural areas, including the Laramie River Station coal-fired power plant, located near Wheatland in Platte County, and the Dave Johnson coal-fired power plant, located near Glenrock in Converse County. There is also some coal production in northern Converse County, and pockets of oil and gas production scattered over the region.

41. The predominant economic activity in rural areas of southeastern Wyoming is agricultural production. Together, the four-county area contains 1,739 farms and ranches covering 8.9 million acres of land. The average size of an agricultural operation is about 5,100 acres, although individual operations vary greatly in size. The most prevalent type of agricultural production involves irrigated hay production in support of livestock operations. In lower elevation areas of Platte County, however, irrigated row crop production is an important economic activity. Irrigation water in the area typically comes from surface water diversions on tributaries of the North Platte River, although groundwater is also used for irrigation in some areas. There is also a significant amount of dryland winter wheat production in the lower elevations of Laramie and Platte Counties.
42. Total agricultural sales in the four-county area totaled \$225.2 million in 1997, accounting for approximately 25 percent of all agricultural sales in the State of Wyoming. Total farm and ranch production expenses in the four-county area were estimated to be about \$177 million in 1997, leaving \$48.2 million in net farm income for the area.¹⁴

Albany County

43. Laramie is the county seat of Albany County, and its 26,600 residents comprise 85 percent of the total county population of 31,300 persons. The only other incorporated community in the county is Rock River, with a population of 230. Rural areas of the county are largely devoted to agricultural production, although recreation is an important economic activity in the mountainous areas of the county within the Medicine Bow National Forest.
44. Albany County contains 315 farms and ranches with 1.9 million acres of agricultural land in production, for an average size of 6,100 acres per operation. Gross farm and ranch sales in Albany County totaled \$34.2 million in 1997, with net farm income in the county estimated at \$8.7 million. The predominant form of agricultural production is livestock, with livestock sales accounting for 95 percent of all agricultural sales. Irrigated hay production in Albany County supports a cattle and calf inventory of about 69,000 head. The county also has a breeding sheep inventory of 6,000 animals.
45. Most crop production in the county is irrigated hay production that is consumed as winter feed by cattle, with a small percentage sold as a cash crop. In 2001, Albany County had 96,000 acres of land in hay production, of which 81,300 acres were irrigated. The largest

¹⁴ Farm and ranch descriptions in this section are based primarily upon the 1997 Census of Agriculture, accessed at <http://www.nass.usda.gov/census/census97>, and the 2002 Wyoming Agricultural Statistics, accessed at <http://www.nas.usda.gov/wy/bulletin/bulletin2002>.) The income estimates presented in this section include income generated by all farms and ranchers within the four-county area, including income realized by small part-time ranchettes with only a few head of cattle.

source of irrigation water in the county is surface water diversions off the Laramie River and its tributaries, but water is also diverted from Horse Creek in eastern Albany County and several other North Platte tributaries in northern parts of the county.

46. Critical habitat for the PMJM has been proposed for designation in rural areas of eastern and northeastern Albany County, including portions of Cottonwood Creek, Horseshoe Creek, Chugwater Creek, Horse Creek, Lodgepole Creek, and several small tributaries of the North Laramie River.

Converse County

47. The two largest communities in Converse County are Douglas, the county seat, with a population of 5,350, and Glenrock, with a population of 2,250. These two communities account for over 60 percent of the county's 12,200 residents. Rural areas of the county are devoted primarily to agricultural production, along with some oil and natural gas production, coal mining and electric power production.
48. Converse County contains 348 farms and ranches with 2.5 million acres of land in agricultural production. The average size ranch in Converse County is 7,200 acres, although many are significantly larger than average in size. Gross farm and ranch sales in Converse County totaled \$26.8 million in 1997, with net farm income estimated at \$6.3 million. As in Albany County, the predominant form of agricultural production in Converse County is livestock, which accounts for 94 percent of all agricultural sales. Livestock inventories in Converse County consist of about 85,000 cattle and calves and 65,000 breeding sheep.
49. In 2001, Converse County had 32,000 acres of land in hay production, of which 29,000 acres were irrigated. The largest source of irrigation water in Converse County is surface water diversions from the North Platte River and its tributaries.
50. Critical habitat for the PMJM has been proposed for designation in a small rural area of southeastern Converse County, including portions of Cottonwood Creek and Horseshoe Creek.

Laramie County

51. Cheyenne is the county seat of Laramie County and the State Capital of Wyoming. Its relatively diverse economic base includes state and local government agencies, F. E. Warren Air Force Base, and a variety of private sector businesses. Cheyenne's population of 53,200 comprises 65 percent of the county's 81,600 residents. The only other incorporated communities in Laramie are Albin (population 120), Burns (population 285), and Pine Bluffs (population 1,160). Many of the rural residents in Laramie County reside in unincorporated areas surrounding the City of Cheyenne. Other rural areas of the county are largely devoted to agricultural production.
52. Laramie County contains 615 farms and ranches with 1.7 million acres of land in agricultural production, for an average size of 2,800 acres per operation. Agricultural operations in Laramie County range from dryland farms raising winter wheat in eastern areas of the county, to large livestock operations in the central and northern portions of the county. Gross farm and ranch sales in the county totaled \$96.0 million in 1997, with net farm income in the county estimated at \$23.0 million. Livestock sales accounted for 79 percent of the total sales, with the remaining 21 percent coming from sales of crops. Livestock inventories in

- Laramie County include approximately 65,000 cattle and calves and 8,000 breeding sheep.
53. In 2001, Laramie County had 55,000 acres of hay production, of which 34,000 acres were irrigated. The irrigated hay operations typically depend upon surface water diversions from the Horse Creek and Chugwater Creek drainages.
54. Critical habitat for the PMJM has been proposed for designation in both rural and urban areas of Laramie County. The rural designations include large portions of Horse Creek and Chugwater Creek and their tributaries, as well as smaller designations along Lodgepole Creek, Goose Creek, and Lone Tree Creek. The urban area proposed for designation is a portion of Crow Creek that runs through F.E. Warren Air Force Base.

Platte County

55. With approximately 8,800 residents, Platte County is the least populated county in the PMJM range. It has five incorporated municipalities, including Wheatland, the county seat, with 3,540 residents. The other municipalities are Guernsey (population 1,140), Chugwater (population 240), Glendo (population 230), and Hartville (population 80). The major industries in Platte County are electric power production, recreation and agriculture. The Laramie River Station coal-fired electric generating facility is located near Wheatland and employs several hundred Platte County residents. Glendo and Guernsey Reservoirs, located in northern Platte County on the North Platte River, are major recreational attractions for residents of eastern Wyoming and northern Colorado.
56. Platte County's agricultural land base includes 2.8 million acres of land divided into 461 farms and ranches, for an average size of about 6,100 acres per operation. Gross agricultural sales in Platte County totaled \$62.8 million in 1997, with net farm income in the county estimated at \$10.2 million. The predominant form of agriculture production is livestock, accounting for 83 percent of all agricultural sales. Livestock inventories in Platte County include approximately 110,000 cattle and 1,000 breeding sheep.
57. About 67,000 acres of land are irrigated in Platte County, and both groundwater and surface water are utilized for irrigation. The largest irrigation water user in Platte County is the Wheatland Irrigation District (WID), with approximately 46,000 acres of land under irrigation.¹⁵ Water is delivered to WID lands using a complex delivery system of storage reservoirs located along the Laramie River in Albany County. The relatively low elevation of WID lands in Platte County allows the production of a variety of row crops, including corn, dry beans, and sugar beets, and forage crops such as alfalfa. Dryland winter wheat is also an important Platte County crop.
58. Critical habitat for the PMJM has been proposed for designation along short stretches of Cottonwood Creek and Preacher Creek in the Laramie range in eastern Platte County, and along a substantial portion of Chugwater Creek from the Laramie County border downstream to a point below the town of Chugwater.

2.1.2 Colorado

59. This section summarizes key economic and demographic information for the seven Colorado counties with areas proposed for critical habitat designation for the PMJM.

¹⁵ Information regarding the WID was obtained from Don Britton, WID Manager.

Because most of the proposed critical habitat designations are near urban, residential areas, the description focuses on residential and related development activities that may be affected by section 7 implementation.

60. Critical habitat has been proposed for portions of Boulder, Douglas, El Paso, Jefferson, Larimer, Teller, and Weld Counties in Colorado. These seven counties have a total population of 2,038,000 persons, or about 46 percent of the total Colorado population of 4,418,000 persons in 2001.¹⁶ The population of the seven-county area has increased by about 40 percent since the 1990 Census.
61. Total income in the seven-county area totaled \$64 billion in 2000, or about 46 percent of total income in Colorado. Total revenue in residential and related development industries in 2000 was \$3 billion, or about 34 percent of all residential and related development revenues in the State of Colorado.¹⁷

Boulder County

62. Covering approximately 742 square miles, Boulder County is located in the central region of Colorado. Over the past decade, the county's population has grown at a rapid rate, increasing by 29.3 percent, just shy of the state average of 30.6 percent. By 2000, the county's total population had grown to approximately 291,288, or about 6.8 percent of the state population.
63. The median household income for Boulder County in 2000 was \$55,861, which was 18 percent higher than the state average of \$47,203 and 33 percent higher than the national average of \$41,994. The poverty rate in the county in 2000 was approximately 9.5 percent.
64. Most of the county area consists of urban land. The most significant factor in the economy is the University of Colorado at Boulder, which has become the core of a network of high-tech companies in the county. The two largest industries in the county are manufacturing (25,633 employees and \$1,175,936 million in payroll) and professional and scientific services (22,927 employees and \$2,013,964 in payroll). Other important industries are retail trade (19,593 employees and \$521,064 million in payroll) and the information industry (11,790 employees and \$952,212 in payroll). The construction sector employs 8,021 people, and provides \$297,059 million in payroll.
65. Critical habitat for the PMJM has been proposed for designation along South Boulder Creek south of the city of Boulder, in Boulder County.

Douglas County

66. Douglas County covers approximately 840 square miles in central Colorado. Between 1990 and 2000, the county's population increased rapidly, growing by 191.0 percent to approximately 175,766, or about 4.1 percent of the state population.

¹⁶ Population estimates are by the US Census Bureau State and County QuickFacts, accessed at <http://quickfacts.census.gov/qfd/>

¹⁷ Bureau of Economic Analysis Regional Accounts Data, accessed at <http://www.bea.doc.gov/bea/regional/reis/>

67. At \$82,929, the median household income in Douglas in 2000 significantly exceeded the national average of \$41,994. It was also more than 76 percent higher than the state average of \$47,203. The poverty rate in the county in 2000 was only 2.1 percent.
68. Douglas County is strategically positioned between Colorado's two largest cities, Denver and Colorado Springs. As a result, approximately 80 percent of its population commutes to work in one of these cities. The two largest industries in the county are retail and construction. The retail industry employs 9,992 people and has a payroll of \$213,663 million, while the construction industry employs 7,441 people and has a payroll of \$277,347 million. The accommodation and food services industry is also a significant employer, with 4,379 employees and \$52,158 million in payroll. Some of the leading non-retail employers in the county are Lucent Technologies, AT&T Broadband, First Data Corp, Merrill Lynch, Information Handling Services, EchoStar Communications, Douglas County Government, Evolving Systems, and DIRECTV.
69. Critical habitat for the PMJM has been proposed for designation along Cherry Creek, West Plum Creek, and the Platte River. South of the city of Castle Rock, Cherry Creek includes Lake Gulch and Upper Lake Gulch. West of the city of Castle Rock, West Plum Creek includes Indian Creek, Jarre Creek, Garber Creek, North Garber Creek, Jackson Creek, Dry Gulch, Spring Creek, Bear Creek, Starr Canyon, Gover Creek, and Merz Canyon. West of the city of Castle Rock the Upper South Platte River includes Bear Creek, West Bear Creek, Sugar Creek, Eagle Creek, Long Hollow, and Trout Creek.

El Paso County

70. El Paso County is just south of Douglas County in the central region of Colorado. It covers a total land area of approximately 2,126 square miles. A large proportion of the county's population lives in Colorado Springs. Between 1990 and 2000, the county's population increased by 30.2 percent to approximately 516,929, or about 12.0 percent of the state population.
71. El Paso's median household income in 2000, \$46,844, was one percent lower than the state average of \$47,203 and 12 percent higher than the national average of \$41,994. The poverty rate in the county in 2000 was approximately eight percent.
72. Some of the most important industries in the economy of El Paso County are manufacturing (22,953 employees and \$1,061,064 million in payroll); retail trade (28,928 employees and \$662,506 million in payroll); professional, scientific and technical services (15,169 employees and \$764,453 million in payroll); health care and social assistance (22,879 employees and \$683,091 million in payroll); and information (12,702 employees and \$810,165 million in payroll). The U.S. Military is also an important employer, with the North American Aerospace Defense Command (NORAD) and Air Force Academy located in Colorado Springs.
73. Critical habitat for the PMJM has been proposed for designation along the Arkansas River Drainage. Intersecting the city of Monument are Dirty Woman Creek, Monument Creek, Beaver Creek, and Jackson Creek. Intersecting the City of Colorado Springs are Smith Creek, Black Squirrel Creek, Kettle Creek, and Monument Creek.

Jefferson County

74. Covering approximately 772 square miles, Jefferson County is located to the west of Douglas County in central Colorado. Between 1990 and 2000, the county's population increased by 20.2 percent to approximately 527,056, or about 12.3 percent of the state population.
75. At \$57,339, Jefferson's median household income in 2000 was 21 percent higher than the state average of \$47,203 and 37 percent higher than the national average of \$41,994. The poverty rate in the county in 2000 was 5.2 percent.
76. Jefferson has a highly diversified suburban economy. The largest industries in the county are retail (31,132 employees and \$677,385 million in payroll); manufacturing (18,483 employees and \$946,725 in payroll); and construction (17,367 employees and \$705,524 million in payroll). Other significant industries are professional, scientific and technical services (16,281 employees and \$852,584 million in payroll); health care and social assistance (19,628 employees and \$590,787 million in payroll); and administration, support, waste management and remediation services (16,743 employees and \$509,283 million in payroll). Some of the largest employers are Lockheed Martin (7,100 employees), Gambro (1,300 employees), Coors Brewing Company (5,000 employees), Exempla Healthcare (3,300 employees), and CoorsTek (1,500 employees). The Denver Federal Center is also an important employer, with approximately 6,200 workers.
77. Critical habitat for the PMJM has been proposed for designation in the Rocky Flats Environmental Technology Site, along Ralston Creek and the Platte River. The creeks found on the Rocky Flats Environmental Technology Site are portions of Rock, Walnut and Woman. Southwest of Arvada are portions of Ralston Creek. West of the city of Castle Rock, the Upper South Platte River includes: Gunbarrel Creek, Sugar Creek, Pine Creek, Cabin Creek, and Wigwam Creek.

Larimer County

78. Covering a land area of 2,601 square miles, Larimer County is located in north-central Colorado just south of the border with Wyoming. Between 1990 and 2000, the county's population increased by 35.1 percent to approximately 251,494, or about 5.9 percent of the state population.
79. The median household income in 2000 was approximately \$48,655, which was three percent higher than the state average of \$47,203 and 16 percent higher than the national average \$41,994. The poverty rate in the county in 2000 was approximately 9.2 percent.
80. The largest industry in the county is manufacturing (12,033 employees and \$581,494 million in payroll). Other important industries are retail trade (15,467 employees and \$319,618 million in payroll); health care and social assistance (10,062 employees and \$296,965 million in payroll); and construction (9,095 employees and \$308,987 million in payroll). Two other important industries are the accommodation and food services industry (11,898 employees and \$134,963 million in payroll) and the administrative support, waste management, and remediation services industry (8,915 employees and \$185,880 million in payroll). Some of the most important employers in the county include Hewlett-Packard, Celestica, LSI Logic, Anheuser Busch, and Teledyne WaterPik. Colorado State University in Fort Collins is another important employer. In addition, tourism is an important part of the county's economy. Several large state and national parks are located in Larimer County. One of these parks, Rocky Mountain National Park, receives more than three million visitors a

year.

81. Critical habitat for the PMJM has been proposed for designation along stretches of the Cache La Poudre River, Buckhorn Creek, and Cedar Creek. Along the North Fork Cache La Poudre River in northeast Larimer are portions of Tenmile Creek, Stonewall Creek, Rabbit Creek, North Fork Rabbit Creek, Middle Rabbit Creek, South Fork Rabbit Creek, North Lone Pine Creek, and Columbine Canyon.

Teller County

82. Teller County is located in central Colorado just south of Douglas County, and covers approximately 557 square miles. Between 1990 and 2000, the county's population increased faster than the state average, growing by 64.9 percent to approximately 20,555, or about 0.5 percent of the state population.
83. The median household income in 2000 was \$50,165. Teller's median household income was six percent higher than the state average of \$47,203 and 19 percent higher than the national average of \$41,994. The poverty rate in the county in 2000 was approximately 5.4 percent.
84. The two largest industries in Teller County are accommodation and food services (1,273 employees and \$18,515 million in payroll) and retail trade (650 employees and \$16,804 million in payroll). Other important industries are finance and insurance (397 employees and \$14,066 million in payroll); arts, entertainment and recreation (767 employees and \$18,786 million in payroll); and professional, scientific and technical services (299 employees and \$14,108 million in payroll).
85. Critical habitat for the PMJM has been proposed for designation along a small stretch of Trout Creek to the southwest of the city of Castle Rock.

Weld County

86. Covering approximately 3,992 square miles, Weld County is located in north-central Colorado to the east of Larimer County just south of the border with Wyoming. Between 1990 and 2000, the county's population increased by 37.3 percent to approximately 180,936, or about 4.2 percent of the state population.
87. In 2000, median household income in the county was \$42,321, which was 10 percent lower than the state average of \$47,203 and one percent higher than the national average of \$41,994. The poverty rate in 2000 was approximately 12.5 percent.
88. The largest industries in the county are manufacturing (10,908 employees and \$412,635 million in payroll); construction (7,129 employees and \$277,159 million in payroll); retail trade (7,609 employees and \$165,054 million in payroll); healthcare and social assistance (5,849 employees and \$174,361 million in payroll); and finance and insurance (4,018 employees and \$164,924 million in payroll). Some of the major employers in the county are Kodak, Hewlett-Packard, Monfort of Colorado/Conagra, State Farm Insurance, Dovatron, Applied Films, Harsh Hydraulics, Platte Valley Steel, Hensel-Phelps Construction, Sykes Enterprises Inc, and Startek. The University of Northern Colorado, the Northern Colorado Medical Center, and Northern Colorado Oncology Center are also major employers in the county.

89. Critical habitat for the PMJM has been proposed for designation along short stretches of Lone Tree Creek in the northwest corner of Weld County.

2.2 Baseline Elements

90. _____ “Baseline elements” consist of those regulations, guidelines, and/or policies that may afford protection to the PMJM in the absence of section 7 implementation or which may require similar administrative action. For example, these regulations may influence development patterns and/or affect the section 7 consultation process. This discussion focuses on the several important regulatory elements that have bearing on this analysis.

2.2.1 **Overlap With Other Listed Species**

91. Generally, if a consultation is triggered for any listed species, the consultation process will also take into account all other listed species known or thought to occupy areas on or near the project lands. As such, listing or critical habitat-related protections for other threatened or endangered species may benefit the PMJM as well (i.e., provide baseline protection). However, due to the difficulty in apportioning the costs of consultations between various species as well as awareness that a consultation for the PMJM would need to be conducted absent consultations for or involving other species, this analysis does not attempt to apportion the consultations and related costs reported by Action agencies between the PMJM and other listed species, and assumes that all future section 7 consultations within the extant boundaries of the proposed critical habitat are fully attributable to the presence of the PMJM and its habitat. The Service has conducted consultations on the PMJM in combination with numerous species, as indicated in Exhibit 2-1.

92.

Exhibit 2-1	
OTHER LISTED SPECIES INCLUDED IN PAST CONSULTATIONS ON THE PREBLE'S MEADOW JUMPING MOUSE	
Species	Status
Ute ladies' tresses orchid (<i>Spiranthes diluvialis</i>)	Threatened
Colorado butterfly plant (<i>Gaura neomixicana</i> ssp. <i>coloradensis</i>)	Threatened
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Threatened
Pawnee montane skipper butterfly (<i>Hesperia leonardus montana</i>)	Threatened
Whooping Crane (<i>Grus americana</i>)	Experimental Population, Non-Essential
Interior Least tern (<i>Sterna antillarum</i>)	Endangered
Piping plover (<i>Charadrius melodus</i>)	Threatened
Black-footed ferret (<i>Mustela nigripes</i>)	Experimental Population, Non-Essential
Wyoming toad (<i>Bufo baxteri</i> (= <i>hemiophrys</i>))	Endangered
Mountain plover (<i>Charadrius montanus</i>)	Proposed, Threatened
Canada lynx (<i>Lynx canadensis</i>)	Threatened
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	Threatened

Greenback cutthroat trout (<i>Oncorhynchus clarki stomias</i>)	Threatened
Arkansas darter (<i>Etheostoma cragini</i>)	Candidate (Colorado only)
Boreal toad (<i>Bufo boreas boreas</i>)	Candidate

2.2.2 Special Regulations Governing Take of the Preble’s Meadow Jumping Mouse

93. On May 22, 2001, the Service adopted special regulations governing the take of the PMJM under section 9 of the Act.¹⁸ These special regulations, also known as “4(d)”, prescribe species specific conditions under which the take of PMJM would not be in violation of section 9 of the Act. Four types of activities are exempted from the take prohibitions of section 9 by the special regulations: 1) rodent control inside structures and within 10 feet of structures, 2) ongoing agricultural activities, which includes farming and ranching, 3) maintenance of existing landscaped areas, and 4) the diversion of water associated with existing water rights. The special regulations apply to both Colorado and Wyoming, specifically Arapahoe, Boulder, Douglas, Elbert, El Paso, Jefferson, Larimer, and Weld Counties in Colorado, and Albany, Converse, Goshen, Laramie, and Platte Counties in Wyoming.
94. Amended special regulations, also known as “4(d) amended,” expands the activities exempted from the take prohibitions of section 9 to include certain noxious weed control and ditch maintenance activities.¹⁹ Each activity is limited to the destruction of quarter mile of riparian shrub habitat within one linear mile of ditch within a year, assuming Best Management Practices (BMPs) are followed. Activities include clearing trash, debris, vegetation, and silt by either physical, mechanical, chemical, or burning procedures, and reconstruction, reinforcement, repair, or replacement of existing infrastructure with components of substantially similar materials and design.
95. This rule, as amended, does not alter Federal agency consultation responsibilities under section 7 of the Act for any of the activities exempted by the rule. Therefore, any rodent control, agricultural, landscape area maintenance, water diversion, noxious weed control, and ditch maintenance activities that involve a Federal nexus are still subject to consultation with the Service. However, the existence of the 4(d) exemption may lessen the burden on Federal Action agencies and third parties associated with future consultations by removing the need to account for the incidental take associated with activities covered by special regulation until it expires in May 2004. Costs associated with section 9 of the Act are described in section 6.8 and Appendix B.

2.2.3 Federal and State Statutes and Regulations and Other Voluntary Protection Measures

96. This section provides relevant information about the regulatory elements that exist in the baseline, or the “without section 7” scenario. Where proposed activities directly affect proposed critical habitat areas, these Federal and state regulations, and other voluntary

¹⁸ Final Special Regulations for the Preble’s Meadow Jumping Mouse, 66 FR 99, May 22, 2001.

¹⁹ Amended Special Regulations for the Preble’s Meadow Jumping Mouse, 67 FR 190, October 1, 2002.

measures may provide a level of protection to the species even in the absence of section 7. Furthermore, these regulations may influence development and/or affect the section 7 consultation process.

97. The baseline regulatory elements potentially relevant to this analysis are described in Appendix A. As the Appendix shows, a considerable number of Federal, state, and other regulatory initiatives could provide the PMJM with some measure of protection absent section 7 consultation.

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98. The previous two sections introduced the geographic areas in which the Service is proposing to designate critical habitat for the PMJM, the socioeconomic profile of these areas, and general trends associated with population, economic, and urban growth. These sections also outlined the baseline level of protection afforded the PMJM and its habitat. This section identifies the current land and water uses in or near proposed critical habitat that may be affected by section 7 implementation for the PMJM. Importantly, these estimates include the effects of section 7 implementation for all activities associated with the proposed critical habitat area. As such, this section does not distinguish impacts that may be attributable co-extensively to the listing of the PMJM from those impacts attributable solely to the critical habitat designation.
99. This section begins with a summary of the categories of economic impact associated with section 7 implementation for the PMJM. It then provides a general description of the activities and potential Federal nexuses affecting the area proposed as critical habitat for the PMJM.

3.1 Categories of Economic Impacts Associated with Section 7 Implementation

100. The following section provides an overview of the categories of economic impacts that are likely to arise due to the implementation of section 7 in the geographic area proposed as critical habitat for the PMJM.

3.1.1 Technical Assistance

101. Frequently, the Service responds to requests for technical assistance from Federal and state agencies, local municipalities, and private landowners and developers with questions regarding whether specific activities may affect a listed species or its critical habitat. Technical assistance costs represent the estimated economic costs of informational conversations between these entities and the Service regarding such potential effects. Most likely, such conversations will occur between municipal or private property owners and the Service regarding lands designated as critical habitat or lands adjacent to critical habitat. The Service's technical assistance activities are voluntary and occur in instances where a Federal nexus does not exist.
102. Estimates of the cost of technical assistance efforts were developed from a review and analysis of historical technical assistance records from the Colorado and Cheyenne Fish and

Wildlife Service field offices. Cost figures were based on an average level of effort for technical assistance efforts of low (less than one hour per request) to high (greater than one hour and an average of nine hours per request), multiplied by the appropriate labor rate for staff from the Service.

3.1.2 Section 7 Consultations

103. Section 7(a)(2) of the Act requires Federal agencies (Action agencies) to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. In some cases, consultations will involve the Service and another Federal agency only, such as the ACOE. Often, they will also include a third party involved in projects on non-Federal lands with a Federal nexus, such as private landowners conducting activities that require a Federal permit. In addition, Action agencies may engage in programmatic consultations to develop strategies to consider impacts to the PMJM and its habitat at the program level, rather than at the individual project level. For example, EPA conducts programmatic consultations with the Service to consider endangered and threatened species when reviewing state water quality standards.
104. During a consultation, the Service, the Action agency, and if applicable, the third party applying for Federal funding or permitting communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, the potential effects to the species and designated critical habitat associated with the proposed activity, and the parties involved.
105. Section 7 consultations with the Service may be either informal or formal. *Informal consultation*, which consists of discussions between the Service, the Action agency, and the third party concerning an action that may affect a listed species or its designated critical habitat, is designed to identify and remove potential impacts at an early stage in the planning process. By contrast, a *formal consultation* is required if the Action agency determines that the proposed action is likely to adversely affect a listed species or designated critical habitat in ways that cannot be resolved through informal consultation. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants. The costs of these efforts are an important component of the impacts assessment.
106. Estimates of the cost of formal and informal individual consultations were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures were based on an average level of effort for consultations of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.
107. Estimates take into consideration the level of effort of the Service, the Action agency, and the applicant during both formal and informal consultations, as well as the varying complexity of consultations. Costs associated with these consultations include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings, preparing letters, and the development of a biological opinion.

108. Per-unit costs associated with formal consultations, informal consultations, and technical assistance calls are presented in Exhibit 3-1. Unless otherwise stated, this table is used to develop total administrative costs for consultations associated with activities within proposed critical habitat for the PMJM. These costs will be explained in more detail in sections four, five, and six, and summarized in section seven of this analysis.

Exhibit 3-1					
ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS FOR THE PMJM (PER EFFORT)^a					
Critical Habitat Impact	Scenario	Service	Action Agency	Third Party	Biological Assessment^b
Technical Assistance	Low	\$40 ^c	n/a	\$600	\$0
	High	\$360 ^c	n/a	\$1,500	\$0
Informal Consultation ^d	Low	\$1,000	\$1,300	\$1,200	\$0
	High	\$3,100	\$3,900	\$2,900	\$5,600
Formal Consultation	Low	\$3,100	\$3,900	\$2,900	\$5,600
	High	\$6,100	\$6,500	\$4,100	\$8,800

^a Low and high estimates primarily reflect variations in staff wages and time involvement by staff.
^b A third party is assumed to bear the cost of a biological assessment. When no third party is involved, the Action Agency bears the cost, and the bearing of this cost varies from agency to agency.
^c Technical assistance costs for the Service are specific to the Colorado and Wyoming Field Offices.
^d Internal consultations are approximately the same cost as informal consultations, unless indicated otherwise. For internal consultations, the Service bears the costs normally borne by both the Service and the Action Agency.

Sources: IEC analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, a review of consultation records from several Service field offices across the country, and communications with Biologists in the Service.

3.1.3 Project Modifications

109. The section 7 consultation process may involve some modifications to a proposed project. Projects may be modified in response to voluntary conservation measures suggested by the Service during the *informal* consultation process in order to avoid or minimize impact to a species and/or its habitat, thereby removing the need for formal consultation. Alternatively, *formal* consultations may involve modifications that are agreed upon by the Action agency and the third party and included in the project description as avoidance and minimization measures, or included in the Service’s biological opinion on the proposed action as reasonable and prudent measures (RPMs) and/or discretionary conservation recommendations to assist the Action agency in meeting their obligations under section 7(a)(1) of the Act.²⁰

110. In some cases, the Service may determine that the project is likely to jeopardize the continued existence of the species and/or destroy or adversely modify its designated critical habitat. In these cases the Service will provide the Action agency with reasonable and prudent alternatives (RPAs) that will keep the action below the thresholds of jeopardy and/or

²⁰ Section 7(a)(1) requires Federal agencies to utilize their authorities to further the purposes of the Act by carrying out programs for the conservation of listed species.

adverse modification. An RPA is an alternative that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the Action agency's legal authority and jurisdiction; and (3) is economically and technologically feasible. These RPAs are typically developed by the Service in cooperation with the Action agency and, when applicable, the third party. Alternatively, the Action agency can develop its own RPAs, or seek an exemption for the project. All of these project modifications have the potential to represent some cost to the Action agency and/or the third party. In certain instances, these modifications can lead to broader regional economic impacts.

3.1.4 Regional Economic Impacts

111. The consultation process and related project modifications could directly affect the operations of entities in some industries (e.g., agriculture producers and residential developers), with secondary impacts on the suppliers of goods and services to these industries, as well as purchasers of productions from these industries. For example, modified or decreased grazing and haying activities could affect businesses providing agricultural equipment and supplies. Thus, project modifications or other restrictions that engender cost and revenue impacts involving commercial enterprises can have a subsequent detrimental effect on other sectors of the local economy, especially when the affected industry is central to the local economy. Industries within a geographic area are interdependent in the sense that they purchase output from other industries and sectors, while also supplying inputs to other businesses. Therefore, direct economic effects on a particular enterprise can affect regional output and employment in multiple industries.

112. There are many methods available for conducting economic impact assessments, depending on the particular policy interests and goals of the economic analysis. Use of an input-output (I-O) model, such as IMPLAN, to gauge the direction and magnitude of regional economic impacts is useful in situations where the critical habitat designation may affect the commercial economy of a specific geographic area. However, I-O modeling is not appropriate for all economic impact analyses associated with critical habitat areas and can result in misinterpretations and biased conclusions if used inappropriately. I-O models are appropriate when the following factors are present: (1) economic impacts of the proposed designation are substantial and clearly defined in the analysis; (2) impacts have a clear effect on one industry or groups of industries prevalent in the geographic region; and (3) substitution possibilities for the focal economic input or activity are not widely available.

3.2 Activities Potentially Affected by Section 7

113. Numerous Action agencies carry out, permit, or fund activities and projects in or adjacent to proposed critical habitat areas. These activities may lead to section 7 consultation with the Service, and in some cases specific projects may be modified in order to protect the PMJM and/or its habitat. This section provides a list of activities likely to be affected by section 7 implementation. It also identifies activities unlikely to incur major section 7 impacts.

114. This analysis predicts that two land-use activities will be most impacted by section 7 implementation: residential and related development in Colorado, and agriculture in Wyoming. Section 4 examines and quantifies the potential effects of section 7 on residential

development and development-related activities. Section 5 examines and quantifies the potential effects of section 7 on agricultural land-uses, and Section 6 examines and quantifies the potential effects on land uses other than residential development and agriculture. Each of these sections report the number of expected section 7 informal and formal consultations and the associated administrative and project modification costs by activity in each of the proposed critical habitat units.

115. The following land use activities are likely to be affected by implementation of section 7 of the Act:

- Residential Development and Development-Related Activities in Colorado (Section 4)
- Agricultural Activities in Wyoming (Section 5)
- Other Land Uses (Section 6)
 - ◆ Road/Bridge Construction and Maintenance
 - ◆ National Fire Plan Projects
 - ◆ F.E. Warren Air Force Base
 - ◆ Utilities (water pipelines; stormwater projects, fiber optic cable)
 - ◆ Rocky Flats Environmental Technology Site
 - ◆ Dams/Reservoirs (no significant impacts)
 - ◆ Gravel Mining (no significant impacts)
 - ◆ Irrigation Districts (no significant impacts)
 - ◆ Recreation
 - ◆ Bank Stabilization
 - ◆ Habitat Conservation Plans

116. The previous sections introduced the geographic areas where the Service is proposing to designate critical habitat for the PMJM; the socioeconomic profile of these areas; general trends associated with population, economic and urban growth; relevant pre-existing policies that affect land uses in the region; current land and water uses in or near the proposed critical habitat areas; and the effects of section 7 implementation for activities associated with the proposed critical habitat. The next three sections identify current activities within and/or affecting the proposed designation as well as the location, nature, and extent of future activities that may be affected by section 7 implementation. This section addresses the expected effects of the designation on development in Colorado. Section 5 examines and quantifies the potential effects of the designation on agricultural land uses in Wyoming, and Section 6 examines and quantifies the potential effects of the proposed designation on land uses other than development and agriculture in both Colorado and Wyoming.

117. This analysis predicts that residential and related development in Colorado will be the activity most impacted by this designation. This section explores the expected economic impacts of the designation on private development in Colorado, organized by unit. It provides estimates of the number of consultations and other impacts on development. These estimates include all section 7-related consultations and technical assistance calls associated with the proposed critical habitat area. As such, this analysis does not attempt to distinguish which impacts may be attributable co-extensively to the listing of the PMJM.

4.1 Economic Impacts to Housing/Residential Development Sector: Conceptual Framework

118. Of frequent concern to communities in which critical habitat has been proposed for designation is the potential for adverse economic impacts arising from constrained residential development. In this section, a brief conceptual overview and description of these types of impacts is provided. Then estimates are provided, where adequate data are available, of the likely magnitude of these impacts in the case of the PMJM designation in Colorado.

119. The nature and magnitude of any economic impact attributable to critical habitat designation will depend upon baseline land and housing market conditions and the extent to which a designation distorts these equilibrium conditions. Land and housing markets reflect a variety of geographic, regulatory and socioeconomic factors that determine, in part, the shapes of respective demand and supply curves (i.e., elasticities, or responsiveness to price changes). For example, these markets reflect the abundance (or lack) of land suitable for

development, existing zoning and land use regulations, and regional growth patterns in income and employment. Demand and supply relationships reveal how any potential regulatory changes brought about by critical habitat designation will be translated into measurable economic impacts.

120. An instructive starting point is a simple competitive partial equilibrium framework that includes markets for raw land, developed land, and housing. Designation of critical habitat may reduce the overall amount of land available to the market, which would be reflected in an inward shift of the supply curve for raw land.²¹ This in turn may reduce supply and increase the price of developed land and housing, at least in the near term. These price changes have implications for each of the economic agents involved -- landowners, developers, builders and home buyers, in terms of the economic surplus they accrue from transactions in the respective markets. The extent of these effects on overall economic welfare and how they are distributed among parties to the transactions depends upon the magnitude of the shifts, as well as the elasticity of demand and supply. This analytical framework can be used to measure the full cost to society of distortions in land and housing markets brought about by critical habitat designation.²²
121. Practically, however, it is very difficult to derive empirical estimates of changes in economic welfare in this manner. These difficulties arise in defining the spatial and temporal scope of the relevant markets and obtaining the data necessary to estimate the supply and demand relationships. As such, this analysis instead attempts to document each of the primary categories of potential economic impacts associated with habitat designation based on information obtained from regional land-use planners, developers and other knowledgeable parties, review of past section 7 consultations, and public comments received on previous economic analyses of this type.²³
122. This analysis considers costs to developers associated with reduced revenues, mitigation costs and project delays. This approach is somewhat analogous to the direct compliance cost method of social cost accounting discussed in the USEPA's *Guidelines for Preparing Economic Analyses*. Because changes in consumer housing prices and other indirect effects are not likely to be significant, these direct costs likely account for the predominant portion of potential social welfare impacts associated with critical habitat designation.
123. Exhibit 4-1 provides a summary of potential impacts on residential and related development due to the critical habitat designation for the PMJM. The exhibit describes the

²¹ The value of a parcel of land reflects the present value of all future services flowing from that land, of which development potential is a significant component. The likelihood of a supply response such as this depends on the extent of undeveloped land in a region, as well as the extent of developable land precluded from use (or restricted in its use) by habitat designation.

²² Just, R.E., D. Hueth and A. Schmitz 1982, *Applied Welfare Economics and Public Policy*, Prentice-Hall Inc, NJ.

²³ Elliott D. Pollack and Company, *The Economic and Fiscal Impact of the Designation of 60,060 Acres of Privately Owned Land in Pima County, Arizona as Critical Habitat for the Cactus Ferruginous Pygmy-Owl*, prepared for Southern Arizona Homebuilders Association, February 25, 1999. Sunding, David, and David Zilberman, *Economic Impacts of Critical Habitat Designation for the California Red-Legged Frog*, prepared for Home Builders Association of Northern California and Sheppard, Mullin, Richter and Hampton LLP, January 22, 2001. Husing, John, *Economics and Politics, Inc., San Bernardino Kangaroo Rat Economic Impact Study*, memo prepared September 27, 2001.

mechanisms for primary and secondary *negative* economic impacts; potentially offsetting positive impacts are described in Section 8.

4.1.1 Categories of Potential Economic Impacts

124. As noted, estimating an exact change in net social welfare associated with land market distortions, should they occur as a result of critical habitat designation, is not practically feasible. However, it is possible to quantify some of the economic impacts anticipated to occur and address others qualitatively. Some of the principal concerns expressed in comments on past economic analyses relate to adverse impacts to developers, as well as the overall regional economic growth implications of critical habitat designation. This analysis finds there are adverse impacts to developers, and some regional growth implications.

4.1.2 Impacts to Landowners, Developers, Builders and Consumers

125. As discussed above, critical habitat designation may inhibit the development potential of some parcels, thereby reducing the supply of developable land. In areas that are already highly developed, or where developable land is scarce for other reasons (i.e., non-critical habitat-related regulations), this reduction in available land and corresponding increase in price could be significant, and ultimately translate into fewer housing units being built within the affected market. In this case, both producers and consumers are affected, as landowners, developers and builders realize lower returns and home buyers face higher prices. In other cases, however, impacts are likely to be limited to landowners only. In areas where developable land is relatively plentiful, developers and builders will identify substitute sites for projects, thereby limiting economic impacts to the owners of specific parcels that suffer a diminishment in their land's value. This is not to say that effects on developers and builders would be nonexistent; presumably, if certain lands were originally chosen for a given project (perhaps because of their locational attributes, such as proximity to amenities, views, etc.), then those areas were perceived as superior relative to substitute areas. Ultimately, however, if adequate substitutes exist, economic impacts beyond the land market are likely to be modest and limited to reductions in profit associated with project modifications, project delays, and any additional development charges that may exist.²⁴

4.1.3 Regional Economic Impacts

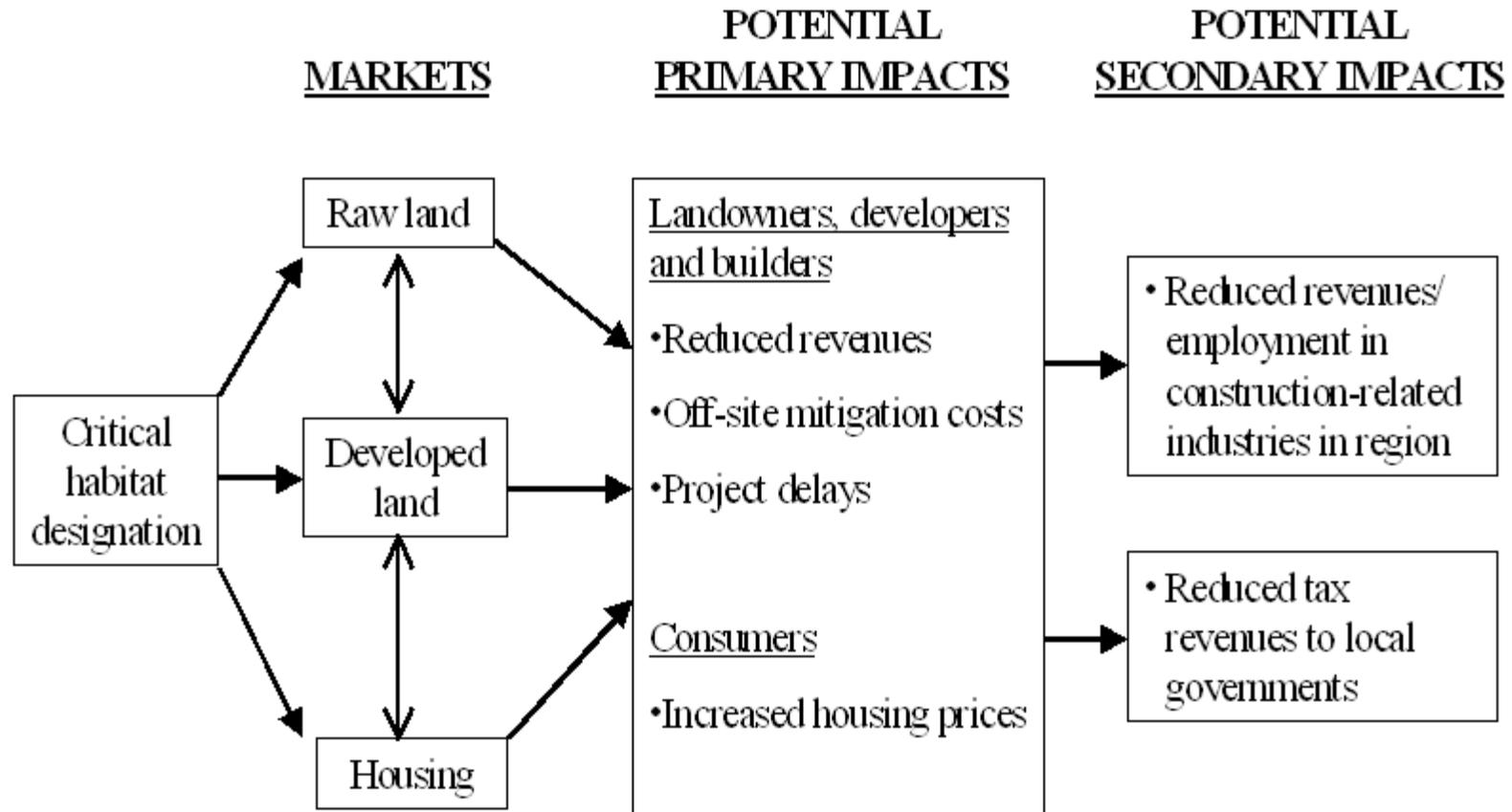
126. In addition to the primary economic impacts identified above, commenters on previous economic analyses of critical habitat designation have described additional categories of economic and financial effects in these markets, generally falling into the category of regional economic impacts.²⁵ Unlike the impacts described above, which reflect the welfare of *all*

²⁴ Watkins (1999) develops a theoretical model to demonstrate how the effects of development charges are borne by landowners, developers and builders. His results generally confirm that such charges encourage higher land and housing prices when demand for developed land is elastic (i.e., changes in the price of developed land are met with relatively larger changes in demand for developed land) and supply of raw land inelastic (i.e., changes in raw land prices are met with relatively smaller changes in demand for raw land) and that raw landowners tend to receive lower prices when supply of raw land is elastic. In either case, the developer bears one-half of such charges in the form of reduced profits. Watkins, A.R. 1999. Impacts of Land Development Charges, Land Economics, 75(3) 415-24.

²⁵ Elliott D. Pollack and Company, The Economic and Fiscal Impact of the Designation of 60,060 Acres of Privately Owned Land in Pima County, Arizona as Critical Habitat for the Cactus Ferruginous Pygmy-Owl,

citizens under different resource allocations, regional economic impacts reflect changes in *local* output, employment and taxes. These types of impacts are generally assumed to be distributive in nature; that is, changes in economic activity in the local economy are offset by changes elsewhere. For example, if development is precluded from one community, this development may simply occur in another community in the same metropolitan area. Nonetheless, because the costs of government regulations are at times more concentrated within a region than are the benefits, it is important to acknowledge such impacts.

Exhibit 4-1
POTENTIAL NEGATIVE ECONOMIC IMPACTS ON RESIDENTIAL AND RELATED DEVELOPMENT



4.1.4 Impacts on Firms in the Construction Industry

127. The principal category of regional impacts associated with critical habitat designation in areas of residential development involves potential changes in revenues and employment in construction-related firms and other industries that support builders and developers. Specifically, commenters have suggested that if development activity decreases in a given area, these secondary industries are likely to suffer severe economic consequences. As discussed above, the extent of any such impacts depends upon prevailing supply and demand conditions. In rare cases where developers are severely constrained by habitat designation and significantly fewer residential units are ultimately constructed as a result, some short-term economic impacts will occur in secondary industries. However, in many cases, designation is more likely to redistribute housing units (location and density) than reduce absolute quantity, with negligible secondary economic impacts, because of the abundance of available substitute development sites in many parts of the western United States.

4.1.5 Changes in Local Government Tax Revenue and Other Impacts

128. A second category of regional impacts identified by commenters to past critical habitat analyses concerns the potential for forgone tax revenues associated with reduced residential development. That is, reduced development potential in an area may lead to lower real estate and other tax revenues.²⁶ However, it is important to note the *net* impact of any expected changes in tax revenues in affected communities. That is, tax revenue reduction from reduced development should be compared to additional costs to municipalities associated with building and maintaining roads, schools, parks and other infrastructure, and providing services such as law enforcement and health care that would be incurred if development occurred. In many cases the change in revenue will be offset by an equal change in municipal expense; thus, it is important that any estimated impacts in this category are net of these service expenditures.
129. Finally, in more extreme cases, concern has been expressed regarding the broader impact of critical habitat designation on regional economies. Specifically, some individuals have questioned whether designation will delay and/or impair an area's ability to realize economic growth by influencing development patterns. Whether further development of a region is, on net, desirable is a point of contention in many markets. Nonetheless, with the exception of cases in which critical habitat designation precludes a large proportion of available land from development, designation is unlikely to substantially affect the course of regional economic development.²⁷

²⁶ Ibid

²⁷ Meyer, Stephen M. 1998. "The Economic Impact of the Endangered Species Act on the Housing and Real Estate Markets." *New York University Environmental Law Journal*. 6(450):1-13.

4.2 Economic Impacts to the Housing/Residential Development Sector Associated with PMJM Critical Habitat

130. In this section, the framework outlined above is drawn upon to estimate potential development-related economic impacts associated with habitat designation in Colorado. Based on conversations with the Service, Action agencies, local developers, and Boulder, Douglas, El Paso, Jefferson, Larimer, and Weld Counties, a significant reduction in total residential development as a result of critical habitat designation is not expected. However, some impacts may be experienced in the form of project delays and required modifications that result in the reduction of profits to the individual developer. Exhibit 4-2 displays a summary of potential economic impacts to the residential development sector due to the critical habitat designation for the PMJM, and describes how they are addressed in this analysis.

Exhibit 4-2		
SUMMARY OF POTENTIAL CATEGORIES OF ECONOMIC IMPACT TO RESIDENTIAL DEVELOPMENT SECTOR: PMJM HABITAT DESIGNATION		
Category	Inclusion in this Analysis	Description
Reduced revenues to landowners, developers and builders	Included	Estimated reduction in profits associated with project modifications
Mitigation costs	Included	Estimated costs per acre mitigation on land
Project Delays	Included	Estimated costs of measures to avoid delay
Change in regional housing prices	Not Included	Not anticipated to occur given availability of developable land and modest reduction in number of units constructed (less than one percent of total expected supply of new homes in each county). Potential increase in home values resulting from more open space on-site.
Regional Economic Impacts	Included	Not assumed to be significant, distributed throughout the metropolitan area (less than one percent of total development value)
Secondary impacts to construction-related industries	Included	Not assumed to be significant given modest reduction in units constructed
Reduced Tax Revenue to Local Government	Not Included	Expect change in revenue will likely be offset by an equal change in municipal expenses

131. Based on a review of past consultations that addressed development and the PMJM, this analysis finds that modifications to the scope or design of a typical development could range from minor to significant. Three categories of costs are quantified: mitigation, habitat restoration and enhancement, and project delays.

- Mitigation captures the cost of setting aside conservation lands on- and off-

site, which includes a reduced number of housing units per project and other project modifications. “Other mitigation costs” include erecting construction fencing, weed control programs, trapping programs, monitoring re-vegetation efforts, pet control programs, on-site personnel monitoring construction, and education efforts.

- Habitat restoration and enhancement costs also capture the cost of restoration, enhancement, and re-vegetation efforts.
- Costs to avoid delay captures the cost to the developer of delay of construction caused by the consultation process.

132. Two types of developments were identified. In the more urban areas (i.e., El Paso and Douglas Counties) of the designation, development is characterized by large residential and commercial projects. In rural areas or areas with more stringent growth regulations (i.e., Boulder, Jefferson, Larimer, and Weld Counties) development is characterized by small-scale residential projects or ranchettes.

4.2.1 Large Scale Development

133. For the purpose of this analysis, large scale residential and related development projects are defined as any project greater than ten units in size. Projects that have resulted in consultations in the past include residential development, commercial development, light industrial development, bridges, roads, driveways, parking facilities, utilities, sewage lines, landscaping, recreational facilities, attached golf courses, trails, channel stabilization, flood control, detention pond expansion, creation of detention basins, storm drain outfalls, and storm water management facilities.

134. This analysis is based on a hypothetical “typical” development project, and assumes that regional development patterns will follow current trends. The specifications for this typical project are derived from the characteristics of “average” large-scale residential and related development projects that have completed the consultation process for the PMJM. The assumptions used to derive this “typical” project include:

- The average large-scale development is 714 units (covering 563 acres of land);
- Home sale values will fall within the range of similar developments in the area; \$248,000 to \$256,000;²⁸
- The average development disturbs 15 acres (or approximately three percent of the development area) of PMJM habitat;
- The average development is required to restore and enhance 29 acres of PMJM habitat, typically on-site (or 0.05 acres enhanced or restored per one acre developed); and
- The average developer mitigates 52 acres. Mitigation includes on- and off-

²⁸ Based on current retail price of new homes for Briargate and Northgate Developments. Colorado Springs Property- Northgate Real Estate, accessed at <http://www.colspringshomes.com> on October 1, 2002. Briargate: For Sale Search Results, accessed at <http://www.briargate.com> on September 30, 2002.

site mitigation, habitat creation and conservation easements.

135. **Mitigation.** Based on past formal consultations, it is assumed that the Service will recommend mitigation in the context of some large-scale residential development projects. Mitigation may include: setting aside conservation lands on- and off-site, potentially including a reduction in the number of housing units in each affected project; purchase of conservation easements; habitat creation; erecting construction fencing; and undertaking weed control programs, trapping programs, monitoring, pet control programs, on-site personnel monitoring construction, and education efforts. The cost of mitigation for a large scale development project can range from \$15,000 to \$40,000 per acre mitigated (assuming 52 acres mitigated per project) or \$780,000 to \$2,080,000 per project.²⁹
136. **Habitat Restoration and Enhancement.** Based on a review of past formal consultations, the Service often requests habitat restoration, enhancement, and re-vegetation for individual projects. The cost of habitat restoration and enhancement can range from \$5,000 to \$15,000 per acre restored and enhanced (assuming 29 acres restored and enhanced per project) or \$145,000 to \$435,000 per project.³⁰
137. **Costs of Delay.** It is a matter of debate as to whether the cost of delay, and which categories of delay costs, should be included as a cost to developers. Both sides of this argument are represented by Meyer³¹ and Sunding.³² Meyer holds that developers do not incur a real cost of delay because of critical habitat, and that any costs can be avoided with better planning.³³ Sunding disagrees, asserting there is a real project delay cost associated with critical habitat.³⁴ This analysis conservatively follows Sunding's argument that the delay associated with the consultation process imposes costs on developers by either extending the period for realization of profits, adding the cost of holding the land longer than anticipated, or incurring additional costs to avoid delay. In this analysis, the cost of delay is captured by calculating the additional expenses incurred by undertaking activities to avoid delay, such as

²⁹ Cost assumptions are based on historical information from recent developments, see Exhibit 4-5.

³⁰ Cost assumptions are based on historical information from recent developments, see Exhibit 4-5.

³¹ Meyer, Stephen M., Review of the draft document Analytical Framework for Economic Analysis of Critical Habitat Designation prepared for the U.S. Fish and Wildlife Service. August 24, 2002.

³² Sunding, David L., Review of the draft document Analytical Framework for Economic Analysis of Critical Habitat Designation prepared for the U.S. Fish and Wildlife Service. September 13, 2002.

³³ "The true cost imposed by project review (e.g., the need to hire lawyers, biological consultants, etc.) are real costs imposed by the ESA-CH (Endangered Species Act, critical habitat) designation process. However, 'project delays' and 'regulatory uncertainty' may be as much a function of a property owner's/manger's poor planning... as it is a regulatory burden." "My review, for example, of the impact of the Golden-Cheeked warbler listing found no effect on real estate prices in counties with listed habitat. I am unaware of any documentation of such effects."

³⁴ "Section 7 consultation adds another layer of bureaucracy to the permitting process and can delay completion of the project. The applicant must conduct required investigations that can easily take months to complete; the entire Section 7 consultation process can last for a year or more." "My previous work on the red-legged frog argued for the importance of considering delay costs." "Anecdotal evidence suggests that delay costs are significant in other cases of critical habitat designations as well."

re-designing roads and boring utilities under habitat.³⁵ Following the above assumption that three percent of the developable acreage in a large-scale development is affected by critical habitat, 21 units (approximately three percent of 714 units) would incur an additional cost of \$5,000 to avoid project delays. The average delay cost would total \$105,000 per project.³⁶

138. Per-effort costs associated with potential project modifications for large-scale residential development are presented in Exhibit 4-3.

Exhibit 4-3		
ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL PROJECT MODIFICATIONS FOR LARGE-SCALE RESIDENTIAL AND RELATED DEVELOPMENT ACTIVITIES (PER EFFORT)		
Potential Project Modification	Costs	
	Low	High
Mitigation	\$780,000	\$2,080,000
Habitat Restoration & Enhancement	\$145,000	\$435,000
Delay	\$105,000	\$105,000
Total Project Modification Costs^a	\$1,030,000	\$2,620,000
^a This analysis assumes an “average” large-scale development of 714 units on 563 acres. Source: Interviews with Service Field Office, Colorado, Biological Opinions, consultants, and local developers. For more information on consultants and local developers contacted see Exhibit 4-5.		

4.2.2 Small-Scale Development

139. For the purpose of this analysis small-scale residential development projects are defined as any development less than ten units in size. Projects that have resulted in consultations in the past include single family home developments, including associated infrastructure and commercial development.

140. This analysis is based on a hypothetical “typical” development project, and assumes that regional development patterns will follow current trends. The specifications for this typical development project are derived from the characteristics of “average” small-scale residential development projects that have completed the consultation process for the PMJM.³⁷ The assumptions used to derive this “typical” project include:

- The average development is one or two units (or 35 acres);
- The average development disturbs two acres of PMJM habitat;

³⁵ A more accurate and preferred method would be to conduct a detailed cash flow analysis. Such an analysis was not performed due to proprietary information issues.

³⁶ Cost assumptions are based on historical information from recent developments, see Exhibit 4-5.

³⁷ The sample size used to characterize small-scale development is quite small (2 developments in Boulder county).

- The average development restores and enhances approximately 1.8 acres of habitat; and
- The average development mitigates roughly 1.6 acres, and places 33 acres of habitat in conservation easement.

141. **Mitigation.** Based on past formal consultations, it is assumed that the Service will recommend mitigation in the context of some small-scale residential development. Mitigation may include: setting aside conservation lands on- and off-site; the purchase of conservation easements; habitat creation; erecting construction fencing; cessation of grazing; and education efforts. The average cost of mitigation for a small-scale development project range from \$10,000 to \$23,000 per acre mitigated, or \$16,000 to \$36,800 per project.³⁸

142. **Habitat Restoration and Enhancement.** Based on a review of past formal consultations, the Service often requests habitat restoration, enhancement, and revegetation for individual projects. The average cost for habitat restoration and enhancement range from to \$5,000 to \$10,000 per acre restored and enhanced, or \$9,000 to \$18,000 per project.³⁹

143. Per-effort costs associated with potential project modifications for small-scale residential development are presented in Exhibit 4-4.

³⁸ Cost assumptions are based on historical information from biological opinions and recent developments. For information from recent developments see Exhibit 4-5.

³⁹ Cost assumptions are based on historical information from recent developments, see Exhibit 4-5.

Exhibit 4-4		
ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL PROJECT MODIFICATIONS FOR SMALL-SCALE RESIDENTIAL DEVELOPMENT ACTIVITIES (PER EFFORT)		
Potential Project Modification	Costs	
	Low	High
Mitigation	\$16,000	\$36,800
Habitat Restoration & Enhancement	\$9,000	\$18,000
Total Project Modification Costs	\$25,000	\$54,800
Source: Interviews with Service Field Office, Colorado, Biological Opinions, consultants, and local developers. For more information on consultants and local developers contacted see Exhibit 4-5.		

144. Information sources for residential and related development cost estimates are presented in Exhibit 4-5.

EXHIBIT 4-5

**SOURCES OF INFORMATION FOR RESIDENTIAL AND RELATED DEVELOPMENT
COSTS ASSOCIATED WITH CRITICAL HABITAT**

Development (Contact)	Project Size		Habitat Impacted (Acres)	Mitigation		Enhancement		Delay	Lost Units	Other	Biological Assessment/ HCP
	Acres	Units		Acres ^a	Cost Per Acre	Acres ^a	Cost Per Acre				
Developers											
Northgate (Picolan Inc., Steve Sharkey)	1,200	2,200	49.02	0	n/a	75.5	\$32,000	2 years, \$500,000 to \$1 million	15% to 25% along the stream corridor	Uncertainty	\$400,000 mitigation plan and BA
Briargate (La Plata Investments, Tom Taylor)	419	1,314	6.63	0.5 and conservation easement	\$40,000 ^b	18.9	\$10,000	\$5,000 to the average lot	200	15% to 20% construction cost increase	\$400,000 to \$500,000 HCP
Tri-View Metro (Ron Simpson)	n/a	2,300	25	Unknown	\$15,000 to \$40,000	Unknown	\$10,000 to \$15,000	n/a	300	\$200,000 soft costs	\$15,000 to \$400,000
Antelope Creek (Howrey and Associates, Bob Howrey)	634	18	<1	0	n/a	46.0	<\$1,000	0.5 years, 5% of total project	0	Monitoring	\$6,000 consultant cost
Pinery West (Community Development Group, Pete Klymkow)	1,482	825	14.1	0	n/a	16.4	\$15,000	2.5 years, \$ millions	0	\$1,500 trail	\$25,000 mitigation plan
Cottonwood South Properties (Omnivest)	67.7	850	4-5	3.4	\$13,000	12.2	n/a	1.5 to 2 years	100 units, \$723,000	\$135,000 trail, fencing, and signs	n/a

EXHIBIT 4-5

**SOURCES OF INFORMATION FOR RESIDENTIAL AND RELATED DEVELOPMENT
COSTS ASSOCIATED WITH CRITICAL HABITAT**

Development (Contact)	Project Size		Habitat Impacted (Acres)	Mitigation		Enhancement		Delay	Lost Units	Other	Biological Assessment/HCP
	Acres	Units		Acres ^a	Cost Per Acre	Acres ^a	Cost Per Acre				
Consultants											
Harding Property (ERO Resources, Steve Dougherty)	n/a	n/a	1	35.5	\$15,000 to \$40,000 Reasonable	0.6	n/a	n/a	15% to 20% reduction in lots	n/a	<\$10,000 Harding Property HCP
US Homes (Greystone Environmental Consultants, Tom Ryon)	400	CP ^c	18	52	On-site	Combined with mitigation	\$8,800	1.5 years	n/a	\$30,000 monitoring	n/a
Northgate; Regency Park; Village at Cottonwood Creek; Lower Pine Creek (SWCA Environmental Consultant, Trent Miller)	n/a	n/a	n/a	Regency Park 146.12	\$15,000 to \$23,000 Regency Park \$18,000	128.1	n/a	n/a	n/a	n/a	Biological Assessments Northgate-\$75,000 Regency Park-\$65,000 Village at Cottonwood Creek-\$28,000 Lower Pine Creek-\$50,000
Indian Creek at Windhorse Ranch (ERO Resources, Mary Powell)	n/a	n/a	0.17	0	n/a	0.3	\$7,000	Months	n/a	n/a	n/a

Source: Individuals or firms cited unless noted otherwise.

^a Information source: Formal biological opinions on the PMJM, available in the administrative record for these consultations maintained in the Colorado Field Office.

^b This estimate includes the cost of lost lots.

^c Commercial property.

4.3 Projected Number of Housing Units Within the Proposed PMJM Critical Habitat Designation

145. To estimate the future impacts of PMJM critical habitat designation on future residential housing development, this analysis first estimates the number of housing units presently anticipated to be built in critical habitat areas. To accomplish this task, geographic information system (GIS) models created by the Denver Regional Council of Governments (DRCOG), Pikes Peak Area Council of Governments, and North Front Range Metropolitan Planning Organization are used to project the number of housing units anticipated to be built over the next ten years.

- The GIS model created by DRCOG projects future population and housing units in Boulder, Douglas, Jefferson, Adams, Arapahoe, Broomfield, Clear Creek, Denver, and Gilpin Counties in five year increments.⁴⁰
- The GIS model created by the Pikes Peak Area Council of Governments projects future population and housing units in El Paso County in the five year increments.⁴¹
- The GIS model created by the North Front Range Metropolitan Planning Organization projects future population and housing units in Larimer and Weld Counties for the next ten years. This model was reviewed but not used to derive estimates for Larimer County as the boundaries do not extend to critical habitat areas.⁴²

146. The models are regularly used by county and local transportation planners. These models project the number of housing units by Transportation Analysis Zone (TAZ) polygons, which are typically subsets of census tracts or block groups. A GIS map of the proposed PMJM critical habitat area was then overlaid on these TAZ polygons, and the number of housing units anticipated to occur within the boundaries of proposed critical habitat was determined.

147. Using this method, the models predict 1,211 units will be built in PMJM critical habitat in the next ten years.⁴³ This figure represents approximately 0.1 percent of the housing growth projected in Boulder, Douglas, El Paso, Jefferson, Larimer, and Weld Counties (1,195,645 units in the next ten years, or approximately 119,564 units per year).

148. Exhibit 4-6 presents the number of projected housing units to be built within the proposed critical habitat on a unit-by-unit basis.

⁴⁰ Denver Regional Council of Governments, Population and Housing Model, December 2002.

⁴¹ Pikes Peak Area Council of Governments, Population and Housing Model, December 2002.

⁴² North Front Range Metropolitan Planning Organization, Population and Housing Model, December 2002.

⁴³ This estimate assumes that development within a TAZ will be distributed equally. Thus, to account for the irregular shapes of the TAZ and critical habitat polygons, TAZ housing projections for zones that fell partially within the boundaries of the proposed critical habitat were multiplied by the ratio of the amount of land falling in versus out of the zone.

Exhibit 4-6		
PROJECTED ANNUAL NUMBER OF NEW HOUSING UNITS IN PMJM CRITICAL HABITAT (TEN YEARS)		
Unit	Annual New Housing Units	Percent of Total
SP3	14	1.16
SP4 ^a	8	0.64
SP5 ^a	4	0.37
SP6 ^a	4	0.03
SP7 ^a	1	0.05
SP8	93	7.68
SP9	n/a	n/a
SP10	17	1.40
SP11	19	1.57
SP12	214	17.68
SP13	54	4.46
A1	783	64.68
Total	1,211	100 %
^a Due to lack of GIS data for areas of critical habitat in Larimer County, these units were derived from estimates provided by the ACOE and confirmed by the Larimer County Planning Office. Source: Denver Regional Council of Governments, Pikes Peak Area Council of Governments, and North Front Range Metropolitan Planning Organization Population and Housing Models.		

4.3.1 History of Consultation on Residential/Commercial Development

149. To estimate the number and character of future section 7 consultations for the PMJM, this analysis relies on the consultation history for the PMJM, and conversations with local developers. There have been at least 15 formal consultations regarding the PMJM that involved private development during the past four years. The Action agency for these consultations was the ACOE. The projects under consultation have varied by type of development and size and scope, and the consultations have varied in length and complexity. Exhibit 4-7 presents a summary of key characteristics of these consultations.

Exhibit 4-7	
SUMMARY OF KEY CHARACTERISTICS OF CONSULTATIONS ON DEVELOPMENT	
Involved Action Agencies	Service, ACOE
Types of development	Single/Multi-family homes, apartments, golf courses, commercial enterprises, business developments, utilities
Acres Affected per project	0.17 to 71.12. Average: 1.75/15 (Small/Large Scale)
Number of housing units per project	1 to 2,200. Average: 1.5/714 (Small/Large Scale)
Length of consultation process	1 month to 3.5 years. Average: 7 months/1 year (Small/Large Scale)
Source: Formal biological opinions on the PMJM, accessed from the administrative record for these consultations maintained in the Colorado Field Office.	

150. In many areas of the United States, ACOE permitting under section 404 of the Clean Water Act constitutes the primary Federal nexus for consultation regarding private development. Under this program, the ACOE issues permits for private activities that involve modifying navigable waterways and/or wetlands for construction and maintenance of structures.⁴⁴

151. EPA's National Pollutant Discharge Elimination System (NPDES) permit program regulates point source pollution into the waters of the United States. EPA's Phase II NPDES Storm Water Program (published December 8, 1999), requires permit coverage for storm water discharges from "construction activity disturbing between 1 and 5 acres of land (i.e. small construction activities)."⁴⁵ In past consultations on development, EPA has not taken the role as lead Action Agency.

4.3.2 Projected Number of Consultations on Residential and Related Development Over the Next Ten Years

Large Scale Development

152. In the more urban areas (i.e., El Paso and Douglas Counties) of the designation, development is characterized by large residential and commercial projects. Past consultations involving large scale developments averaged 714 units. To generate an upper bound estimate of the likely number of future section 7 consultations on the PMJM (i.e., more likely to overstate costs than understate them), this analysis assumes that all future housing units in El Paso and Douglas Counties will be developed as part of large-scale development, and thus maybe subject to a section 7 consultation. By assuming that an average housing development will consist of a proposal for 714 units, and that approximately three percent (or 21 units per development) are located in or impact critical habitat, this analysis estimates that there will be approximately 5.1 consultations per year (annual number of units built divided by 21) in PMJM critical habitat, or 51 consultations during the next ten years. Exhibit 4-8 presents the

⁴⁴ ACOE issues four types of permits: (1) individual permit, a type of standard permit requiring public comment; (2) letter of permission (LOP), a type of standard permit requiring coordination with adjacent property owners; (3) nationwide permits, which authorize a category of activities and are issued for individual small projects across the United States; and (4) regional or general permits, which authorize a category of activities in a specific region.

⁴⁵ Accessed at http://cfpub.epa.gov/npdes/stormwater/swphase2.cfm?program_id=6 on August 30, 2002.

estimated number of future consultations by unit.

Small Scale Development

153. In rural areas or areas with more stringent growth regulations (i.e., Boulder, Jefferson, Larimer, and Weld Counties), development is characterized by small-scale residential projects or ranchettes. Past consultations involving small scale developments averaged 1.5 units. To generate an upper bound estimate of the likely number of future section 7 consultations on the PMJM (i.e., more likely to overstate costs than understate them), this analysis assumes that all future housing units in Jefferson, Larimer, and Weld Counties will be developed as part of small-scale development, and may be subject to a section 7 consultation.⁴⁶ By assuming that an average housing development will consist of a proposal for 1.5 units located in or impacting critical habitat, this analysis estimates that there will be approximately 4.2 consultations per year (annual number of units built divided by 1.5) in PMJM critical habitat, or 42 consultations during the next ten years. Exhibit 4-8 presents the estimated number of future consultations by unit.

⁴⁶ This estimate was derived using a county based GIS parcel base with open space, built-out, vacant lands, and South Boulder Creek layers overlayed. Measuring approximately 400 to 500 feet from either side of the creek, from Eldorado Springs to the intersection of Baseline and Cherryvale, 11 vacant parcels and 91 parcels developed to their built out uses were identified. Although it is possible some of the 91 developed parcels could be redeveloped in the future, the PMJM habitat is likely to be impacted already. With the exception of the University of Colorado property, the 11 vacant parcels are zoned as either agricultural or rural residential. These zones permit one dwelling unit per 35 acres as a “use by right”, meaning subdivision or other high density structural uses are not allowed. The remaining lands within critical habitat are publicly controlled lands (acquired open space, conservation easements, lands where the development rights have been purchased, etc.), and are not eligible for development.

Boulder County consultations were estimated by Pete Fogg, Boulder County, December 12, 2002.

Exhibit 4-8

UPPER-BOUND ESTIMATE OF FORMAL CONSULTATIONS BETWEEN THE SERVICE AND ACOE ASSOCIATED WITH RESIDENTIAL AND RELATED DEVELOPMENT AFFECTING PROPOSED CRITICAL HABITAT FOR THE PMJM (TEN YEARS)

Unit	Projected Number of Units	Number of Formal Consultations
SP3	14	9
SP4	8	5
SP5	4	3
SP6	4	2
SP7	1	1
SP8	93	11
SP9	n/a	n/a
SP10	17	11
SP11	19	1
SP12	214	10
SP13	54	3
A1	783	37
TOTAL CONSULTATIONS ON DEVELOPMENT		93
<p>Note: Douglas, El Paso, Jefferson, Weld County estimates have not been confirmed with county officials. Sources: Personal communications with Service biologists, relevant Federal agencies, review of past Biological Opinions, and PAG model, 2002.</p>		

4.4 Total Economic Cost Associated with Residential and Related Development

154. This section presents the forecast of total economic cost associated with residential and related development for section 7 implementation in Colorado for the PMJM for the next ten years.

155. This report considers section 7-related economic impacts that may be associated with activities affecting proposed critical habitat. However, the listing of the PMJM as endangered under the Act may impact land use activities in ways not associated with section 7. For example, section 9 of the Act prohibits take of an endangered species and section 10 outlines incidental take permitting procedures for entities without a Federal nexus. Economic costs associated with these impacts are considered in section 6.8 of this analysis, as these may be motivated by the proposed critical habitat designation, and are therefore attributable to the critical habitat designation. The remainder of this section summarizes costs associated with the implementation of section 7 of the Act.

4.4.1 Estimated Costs of Consultations and Technical Assistance

156. Estimates of the cost of formal and informal individual consultations and technical assistance were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country, and the Colorado and Wyoming field offices. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures were based on an average level of effort for consultations of low,

medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.

157. Estimates take into consideration the level of effort of the Service, the Action agency, and the applicant during both formal and informal consultations and technical assistance, as well as the varying complexity of consultations. Costs associated with these consultations include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings, preparing letters, and the development of a biological opinion.
158. Per-unit costs associated with formal consultations, informal consultations, and technical assistance calls are presented in Section 3 in Exhibit 3-1. Estimates for the costs associated with preparing a biological assessment were generated by review and analysis of past projects.⁴⁷ Biological assessment costs for small scale projects fall within the range of other activities (\$5,600 to \$8,800), while costs for large scale projects tend to be higher (\$47,500).

4.4.2 Estimated Number and Costs of Project Modifications

159. Exhibit 4-9 provides estimates of total section 7-related costs associated with residential and related development activities affecting critical habitat for the PMJM.

⁴⁷ Cost assumptions are based on historical information from recent developments, see Exhibit 4-5.

Exhibit 4-9

**TOTAL ESTIMATED ECONOMIC COSTS DUE TO POTENTIAL ADMINISTRATIVE REQUIREMENTS
AND PROJECT MODIFICATIONS ASSOCIATED WITH RESIDENTIAL AND RELATED DEVELOPMENT
(TEN YEARS)**

Activity	Nexus	Unit	Future Consultations (Formal/ Informal)	Informal Consultation Costs	Form al Consultation Costs	Project Modification Costs	Total Costs
Large-Scale Residential and Related Development (Douglas and El Paso Counties)	ACOE Permit	A1	37/40	\$140,000 to \$620,000	\$2,124,000 to \$2,375,000	\$38,110,000 to \$96,940,000	\$40,374,000 to \$99,935,000
		SP12	10/15	\$53,000 to \$233,000	\$574,000 to \$642,000	\$10,300,000 to \$26,200,000	\$10,927,000 to \$27,075,000
		SP13	3/4	\$14,000 to \$62,000	\$172,000 to \$193,000	\$3,090,000 to \$7,860,000	\$3,276,000 to \$8,115,000
		SP11	1/11	\$39,000 to \$171,000	\$57,000 to \$64,000	\$1,030,000 to \$2,620,000	\$1,126,000 to \$2,855,000
		Subtotal	51/70	\$245,000 to \$1,085,000	\$2,927,000 to \$3,274,000	\$52,530,000 to \$133,620,000	\$55,702,000 to \$137,979,000
Small-Scale Residential Development (Boulder, Jefferson Larimer, and Weld Counties)	ACOE Permit	SP8	11/7	\$25,000 to \$109,000	\$170,000 to \$280,000	\$275,000 to \$603,000	\$470,000 to \$991,000
		SP10	11/1	\$4,000 to \$16,000	\$170,000 to \$280,000	\$275,000 to \$603,000	\$449,000 to \$898,000
		SP3	9/1	\$4,000 to \$16,000	\$140,000 to \$230,000	\$225,000 to \$493,000	\$368,000 to \$738,000
		SP4	5/1	\$4,000 to \$16,000	\$78,000 to \$128,000	\$125,000 to \$274,000	\$206,000 to \$417,000
		SP5	3/0	n/a	\$47,000 to \$77,000	\$75,000 to \$164,000	\$122,000 to \$241,000
		SP6	2/0	n/a	\$31,000 to \$51,000	\$50,000 to \$110,000	\$81,000 to \$161,000
		SP7	1/0	n/a	\$16,000 to \$26,000	\$25,000 to \$55,000	\$41,000 to \$80,000
		Subtotal	42/10	\$35,000 to \$155,000	\$651,000 to \$1,071,000	\$1,050,000 to \$2,302,000	\$1,736,000 to \$3,528,000
Total Costs			93/80	\$280,000 to \$1,240,000	\$3,578,000 to \$4,345,000	\$53,580,000 to \$135,922,000	\$57,438,000 to \$141,507,000

Note: Costs are presented in descending order based on total costs. Totals may not sum due to rounding.

Source: Interviews with Service Field Office, Colorado, Biological Opinions, consultants, and local developers. For more information on consultants and local developers contacted see Exhibit 4-5.

160. The total costs due to potential administrative requirements and project modifications associated with residential and related development are estimated to range from \$57.4 to \$141.5 million. Most of these costs occur in SP12 and A1 (over 89 percent of total costs). Although these costs may appear high, they should be considered in context of total residential and related development for the local area of Boulder, Douglas, El Paso, Jefferson, Larimer, and Weld Counties.

- Less than one percent of future development in all (Boulder, Douglas, El Paso, Jefferson, Larimer, and Weld) counties will incur costs associated with critical habitat.
- The cost of critical habitat, as a percentage of revenues for all residential development in the area (Boulder, Douglas, El Paso, Jefferson, Larimer and Weld Counties) is less than one percent.

161. Exhibit 4-10 presents the percent of development impacted and cost of critical habitat (as percentage of county revenues) for each county in Colorado where development activity in critical habitat is expected to occur.

Exhibit 4-10		
IMPACT OF CRITICAL HABITAT ON RESIDENTIAL AND RELATED DEVELOPMENT (TEN YEARS)		
County	Percentage of Future Homes Impacted	Cost of Critical Habitat (% of Revenues)
Boulder	0.071	0.003
Douglas	0.201	0.048
El Paso	0.293	0.653
Jefferson	0.017	0.001
Larimer	0.014	0.001
Weld	0.007	0.001

Source: Impacts estimates are based on data from population estimates by the US Census Bureau State and County QuickFacts, accessed at <http://quickfacts.census.gov/qfd/>. Bureau of Economic Analysis Regional Accounts Data, accessed at <http://www.bea.doc.gov/bea/regional/reis/>.

162. Given the availability of *substitute* housing sites in the study area, total residential development (i.e., the number of new housing units constructed) is not likely to decline as a result of the critical habitat designation for the PMJM. It is likely, however, that project delays and project modifications will result in some impacts (or increased costs) either to the landowner/seller, the land developer, or (possibly) the housing consumer. For example, if the full measure of these costs is borne by the landowner/seller in a designated critical habitat, then the value of the land is likely to decrease; that is, the seller will receive a lesser price under the designation for the same land. Alternatively, if the full measure of these costs is borne by the land developer, then the total dollar *profits* to the developer could decrease by

approximately six percent to 30 percent, assuming a profit margin of five to ten percent.⁴⁸ Thus, in this scenario the developer experiences lower profit margins, but the price to the home buyer remains the same.

163. In the event that the housing consumer bears the full measure of these cost impacts by virtue of purchasing a home in a critical habitat designation area, the purchaser could experience a 1.5 percent increase in home prices with a concurrent increase in amenities, including more open space or larger lot size.⁴⁹ It is important to note, however, that these amenities may be offset by *disamenities*, including a decrease in actual home size (i.e., in square footage). Analysis suggests that consumers in the immediate area surrounding the critical habitat are not likely to experience an increase in home prices.

4.5 Regional Economic Impact

164. The designation of critical habitat for the PMJM is likely to lead to some reduction in residential home construction in Douglas and El Paso Counties relative to the baseline (i.e. a reduction in the growth that would have occurred in the absence of critical habitat designation). This decrease in construction revenues will result in secondary effects on related sectors of the region's economy. Some of these related sectors may be closely associated with the construction industry, such as the carpentry and home furnishing industries. However, other affected sectors may be less closely associated with the construction industry, such as the radio and communications equipment and banking industries. For example, a decrease in residential construction may lead to a decrease in banking industry revenue.

165. This analysis relies on regional economic modeling to estimate the economic impacts of these initial and secondary effects. In particular, it utilizes a software package called IMPLAN to estimate the total economic effects of the reduction in activity in the construction industry due to critical habitat designation. IMPLAN is commonly used by state and Federal agencies for policy planning and evaluation purposes. The model draws upon data from several Federal and state agencies, including the Bureau of Economic Analysis and the Bureau of Labor Statistics.

166. IMPLAN translates initial changes in expenditure that are entered in the model into changes in demand for output from affected industries and corresponding changes in demand for inputs to those industries and so on. These effects can be described as *direct*, *indirect*, or *induced*, depending upon the nature of the change.

- *Direct effects* represent changes in output attributable to a change in demand or a supply shock. These are specified initially by the modeler.
- *Indirect effects* are changes in output of industries linked to those that are directly affected by the initial change in expenditures.

⁴⁸ Assuming the average price per home is \$250,000, and a profit margin of five percent to ten percent, a developer can expect \$12,500 to \$25,000 profit per home. This analysis estimates \$1,443 to \$3,660 in increased costs per unit (estimated costs per development divided by total units per development). Decrease in total profits is cost per unit divided by expected profit per unit.

⁴⁹ This analysis estimates \$1,443 to \$3,669 in increased costs per unit. Assuming the average price per home is \$250,000, the increased cost to the consumer would be 0.6 percent to 1.5 percent (increased cost per unit divided by average home price).

- *Induced effects* reflect changes in household consumption arising from changes in employment (which in turn are the result of direct and indirect effects). For example, changes in employment in a region may affect the consumption of certain goods and services.

These categories are calculated for all industries and aggregated to determine the regional economic impact of critical habitat designation.

167. There are two important caveats relevant to the interpretation of IMPLAN model estimates. The first is that the model is static in nature and measures only those effects resulting from a specific policy change (or the functional equivalent specified by the modeler) at one point in time. Thus, IMPLAN does not account for posterior adjustments that may occur, such as the subsequent reemployment of workers displaced by the original policy change. This suggests that IMPLAN is likely to overstate the long-run net output and employment effects resulting from critical habitat designation and the resulting decrease in construction activity. A second caveat to the IMPLAN analyses is related to the model data. Our IMPLAN analysis relies upon input/output relationships derived from 1998 data. Thus, in our analyses we assume that this characterization of the study area's economy is a reasonable approximation of current conditions. The results of this analysis may be sensitive to this assumption if significant changes have occurred in the structure of region's economy. However, the magnitude and direction of any such bias are unknown.
168. The current development plans for Douglas and El Paso counties estimate that approximately 1,070 units will be built along the stream corridor in the critical habitat area.⁵⁰ Critical habitat designation is likely to lead to 15-25 percent of these houses not being built, which means that approximately 161 to 268 units may not be built over the next ten years.⁵¹ This loss is equivalent to three to five units lost per project. We estimate that these homes would cost \$250,000, on average. Of this total, however, approximately 25 percent is accounted for by value of the land (home lot). Therefore, we estimate that approximately \$187,500 (the structure costs) is lost for each unit not built. We multiply this cost by the annual decrease in construction activity (16 to 27 units) to obtain an estimate of \$3 to \$5 million for the annual loss in construction revenue due to critical habitat designation.
169. This change in construction revenue will ripple through the economy, leading to a number of indirect and induced effects (Exhibit 4-11). We estimate that the decline in revenues of industries indirectly linked to the residential construction industry is likely to lead to the reduction of between \$1.0 and \$1.7 million in expenditures. In addition, we estimate that the changes in direct and indirect expenditures will lead to a decline of approximately \$600,000 to \$625,000 in household consumption (induced effects). Thus, the total annual impact of the reduction in residential construction in the study area will be between \$4.6 and \$7.3 million. We also use IMPLAN to calculate the change in net employment. This analysis shows that there will be a total loss of 48 to 80 jobs due to critical habitat designation.

⁵⁰ Development losses in Boulder, Jefferson, Larimer, and Weld are not included in the regional impact analysis because units will likely be built on other areas of the property or will be built elsewhere.

⁵¹ For cost assumptions see Exhibit 4-5.

<p align="center">Exhibit 4-11 ECONOMIC IMPACT OF A REDUCTION IN RESIDENTIAL HOME CONSTRUCTION RELATIVE TO THE BASELINE (ANNUAL IN MILLIONS OF 2002 DOLLARS)</p>								
Region	Direct Effect on Expenditures		Indirect Effect on Expenditures		Induced Effect on Expenditures		Total Regional Economic Impact ^a	
	Low	High	Low	High	Low	High	Low	High
Douglas and El Paso Counties	\$3.0	\$5.0	\$1.0	\$1.7	\$600,000	\$625,000	\$4.6	\$7.3
^a Totals may not add due to rounding.								

4.6 Caveats

170. The following is a discussion of the limitations and assumptions of the residential development cost model.

- This analysis assumes that none of the formal consultations are a result of HCPs. The number of section 7 consultations would not be reduced by individual HCPs but could be reduced by county-level HCPs. It is likely that many projects in the future will fall under county-level and individual HCPs, reducing the cost of consultation. This is especially true in El Paso County, where the ACOE does not take jurisdiction over entire projects if only minor amounts of habitat are impacted; the consultation will include only the impacting activity.⁵² The cost of an HCP can range from less than \$10,000 for a small scale project to upwards of \$400,000 to \$500,000 for a large scale project.⁵³ It is likely that HCP costs for small scale developments will be similar to BA costs, while HCPs for large scale developments could cost more.
- Although there have been no residential or related development consultations with the EPA, the possibility does exist that there may be some in the future.
- The cost estimates presented above could overstate the costs that will result from critical habitat designation due to pre-existing limits on development within the counties (i.e., costs presented here may in fact have been experienced in baseline, absent the designation). Boulder County's Comprehensive Plan already imposes stringent mitigation targets for permitted development in many areas of the county. The estimates presented in this report do not take these limits into account, and thus assume that all delays and mitigation efforts are likely to result from the listing and critical habitat designation of the PMJM.
- A more accurate and preferred method to estimate costs would be to conduct

⁵² Van Truan, ACOE Personnel, Pueblo Office, pers. comm. 2002.

⁵³ Cost assumptions are based on historical information from recent developments, see Exhibit 4-5.

a detailed cash flow analysis of residential development with and without critical habitat designation. Such an analysis was not performed due to proprietary information issues.

- This analysis assumes that the density of development in the study area does not change as a result of changes to development plans. Because of the availability of near perfect substitutes there is nothing to indicate development would not continue at projected densities in the study area.⁵⁴
- It is assumed that the average development project is delayed one year due to the consultation process. It should be noted that the length of the consultation process is not entirely attributable to the Service but also includes the time it takes for consultants to prepare and revise biological assessments, efforts that could be undertaken prior to consultation.
- The above cost analysis assumes that there are no (resulting financial benefits to the developer or homeowners as opposed to other, non-quantifiable social welfare benefits) benefits associated with preserving open space on-site or with increasing lot size. See Section 8 for a discussion of these potential benefit categories.

⁵⁴ Substitute land is also available. Jefferson County, adjacent to Douglas and Boulder Counties, has approximately 77,000 acres of developable land available. This includes land in Jefferson County that has gone through the County process to re-zone or subdivide. Russ Clark, Jefferson County Planning Office pers. comm. 2002.

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171. Based on conversations with the Service, county representatives, and private landowners, agricultural activities were identified as the primary land use in the areas proposed as critical habitat in Wyoming. Based on similar conversations with the Service and county representatives in Colorado, it was determined that agricultural activities in the areas proposed as critical habitat in Colorado are a minor component of overall impacts in Colorado. Therefore, the focus of this section is on the economic impact to agricultural activities in Wyoming associated with section 7 protection for the PMJM.
172. The proposed critical habitat designations for the PMJM will affect private landowners in Wyoming if a Federal nexus exists with respect to their farming or ranching operations.⁵⁵ Even if a landowner's agriculture operation involves a Federal nexus, resulting in a section 7 consultation with the Service, the Service is not likely to stop or change the on-going agriculture activity because agricultural activities do not typically result in "adverse modification" of critical habitat.⁵⁶
173. This section discusses costs associated with agricultural activities on lands proposed as critical habitat in Wyoming that are a direct result of the protections provided for the PMJM by section 7 of the Act (i.e., involve a Federal nexus). Impacts associated with agricultural activities that typically do not involve a Federal nexus are discussed later, in section 6.8 and Appendix B.
174. Section 5.1 provides background information regarding the typical components and economics of an average rancher in the area proposed as critical habitat in Wyoming. Section 5.2 identifies the agricultural activities within and/or affecting the proposed critical habitat as well as the location, nature, and extent of future agricultural activities that may be directly affected by section 7 implementation. These estimates include all section 7-related consultations associated with the proposed critical habitat area, including those costs associated with the listing of the PMJM.

⁵⁵ However, the designation, or proposed designation, of critical habitat may affect private entities with no Federal nexus, and therefore no section 7 responsibilities under the Act. These impacts are discussed in section 6-8 of this analysis.

⁵⁶ Adverse modification is defined as "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical." 50 CFR 402.02; Personal communication with Biologists, U.S. Fish and Wildlife Service, Cheyenne Field Office and Colorado Ecological Services Field Office, 2002.

5.1 Background on Haying and Grazing Activities in Areas Proposed as Critical Habitat

175. The proposed critical habitat designations for the PMJM, as well as co-extensive impacts attributable to listing, could affect ranching activities in southeastern Wyoming. The largest area of land proposed for designation in Wyoming is along Chugwater Creek (unit NP3) and Horse Creek (unit NP5) in northern Laramie County, eastern Albany County, and southern Platte County. These two units comprise 13,789 acres of riparian habitat along the two streams, or 69 percent of all lands proposed for designation in Wyoming. The lands proposed for designation in these two units are largely part of private ranches, and are currently used primarily for cattle grazing and hay production.
176. The second largest area of land proposed for designation is along a series of small creeks in northeastern Albany County, southern Converse County, and northwestern Platte County. The affected creeks include Cottonwood Creek and several of its tributaries (unit NP1), Horseshoe Creek (unit NP2), and Friend Creek and Murphy Canyon (unit NP4). These three units comprise 4,350 acres, or 22 percent of all lands proposed for designation in Wyoming. Unlike the areas proposed for designation along Chugwater and Horse Creeks, these three units contain significant Federal land holdings, including portions of the Medicine Bow-Routt National Forest. Private lands are also included in the proposed designations, some of which are used for hay production. Both private and Federal lands in these units are used primarily for cattle grazing. Other agricultural lands proposed for designation in Wyoming include 654 acres along Lodgepole and Upper Middle Lodgepole Creeks in eastern Laramie County (unit SP1), and a small amount of acreage along Lone Tree Creek in southern Laramie County (unit SP3).⁵⁷
177. The cattle ranches in southeast Wyoming that may be affected by section 7 implementation depend heavily upon stream-flow and early season precipitation to produce the grass that supports livestock during the entire year. Most ranchers use flood irrigation during the spring to irrigate hay meadows. The hay from these meadows is harvested in mid-summer and is used to feed cattle during the winter months. These hay meadows are typically located along riparian areas of creeks, which can also be prime habitat for the PMJM. In the spring, while the hay fields are under irrigation, cattle are typically moved to higher elevation grazing lands. Cattle are then returned to the hay meadows in late summer or early fall after the hay crop is harvested to graze on re-growth. During the winter months, the cattle are fed hay. Cattle are typically fed until spring, after calving is complete, and the yearly process begins again.⁵⁸
178. Ranching operations in areas proposed for critical habitat designation in southeast Wyoming vary greatly in size. A typical moderate-sized operation might have 400 cows and 25 bulls, along with a number of horses, calves, and yearling heifers and steers. The limiting factor in the size of cattle herds is usually the amount of winter feed that can be produced from irrigated hay meadows. The average beef cow is fed two to three tons of grass hay during the winter, and the average annual yield from irrigated meadows in southeastern

⁵⁷ Acreage figures for proposed critical habitat designations are as reported in the *Designation of Critical Habitat for the Preble's Meadow Jumping Mouse (Zapus hudsonius preblei)*; Proposed Rule, 67 FR 137, July 17, 2002.

⁵⁸ The descriptions of ranching operations are based primarily upon information received from Renee Taylor of True Ranches and Dallas Mount of the Platte County Office of the University of Wyoming Cooperative Extension Service.

Wyoming ranges from one to two tons of hay per acre.⁵⁹

179. The profitability of ranching operations depends upon many factors, including cattle prices, management practices, water availability, and a host of variables relating to operating costs. A University of Wyoming study showed that in 1992, a typical 400-cow operation in Wyoming netted \$151.83 per cow annually, on a cash basis, for a total annual cash income of \$60,732.⁶⁰ After deducting non-cash costs for depreciation and family management and labor, however, net profit drops to \$2.80 per cow, or \$1,120 in total. These returns are low given the owner of a typical 400-cow operation used \$1.8 million of ranch assets to produce the returns (1992 dollars).⁶¹
180. Economic returns to ranching activities in southeastern Wyoming have declined to below average levels in recent years due to a three-year drought that has reduced water supplies and feed production. Statewide precipitation for the first half of 2002 was the lowest on record, and many ranchers will be forced to either reduce herd size or purchase feed to carry their cattle over the winter of 2002-2003. Concurrently, because of the drought, the cost of hay has been rising. According to the Wyoming Agricultural Statistics Service, average hay prices rose from \$65 per ton in 1999 to \$109 per ton in 2001, an increase of 68 percent.⁶² During 2002, hay has been selling for as high as \$125 to \$175 per ton. These price increases have had a detrimental effect on the ability of many ranchers to operate profitably during the drought period. However, those farmers who sell hay, rather than feed it to their cattle, have benefitted from the higher hay prices.

5.2 Estimated Impacts of Section 7 on Haying and Grazing Activities

181. Agricultural activities, such as haying and grazing, make up the bulk of economic activity in the Wyoming proposed critical habitat areas. Agricultural activities typically do not involve a Federal nexus because most are not authorized, permitted, or funded by a Federal agency. There are, however, numerous Federal agricultural programs that may create a Federal nexus with agricultural activity in critical habitat areas. This section assesses the economic impacts of agricultural activities involving a Federal nexus (i.e., those activities that will generate a section 7 consultation); impacts associated with agricultural activities that typically do not involve a Federal nexus are discussed later, in section 6.8 and Appendix B.
182. Most activities on private land generally do not constitute a Federal nexus unless some type of Federal funding is involved or a Federal permit is required. However, ranching and other agricultural activities can have a Federal nexus if a rancher or farmer receives a loan or grant from the Federal Farm Service Agency (FSA), or receives a grant from the NRCS to voluntarily adopt conservation practices that improve or maintain the quality of the natural resources in the area, such as through the Environmental Quality Incentives Program. After

⁵⁹ Id.

⁶⁰ The income estimates presented in this section include income generated by a full-time, moderate-sized (400 cow) agricultural operation in Wyoming. Therefore, these estimates do not include income realized by small part-time ranchettes with only a few head of cattle.

⁶¹ Financial information on ranches was obtained primarily from *Contributions of Federal Lands to Wyoming Range Livestock Production*, 1992, University of Wyoming College of Agriculture Publication B-993, February 1992.

⁶² *Wyoming Agricultural Statistics, 2002*, Wyoming Agricultural Statistics Service, Cheyenne.

consulting with the Service and other Federal action agencies, the following agricultural activities were identified as activities that may involve a Federal nexus and be subject to section 7 of the Act:

- Agricultural operation improvements funded through the FSA or the Farm Bill;
- Conservation activities, such as riparian improvement projects, funded by the FSA and/or the NRCS; and
- Grazing permitted by the USFS and BLM on Federal lands.

5.2.1 Federally Funded Operational Improvements

183. The FSA provides technical and financial assistance to farmers under the Farm Bill. This assistance includes helping farmers conserve land and water resources, providing credit to new or disadvantaged farmers and ranchers, helping farmers and ranchers recover from disasters, and stabilizing farm income. The determination of whether a federally funded agricultural program creates a Federal nexus varies depending on the scope of the assistance, grant, or program. For example, the Service has determined that the FSA does not have discretion in implementing Federal emergency and disaster relief funding to farmers and ranchers. Therefore, a Federal nexus does not exist and a section 7 consultation would not be triggered by disaster payments to agriculture producers.⁶³ However, uncertainty exists regarding which other FSA funding programs may create a Federal nexus.⁶⁴

184. The FSA believes that the critical habitat designation has the potential to affect the types of agricultural projects it typically funds, and is in the process of determining how the designation of critical habitat will affect its activities. Therefore, there is the potential for additional consultations in the future associated with operational improvement assistance provided to farmers and ranchers by the FSA.⁶⁵ However, due to uncertainty regarding FSA funding of programs that may cause a Federal nexus and the number of future consultations that may be associated with federally funded operational improvements, this analysis does not quantify any impacts associated with this activity.

⁶³ Personal communication with U.S. Fish and Wildlife staff, Solicitor's Office, and Colorado and Wyoming Field Offices, 2002.

⁶⁴ Id.

⁶⁵ Personal Communication with Lois VanMark, Farm Service Agency, 2002.

5.2.2 Federally Funded Conservation Activities

185. The NRCS provides cost-share and other Federal assistance to private ranchers and farmers for the institution of environmentally friendly land use practices. Typical conservation activities on Wyoming ranches and farms include grassland restoration, wetland restoration, and riparian restoration and enhancement. The NRCS provides funding under the following programs for conservation activities on private lands:

- Conservation Reserve Program (CRP) - Provides annual rental and cost-share assistance to encourage farmers and ranchers to plant perennial vegetative cover to improve soil, water, and wildlife resources. To be eligible for CRP, land must have been planted in an agricultural commodity two out of the last five years; considered highly erodible or subject to scour erosion; and devoted to any number of highly beneficial environmental practices, such as filter strips, riparian buffers, grass waterways, shelterbelts, wellhead protection areas, or other similar practices. Annual rental payments are made based on the agricultural rental value of the land. CRP contracts last from 10 to 15 years, depending on the goals of the operator. This program is administered by the FSA, with technical assistance provided by the NRCS.
- Environmental Quality Incentives Program (EQIP) - NRCS provides technical and financial assistance to farmers and ranchers for the installation or implementation of structural and management conservation practices on eligible agricultural land.
- Wildlife Habitat Incentives Program (WHIP) - Provides technical and financial assistance to landowners who develop upland, wetland, riparian, and aquatic habitat areas on their property.
- Emergency Watershed Protection Program (EWP) - NRCS provides technical and financial assistance to protect landowners who clear debris from clogged waterways, restore vegetation, and stabilize river banks as long as the measures utilized are environmentally and economically sound. The EWP also allows NRCS to purchase floodplain easements to restore, protect, maintain, and enhance floodplain functions; conserve natural values, including fish and wildlife habitat; improve water quality; and increase open space.
- Soil and Water Conservation Assistance (SWCA) - Provides cost share and incentive payments to farmers and ranchers who voluntarily address threats to soil, water, and related natural resources, including grazing land, wetlands, and wildlife habitat.
- Watershed Prevention, River Basin Planning, and Flood Prevention Operations - Provides technical and financial assistance to landowners to protect watersheds from damage caused by erosion, floodwater, and sediment.
- Wetlands Reserve Program (WRP) - Provides technical and financial assistance to eligible landowners to restore and protect wetland functions and values.

186. These conservation programs are funded through the Farm Bill. The 2002 Farm Bill has increased funding for conservation practices, and competition for these funds is expected

to increase as more landowners learn about these programs.⁶⁶

187. The NRCS believes that the designation of critical habitat will result in an increase in informal and formal consultations.⁶⁷ Due to uncertainty concerning what protection measures the Service would likely request during consultation, the NRCS is unable to predict with certainty the number of consultations expected over the next ten years, or allocate anticipated consultations to particular agricultural activities. However, at a minimum, the NRCS anticipates an average of one consultation for each landowner over the next ten years concerning one or more of the following conservation activities:

- Fencing;
- Prescribed grazing;
- Livestock exclusion;
- Tree-shrub planting;
- Streambank stabilization;
- Wetland development;
- Relocation of animal feeding operations;
- Equipment accesses to construction sites;
- Channel work for fish and erosion control;
- Livestock crossing;
- Pipelines (replacement of ditches); and
- Irrigation practices.

188. The Service conducted a search of courthouse documents for landowners within the area proposed as critical habitat in Wyoming in order to develop a mailing list for information regarding the PMJM and proposed critical habitat.⁶⁸ As a result of this search, the Service found names and addresses for 60 individuals.⁶⁹ Therefore, this analysis assumes that there will be 60 consultations over the next ten years. It is also assumed that these consultations will occur at an annual rate of six consultations per year, and that ten percent will require the initiation of a formal consultation.⁷⁰

189. The NRCS anticipates that the Service may recommend project modifications in 30 percent of informal consultations and 100 percent of formal consultations. Examples of project modifications include timing restrictions, changes in access to work sites, changes in area of work, and changes in project design.⁷¹ The NRCS also anticipates an increase in costs associated with project modifications, but is uncertain of the amount of the cost. At a minimum, NRCS anticipates additional administrative costs associated with these informal and formal consultations. Exhibit 5-1 provides the administrative time and associated costs that accrue to the NRCS for these anticipated consultations.

⁶⁶ Personal Communication with Dick Rintamaki, Natural Resources Conservation Service, 2002.

⁶⁷ Id.

⁶⁸ Personal Communication with U.S. Fish and Wildlife Service, Cheyenne Field Office, 2002.

⁶⁹ Due to the likely incompleteness and possible inaccuracy of the court documents, this number may either overstate or understate the number of grazing and haying operations within proposed critical habitat.

⁷⁰ Personal communication with Dick Rintamaki, 2002.

⁷¹ Id.

Exhibit 5-1			
ESTIMATED ADMINISTRATIVE COST OF CONSULTATIONS FOR CONSERVATION ACTIVITIES FUNDED BY THE NRCS (PER EFFORT)			
Activity	Number of Staff Days	Cost/Day	Total Cost
Informal Consultation	5	\$248	\$1,240
Informal Consultation with Project Modifications	10	\$248	\$2,480
Formal Consultation	15	\$248	\$3,720
Formal Consultation with Project Modifications	20	\$248	\$4,960
Source: Personal Communication with Natural Resources Conservation Service personnel, October 17 and 25, 2002.			

190. During the next ten years, the NRCS estimates that informal and formal consultations will cost the Agency approximately \$87,000 and \$30,000, respectively. Add to this the per project administrative costs for the Service and private landowners (see Exhibit 3-1), and the total administrative costs associated with consultations for conservation activities increases to approximately \$500,000 over the next ten years. These costs would be borne by the Service, NRCS, and private landowners.
191. The NRCS has expressed concern that the Services' ongoing activities to designate critical habitat could cause some landowners to cooperate less with the Service and the NRCS on conservation projects.⁷² Landowners may cease participation in conservation projects to avoid drawing public attention to the fact that there may be PMJM on their property, or to avoid having PMJM discovered on their property or having their property identified as favorable PMJM habitat. In addition, landowners may reduce participation in these projects to avoid Federal involvement over their land management practices. Specifically, landowners are concerned that participation in conservation projects within critical habitat may result in project modifications that expand the project and increase the cost, or that shift the focus of the project away from the landowner's initial intent. Landowners also perceive a risk of restrictions on land use in the future associated with section 7 implementation.⁷³ As a result, a modest but undetermined reduction in cooperation may occur, along with a corresponding but undetermined environmental loss to society.
192. Reduced cooperation from landowners in the areas proposed as critical habitat in Wyoming may include refusal to allow biological surveys of their land, refusal to develop HCPs, or refusal to participate in watershed and conservation partnership programs sponsored by the Service and the NRCS. It may also involve canceling participation in existing conservation projects. Reduced cooperation could result in lower-quality land management, environmental degradation, and increased risks to native plants and wildlife. If the environmental changes were valued, they could reflect an economic loss to society.

⁷² Personal Communication with Dick Rintamaki, 2002.

⁷³ Personal communication with Tim Byer, U.S. Forest Service, Medicine Bow-Routt National Forest, Douglas Ranger District, 2002.

193. Any change from the current level of cooperation from landowners will depend on how much land is designated, which land is designated, actual and perceived restrictions on land use due to the designations, and perceived risks in the future. For the PMJM in Wyoming, the proposed critical habitat designation is expected to have a modest impact on agricultural land use over and above existing baseline restrictions. Additionally, as landowners gain experience with the actual effects of critical habitat, their concerns about whether or not to cooperate on conservation projects may diminish.

5.2.3 Grazing on Forest Service and BLM Lands

Grazing Allotments on the Medicine Bow-Routt National Forest

194. The Forest Service maintains eight to nine large grazing allotments on the Medicine Bow-Routt National Forest. These grazing allotments are located in proposed critical habitat in units NP1 through NP5, SP1 and SP3, and currently permit the grazing of 12 to 1,012 Animal Unit Months (AUMs).⁷⁴ Approximately five percent of the allotments fall within proposed critical habitat for the PMJM.⁷⁵
195. The grazing permits are effective for ten years, and the USFS anticipates that one or two allotments will be re-permitted during the next ten years. However, the USFS anticipates that landowners will not request an increase in stocking rates (i.e., AUMs allowed on an allotment). Because grazing permit modifications are not expected, the USFS does not anticipate initiating consultations with the Service for these re-permitting activities.⁷⁶

Grazing Allotments on BLM Land

196. The BLM maintains five small grazing allotments on land located within or surrounding proposed critical habitat units NP1 (Cottonwood Creek), NP2 (Horseshoe Creek), and NP3 (Chugwater Creek). The BLM anticipates renewing the grazing leases on three of these allotments during the next ten years, one in each critical habitat unit, and that these grazing lease renewals will require formal consultation with the Service. Due to the size of these allotments, the BLM does not anticipate requiring project modifications. Additionally, the BLM does not expect any commercial recreation, fire related projects, or other BLM activities on these three allotments.⁷⁷
197. The BLM has an allotment along Horseshoe Creek in unit NP2 that includes a 40 acre plot of public land. The BLM anticipates burning this plot in the future to reduce fuel; protecting rural housing and structures. This project will involve the initiation of a formal consultation and the following project modifications: (1) all work completed outside the 394 foot buffer surrounding Horse shoe Creek; (2) implement procedures to avoid soil and surface disturbance to eliminate sediment deposition and erosion into the creek; (3) burn brush piles during snow-covered conditions to reduce the possibility of wildfire; and (4) provide the

⁷⁴ Animal-units per month represent the amount of forage required by one animal for one month. One animal unit is defined as 1,000 lb beef cow with or without nursing calf and a daily requirement of 26 lbs of dry forage.

⁷⁵ Id.

⁷⁶ Id.

⁷⁷ Personal communication with Willie Fitzgerald, U.S. Bureau of Land Management, 2002.

project environmental analysis (EA) to the Service for review. This project is estimated to cost \$500/acre for a total cost of \$20,000. However, none of these project modification costs are attributable to the PMJM or the proposed critical habitat designation.⁷⁸

198. Therefore, the BLM anticipates four formal consultations on grazing allotment activities at a cost of \$59,000 to \$98,000.⁷⁹ These administrative costs would be borne by the Service, BLM, and private parties.

Potential Impacts of Section 9 on Grazing Activities on Federal Lands

199. While the USFS and BLM do not expect any project modifications associated with future consultations on grazing permits and leases, the Service anticipates including conditions to minimize take in all future consultations associated with grazing leases on Federal lands, such as restrictions on the number of AUM's within riparian areas or the construction of fencing with water gaps to keep herds out of the riparian areas.⁸⁰ These conditions would be consistent with Action agency responsibilities under the Act to consider PMJM needs. However, due to uncertainty regarding the types of modifications the Service may request during future consultations for Federal grazing permits and leases following the expiration of special rule 4(d), this analysis is unable to quantify impacts on future consultations related to section 9 of the Act (see Appendix B).

5.3 Total Economic Cost Associated with Agriculture

200. _____ This section presents the total economic cost associated with section 7 implementation for agricultural activities in the areas proposed as critical habitat for the PMJM in Wyoming over the next ten years.
201. This section considers section 7-related economic impacts that may be associated with agricultural activities affecting proposed critical habitat for the PMJM in Wyoming. However, the listing of the PMJM as endangered under the Act may impact land use activities in ways not associated with section 7. For example, section 9 of the Act prohibits take of an endangered species and section 10 outlines incidental take permitting procedures for entities without a Federal nexus. Economic costs associated with these impacts are discussed in section 6.8 and Appendix B.
202. Per-unit costs associated with formal and informal consultations and technical assistance calls are presented in Section 3 in Exhibit 3-1. However, where available and provided, this analysis utilizes administrative cost estimates that are specific to the relevant Agency or project.
203. Uncertainty exists regarding the nature and cost of project modifications that may be requested by the Service in consultations on federally funded operational improvement and conservation activities. Due to this uncertainty, project modification costs are not quantified for these activities. For grazing leases on Federal land, the USFS does not anticipate that the

⁷⁸ Id.

⁷⁹ See exhibit 3-1 for the per-project consultation costs for this estimate.

⁸⁰ Personal communication with the Tim Byer, 2002.

Service will request any project modifications. For leases on BLM land, the BLM anticipates \$20,000 in project modification costs associated with a fuel reduction project in unit NP2. However, these costs are not attributable to the PMJM or the proposed critical habitat designation.

204. Exhibit 5-2 provides estimates of total section 7-related costs associated with agriculture activities affecting proposed critical habitat for the PMJM.

Exhibit 5-2

**ESTIMATED ECONOMIC COSTS ASSOCIATED WITH SECTION 7 IMPLEMENTATION
ON AGRICULTURAL LANDS PROPOSED AS CRITICAL HABITAT FOR THE PMJM IN WYOMING
(TEN YEARS)**

Activity	Nexus	Units	Future Consultations (Formal/Informal)	Informal Consultation Costs	Formal Consultation Costs	Project Modification Costs	Total Costs
Operational Improvements	FSA Funding	All	(unknown/unknown)	unknown	unknown	unknown	unknown
Conservation Activities	NRCS/FSA Funding	NP3	(2.1/18.9)	\$125,000	\$50,000	unknown	\$176,000
		NP5	(2.1/18.9)	\$125,000	\$50,000	unknown	\$176,000
		NP2	(0.4/3.6)	\$24,000	\$10,000	unknown	\$33,000
		NP1	(0.4/3.6)	\$24,000	\$10,000	unknown	\$33,000
		NP4	(0.4/3.6)	\$24,000	\$10,000	unknown	\$33,000
		SP1	(0.3/2.7)	\$18,000	\$7,000	unknown	\$25,000
		SP3	(0.3/2.7)	\$18,000	\$7,000	unknown	\$25,000
		Subtotal	(6.0/54.0)	\$358,000	\$144,000	unknown	\$502,000
Grazing on USFS Land	Federal Permit	All	(0/0)	0	0	0	0
Grazing on BLM Land	Federal Permit	NP2	(2/0)	0	\$28,000 to \$47,000	0	\$28,000 to \$47,000
		NP1	(1/0)	0	\$16,000 to \$26,000	0	\$16,000 to \$26,000
		NP3	(1/0)	0	\$16,000 to \$26,000	0	\$16,000 to \$26,000
		Subtotal	(4/0)	0	\$59,000 to \$98,000	0	\$59,000 to \$98,000
Total			10/54	\$358,000	\$203,000 to \$242,000	unknown	\$561,000 to \$600,000

Note: Costs are presented in descending order based on total costs. Totals may not sum due to rounding..

Source: Based on IEC review of past Biological Opinions and personal communication with Service biologists, FSA, NRCS, BLM, and the USFS.

205. A majority of the costs associated with section 7 implementation on agricultural lands proposed as critical habitat for the PMJM in Wyoming consist of administrative costs that are primarily borne by the Service and Federal Action agencies. Therefore, the implementation of section 7 of the Act is not likely to significantly impact agricultural operations in the areas proposed as critical habitat for the PMJM in Wyoming.

5.4 Caveats

206. The following is a discussion of the limitations and assumptions of this analysis on the impacts of section 7 implementation on agricultural activities.

- The historic occurrence and cost of consultations and project modifications are good predictors of future consultation behavior and consultation and project modification costs.
- Private ranchers will seek Federal funding for agricultural improvements and voluntary conservation activities.
- This analysis assumes that landowner concerns about whether or not to cooperate on federally funded conservation projects will diminish as they gain experience with the actual effects of section 7 implementation.
- The BLM consultation estimates may overstate overall impacts to its grazing activities due to BLM policy of measuring impacts associated with cattle herds from adjacent private property not separated from BLM land by fence.
- This analysis likely understates impacts due to uncertainty regarding the type of FSA funding that involves a Federal nexus and requires consultation, as well as uncertainty regarding the number and cost of project modifications for projects funded by the FSA and NRCS.
- Historic stocking rates and allotment sizes are adequate thresholds to determine future USFS consultation and project modification costs for grazing re-permitting or renewal activities.

207. This section identifies and evaluates the economic impact of other activities within and/or affecting the proposed critical habitat designation as well as the location, nature, and extent of future activities that may be affected by section 7 implementation in the critical habitat area. The discussion includes a description of the activity, how the activity would be affected, and a calculation of the associated costs due to section 7 implementation.

6.1 Road/Bridge Construction and Maintenance

208. A significant number of road/bridge construction and maintenance activities may occur within the proposed critical habitat area during the next ten years. Potential road/bridge projects include: construction and maintenance of access roads to dams, pipelines, and other infrastructure, expansion or improvement of the existing public road network, and construction or improvement of private roads.

209. The typical Federal nexuses for road/bridge construction and maintenance activities are either funding from the FHWA for WYDOT and CODOT projects and/or CWA §404 permitting from the ACOE for projects with the potential to discharge dredged or fill material into navigable waters of the United States. This analysis anticipates 149 to 169 informal consultations and 125 formal consultations associated with road/bridge construction and maintenance activities during the next ten years.

Wyoming

210. During the next ten years, the WYDOT anticipates conducting considerable road/bridge construction and maintenance activities within the proposed PMJM critical habitat areas, including road improvements, bridge/culvert replacements, right-of-way fence replacements, and vegetation control. The WYDOT anticipates initiating up to 120 informal and 60 formal consultations during the next ten years associated with these activities, with these activities evenly distributed among the proposed critical habitat units in Wyoming (excluding unit SP2 which is located entirely on the F.E. Warren Air Force Base).⁸¹ The ACOE also anticipates initiating seven informal consultations associated with CWA §404 permit applications for the construction and maintenance of access roads in units SP3, NP2,

⁸¹ Personal communication with Debra Ferguson, WYDOT, 2002.

NP3, and NP5.⁸² Additionally, the USFS anticipates initiating one informal consultation over the next ten years associated with the construction of a horseback riding trail in unit NP1 at an administrative cost of \$2,300 to \$12,600.⁸³ The total administrative costs associated with all road/bridge construction and maintenance consultations range from approximately \$1,380,000 to \$3,510,000 during the next ten years.⁸⁴

211. The USFS anticipates that the Service may request the following project modifications for the horseback riding trail: construction of a cattle guard in large crossings, and, to minimize impacts to vegetation, the hardening of the project site around small crossings and the establishment of a ten foot buffer zone in riparian areas. However, the USFS anticipates that the cost of these project modifications will be negligible as they are already required under the USFS' trail management standards to minimize impacts from trail construction and maintenance.⁸⁵

212. The WYDOT anticipates that 100 percent of informal consultations will involve project modifications, including seasonal timing restrictions (i.e., mowing outside the hibernation season), and the avoidance of impacts to riparian vegetation by changing detours. The cost associated with timing restrictions varies greatly, depending upon the scope of the work, but can result in extending a project an additional field season which doubles the cost of the job.⁸⁶ Due to this uncertainty, this analysis does not estimate the cost associated with timing restrictions. The cost associated with the avoidance of impacts to riparian vegetation is estimated at \$30,000 per project, for a total project modification cost up to \$3,600,000 during the next ten years.⁸⁷

213. Additionally, the WYDOT anticipates that 100 percent of formal consultations will involve project modifications. Exhibit 6-1 describes the type, number, and cost of project modifications the WYDOT anticipates implementing for future road/bridge construction and maintenance projects.⁸⁸ The total cost of project modifications for all formal road/bridge construction and maintenance projects is estimated at \$3,390,000 during the next ten years.

Exhibit 6-1			
ESTIMATED NUMBER AND COST OF PROJECT MODIFICATIONS ASSOCIATED WITH FORMAL CONSULTATIONS FOR WYDOT ROAD/BRIDGE CONSTRUCTION AND MAINTENANCE PROJECTS (TEN YEARS)			
Project Modification	Number (Ten Years)	Per Unit Cost	Total Cost
Habitat Mitigation	50 acres	\$15,000	\$750,000

⁸² Personal communication with ACOE personnel, 2002.

⁸³ The source of per unit consultation costs is Exhibit 3-1.

⁸⁴ Ibid.

⁸⁵ Personal communication with Tim Byer, 2002.

⁸⁶ Personal communication with Debra Ferguson, 2002.

⁸⁷ Id.

⁸⁸ Id.

Exhibit 6-1
ESTIMATED NUMBER AND COST OF PROJECT MODIFICATIONS ASSOCIATED WITH
FORMAL CONSULTATIONS FOR WYDOT ROAD/BRIDGE
CONSTRUCTION AND MAINTENANCE PROJECTS
(TEN YEARS)

Project Modification	Number (Ten Years)	Per Unit Cost	Total Cost
Habitat Mitigation on Public Lands	30 projects	\$25,000	\$750,000
Habitat Enhancement	30 projects	\$5,000	\$150,000
Monitoring	30 projects	\$1,000	\$30,000
Creation of natural stream-bottom into culvert crossings; conversion of culvert crossings to bridge crossings	30 projects	\$50,000	\$1,500,000
Trapping and relocation of PMJM	30 projects	\$3,500	\$105,000
NPDES compliance and erosion control plans	Baseline	Baseline	\$0
Delineation of “no disturbance zones” to prevent disturbance of PMJM habitat	30 projects	\$1,500	\$45,000
Restriction on borrow areas, storage, staging, or fueling of construction equipment or materials in riparian zones	Baseline	Baseline	\$0
Educate contractors regarding listed species in project areas	30 projects	\$1,500	\$45,000
Development of coordinator process with other agencies to resolve issues that arise during construction	30 projects	\$500	\$15,000
Total			\$3,390,000

214. The total estimated cost of these consultations, including project modifications, range from approximately \$8,370,000 to \$10,500,000. These consultation costs will be borne by the Service, the Action agency (FHWA; ACOE; USFS), and the third party (WYDOT; private landowners). The major sources of uncertainty in these estimates include the predicted number of consultations and the cost of project modifications.

Colorado

215. During the next ten years, the ACOE anticipates conducting 41 informal and 65 formal consultations for road/bridge construction and maintenance activities that occur within the proposed PMJM critical habitat area.⁸⁹ The total estimated administrative cost of these

⁸⁹ Personal Communication with Van Truan, 2002. Personal Communication with Timothy Carey, ACOE Personnel, Littleton Office, 2002.

CODOT anticipates 50 formal consultations regarding bridge projects over the next ten years. This analysis assumes those 50 consultations are included in the ACOE projection. Personal communication with Jerry Powell, CODOT, 2002.

consultations range from \$1,151,000 to \$2,293,000.⁹⁰ These consultation costs will be borne by the Service, the Action agency (potential Action agencies include ACOE, FHWA, and DOT), and the third party, such as the CODOT.

216. Those transportation projects requiring formal consultations will also require project modifications. Historic modification requirements include purchasing mitigation land, activity timing restrictions, habitat restoration and enhancement, and on-site monitoring of construction activities. The cost of purchasing an acre of habitat can range from \$3,000 to \$30,000.⁹¹ Based on past formal consultations, it is assumed that the Service will recommend mitigation of 2.5 acres on average for transportation projects. Mitigation may include purchase of land off-site, purchase of conservation easements, or habitat creation. The cost of project modifications per formal road/bridge construction and maintenance project is estimated range from \$7,500 to \$75,000, or \$488,000 to \$4,875,000 total over the next ten years.

217. The total estimated cost of these consultations, including project modifications, ranges from approximately \$1,640,000 to \$7,170,000. Most of the project modification costs will be borne by the third party, such as the CODOT. The major source of uncertainty in this estimate is the variability of project modification costs.

6.2 National Fire Plan Projects

218. Fire management is a responsibility of the USFS. Fire management activities fall into several categories: suppression, prevention and restoration.

- Fire suppression activities are those emergency efforts in response to wildfire.
- Fire prevention activities are those efforts to reduce wildfire risk to people and communities, including prescribed burning. The USFS will continue to practice prescribed burning on all national forest land inside the proposed PMJM critical habitat in Wyoming and Colorado.
- Fire restoration activities are designed to help forests and rangelands recover from the effects of a wildfire. The only planned restoration activities likely to be undertaken in the proposed PMJM critical habitat are in the Pike-San Isabel National Forest in Colorado. Examples of likely restoration activities to be undertaken in the proposed PMJM critical habitat include sediment trap construction, riparian restoration, and dredging of beaver pond sediments.

While fire suppression activities are subject to emergency consultation rules, prescribed burning and fire restoration activities in the proposed critical habitat area are subject to section 7 consultations, and will likely require the USFS to initiate formal consultations with the Service.⁹² Therefore, this analysis anticipates 42 to 62 formal consultations related to

⁹⁰ The source of per unit consultation costs is Exhibit 3-1.

⁹¹ Personal Communication with Rolland Wostl, CODOT, 2002.

⁹² Emergency consultations are permitted in cases where forest fires pose a risk to human life. In such instances, the USFS applies for an emergency consultation which allows it to defer the consultation process until after the forest fire is under control. Personal communication with Service, Cheyenne Field Office, 2002.

national fire plan projects during the next ten years. Programmatic consultations for national fire plan projects are currently being developed and could reduce the cost of future consultations.⁹³

Wyoming

219. The USFS is not conducting prescribed burning activities in areas that would harm PMJM habitat. Therefore, the USFS does not anticipate initiating any consultations for national fire plan projects on those portions of the Medicine Bow-Routt National Forest located within the proposed PMJM critical habitat area during the next ten years. However, the USFS does anticipate initiating one formal consultation associated with an administrative study to determine how burning and grazing activities may impact critical habitat for the PMJM in unit NP1.⁹⁴ The estimated administrative costs of this formal consultation will range from \$12,600 to \$21,400.⁹⁵ These consultation costs will be borne by the Service and the USFS. The USFS does not anticipate implementing project modifications in association with this formal consultation because the purpose of the study is to determine whether protective measures should be required in future consultations on burning and grazing activities.⁹⁶

Colorado

220. During the next ten years, the USFS anticipates conducting 41 to 61 formal consultations (the range is due to the variability of the number of annual consultations by Arapaho-Roosevelt National Forest) for national fire plan projects on Pike-San Isabel National Forest and Arapaho-Roosevelt National Forest land located within the proposed PMJM critical habitat area.⁹⁷ The USFS estimates the administrative cost of formal consultations will range from \$12,600 to \$21,400 per consultation, resulting in a total administrative consultation cost of \$516,600 to \$1,305,400.⁹⁸ These consultation costs will be borne by the Service and the USFS.
221. The USFS does not anticipate any additional costs with implementing project modifications in association with these formal consultations.⁹⁹

6.3 Warren Air Force Base

222. The Sikes Act Improvement Amendment (SAIA) of 1997 required every military installation containing land and water suitable for the conservation and management of natural

⁹³ Personal communication with Service Personnel, Colorado Field Office, 2002.

⁹⁴ Personal communication with Tim Byer, 2002.

⁹⁵ The source of per unit consultation costs is Exhibit 3-1.

⁹⁶ Personal communication with Tim Byer, 2002.

⁹⁷ Personal communication with Denny Bohan, USFS, 2002, Pike-San Isabel National Forest (11 formal consultations) during the next ten years. Personal communication with Dennis Lowry, USFS, 2002, Arapaho-Roosevelt National Forest (three to five formal consultations per year).

⁹⁸ The source of per unit consultation costs is Exhibit 3-1.

⁹⁹ Personal communication with Denny Bohan, 2002, Pike-San Isabel National Forest. Personal communication with Dennis Lowry, 2002, Arapaho-Roosevelt National Forest.

resources to complete, by November 17, 2001, an Integrated Natural Resources Management Plan (INRMP). The purpose of the INRMP is to integrate the stewardship of the natural resources with the operation of the military installation. Each military installation containing listed species or critical habitat must consult with the Service on its INRMP.

223. Warren Air Force Base (WAFB) is currently consulting with the Service on whether its INRMP provides the PMJM and its habitat sufficient protection to allow the Service to exclude WAFB from critical habitat. WAFB anticipates that all of the projects currently planned will require informal consultation with the Service under the listing of the PMJM, and is not certain whether exclusion from critical habitat will reduce the number of consultations in the future.

224. During the next ten years, WAFB anticipates initiating 28 to 31 informal consultations with the Service for various activities occurring within the proposed PMJM critical habitat area.¹⁰⁰ The Service may also restrict project activities to the winter season, when the PMJM is inactive, and require that WAFB enhance PMJM habitat. Anticipated projects/activities and the estimated cost of project modifications, if any, are as follows:

- One informal consultation for a project to construct a stormwater retention basin and outfall to Crow Creek. Timing restrictions and habitat enhancement requirements may increase total costs by \$210,000.
- Seven to ten informal consultations for road maintenance activities. Timing restrictions may increase total costs by at least \$500,000.
- Five informal consultations for weed control activities, one informal consultation associated with expanding the family camp, and five informal consultations regarding research activities and habitat manipulation. Although timing restrictions may increase total costs, the impact is expected to be negligible.
- Seven informal consultations for nature trail construction and maintenance activities. Timing restrictions and habitat enhancement requirements may increase costs by \$20,000. The Service may also require that WAFB reroute trail segments. While rerouting may increase project costs, the impact is expected to be negligible.

¹⁰⁰ Personal communication with Cathy Pesenti and John Wright, 2002.

- One informal consultation related to clean-up activities at base landfills under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
- One informal consultation to relocate a propane tank farm. This project will involve the development and implementation of a sediment control plan. Because this plan is required under the NPDES program, its cost is not attributable to the PMJM or the proposed critical habitat designation.

225. The administrative consultation costs associated with these informal consultations range from approximately \$64,000 to \$391,000.¹⁰¹ Project modifications are expected to cost an additional \$730,000, and represent 65 to 92 percent of total consultation and modification costs. The total estimated cost of these consultations, including project modifications, ranges from \$790,000 to \$1,120,000. Consultation costs will be borne by the Service and the base, while all project modification costs will be borne solely by the base.

6.4 Utilities

226. A significant number of utility related activities may occur within the proposed critical habitat area during the next ten years. Potential utility projects include installation, construction and maintenance activities associated with sewer pipelines, water transmission mains, natural gas pipelines, fiber optic cable and other services related to development.

227. The primary Federal nexus for utility related activities is the ACOE, which authorizes CWA §404 permits for projects with the potential to discharge dredged or fill material into navigable waters of the United States. Another possible nexus for utility related activities is FERC project licensing.

Wyoming

228. During the next ten years, the ACOE anticipates conducting approximately nine informal and four formal consultations for utility-related activities that occur within units SP3, NP3, and NP5.¹⁰² The total estimated administrative cost of these consultation activities range from approximately \$97,000 to \$245,000.¹⁰³ These consultation costs will be borne by the Service, the Action agency (ACOE, FERC), and the third party (private applicants).

¹⁰¹ The source of per unit consultation costs is Exhibit 3-1.

¹⁰² The ACOE estimated 13 consultations (SP3 - 5 permits; NP3 - 4 permits; and NP5 - 4 permits) with one in three permits requiring initiation of a formal consultation. Personal communication with Chandler Peter, ACOE, 2002.

¹⁰³ The source of per unit consultation costs is Exhibit 3-1.

229. Furthermore, the ACOE anticipates implementing the following project modifications for all consultations:

- Sediment control fabric to limit PMJM movement into the construction area;
- Revegetation with woody species; and
- On-site monitoring.

230. The ACOE also anticipates the applicant will incur additional costs from project delays associated with the consultation process. These project delays may result in a loss of public funding because of the applicant's inability to meet expenditure and budget time lines. However, the ACOE is unable to quantify the costs associated with implementation of the project modifications described above or the potential associated project delays.¹⁰⁴

231. The Service anticipates consulting with FERC at least once during the next ten years in association with the potential need for a new natural gas pipeline for the Medicine Bow Lateral pipeline project.¹⁰⁵ However, costs associated with this project are not quantified at this time due to lack of sufficient information and uncertainty regarding whether or not planning for the new pipeline will occur during the next ten years.

Colorado

232. During the next ten years, the ACOE anticipates conducting 79 formal consultations for utility related activities that occur within the proposed PMJM critical habitat area.¹⁰⁶ The total estimated administrative cost of these consultation activities range from \$1,225,000 to \$2,015,000.¹⁰⁷ Most of these consultation costs will be borne by the Service, the Action agency (ACOE), and the third party, such as local sanitation districts or waste water authorities.

233. Those utility related projects requiring formal consultations will also require project modifications. Historic modification requirements include habitat restoration and enhancement, purchasing mitigation land, activity timing restrictions, and on-site monitoring of construction activities. These costs are not quantified at this time due to lack of sufficient information. Most of the project modification costs will be borne by a third party such as local sanitation districts and waste water authorities, and CODOT. The major source of uncertainty in this estimate is the unknown cost of project modifications.

6.5 Rocky Flats Environmental Technology Site

234. Rocky Flats Environmental Technology Site is a CERCLA cleanup facility, and activities expected to occur in critical habitat will be associated with the cleanup of the site

¹⁰⁴ Personal communication with Chandler Peter, 2002.

¹⁰⁵ Personal communication with Service, Cheyenne Field Office, 2002.

¹⁰⁶ Personal Communication with Van Truan, 2002. Personal Communication with Timothy Carey, 2002.

¹⁰⁷ The source of per unit consultation costs is Exhibit 3-1.

and not section 7 designation.¹⁰⁸ Critical habitat designation, however, may increase the amount of affected acreage and associated cleanup costs, for 24 acres total. These additional cleanup costs are likely to range from \$60,000 to \$80,000 per acre.¹⁰⁹ The increased cost for the entire project attributable to section 7 is estimated to range from \$1.44 million to \$1.92 million.¹¹⁰ Discussions about conducting a programmatic consultation regarding Rocky Flats activities are currently under way. A programmatic consultation could reduce the cost of consultation.¹¹¹

6.6 Recreation on Forest Service Lands

235. The USFS allows access to its lands for public recreation. Special use permits (SUPs) are required for recreational activities, and the USFS is required to consult with the Service on each SUP application in proposed critical habitat.

Wyoming

236. Typical recreational activities on Medicine Bow-Routt National Forest land include hunting and horseback riding. Such activities have been permitted in the past and will likely continue to be permitted in the future. However, these types of activities are typically limited to existing road and trail networks, with only pass-through access within the proposed critical habitat for the PMJM, and are thus considered a limited threat to the PMJM and its proposed critical habitat. Therefore, no SUPs are expected, and no consultations are anticipated regarding recreational activities within the proposed critical habitat during the next ten years.¹¹²

Colorado

237. Recreational activities on Pike-San Isabel National Forest land that may require consultation include recreation management, campground construction and maintenance, and restroom facility management. Formal administrative consultation costs range from \$12,600 to \$21,400, and project modifications are not expected to be required.¹¹³ With an estimated 2 formal consultations over the next ten years, the total cost of these consultations is estimated to range from \$25,000 to \$43,000.¹¹⁴ These consultation costs will be borne by the Service and USFS.

¹⁰⁸ Specific activities expected to occur during the next ten years may include: well abandonment and replacement projects; remediation including the placement of ET covers and slurry walls; removal of monitoring equipment; breaching of dams; and maintenance activities, such as dam relocation and weed removal. Potential small-scale projects include the removal of power lines, well abandonment and replacement, flume installation and replacement, road maintenance, and vegetation management.

¹⁰⁹ Personal Communication with Cliff Franklin, Rocky Flats Field Office Personnel, 2002.

¹¹⁰ Rocky Flats Field Office Personnel Public Comment on the PMJM, September 11, 2002.

¹¹¹ Personal Communication with Service Personnel, Colorado Field Office, 2002.

¹¹² Personal communication with Tim Byer, 2002.

¹¹³ The source of per unit consultation costs is Exhibit 3-1.

¹¹⁴ Personal communication with Denny Bohan, 2002.

238. Recreational activities on Arapaho-Roosevelt National Forest land include campground construction and maintenance, trail construction and maintenance, and constructing or upgrading recreational facilities. However, the USFS does not anticipate consultations associated with recreation activities in the Arapaho-Roosevelt National Forest during the next 10 years.¹¹⁵

6.7 Bank Stabilization

239. Typical bank stabilization activities include flood control and damage reduction efforts that range from small, local protection projects, such as construction of levees and non-structural flood control measures, to major dams. Erosion control and bank stabilization activities are typically associated with dredging and marsh creation. The primary Federal nexus for bank stabilization activities within the proposed critical habitat is the ACOE, which authorizes CWA §404 permits for projects with the potential to discharge dredged or fill material into navigable waters of the United States.

Wyoming

240. During the next ten years, the ACOE anticipates conducting 7 consultations (4.7 informal and 2.3 formal) for bank stabilization activities that occur within units SP2, NP1, NP2, NP4, and NP5.¹¹⁶ The total estimated administrative cost of these consultation activities range from \$52,000 to \$132,000.¹¹⁷ These consultation costs will be borne by the Service, the ACOE, and the third party (private applicant).

241. Furthermore, the ACOE anticipates implementing the following project modifications for all consultations:

- Sediment control fabric to limit PMJM movement into the construction area;
- Revegetation with woody species; and
- On-site monitoring.

¹¹⁵ Personal communication with Dennis Lowry, 2002.

¹¹⁶ Of the estimated 7 consultations, 3 consultations will occur on activities in SP2 and one consultation each will occur in units NP1, NP2, NP4, and NP5. The ACOE anticipates that one in three permits will require a formal consultation. Personal communication with Chandler Peter, 2002.

¹¹⁷ The source of per unit consultation costs is Exhibit 3-1.

242. The ACOE also anticipates the applicant will incur additional costs from project delays associated with the consultation process. These project delays may result in a loss of public funding because of the applicant's inability to meet expenditure and budget time lines. However, the ACOE is unable to quantify the costs associated with implementation of the project modifications described above or the potential associated project delays.¹¹⁸

Colorado

243. During the next ten years, the ACOE anticipates conducting 25 formal consultations for bank stabilization activities that occur within the proposed PMJM critical habitat area.¹¹⁹ The total estimated administrative cost of these consultation activities range from \$388,000 to \$638,000.¹²⁰ Most of these consultation costs will be borne by the Service, the Action agency (ACOE), and the third party (CODOT).¹²¹
244. Those bank stabilization related projects requiring formal consultations may require project modifications. These costs are not quantified at this time due to lack of sufficient information. Most of the project modification costs will be borne by a third party such as CODOT. The major source of uncertainty in this estimate is the unknown type and cost of project modifications.

6.8 Habitat Conservation Plans (HCPs)

245. Under section 10(a)(1)(B) of the Act, a non-Federal entity (i.e., a landowner or local government) may develop an HCP in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.¹²² The HCP attempts to counterbalance potential harmful effects that a proposed activity may have on a species, while allowing the otherwise lawful activity to proceed. Statutory requirements for approval of an HCP depend on the species of concern and are subject to the development plan. The purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. As such, HCPs are generally developed to meet the requirements of section 10 of the Act.
246. However, a connection may exist between the establishment of HCPs (and the costs these actions impose) and the designation of critical habitat. For example, landowners may develop an HCP in order to have lands that are planned for development excluded from a critical habitat designation. Such HCPs would be an effect of critical habitat designation because of the motivation to create them. Additionally, because the HCP process includes the issuance of a Federal permit (i.e., the incidental take permit), the Service is required to

¹¹⁸ Personal communication with Chandler Peter, 2002.

¹¹⁹ Personal communication with Timothy Carey, 2002.

¹²⁰ The source of per unit consultation costs is Exhibit 3-1.

¹²¹ The bank stabilization projects predicted are separate from road/bridge construction and maintenance projects estimated above. The projects anticipated by CODOT in the road and bridge construction and maintenance section include only bridge projects. Personal communication Jerry Powell, 2002.

¹²² U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning." From: <http://endangered.fws.gov/hcp/>, August 6, 2002.

conduct an intra-agency (i.e., internal) section 7 consultation as part of the permit approval process. Such linkages make it necessary to clarify when and whether to incorporate HCP costs within a critical habitat economic analysis.

247. Therefore, although this analysis focuses on impacts that are solely related to section 7 of the Act, consultations on HCPs and resulting project modification costs are considered. The following provides general guidance regarding the inclusion of such costs in the critical habitat designation economic analysis:

- In cases in which an HCP existed prior to a proposed designation, the costs of developing the HCP and the added costs of management imposed by the HCP are not considered in a section 7 economic analysis. These costs are appropriately considered to be part of the regulatory baseline.
- In cases in which an HCP is proposed, or reasonably foreseeable, the administrative costs associated with the internal section 7 consultation should be included in the economic analysis of total section 7 costs. Because the consultation will take place regardless of the presence of critical habitat, these administrative costs are co-extensive to the listing of the PMJM. In addition, if, as a result of the designation of critical habitat, additional project modifications will be recommended by the Service and incorporated into the HCP in order to avoid adversely modifying critical habitat, the costs of these project modifications should also be included in the economic analysis of critical habitat.¹²³ Costs associated with these project modifications are attributable to the designation of critical habitat.¹²⁴
- In cases in which development of one or more HCPs can be documented as being precipitated by critical habitat designation (i.e., to avoid designation or to reduce the costs of the designation), the costs of development of the HCP and the added costs of management imposed by the HCP should be included in the critical habitat economic analysis. In such cases the analysis should be presented with appropriate caveats as to the uncertainty regarding the extent to which the HCP would have existed absent critical habitat designation.

Wyoming

248. The Service held several well-attended public meetings when the 4(d) special

¹²³ Project modification costs associated with the jeopardy standard are not considered for the following reason. Section 10(a)(2)(B) of the Act requires that for the issuance of an incidental take permit, the HCP must assure that “the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild.” According to the Service’s *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, “the wording of this criterion is identical to the “jeopardy” definition under the section 7 regulations (50 CFR Part 402.02)...Congress was explicit about this link, stating in the Conference Report on the 1982 ESA amendments that the Services will determine whether or not to grant a permit, ‘in part, by using the same standard as found in section 7(a)(2) of the ESA, as defined by the [Services’] regulations.’” (U.S. Department of the Interior and U.S. Department of Commerce, *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, November 4, 1996). As a result, during the HCP process, actions undertaken to meet the jeopardy provision of section 7 are also required under section 10 of the Act and are therefore considered to be part of the baseline of this economic analysis.

¹²⁴ Generally, project modifications associated with internal consultations on the issuance of an incidental take permit are rare, because the Service is unlikely to request additional measures beyond those identified to meet section 10 issuance criteria.

regulation was first proposed in December 1998 to educate the public regarding: (1) the prohibitions that had gone into place at the time of the listing; (2) the type of habitat PMJM inhabits; (3) the stream stretches most likely to contain PMJM; and (4) some of the activities likely to result in take of PMJM. However, according to conversations with the Service, county representatives, and private landowners, no county-level or individual HCPs have been implemented. Therefore, it is unlikely that any county-level or individual HCPs will be developed over the next ten years as a result of increased public knowledge of the PMJM stemming from the designation.¹²⁵ The cost associated with the development of an HCP and the cost associated with any activity restrictions recommended by the Service to minimize take of PMJM have been cited as the major impediments to the development of these plans.¹²⁶

249. County-level HCPs may reduce the number of future individual consultations and thus the administrative costs associated with those consultations. This in turn could result in a double counting of administrative consultation costs in instances where uncertainty exists regarding the timing and scope of county-level HCPs. However, since no county-level HCPs are anticipated during the next ten years, the estimated impact on land uses in the areas proposed as critical habitat in Wyoming is not skewed by such uncertainty.

Colorado

250. According to conversations with the Service, county representatives, the Nature Conservancy, and private landowners, potential development of a number of HCPs has been discussed, and in a few cases, initiated, in Colorado. Currently El Paso, Douglas, Boulder, Jefferson and Elbert Counties, and Livermore Valley in Larimer County in conjunction with the Nature Conservancy, are developing conservation plans.¹²⁷ While it is possible one or two county HCPs may be completed, it is not known when or if these counties, or others included in the proposed designation, will complete HCPs in the future. Private individuals have also completed HCP's for residential developments.¹²⁸ However, after speaking with private landowners and the Service, it is also unclear how many developers will complete HCPs in the future.

251. Due to uncertainty regarding the timing, scope, and utilization of county-level HCPs, this analysis makes a conservative estimate (i.e., more likely to overstate than understate costs) of the impacts to projected land uses over the next ten years by assuming that HCPs will not be implemented, rather each project will involve a Federal nexus and require a formal consultation. This assumption could overestimate costs if: 1) county HCPs are approved; 2) development or related activities (i.e., transportation) are included in the county HCPs; and 3) these activities are permitted through the county HCPs. Costs associated with consultations are likely to be overstated, because they do not reflect the reduction in the number of individual consultations, and thus the administrative costs associated with those

2002. ¹²⁵ Personal communications with Service personnel, private landowners, and County representatives,

2002. ¹²⁶ Personal communications with Service personnel, private landowners, and County representatives,

¹²⁷ Personal communication with Service personnel, Colorado Field Office, 2002.

¹²⁸ HCPs have been completed for Continental Homes for the Pinery Glenn Subdivision, the Harding Property, and the Leonard Property Biological Opinions. Briargate Planned Community is currently developing an HCP. Personal Communication with Tom Taylor, La Plata Investments, 2002.

consultations, that may result from the implementation of county-level HCPs. Costs associated with the development of county HCPs are not included in this analysis. These costs are expected to be offset by cost reductions realized by individuals utilizing the county HCPs.

6.9 Dams/Reservoirs

252. The service recently received preliminary proposals to expand the capacity of three municipal water reservoirs: the ACOE's Chatfield Reservoir, the Haligan Reservoir, and the Seaman Reservoir. It is unlikely that any of these projects would be completed within the ten-year time frame of this analysis.¹²⁹ Costs could potentially be associated with the project before completion regarding planning and consideration of critical habitat. These potential costs are not quantified at this time due to a lack of sufficient information.

6.10 Gravel Mining

253. Information received from the public indicates that four gravel mining operations, currently in production, may be located within the proposed critical habitat area in Colorado and Wyoming.¹³⁰ Gravel mining operations can require Section 404 permits from the ACOE, and during the life of a gravel mining operation, a permit amendment may be required. Although unlikely, if the amended activity was found to affect the PMJM, a consultation could be required.¹³¹ If formal consultations are required for all four gravel mining operations, the administrative cost of these consultations could range from \$62,000 to \$102,000.¹³² The consultation process could delay gravel extraction by 18 months to two years. The cost of delay to each mining operation could range from \$69,000 to \$92,000, or \$276,000 to \$368,000 total.¹³³ The total estimated cost of these consultation activities could range from \$338,000 to \$470,000. Due to the high level of uncertainty regarding whether or not these projects would require a consultation, these costs are not included in the analysis.

6.11 Irrigation Districts

Wyoming

254. The WID is located within the PMJM range identified by the listing of the species. However, all lands owned by, or for which the WID has an easement, are located outside the

¹²⁹ Personal Communication Service Personnel, Colorado Field Office, 2002.

¹³⁰ Public comment received from Melissa Young representing the Colorado Rock Products Association, September 16, 2002.

¹³¹ Personal communication Rena Brand, ACOE Personnel, Littleton Office, 2002.

¹³² The source of per unit consultation costs is Exhibit 3-1.

¹³³ This estimate is based on a market price of \$2.00 per ton for gravel at an extraction rate of 2.25 million tons per year. Annual revenues would be \$4.5 million dollars. Profit margins for a sand and gravel mining operation of this size are estimated to be 12.6 percent based on the RMA 2001. Calculated using a seven percent discount rate.

proposed critical habitat designation for the PMJM. As such, the WID anticipates that it will not be impacted by the proposed critical habitat designation.¹³⁴

Colorado

255. According to the Service, in Colorado there is no Federal nexus for water delivery and ditch maintenance activities performed by irrigation districts within the proposed PMJM habitat. Therefore, section 7 consultations regarding the PMJM are not likely to occur during the next ten years.

6.12 Timber Harvesting

Wyoming

256. The USFS does not have an active timber program within the Douglas Ranger District of the Medicine Bow-Routt National Forest. Therefore, the USFS does not anticipate initiating any consultations associated with logging activities within the proposed critical habitat for the PMJM.¹³⁵

6.13 Total Economic Cost Associated with Other Land Use Activities

257. Exhibit 6-2 provides estimates of total section 7-related costs associated with other land use activities affecting proposed critical habitat for the PMJM in Wyoming.

¹³⁴ Personal communication with Don Britton, 2002.

¹³⁵ Personal communication with Tim Byer, 2002.

Exhibit 6-2

**TOTAL ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL ADMINISTRATIVE REQUIREMENT AND PROJECT MODIFICATIONS
FOR OTHER LAND USE ACTIVITIES IN WYOMING
(TEN YEARS)**

Activity	Nexus	Units	Future Consultations (Formal/ Informal)	Informal Consultation Costs	Formal Consultation	Project Modification Costs	Total Costs
Transportation	Federal funding, permitting	NP3	8.6/20.2	\$71,000 to \$313,000	\$133,000 to \$219,000	\$999,000	\$1,203,000 to \$1,531,000
		NP5	8.6/19.2	\$67,000 to \$298,000	\$133,000 to \$219,000	\$999,000	\$1,199,000 to \$1,515,000
		SP3	8.6/18.2	\$64,000 to \$282,000	\$133,000 to \$219,000	\$999,000	\$1,196,000 to \$1,500,000
		NP1	8.6/18.2	\$63,000 to \$279,000	\$133,000 to \$219,000	\$999,000	\$1,194,000 to \$1,497,000
		NP2	8.6/18.2	\$64,000 to \$282,000	\$133,000 to \$219,000	\$999,000	\$1,196,000 to \$1,500,000
		NP4	8.5/17	\$60,000 to \$264,000	\$132,000 to \$217,000	\$999,000	\$1,190,000 to \$1,479,000
		SP1	8.5/17	\$60,000 to \$264,000	\$132,000 to \$217,000	\$999,000	\$1,190,000 to \$1,479,000
		Subtotal	60/128	\$447,000 to \$1,981,000	\$930,000 to \$1,530,000	\$6,990,000	\$8,367,000 to \$10,501,000
National Fire Plan	Federal authorization	NP1	1/0	n/a	\$13,000 to \$21,000	\$0	\$13,000 to \$21,000
Warren Air Force Base	Federal authorization	SP2	0/28-31	n/a	\$64,000 to \$391,000	\$730,000	\$794,000 to \$1,121,000
Utilities	Federal permitting	SP3	1.7/3.3	\$12,000 to \$51,000	\$26,000 to \$43,000	unknown	\$38,000 to \$95,000
		NP3	1.3/2.7	\$9,000 to \$42,000	\$20,000 to \$33,000	unknown	\$30,000 to 75,000
		NP5	1.3/2.7	\$9,000 to \$42,000	\$20,000 to \$33,000	unknown	\$30,000 to \$75,000
		Subtotal	4.3/8.7	\$30,000 to \$135,000	\$67,000 to \$110,000	unknown	\$97,000 to \$245,000
Recreation	Federal permitting and authorization	All	0	n/a	n/a	n/a	n/a
Bank stabilization	Federal permitting	SP2	1/2	\$7,000 to \$31,000	\$16,000 to \$26,000	unknown	\$23,000 to \$57,000

Exhibit 6-2

**TOTAL ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL ADMINISTRATIVE REQUIREMENT AND PROJECT MODIFICATIONS
FOR OTHER LAND USE ACTIVITIES IN WYOMING
(TEN YEARS)**

Activity	Nexus	Units	Future Consultations (Formal/ Informal)	Informal Consultation Costs	Formal Consultation	Project Modification Costs	Total Costs
		NP1	0.33/0.66	\$2,000 to \$10,000	\$5,000 to \$8,000	unknown	\$7,000 to \$19,000
		NP2	0.33/0.66	\$2,000 to \$10,000	\$5,000 to \$8,000	unknown	\$7,000 to \$19,000
		NP4	0.33/0.66	\$2,000 to \$10,000	\$5,000 to \$8,000	unknown	\$7,000 to \$19,000
		NP5	0.33/0.66	\$2,000 to \$10,000	\$5,000 to \$8,000	unknown	\$7,000 to \$19,000
		Subtotal	2.3/4.6	\$16,000 to \$72,000	\$36,000 to \$59,000	unknown	\$52,000 to \$131,000
HCPs	Internal Service Consultation	All	n/a	n/a	n/a	n/a	n/a
Irrigation Ditch Maintenance	Federal funding; Federal permit	All	0	n/a	n/a	n/a	n/a
Timber Harvesting	Federal authorization; Federal funding	All	0	n/a	n/a	n/a	n/a

Note: Costs are presented in descending order based on total costs. Numbers may not sum due to rounding.

Source: Based on IEC review of past Biological Opinions and personal communication with Service Biologists, USFS, ACOE, WYDOT, DOE, and F.E. Warren Air Force Base personnel.

258. Exhibit 6-3 provides estimates of total section 7-related costs associated with other land use activities affecting proposed critical habitat for the PMJM in Colorado.

Exhibit 6-3

**TOTAL ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL ADMINISTRATIVE REQUIREMENT AND PROJECT MODIFICATIONS
FOR OTHER LAND USE ACTIVITIES IN COLORADO
(TEN YEARS)**

Activity	Nexus	Units	Future Consultations (Formal/ Informal)	Informal Consultation Costs	Formal Consultation Costs	Project Modification Costs	Total Costs
Transportation	Funding, permitting, Federal agency	A1	15/20	\$70,000 to \$310,000	\$233,000 to \$383,000	\$113,000 to \$1,125,000	\$415,000 to \$1,818,000
		SP12	11/5	\$18,000 to \$78,000	\$171,000 to \$281,000	\$83,000 to \$825,000	\$271,000 to \$1,133,000
		SP11	11/4	\$14,000 to \$62,000	\$171,000 to \$281,000	\$83,000 to \$825,000	\$267,000 to \$1,168,000
		SP4	5/2	\$7,000 to \$31,000	\$78,000 to \$128,000	\$38,000 to \$375,000	\$122,000 to \$534,000
		SP5	5/2	\$7,000 to \$31,000	\$78,000 to \$128,000	\$38,000 to \$375,000	\$122,000 to \$534,000
		SP6	5/2	\$7,000 to \$31,000	\$78,000 to \$128,000	\$38,000 to \$375,000	\$122,000 to \$534,000
		SP7	5/2	\$7,000 to \$31,000	\$78,000 to \$128,000	\$38,000 to \$375,000	\$122,000 to \$534,000
		SP3	2/1	\$4,000 to \$16,000	\$31,000 to \$51,000	\$15,000 to \$150,000	\$50,000 to \$217,000
		SP8	2/1	\$4,000 to \$16,000	\$31,000 to \$51,000	\$15,000 to \$150,000	\$50,000 to \$217,000
		SP10	2/1	\$4,000 to \$16,000	\$31,000 to \$51,000	\$15,000 to \$150,000	\$50,000 to \$217,000
		SP13	2/1	\$4,000 to \$16,000	\$31,000 to \$51,000	\$15,000 to \$150,000	\$50,000 to \$217,000
		Subtotal	65/41	\$144,000 to \$636,000	\$1,008,000 to \$1,657,000	\$487,500 to \$4,875,000	\$1,639,000 to \$7,168,000

Exhibit 6-3

**TOTAL ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL ADMINISTRATIVE REQUIREMENT AND PROJECT MODIFICATIONS
FOR OTHER LAND USE ACTIVITIES IN COLORADO
(TEN YEARS)**

Activity	Nexus	Units	Future Consultations (Formal/ Informal)	Informal Consultation Costs	Formal Consultation Costs	Project Modification Costs	Total Costs
National Fire Plan	Federal agency	SP4	7.5-12.5/0	n/a	\$95,000 to \$268,000	\$0	\$95,000 to \$268,000
		SP5	7.5-12.5/0	n/a	\$95,000 to \$268,000	\$0	\$95,000 to \$268,000
		SP6	7.5-12.5/0	n/a	\$95,000 to \$268,000	\$0	\$95,000 to \$268,000
		SP7	7.5-12.5/0	n/a	\$95,000 to \$268,000	\$0	\$95,000 to \$268,000
		SP12	3.7/0	n/a	\$46,000 to \$79,000	\$0	\$46,000 to \$79,000
		SP13	3.7/0	n/a	\$46,000 to \$79,000	\$0	\$46,000 to \$79,000
		A1	3.7/0	n/a	\$46,000 to \$79,000	\$0	\$46,000 to \$79,000
		Subtotal	41-61/0	n/a	\$517,000 to \$1,305,000	\$0	\$517,000 to \$1,305,000
Utilities	Permitting	SP11	15/0	n/a	\$233,000 to \$383,000	unknown	\$233,000 to \$383,000
		SP12	15/0	n/a	\$233,000 to \$383,000	unknown	\$233,000 to \$383,000
		A1	11/0	n/a	\$171,000 to \$281,000	unknown	\$171,000 to \$281,000
		SP4	7/0	n/a	\$109,000 to \$179,000	unknown	\$109,000 to \$179,000
		SP5	7/0	n/a	\$109,000 to \$179,000	unknown	\$109,000 to \$179,000
		SP7	7/0	n/a	\$109,000 to \$179,000	unknown	\$109,000 to \$179,000
		SP6	7/0	n/a	\$109,000 to \$179,000	unknown	\$109,000 to \$179,000
		SP10	3/0	n/a	\$47,000 to \$77,000	unknown	\$47,000 to \$77,000
		SP8	3/0	n/a	\$47,000 to \$77,000	unknown	\$47,000 to \$77,000
		SP13	2/0	n/a	\$31,000 to \$51,000	unknown	\$31,000 to \$51,000
		SP3	2/0	n/a	\$31,000 to \$51,000	unknown	\$31,000 to \$51,000
		Subtotal	79/0	n/a	\$1,225,000 to \$2,015,000	unknown	\$1,225,000 to \$2,015,000
Rocky Flats Environmental Technology Site	CERCLA	SP9	0/0	Unknown	Unknown	\$1,440,000 to \$1,920,000	\$1,440,000 to \$1,920,000

Exhibit 6-3

**TOTAL ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL ADMINISTRATIVE REQUIREMENT AND PROJECT MODIFICATIONS
FOR OTHER LAND USE ACTIVITIES IN COLORADO
(TEN YEARS)**

Activity	Nexus	Units	Future Consultations (Formal/ Informal)	Informal Consultation Costs	Formal Consultation Costs	Project Modification Costs	Total Costs
Recreation	Federal agency	SP12	0.67/0	n/a	\$8,000 to \$14,000	\$0	\$8,000 to \$14,000
		SP13	0.67/0	n/a	\$8,000 to \$14,000	\$0	\$8,000 to \$14,000
		A1	0.67/0	n/a	\$8,000 to \$14,000	\$0	\$8,000 to \$14,000
		Subtotal	2/0	n/a	\$25,000 to \$43,000	\$0	\$25,000 to \$43,000
Bank stabilization	Permitting	SP11	5/0	n/a	\$78,000 to \$128,000	unknown	\$78,000 to \$128,000
		SP12	5/0	n/a	\$78,000 to \$128,000	unknown	\$78,000 to \$128,000
		A1	3/0	n/a	\$47,000 to \$77,000	unknown	\$47,000 to \$77,000
		SP4	2/0	n/a	\$31,000 to \$51,000	unknown	\$31,000 to \$51,000
		SP5	2/0	n/a	\$31,000 to \$51,000	unknown	\$31,000 to \$51,000
		SP6	2/0	n/a	\$31,000 to \$51,000	unknown	\$31,000 to \$51,000
		SP7	2/0	n/a	\$31,000 to \$51,000	unknown	\$31,000 to \$51,000
		SP10	1/0	n/a	\$16,000 to \$26,000	unknown	\$16,000 to \$26,000
		SP3	1/0	n/a	\$16,000 to \$26,000	unknown	\$16,000 to \$26,000
		SP8	1/0	n/a	\$16,000 to \$26,000	unknown	\$16,000 to \$26,000
		SP13	1/0	n/a	\$16,000 to \$26,000	unknown	\$16,000 to \$26,000
		Subtotal	25/0	n/a	\$388,000 to \$638,000	unknown	\$388,000 to \$638,000

Note: Costs are presented in descending order based on total costs. Numbers may not sum due to rounding.

Source: Based on IEC review of past Biological Opinions and personal communication with Service Biologists, USFS, ACOE, CODOT and DOE personnel.

**ESTIMATED TOTAL COSTS OF SECTION 7 IMPLEMENTATION
FOR THE PMJM**

SECTION 7

259. This section presents the expected total economic cost of actions taken under section 7 of the Act associated with the geographic area proposed as critical habitat for the PMJM. It provides a summation of total cost estimates of the consultations and project modifications associated with the activities described in the previous three sections and introduces cost estimates for technical assistance.

260. It is important to note that the listing of the PMJM as threatened under the Act may result in impacts on land use activities that are not associated with section 7. As discussed previously, section 9 of the Act prohibits take of listed species, and section 10 outlines permitting procedures for entities whose activities do not involve a Federal nexus. Economic costs associated with these impacts for agricultural activities are discussed in Appendix B.

7.1 Estimated Costs of Section 7 Technical Assistance

261. Cost estimates for technical assistance are based on recent experience at the Service's Wyoming and Colorado Field Offices. The Service's protocol is to resolve as many issues over the phone as possible. If an issue cannot be resolved over the phone a letter is written. In general, there are two categories of technical assistance: (1) requests that take one hour or less, and involve phone calls and/or a quick letter; and (2) requests that involve survey reviews and more in-depth project evaluation, which may involve a site visit, longer letters, and more than one hour of Service staff time. Costs associated with these efforts include the opportunity cost of Service personnel time, as well as third party staff costs. Per effort costs associated with technical assistance are presented in Exhibit 3-1.

262. Based on the number of technical assistance efforts specifically addressing the PMJM during the past year, this analysis assumes that the Wyoming Field office will receive 54 requests per year.¹³⁶ Of these 54 requests, 36 required less than one hour of Service personnel time, and 18 more than one hour. On average, technical assistance efforts required nine hours of Service personnel time, and Service staff time is charged at \$40 per hour. Therefore, the more simple technical assistance requests cost \$40 per request, and the more time-intensive requests averaged \$360 per request. Assuming technical assistance requests continue at the present rate, the annual cost to the Service for technical assistance in Wyoming is expected to be \$7,920, or \$79,200 over the next ten years. Add to this the cost

¹³⁶ Personal communication with Service, Wyoming Field Office, 2002.

to third parties, and the total cost of technical assistance efforts in Wyoming over the next ten years is estimated to range from approximately \$403,000 to \$889,000.¹³⁷

263. Based on the number of technical assistance efforts during the past year, this analysis estimates that the Colorado Field office will receive 150 phone calls, 50 letters, and 20 trapping results annually.¹³⁸ This analysis estimates that 200 phone calls and letters will be of a low level of complexity, and that 20 phone calls and letters will be of a high level of complexity. Assuming annual technical assistance requests continue at the present rate, the total cost of technical assistance efforts over the next ten years is expected to range from \$1,472,000 to \$3,452,000.¹³⁹ This is likely an overstatement of costs for technical assistance, as requests are expected to decrease over time as counties implement HCPs and area residents become more informed as to the affects of critical habitat.

7.2 Estimated Total Costs of Section 7

264. The cost estimates presented in Exhibit 7-1 are a function of the assumed number of consultations and project modifications associated with activities affecting the proposed critical habitat for the PMJM, along with the per effort costs outlined in Exhibit 3-1, presented by activity. As illustrated in this exhibit, most of the costs in Wyoming are expected to be associated with transportation (78 percent), while most of the costs in Colorado (more than 89 percent) are expected to be associated with residential and related development. These development costs are primarily borne by activities in Units SP12 and A1 (together comprising approximately 77 percent of estimated total costs of the designation).

¹³⁷ To calculate costs for technical assistance costs to the Service are estimated as point estimates, while the costs to all other parties are assumed to vary.

¹³⁸ Personal communication with Service, Colorado Field Office, 2002.

¹³⁹ To calculate costs for technical assistance costs to the Service are estimated as point estimates, while the costs to all other parties are assumed to vary.

Exhibit 7-1

**ESTIMATED TOTAL ECONOMIC COSTS OF ASSOCIATED ACTIVITIES BY STATE
(TEN YEARS)**

Activity	Units (No. of Formal/ Informal Consultations)	Informal Consultation	Formal Consultation	Project Modifications	Total Costs
WYOMING					
Agriculture	6/54	\$358,000	\$203,000 to \$242,000	unknown	\$561,000 to \$600,000
Transportation	60/128	\$447,000 to \$1,981,000	\$930,000 to \$1,530,000	\$6,990,000	\$8,367,000 to \$10,501,000
National Fire Plan	1/0	n/a	\$13,000 to \$21,000	\$0	\$13,000 to \$21,000
Warren Air Force Base	0/28-31	\$64,000 to \$391,000	n/a	\$730,000	\$794,000 to \$1,121,000
Utilities	4.3/8.7	\$31,000 to \$135,000	\$67,000 to \$110,000	unknown	\$97,000 to \$245,000
Recreation	All	n/a	n/a	n/a	n/a
Bank Stabilization	2.3/4.7	\$16,000 to \$72,000	\$36,000 to \$59,000	unknown	\$52,000 to \$131,000
Technical Assistance					
Subtotal	73.6/223.4-226.4	\$916,000 to \$2,937,000	\$1,248,000 to \$1,962,000	\$7,720,000	\$10,287,000 to \$13,508,000
COLORADO					
Development	93/80	\$280,000 to \$1,240,000	\$3,578,000 to \$4,345,000	\$53,580,000 to \$135,922,000	\$57,438,000 to \$141,507,000
Transportation	65/41	\$144,000 to \$636,000	\$1,008,000 to \$1,657,000	\$488,000 to \$4,875,000	\$1,639,000 to \$7,168,000
National Fire Plan	41-61/0	n/a	\$517,000 to \$1,306,000	\$0	\$517,000 to \$1,306,000
Utilities	79/0	n/a	\$1,225,000 to \$2,015,000	unknown	\$1,225,000 to \$2,015,000
Rocky Flats Environmental Technology Site	0/0	unknown	unknown	\$1,440,000 to \$1,920,000	\$1,440,000 to \$1,920,000
Recreation	2/0	n/a	\$25,000 to \$43,000	\$0	\$25,000 to \$43,000
Bank Stabilization	26/0	n/a	\$388,000 to \$638,000	unknown	\$388,000 to \$638,000
Technical Assistance					
Subtotal	326/121	\$424,000 to \$1,876,000	\$6,740,000 to \$10,003,000	\$55,508,000 to \$142,717,000	\$64,143,000 to \$158,047,000
TOTAL	399.6/347.4	\$1,340,000 to \$4,812,000	\$7,988,000 to \$11,965,000	\$63,228,000 to \$150,437,000	\$74,430,000 to \$171,554,000

Note: Numbers may not sum due to rounding.

Source: Based on past consultation records and conversations with Federal agencies potentially affected by the proposed critical habitat designation.

265. The cost estimates presented in Exhibit 7-2 are a function of the assumed number of consultations, technical assistance, and project modifications associated with activities affecting the proposed critical habitat for the PMJM, along with the per effort costs outlined in Exhibit 3-1, presented by critical habitat unit.

Exhibit 7-2

**TOTAL SECTION 7 COSTS ASSOCIATED WITH THE LISTING OF AND DESIGNATION OF CRITICAL HABITAT FOR THE PMJM BY UNIT
(TEN YEARS)**

Units	No. of Formal/Informal Consultations	Informal Consultation	Formal Consultation	Project Modification Costs	Total Costs^a
WYOMING					
NP1	10.33/22.46	\$89,000 to \$313,000	\$176,000 to \$284,000	\$999,000	\$1,329,000 to \$1,741,000
NP2	9.33/22.46	\$90,000 to \$316,000	\$176,000 to \$284,000	\$999,000	\$1,328,000 to \$1,739,000
NP3	12/4 1.8	\$206,000 to \$480,000	\$219,000 to \$328,000	\$999,000	\$1,496,000 to \$1,968,000
NP4	9.23/21.26	\$86,000 to \$298,000	\$146,000 to \$235,000	\$999,000	\$1,241,000 to \$1,553,000
NP5	12.33/41.46	\$204,000 to \$475,000	\$209,000 to \$311,000	\$999,000	\$1,519,000 to \$2,022,000
SP1	8.8/19.7	\$77,000 to \$281,000	\$139,000 to \$224,000	\$999,000	\$1,221,000 to \$1,517,000
SP2	1/33	\$71,000 to \$422,000	\$16,000 to \$26,000	\$730,000	\$825,000 to \$1,195,000
SP3	10.6/24.2	\$93,000 to \$351,000	\$167,000 to \$270,000	\$999,000	\$1,328,000 to \$1,773,000
Subtotal	73.62/226.34	\$916,000 to \$2,937,000	\$1,248,000 to \$1,962,000	\$7,720,000	\$10,287,000 to \$13,508,000
COLORADO					
SP3	14/2	\$7,000 to \$31,000	\$218,000 to \$358,000	\$240,000 to \$643,000	\$517,000 to \$1,156,000
SP4	31.5/2	\$11,000 to \$47,000	\$389,000 to \$752,000	\$163,000 to \$649,000	\$676,000 to \$1,716,000
SP5	29.5/2	\$7,000 to \$31,000	\$358,000 to \$701,000	\$113,000 to \$539,000	\$582,000 to \$1,516,000
SP6	28.5/2	\$7,000 to \$31,000	\$343,000 to \$676,000	\$88,000 to \$485,000	\$532,000 to \$1,413,000
SP7	27.5/2	\$7,000 to \$31,000	\$327,000 to \$651,000	\$63,000 to \$430,000	\$494,000 to \$1,340,000
SP8	17/8	\$28,000 to \$124,000	\$263,000 to \$433,000	\$290,000 to \$753,000	\$664,000 to \$1,504,000
SP9	0/0	unknown	unknown	\$1,440,000 to \$1,920,000	\$1,440,000 to \$1,920,000
SP10	17/2	\$7,000 to \$31,000	\$263,000 to \$433,000	\$290,000 to \$753,000	\$623,000 to \$1,365,000
SP11	32/15	\$53,000 to \$233,000	\$538,000 to \$855,000	\$1,113,000 to \$3,445,000	\$1,859,000 to \$4,898,000
SP12	45.37/20	\$70,000 to \$310,000	\$1,109,000 to \$1,525,000	\$10,383,000 to \$27,025,000	\$11,778,000 to \$29,368,000
SP13	12.37/5	\$18,000 to \$78,000	\$304,000 to \$413,000	\$3,105,000 to \$8,010,000	\$3,484,000 to \$8,635,000
A1	70.37/60	\$210,000 to \$930,000	\$2,628,000 to \$3,208,000	\$38,223,000 to \$98,065,000	\$41,493,000 to \$103,216,000
Subtotal	326/121	\$424,000 to \$1,876,000	\$6,740,000 to \$10,003,000	\$55,508,000 to \$142,717,000	\$64,143,000 to \$158,047,000
TOTAL	399.6/347.4	\$1,340,000 to \$4,812,000	\$7,988,000 to \$11,965,000	\$63,228,000 to \$150,437,000	\$74,430,000 to \$171,554,000

^a Technical assistance costs are allotted by unit based on the distribution of formal and informal consultations. These costs are included in Total Costs only.

Note: Totals may not sum due to rounding.

266. Based on this analysis, the upper-bound total nominal cost of consultations, technical assistance, and resultant project modifications will range from \$74.4 million to \$171.6 million over the next ten years. Most of these costs will be borne by third parties (i.e., WYDOT, CODOT, private developers, etc). In addition, most consultation activity (and related costs) will occur in

units SP12 and A1.

267. Exhibit 7-3 presents the discounted present value of total costs based on a seven percent discount rate assuming that total costs are distributed evenly over the ten-year period.

Exhibit 7-3		
PRESENT VALUE TOTAL SECTION 7 COSTS		
(TEN YEARS)		
	Total Section 7 Costs	
	Low	High
Wyoming Total Activity Costs	\$10,290,000	\$13,510,000
Colorado Total Activity Costs	\$64,140,000	\$158,040,000
TOTAL COST	\$74,430,000	\$171,550,000
Present Value (7%)	\$52,280,000	\$120,500,000
Annualized (7%)	\$7,440,000	\$17,160,000
Note: This table presents nominal costs as well as the discounted present value of total costs based on a seven percent discount rate with the assumption that total costs are distributed evenly over the ten-year period. Discounted costs are then annualized assuming that total costs will be evenly distributed across the ten-year period.		

268. While the total economic costs associated with section 7 implementation for the PMJM appear high, they must be considered in the context of the value of the economic activity that is predicted to occur over the next ten years in the region. In Colorado, where most of the costs associated with the designation are expected to occur, annual economic activity exceeded \$64 billion in 2000. In Wyoming, the annual value of economic activity in 2000 approached \$4 billion.¹⁴⁰ Thus, the estimated upper-bound of annual present value costs associated with the listing and proposed critical habitat designation for the PMJM (\$17 million) represents less than three-hundredths of one percent of the total value of annual economic activity in this area.

7.3 Potential Impacts on Small Businesses

269. Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), when a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis describing the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).¹⁴¹ However, no 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

¹⁴⁰ U.S. Bureau of Economic Analysis, "Regional Accounts Data: Local Area Personal Income," <http://www.bea.doc.gov/bea/regional/reis/>.

¹⁴¹ 5 U.S.C. 601 et. seq.

entities.¹⁴² SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. Accordingly, the following represents a screening level analysis of the potential effects of section 7 on small entities to assist the Secretary in making this certification.

270. This analysis first determines whether section 7 potentially affects a "substantial number" of small entities in counties supporting critical habitat areas. SBREFA does not explicitly define "substantial number."¹⁴³

7.3.1 Estimated Number of Small Businesses Affected: The "Substantial Number" Test

271. To be conservative, (i.e., more likely to overstate impacts than understate them), this analysis assumes that a unique entity will undertake each of the projected consultations in a given year, and so the number of businesses affected is equal to the total annual number of consultations (both formal and informal).¹⁴⁴

272. First, the number of small businesses affected is estimated;¹⁴⁵

- Estimate the number of businesses within the study area affected by section 7 implementation annually (assumed to be equal to the number of annual consultations);
- Calculate the percent of businesses in the affected industry that are likely to be small;
- Calculate the number of affected small businesses in the affected industry;
- Calculate the percent of small businesses likely to be affected by section 7 implementation in proposed critical habitat.

273. Small businesses in the construction and related development industry could potentially be affected by section 7 protection for the PMJM if the designation leads to significant project modifications or delays. This analysis assumes that 173 unique companies will consult with the Service on development projects during the next ten years, or 17.3

¹⁴² Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" **and** a threshold for a "substantial number of small entities." See 5 U.S.C. 605 (b).

¹⁴³ See U.S. Small Business Administration, The Regulatory Flexibility Act: An Implementation Guide for Federal Agencies, 1998. Accessed at: www.sba.gov/advo/laws/rfaguide.pdf on December 3, 2001.

¹⁴⁴ While it is possible that the same business could consult more than once, it is unlikely to do so during the one-year time frame addressed in this analysis. However, should such multiple consultations occur, they would concentrate effects of the designation on fewer entities. In such a case, the approach outlined here would overstate the number of affected businesses.

¹⁴⁵ Note that because these values represent the probability that small businesses will be affected during a one-year time period, calculations may result in fractions of businesses. This is an acceptable result, as these values represent the probability that small businesses will be affected by section 7 implementation of the Act.

businesses per year. There are approximately 335 small residential and related development companies in Boulder, El Paso, Douglas, and Larimer counties in which critical habitat units are located.¹⁴⁶ Thus, approximately five percent of small residential and related development companies may be affected by section 7 implementation in proposed critical habitat annually.

274. To the extent that section 7 implementation may lead to an increase in the number of consultations and project modifications regarding agricultural operations in Wyoming, the Service estimates that approximately 54 informal and ten formal consultations are likely to occur within proposed critical habitat areas during the next ten years, or 5.4 informal and one formal consultations per year. There are approximately 162 small farms and ranches in the Wyoming counties in which critical habitat units are located.¹⁴⁷ Therefore, approximately four percent of small agricultural operations in the counties in which critical habitat units are located may be affected by section 7 implementation in proposed critical habitat annually.

7.3.2 Estimated Effects on Small Businesses: The “Significant Effect” Test

275. Costs of section 7 implementation to small businesses consist primarily of the cost of participating in section 7 consultations and the cost of project modifications. To calculate the likelihood that a small business will experience a significant effect from section 7 implementation for the PMJM, the following calculations were made:

- Calculate the per-business cost. This consists of the unit cost to a third party of participating in a section 7 consultation (formal or informal) and the unit cost of associated project modifications. To be conservative (i.e., more likely to overstate impacts than understate impacts), this analysis uses the high-end estimate for each cost.
- Determine the amount of annual sales a company would require for this per-business cost to constitute a “significant effect.” This is calculated by dividing the per-business cost by the three percent “significance” threshold value.
- Estimate the likelihood that small businesses in the study area will have annual sales equal to or less than the threshold amount calculated above. This is estimated using national statistics on the distribution of sales within industries.¹⁴⁸
- Based on the probability that a single business may experience significant effects, calculate the expected value of the number of businesses likely to experience a significant effect.

¹⁴⁶ Census Bureau, County Business Patterns, Accessed at: <http://www.census.gov/epcd/cbp/view/cbpview.html> on August 26, 2002.

¹⁴⁷ Census Bureau, County Business Patterns, Accessed at: <http://www.census.gov/epcd/cbp/view/cbpview.html> on August 26, 2002.

¹⁴⁸ This probability is calculated based on national industry statistics obtained from the Robert Morris Associated *Annual Statement of Studies: 2001-2002* and from comparison with the SBA definitions of small businesses.

- Calculate the percent of businesses in the study area and within the affected industry that are likely to be affected significantly.

276. Small businesses in the construction and development industries could potentially bear a per-business cost of \$25,000 to \$2.6 million. The annual sales that a company would require for this per-business cost to constitute a “significant effect” would be less than \$86.7 million. Based on national statistics, 100 percent of small developers and 100 percent of builders and general contractors in Boulder, Douglas, El Paso, Jefferson, Larimer, and Weld Counties have annual sales less than this amount. Thus, the expected number of small businesses likely to experience a significant effect is 100 percent of 17.3, or 17.3 businesses annually. This number represents approximately five percent of construction and development companies in Boulder, Douglas, El Paso, Jefferson, Larimer, and Weld Counties.

277. As discussed above, 162 agriculture operations in Albany, Converse, Laramie and Platte Counties, or approximately 95 percent of all agriculture operations in the counties proposed as critical habitat, are considered small. Small businesses in the agriculture industry could potentially bear a per-business cost of \$4,100 per formal and \$2,900 per informal consultation, respectively.¹⁴⁹ The annual sales that a rancher or farmer would require for the \$4,100 per-business cost and the \$2,900 per-business cost to constitute a “significant effect” would be less than \$137,000 and \$97,000, respectively. Based on national statistics, approximately 86 percent of agriculture operations in the counties proposed as critical habitat have annual sales less than the “significant effect” threshold for formal consultation, and 82 percent have annual sales less than the “significant effect” threshold for informal consultation. Thus, the expected number of small agriculture businesses likely to experience a significant effect from formal consultation is 86 percent of 0.95 (95 percent of one formal consultation per year), or about 0.8 annually, and the number of small agriculture businesses likely to experience a significant effect from informal consultation is 82 percent of 5.1 (95 percent of 5.4 informal consultations per year), or about 4.2 annually. These five agriculture operations (0.8 plus 4.2) represent approximately three percent of the 162 small agricultural operations in the counties proposed as critical habitat in Wyoming.

POTENTIAL BENEFITS OF PROPOSED CRITICAL HABITAT

SECTION 8

278. The published economics literature has documented that real social welfare benefits

¹⁴⁹ High-informal consultation cost and high-formal consultation cost for third parties from Exhibit 3-1.

can result from the conservation and recovery of endangered and threatened species (Bishop (1978, 1980), Brookshire and Eubanks (1983), Boyle and Bishop (1987), Hageman (1985), Samples *et al.* (1986), Stoll and Johnson (1984)). Such benefits have also been ascribed to preservation of open space and biodiversity, both of which are associated with species conservation (see examples in Pearce and Moran (1994) and Fausold and Lilieholm (1999)). Likewise, regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

279. The primary goal of the Act is to enhance the potential for species recovery. Thus, the benefits of actions taken under the Act are primarily measured in terms of the value the public places on species preservation (e.g., avoidance of extinction, and/or an increase in a species' population). Such social welfare values may reflect both use and non-use (i.e., existence) values. For example, use values might include the potential for recreational use of a species, should recovery be achieved. 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.

280. In addition, as a result of actions taken to preserve endangered and threatened species, various other benefits may accrue to the public. Such benefits may be a direct result of modifications to projects made following section 7 consultation, or may be collateral to such actions. For example, a section 7 consultation may result in the requirement for buffer strips along streams, in order to reduce sedimentation due to construction activities. A reduction in sediment load may directly benefit water quality, while the presence of buffer strips may also provide the collateral benefits of preserving habitat for terrestrial species and enhancing nearby residential property values (e.g., preservation of open space).

281. This chapter describes the benefits resulting from implementation of section 7 of the Act, in the context of areas affected by the proposed designation for the PMJM. It then provides a qualitative discussion of ancillary environmental and economic benefits associated with the preservation of open space.

282. As discussed below, it is not feasible to fully describe and accurately monetize the benefits of this designation in the context of this economic analysis. The discussion presented in this report provides insight into the potential benefits of the designation based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

8.1 Categories of Benefits

283. Implementation of section 7 of the Act is expected to substantially increase the probability of recovery for the PMJM. Such implementation includes both the jeopardy provisions afforded by the listing as well as the adverse modification provisions provided by the designation. Specifically, the section 7 consultations that address the PMJM will assure that actions taken by Federal agencies do not jeopardize the continued existence of the species

or adversely modify its habitat. Note that these measures are separate and distinct from the section 9 “take” provisions of the Act, which also provide protection to this species.

284. The benefits of critical habitat designation can therefore be placed into two broad categories: (1) those associated with the primary goal of species recovery and (2) those that derive mainly from the habitat protection required to achieve this primary goal. In the case of the PMJM, habitat protection provides for environmental benefits, including:

- **Decreased habitat loss** resulting from habitat protection, restoration, and enhancement projects including revegetation and limited utilization rates (i.e. reduced density of development).
- **Decreased destruction of riparian habitat** resulting from mitigation measures and other restoration projects.
- **Substitute habitat (mitigation)** resulting from habitat protection, enhancement, restoration, and enhancement projects and acquisition of mitigation lands.
- **Preservation of open space** resulting from acquisition of mitigation lands.

285. Exhibit 8-1 details those activities expected to generate section 7 consultations leading to project modifications associated with the proposed critical habitat for the PMJM, organized by the category of physical/biological improvement expected to result from the project modification. For example, of the approximately 400 formal consultations anticipated, it is expected that almost all of these will result in project modifications providing for decreased destruction and modification of the riparian system, decreased habitat loss, substitute habitat, decreased take of PMJM, decreased time the species is displaced, decreased disruption to travel corridors, and decreased take of other species and their habitat. In addition, approximately 330 of the consultations will result in project modifications providing for increased preservation of open space. These ecological and environmental benefits are expected to result from consultations regarding landfills, utilities, roads, weed control, development, research, recreation, and bank stabilization spread across the 19 proposed critical habitat units (for more information on the breakdown of consultation type by critical habitat unit, see Exhibits ES-3 and ES-4 in the Executive Summary). Note that estimates of future consultations provided in Exhibit 8-1 are conservative (i.e., more likely to overstate than understate the true number of project modifications that could result from section 7 requirements associated with the PMJM).

286. The physical/biological improvements implied by Exhibit 8-1 may in turn provide for a variety of economic benefits. For example, the purchase of mitigation lands may enhance property values and therefore reduce the total net cost of section 7 to developers. The discussion below provides qualitative descriptions of the economic benefits associated with these environmental improvements. While it is possible to estimate the number of projects that will generate consultations requiring project modifications, as well as the number of acres set aside as project mitigation, existing data do not allow for complete monetization of the ecological or economic implications of these requirements.

Exhibit 8-1

**PHYSICAL/BIOLOGICAL CHANGES EXPECTED TO
RESULT FROM IMPLEMENTATION OF SECTION 7 OF THE ACT**

Physical/Biological Improvement	Potential Project Modification	Activity	Critical Habitat Unit	Number of Expected Consultations^a	Breakdown of Consultations
Decreased destruction and modification of the riparian system	Timing restrictions	Residential Development	Unit SP1	8.8 consultations	8.5 transportation; 0.3 haying and grazing
	Minimizing time of disturbance	Federally Funded Grazing and Haying	Unit SP2	33 consultations	1 landfill; 2 utilities; 5 roads; 5 weed control; 1 development; 10 research; 12 recreation; 1 bank stabilization
Decreased habitat loss	Habitat protection, restoration, and enhancement projects ^b	Road and Bridge Construction	Unit SP3	24.6 consultations	10.6 transportation; 3.7 utilities; 1 bank stabilization; 9 development; 0.3 haying and grazing
Increased open space		Utilities	Unit SP4	19 consultations	5 transportation; 5 development; 7 utilities; 2 bank stabilization
Substitute habitat (mitigation)	Erosion control measures ^c	National Fire Plan Projects	Unit SP5	17 consultations	3 development; 5 transportation; 7 utilities; 2 bank stabilization
Decreased take of PMJM		Recreation	Unit SP6	16 consultations	2 development; 5 transportation; 7 utilities; 2 bank stabilization
Decreased time species is displaced and decreased disruption to travel corridors	Informing workers of importance of habitat	Bank Stabilization	Unit SP7	15 consultations	1 development; 5 transportation; 7 utilities; 2 bank stabilization
		Warren Air Force Base Projects	Unit SP8	17 consultations	1 development; 5 transportation; 7 utilities; 2 bank stabilization
Decreased take of other species and habitat	Restriction of equipment and staging areas from riparian habitat		Unit SP10	17 consultations	11 development; 2 transportation; 3 utilities; 1 bank stabilization
			Unit SP11	32 consultations	11 development; 2 transportation; 3 utilities; 1 bank stabilization
	Trapping and moving species		Unit SP12	41 consultations	11 development; 2 transportation; 3 utilities; 1 bank stabilization
			Unit A1	8 consultations	1 development; 11 transportation; 15 utilities; 5 bank stabilization
			Unit NP1	10.33 consultations	10 development; 11 transportation; 15 utilities; 5 bank stabilization
	Installing barriers (silt fences) around construction areas		Unit NP2	9.33 consultations	3 development; 2 transportation; 2 utilities; 1 bank stabilization
	Wooden structure to provide cover for				0.33 bank stabilization; 0.4 haying and grazing; 8.6 transportation

Exhibit 8-1

**PHYSICAL/BIOLOGICAL CHANGES EXPECTED TO
RESULT FROM IMPLEMENTATION OF SECTION 7 OF THE ACT**

Physical/Biological Improvement	Potential Project Modification	Activity	Critical Habitat Unit	Number of Expected Consultations ^a	Breakdown of Consultations
	travel while habitat is being restored to minimize disruption of corridor		Unit NP3	12 consultations	8.6 transportation; 0.33 bank stabilization; 0.4 haying and grazing
			Unit NP4	9.23 consultations	8.6 transportation; 1.3 utilities; 2.1 haying and grazing
			Unit NP5	12.33 consultations	0.33 bank stabilization; 8.5 transportation; 0.4 haying and grazing 8.6 transportation; 0.33 bank stabilization; 2.1 haying and grazing; 1.3 utilities

^a This analysis assumes that any benefits from section 7 of the Act stem from the application of project modifications. Therefore, this analysis assumes that the projected number of consultations requiring project modifications most accurately represents the level of protection the PMJM may receive as a result of section 7 implementation.

^b Habitat protection, restoration, and enhancement projects may include one or more of the following: grassland restoration; grazing/fencing projects; wetland development and restoration; and/or riparian restoration.

^c Erosion control measures may include one or more of the following: erosion and sedimentation plan; silt fencing; cessation of grazing; seeding; revegetation; and/or removing and replacing topsoil after construction.

8.2 Benefits Associated with Species Recovery

287. The primary benefit of designating critical habitat is to increase the chance of recovery of the endangered PMJM. Quantifying the benefits associated with improved chance of recovery for the PMJM requires an assessment of the public's value for the designation of critical habitat for species such as the PMJM. A number of published studies demonstrate that the public holds values for threatened and endangered species, or their habitat, separate and distinct from any expected direct use of these species (i.e., willingness to pay to simply ensure that a species will continue to exist).¹⁵⁰ While a number of studies estimate the public's willingness to pay to protect threatened and endangered species, or to ensure protection of critical habitat, there is a paucity of such studies relating to small mammals. Despite the lack of studies that estimate monetary measures of existence values for the PMJM or its critical habitat, it is likely that the improved chance of recovery of the PMJM provided by the designation of critical habitat would increase the public's existence value for the species.

8.3 Benefits Associated with Habitat Protection

8.3.1 Open Space Preservation and Real Estate Effects

288. Project modifications resulting from future consultations are expected to include provisions for open space preservation in Colorado.¹⁵¹ Specifically, future consultations in units SP11, SP12, and A1 are expected to result in the conservation of approximately 2,652 total acres of open space. In addition, a total of 84 acres of open space is expected across units SP3, SP4, SP5, SP6, SP7, SP8 and SP10. The primary goal of these modifications is to provide improved habitat and safe travel corridors for the PMJM. Future open space preservation, including the purchase of development rights, may also result in benefits to the public in the form of improved recreational opportunities and enhanced quality of life, and to the housing industry and individual landowners in the form of increased property values, reflecting the amenity value of having a home located near open space.

Hedonic Studies

289. Various studies have documented the positive effect of environmental amenities, including open space, on the value of nearby residential and commercial properties (Weicher and Zeibst (1973), Thibodeau and Ostro (1981), Nelson (1985), Lacy (1990), Garrod and Willis (1992), Geoghegan (1998), Acharya and Bennet (2001)). The enhancement of real estate values depends on, among other things, the proximity of homes to open space, the existing supply of conserved land, and local development pressure. Future project modifications involving the purchase of mitigation lands in and around the proposed critical habitat units for the PMJM in Colorado are likely to occur in areas of intense development

¹⁵⁰ Some of the studies that estimate the public's willingness to pay to protect other threatened species or their habitat include Boyle and Bishop (1987), Elkstrand and Loomis (1998), Kotchen and Reiling (2000), and Loomis and White (1996).

¹⁵¹ Note that in Wyoming future project modifications are unlikely to result in the preservation of open space. As such, real estate effects are unlikely to be felt in or around the critical habitat units in Wyoming.

pressure. For example, the majority of the projected 2,736 acres of future mitigation lands will be found in Douglas and El Paso Counties, both of which have demonstrated intense population growth and increased demand for housing (see Section 2: Relevant Baseline Information). Future residential and commercial growth in these areas will lead to a reduction in the supply of open space within developing communities, thereby increasing the value of existing and acquired open space, based on its relative scarcity.

290. A review of the hedonic literature demonstrates that preserving open space (i.e., greenbelts, wetlands, wildlife corridors, and riparian areas) in a community can lead to enhanced residential property values.¹⁵² Exhibit 8-2 provides examples of economic studies that attempt to quantify the impact of open space on home values. For example, Riddel (2001) examined data on housing sales between 1981 and 1995 in Boulder, Colorado. Analysis of these data indicate, among other things, that as the number of acres of designated and preserved open space in a community increases over time, regional home prices, controlled for appreciation, also rose (all other variables held constant). Specifically, the author estimates a 0.25 percent average annual increase in median property values (or 3.75 percent increase over 15 year period) resulting from the purchase of 15,000 acres of open space in Boulder.
291. Similarly, Mahan et al (2000) examined data on home sales around Portland, Oregon, to assess the economic impact on home values of nearby open space, including wetlands, streams, lakes, and parks. The study considers both the distance from homes to open space and the size (number of acres) of the preserved area. The study concludes that, all other variables held constant, the impact of open space on residential property varies depending on the type of preserved land. Reducing the distance between residential properties and preserved open space by 1,000 feet increases median property values by 0.3 percent (wetlands), 0.2 percent (streams), and 1.3 percent (lakes), respectively.
292. The financial impact of open space preservation implies that while developers will incur costs associated with purchasing mitigation lands (see Section 4), this cost likely will be off-set to some degree by an “open space premium” attached to homes adjacent to, or nearby, preserved open space. That is, the net cost to developers of designating critical habitat for the PMJM should reflect the cost of purchasing additional land, less the increased premium on property values attributable to newly acquired open space. As discussed below, quantifying the “open space premium” attributable to critical habitat is not possible given existing information.

¹⁵² Furthermore, one study (Correll et al (1978)) found that by integrating open space into a housing development during the initial conceptual phase (i.e., purchased prior to construction), the positive effect on property values in the adjacent neighborhood is greater than when land is acquired and conserved as an afterthought.

293. Interpreting the results of the literature summary (Exhibit 8-2), as well as hedonic literature in general, requires some further consideration. Hedonic literature examines a variety of environmental (or other) variables that influence residential property values, and quantifies this influence as a series of private financial gains (i.e., increased asset value to homeowner and developers). These *private* financial gains also reflect the *public* benefits of preserving open space. As noted above, social benefits may include improved quality of life (e.g., recreational opportunities, enhanced aesthetic views, etc), while environmental benefits may include the protection of ecologically sensitive areas. The studies identified in Exhibit 8-2, which document enhanced property values for homes located near open space, are reflective of what may happen in the areas of intense development pressure within and around critical habitat units for the PMJM in Colorado.

294. Transferring the results of the existing hedonic studies to the case of critical habitat designation for the PMJM would require data that are not currently available. Without the required information (detailed below), conducting a defensible transfer of “open space value” as identified in the literature to the policy case in Colorado is not feasible. To conduct an accurate transfer of values from the literature, the following information is needed:

- First, information on how the characteristics of housing markets in different parts of the country studied in the literature compare to a prospective housing market in Colorado (e.g., median/mean price, housing stock, etc.);
- Second, information on the extent of existing open space, and expectations of the supply of future open space, in communities affected by the proposed designation; and
- Third, information on the characteristics of *future* development patterns and housing attributes in areas of proposed critical habitat in Colorado.

295. The third piece of information is particularly important, yet difficult to obtain. Even if the information related to different housing markets and variable community open space conditions could be identified, a number of uncertainties about *future* housing markets preclude an accurate projection of property value impacts. For example, the literature provides case studies of the impact of open space on currently functioning housing markets. That is, existing homes are bought and sold over time and a pattern emerges regarding key variables sought by home buyers. Using this information to predict consumer preferences in areas where development has not yet occurred invites a number of uncertainties. For example, it is difficult to compare the baseline scenario – the house that would have been built without the preservation of adjacent open space – to the house that is designed and built, given the knowledge that nearby land will be preserved. The home under the critical habitat scenario may be designed to incorporate a viewshed provided by the open space, whereas the baseline home may be a more ordinary structure, similar to neighboring homes. In short, information is not available to allow for an accurate transfer of the values found in the hedonic literature to the case of critical habitat designation for the PMJM.

Exhibit 8-2

**RECENT HEDONIC STUDIES EXAMINING CHANGES IN RESIDENTIAL PROPERTY VALUES
FOR HOMES LOCATED NEAR OPEN SPACE**

Author	Geographic Area	Key Issues Addressed in Study	Increase in home value
Smith et al. (2002)	Wake County, NC	Measures impact of distance to public open space on property values over time (1980-1998). Examines whether the distinction between fixed and adjustable open space land use affects property values	Suggests a consistently positive and significant influence of distance to public open space on property values. Impacts range from a 0.1 to 2.8 percent increase in mean price per 1,000 feet, as distance to public open space decreases
Boyle et al. (2001)	Boston, MA	Measures impact of distance to National Wildlife Refuge on property values near an urban area	2.4 to 3.2 percent increase in mean property value per 5,280 feet (1 mile) as distance to refuge is decreased
	Central & Western NY	Measures impact of distance to National Wildlife Refuge on property values in rural and suburban areas	0.7 to 6 percent increase in mean property value per 5,280 feet (1 mile) as distance to refuge is decreased
	Northwestern, PA	Measures impact of distance to National Wildlife Refuge on property values in a rural area	2 percent increase in mean property value per 5,280 feet (1 mile) as distance to refuge is decreased
Acharya and Bennett (2001)	New Haven, CT	Measures impact of an increase in open space within a 5,280 foot (1 mile) radius of residential properties.	Increase of 0.05 percent of mean home value for each percent increase in open space preserved within a 5,280 feet (1 mile) buffer (mean percent of open space preserved within buffer is 48)
Earnhart (2001)	Fairfield, CT	Measures impact of restored open space in coastal areas (i.e., marsh restoration) on property values. Combines stated and revealed preference data in a hedonic equation to explain impact on property values. Active restoration of marshes included re-establishment of natural tidal flushes and removal of non-native, invasive flora.	Author's preferred model, which combines stated and revealed data, estimates an impact of 2.7 percent on median home values
Lutzenhiser and Netusil (2001) ^a	Portland, OR	Measures impact of "natural area park" open space on property values. Natural area parks restrict public access, preserve 50 percent of the land in native and/or natural vegetation, and are managed specifically for habitat protection	Approximately 16 percent increase in mean property values of homes located within 1,500 feet of an 80-acre natural area park

Exhibit 8-2

**RECENT HEDONIC STUDIES EXAMINING CHANGES IN RESIDENTIAL PROPERTY VALUES
FOR HOMES LOCATED NEAR OPEN SPACE**

Author	Geographic Area	Key Issues Addressed in Study	Increase in home value
Riddel (2001)	City of Boulder, CO	Measures impact of marginal increases in open space on property values over time	A 0.25 percent <i>average annual</i> increase in median property values (or 3.75 percent increase over 15 year period) as a result of purchasing 15,000 acres over 15 years
Bolitzer and Netusil (2000) ^a	Portland, OR	Measures impact of distance to, and size of, open space on property values. Examines whether open space type (e.g., public park, private park, cemetery, golf course) or size of open space affects sale price of residential properties	Increase in property values of 1.4 to 3.1 percent and 1.9 to 4 percent for homes located within 1,500 feet of (1) <i>any</i> open space and (2) a 20-acre parcel of open space (i.e., the mean size of open space parcels), respectively
Leggett and Bockstael (2000)	Chesapeake Bay, MD	Measures impact of percent of land in open space on residential properties within a 3,960 foot (3/4 mile) radius	Demonstrates statistical significance of percent open space on mean property values (specific impact varies based on numerous dynamic variables)
Mahan et al. (2000)	Portland, OR	Measures impact of distance to open space and the size (number of acres) of the preserved parcel on property values. Examines whether open space type (e.g., wetlands, streams, lakes) affects sale price of residential properties	Increase in mean property values of 0.3, 0.2, or 1.3 percent per 1,000 feet as distance to open space decreases for wetlands, streams, and lakes, respectively. Increases in property values are evaluated at an initial distance of 5,280 feet (1 mile) from open space
Streiner and Loomis (2000)	Coastal California Communities	Measures impact of river restoration on adjacent property values. Study evaluates seven of California's Urban Stream Restoration projects	Increase in mean property values of between 3 and 13 percent for homes located near stabilized and restored streambanks and newly acquired riparian conservation lands
Geoghegan et al. (1997)	Washington, DC	Measures impact of an increase in open space within a 330 foot (0.1 km) radius on residential property values.	A 1.9 percent increase in the mean value of homes for each 1 percent increase in the amount of open space found within the 330 feet (0.1 km) buffer zone

Exhibit 8-2

**RECENT HEDONIC STUDIES EXAMINING CHANGES IN RESIDENTIAL PROPERTY VALUES
FOR HOMES LOCATED NEAR OPEN SPACE**

Author	Geographic Area	Key Issues Addressed in Study	Increase in home value
Doss and Taff (1996)	Ramsey Co. (St. Paul Metro area), MN	Measures impact of mean distance to wetlands on residential property values. Examines whether open space wetland type (e.g., forested, scrub-shrub, emergent-vegetation, open-water) affects the sales price of residential properties.	A 0.14, 0.13, and 0.10 percent increase in mean property value for each additional 35 feet (10 meters) closer a home is located to a scrub-shrub, emergent-vegetation, or open water wetland, respectively. The impacts are evaluated at the mean open space acreage for each open space type. Interestingly, the author found a negative effect associated with forested wetlands.
Lupi et al. (1991)	Ramsey Co. (St. Paul Metro area), MN	Measures impact of size of wetland open space on property values within neighborhoods. Neighborhoods were defined as a wetland survey section encompassing approximately 30 acres	A 0.05 percent increase in property values for homes located within a “neighborhood” with the mean acreage of preserved wetlands

^a Note that the Lutzenhiser and Netusil (2001) and Bolitzer and Netusil (2000) studies utilize a similar dataset of home sales in Multnomah County (Portland, OR) from 1990 to 1992.

8.3.2 Recreational Benefits

296. Protecting critical habitat for the PMJM may result in preservation of habitat suitable for recreational uses, such as hiking, horseback riding, picnicking, and bird-watching. Project modifications involving the purchase of mitigation lands by residential developers may result in the preservation of areas to be designated as parks or preserves for both species conservation and public enjoyment. Monetization of these benefits, however, would require data on the number of additional trips or increased quality of trips resulting from the designation. Such data are not currently available.

8.3.3 Overall Ecosystem Health

297. The habitat protection measures required for the PMJM generally encompass stretches of riparian habitat, which provide ancillary benefits to other species that cohabit these areas in Colorado and Wyoming. That is, protecting the primary constituent elements for the PMJM through future project modifications will lead to habitat improvement benefits for other threatened and endangered flora and fauna. According to the Natural Diversity Information Source, maintained by Colorado State, “Approximately 75 percent of the wildlife species known or likely to occur in Colorado are dependent on riparian areas during all or a portion of their life cycle. This is especially significant when we realize that riparian areas make up less than one percent of the land mass in Colorado.”¹⁵³

298. Exhibit 2-1 provides a list of other species included in historic section 7 consultations with the PMJM. This list provides information about other species found in or around the PMJM riparian habitat. Each one of these organisms may in turn provide some level of direct or indirect benefit to the public (e.g., existence value) and/or local economies. Conservation recommendations such as timing restrictions, minimized time of disturbance, and installing barriers around construction areas contribute generally to the maintenance of biodiversity and collectively act to protect the riparian ecosystem. The purchase of mitigation lands (as described above) will also contribute to the preservation of these riparian ecosystems. While these benefits can be described qualitatively, existing data are not available to monetize these changes.

8.3.4 Other Benefits

299. Additional benefits of designating critical habitat for the PMJM may include the following:
- Educational/informational benefits for those who work in or around sensitive riparian habitat areas. For example, utility and road construction workers will likely benefit from an increased awareness of the extent of PMJM habitat and of reasonable measures to mitigate impact (e.g., removing and replacing topsoil after construction, keeping equipment staging areas out of the habitat, minimizing potential for spills, providing a natural stream bottom in culverts to encourage passage of mice through natural corridors, etc);

¹⁵³ See Natural Diversity Information Source webpage at (<http://ndis.nrel.colostate.edu/ndis/riparian/ripwetdef.htm>)

- Increased support for existing conservation efforts, and reduced uncertainty regarding the extent of PMJM habitat;
- Increased protection for some bird species resulting from a PMJM conservation measure designed to limit property owners from allowing pets to range unaccompanied off the owner's property. For example, future development projects will likely impose covenant restrictions on residential housing, including apartments and townhouses, in areas within a designated distance from PMJM habitat. These provisions, designed to protect the PMJM against feline predators or other pets, will likely result in a benefit to birds species that frequently fall prey to house pets; and
- Improved knowledge resulting from firm legal definitions of areas known to be essential to the survival and recovery of the species. This may assist agencies and local jurisdictions in defining key habitat areas for the species. County planners, therefore, may have better information to formulate their land use policies as a result of critical habitat designation.

At this time sufficient information does not exist to quantify or monetize these benefits.

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Converse County
Farm Service Agency
F.E. Warren Air Force Base
Laramie County Conservation District
Local developers
Natural Resources Conservation Service
Platte County
Platte County Office of the University of Wyoming Cooperative Extension Service
Private landowners
Rocky Flats Field Office
True Ranches
U.S. Bureau of Land Management
U.S. Fish and Wildlife Biologists, Cheyenne and Colorado Field offices
U.S. Forest Service, Arapaho-Roosevelt National Forest
U.S. Forest Service, Medicine Bow-Routt National Forest, Douglas Ranger District
U.S. Forest Service, Pike-San Isabel National Forest
U.S. Army Corps of Engineers, Littleton and Omaha District offices
Wheatland Irrigation District
WY Department of Transportation

Public comment provided by the following:

Rocky Flats Field Office Personnel, September 11, 2002.