

CHAPTER 5

CUMULATIVE IMPACTS ANALYSIS

5.1 INTRODUCTION

NEPA requires an assessment of potential cumulative impacts. Federal regulations (40 CFR 1508.7) define cumulative impacts as:

"...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Potential cumulative impacts are assessed at the resource level. The cumulative impact analysis (CIA) area for past, existing and reasonably foreseeable future activities (RFFA's) that may generate cumulative impacts varies depending on the resource under consideration. For example, the CIA area for air quality effects is regional in nature; therefore the scope of activities considered is necessarily broad. In contrast, the CIA area for geology and minerals considers the project area associated with the proposed action and alternatives; therefore the scope of potential cumulative activities considered is much narrower.

This discussion of potential cumulative impacts assumes the successful implementation of the environmental protection and mitigation measures discussed in chapters two and four of this EIS as well as compliance with the GRRRA and GDRA RMP's and all applicable federal, state and local regulations and permit requirements. The analysis of cumulative impacts addresses both potential negative and positive impacts.

5.2 PAST, EXISTING AND REASONABLY FORESEEABLE FUTURE ACTIVITY

Past, existing and RFFA's are organized by CIA area and include the following:

5.2.1 Desolation Flats Project Area

Historic and existing activities in the DFPA include cattle grazing, dispersed recreation and oil and gas exploration, development and production. Reasonably foreseeable future activities within the DFPA are limited to the Proposed Action and alternatives.

The previously approved Mulligan Draw Project is located within the DFPA and is included in the proposed Desolation Flats EIS for analysis of the potential for increased well density of up to four wells per section. The Mulligan Draw Environmental Impact Statement (USDI-BLM 1992b) was completed in August 1992 and provided an analysis of a planned natural gas production project on public lands located in the northwest portion of the DFPA. Celsius Energy Company and other operators planned to drill approximately 45 total wells on 640 acre spacing over a span of several years to develop the natural gas reserves in the Mulligan Draw field. A total of 15 wells have been drilled in the Mulligan Draw area and an estimated 23 remain to be drilled.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

The Dripping Rock Unit/Cedar Breaks Area is also included within the DFPA. The EA for this proposal involved a proposal to drill 58 natural gas wells on 640-acre spacing. To date 17 wells have been drilled in these units.

While future natural gas proposals are possible, the Proposed Action incorporates all reasonably foreseeable natural gas activity within the project area based on current knowledge of the area's geology and natural gas drilling and development technology. If these factors change and additional proposals are submitted, or significant changes in the Proposed Action are warranted, additional NEPA assessment (including cumulative impact analysis) would be required.

5.2.1.1 Disturbance within the Desolation Flats Project Area

Existing disturbance within the DFPA is approximately 1506.4 acres, or around 0.6 percent of the 233,542 acres comprising the project area. During the construction phase, the Proposed Action would disturb 4,923 acres and Alternative A would disturb 7,582 acres. Under Alternative B (No-Action) additional surface disturbance would occur on a case-by-case basis as individual wells are authorized by the BLM. Disturbance areas within the DFPA area would be reduced upon reclamation of pipeline ROW's and unused portions of drill pad and ancillary facility disturbances during the production phase for each alternative. Under the Proposed Action, reclamation would reduce impacts to 2,139 acres for a cumulative impact of 3,645.4 acres or 1.6 percent of the DFPA. Alternative A impacts would decrease to 3,300 acres, with cumulative impacts affecting 4806.4 acres or about 2.1 percent of the DFPA.

5.2.2 Southeastern Sweetwater County/Southwestern Carbon County CIA Area

Past and historic activities occurring in the area surrounding the Proposed Action include oil and gas exploration, development and production, dispersed recreation, ranching and grazing, and residential, commercial and industrial development in the communities of Wamsutter and Baggs.

RFFA's in adjacent areas primarily involve natural gas development. The Proposed Action is located in an area of intensive natural gas development. The projects and the NEPA documents from which potential cumulative impacts were obtained are listed below.

- The Greater Wamsutter Area II (GWA II) Natural Gas Development Project Environmental Impact Statement (USDI-BLM 1995) provided an analysis of impacts associated with a maximum development pattern of 750 new production wells at 300 locations within the GWA II and associated access roads, pipelines, and other ancillary facilities. The GWA II analysis area is located to the northeast of the DFPA and includes approximately 334,191 acres.
- The Continental Divide/Wamsutter II Natural Gas Development Environmental Impact Statement (USDI-BLM 1999a) includes the Continental Divide area combined with the GWA II area. The combined project area is generally located in Townships 15 through 23 North, Ranges 91 through 99 West, in Sweetwater and Carbon counties, Wyoming. The total combined area encompasses approximately 1,061,200 acres. This project is located north of the DFPA.

Development within the GWA II reached the levels analyzed in the EIS for that project (300 well locations). Directional drilling proved to be technically impractical or uneconomical in

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

many areas within the GWA II project area, and additional well locations beyond those analyzed in the GWA II EIS were required to develop the anticipated 750 production wells. The expansion of development in the GWA II area and development in the Continental Divide area were combined in one analysis to make NEPA compliance more efficient and to facilitate the analysis of cumulative impacts.

The CD/WII EIS provides an assessment of environmental impacts associated with development of 3,000 natural gas wells. Based on that assessment, the BLM approved development of up to 2,130 wells, 50 percent on federal lands within the project area, beginning in 1999 and continuing for approximately 20 years, with a project life of 30 to 50 years. Various associated facilities (e.g., roads, pipelines, power lines, water wells, disposal wells, evaporation ponds, compressor stations, etc.) would also be constructed.

- Creston/Blue Gap Natural Gas Project Environmental Impact Statement (USDI-BLM 1994a) was approved on October 4, 1994, and provides an assessment of the environmental consequences of a proposed natural gas development project located north and east of the DFPA. The BLM's decision allowed a maximum of 275 wells on 250 locations on a 160-acre spacing pattern.
- Uinta Basin Lateral Pipeline Environmental Assessment (USDI-BLM 1992c) was completed in January 1992 and provided an analysis of impacts associated with construction and use of a 20-inch natural gas pipeline located west and north of the DFPA. Total length of the proposed pipeline is approximately 222 horizontal miles and would transport natural gas from various supply sources in the Uinta Basin of eastern Utah and the Piceance Basin of western Colorado to natural gas mainlines located near Wamsutter, Wyoming.
- The Hay Reservoir Unit Natural Gas Development Environmental Assessment (USDI-BLM 1992d) involved a natural gas producing area located northwest of the DFPA and GWA II. It analyzed impacts of an increase of up to 20 additional wells over two years, in addition to 24 existing wells.
- The South Baggs Area Natural Gas Development Project EIS (USDI-BLM 1999c) analyzed potential impacts of drilling 50 additional natural gas wells in the South Baggs area which is located southeast of the DFPA.
- The Vermillion Basin Natural Gas Exploration and Development Project Environmental Assessment (USDI-BLM 2000) analyzed potential impacts of drilling up to 56 wells in the 92,490-acre Vermillion Basin Project Area (VBPA), located 24 miles southwest of the DFPA.
- The BLM has issued a scoping notice for the preparation of an EIS for the proposed Atlantic Rim Coalbed Methane Development Project, located east of the DFPA. The proposed project area encompasses approximately 310,335 acres, of which 199,558 are federal surface, 15,156 are State of Wyoming lands and 94,621 acres are private surface. For the purpose of environmental assessment, the Atlantic Rim operators have indicated that a maximum of 3,880 coalbed methane wells may be drilled in the Atlantic Rim area over a 6 to 10-year period. The productive life of the field is estimated at 20 to 30 years. While the Atlantic Rim EIS is being prepared, the BLM would allow drilling of a maximum of 200 exploration wells in nine pod locations specifically for the acquisition of data necessary for the completion of the EIS.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Because potential impacts associated with the 3,880-well proposal have not yet been identified, they cannot be considered in the analysis of potential cumulative impacts for the Desolation Flats EIS. However, this cumulative analysis does consider the environmental effects associated with the 200 test wells. The forthcoming Atlantic Rim EIS would provide an analysis of the cumulative impacts of the full 3,880-well proposal, which would include the Desolation Flats project and the other projects listed above.

5.2.3 Watershed CIA Area

Cumulative analysis of natural resources that relate to watershed function and stability should occur at the watershed level. Thus, the CIA area for soils, water resources, vegetation and wetlands includes two components: (1) an analysis of potential cumulative impacts within the DFPA, and (2) an analysis of potential cumulative impacts within watersheds that contain the DFPA.

The watershed area considered in the CIA was defined following USDI-BLM (1994c) guidelines based on the USGS delineated watershed boundaries that contain or are adjacent to the DFPA. The DFPA falls predominantly within the Sand Creek and Barrel Springs Draw drainage basins; however, a very small (negligible) portion of the DFPA drains into Cherokee Creek, a tributary of the Little Snake River. The total CIA area is approximately 589,607 acres in size. The CIA area includes those portions of the Creston/Blue Gap, Continental Divide/Wamsutter II, and South Baggs EIS study areas that fall within the Sand Creek and Barrel Springs Draw drainage basins. Figure 5-1 depicts the location and relationship of the DFPA and the considered watersheds.

For threatened, endangered, and sensitive fish species, the Watershed CIA is extended to the Muddy Creek and Northwest Little Snake River (Sand Creek) watersheds (Figure 5-4). Both of these watersheds drain into the Little Snake River.

5.2.3.1 Disturbance within the Watershed CIA Area

Cumulative disturbance within the watershed CIA area includes estimated disturbance associated with the Desolation Flats project and existing and future disturbance associated with those portions of the Creston/Blue Gap, Continental Divide/Wamsutter II and South Baggs projects located within the Barrel Springs and Sand Creek drainage areas. No other permitted projects or RFFA's within the CIA area are currently anticipated.

The total existing and future disturbance in the watershed CIA area is estimated at approximately 5,220 acres, or 0.89 percent of the CIA (this disturbance estimate takes reclamation and future disturbance into consideration).

For the combined Muddy Creek and Northwest Little Snake River watersheds, cumulative disturbance is estimated to be 19,609 acres, or 1.7 percent of the two watersheds combined.

5.2.4 Regional CIA Area

The regional perspective is useful primarily for the analysis of air quality and socioeconomic impacts. The southwest Wyoming and Northwest Colorado region includes extensive oil and gas development, grazing and ranching, recreational development and dispersed recreation use, coal and iron mining, soda ash, fertilizer and electric power production, and residential, commercial and industrial development. There are also several highways and Interstate 80 which must be considered in the analysis of cumulative air quality impacts.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

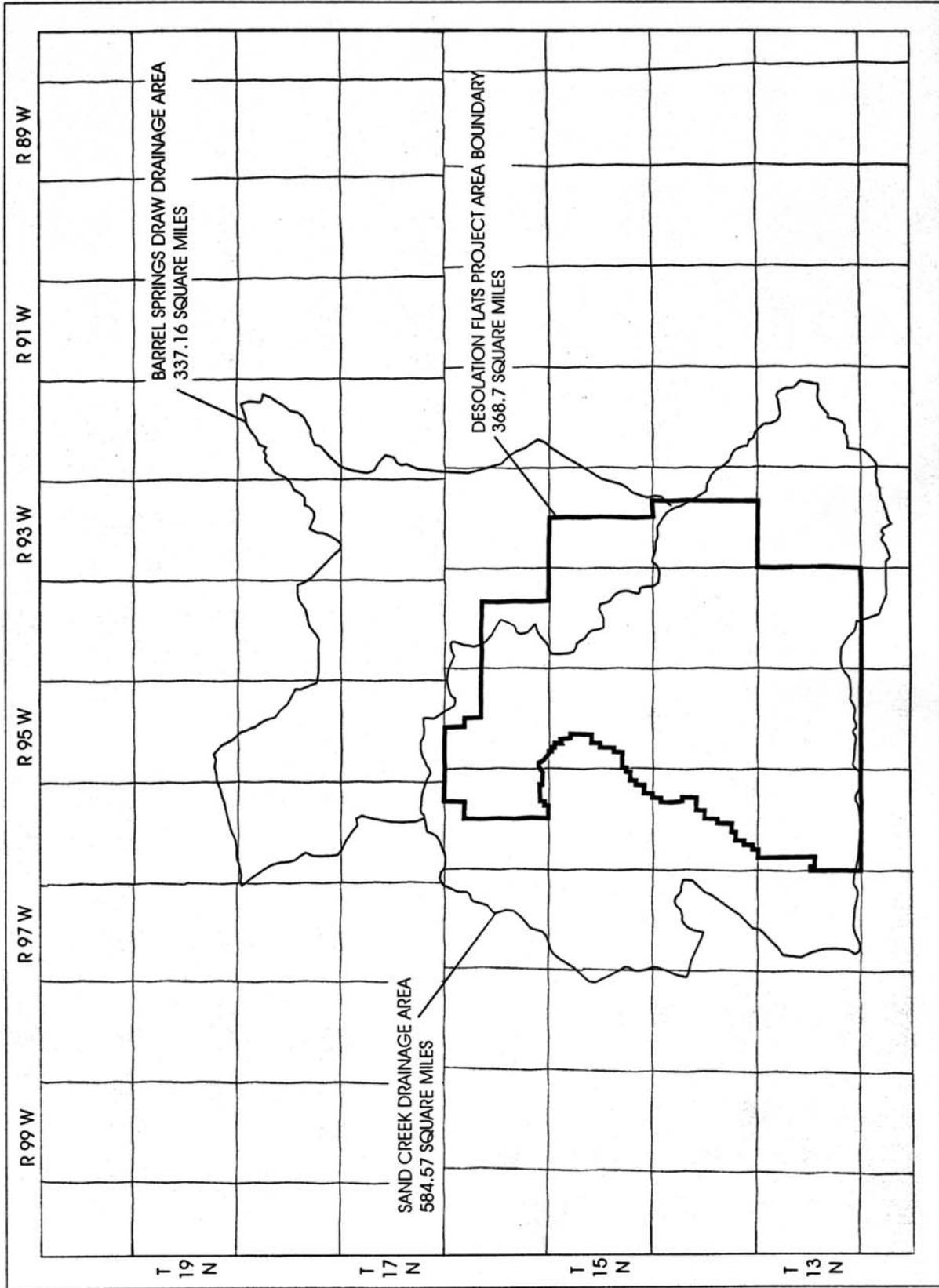


Figure 5-1. Watershed Boundaries Used in the Cumulative Impacts Analysis

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

5.3 POTENTIAL CUMULATIVE IMPACTS BY RESOURCE

5.3.1 Geology/Minerals/Paleontology

The CIA area for geology, minerals, and paleontology is the DFPA. Resources within the DFPA have not been significantly affected by present and existing activities and are not anticipated to be significantly affected by the Proposed Action or alternatives. The Proposed Action and alternatives are the only RFFA within the DFPA, therefore, cumulative impacts on geology, minerals and paleontology are not anticipated.

5.3.2 Climate and Air Quality

The CIA area for climate and air quality consists of southwestern Wyoming and northwestern Colorado. Cumulative impacts result from the development of the DFPA and other NEPA approved projects in combination with state permitted sources and other sources not subject to NEPA analysis.

5.3.2.1 Cumulative Emissions Inventory

For the cumulative analysis, three additional emission inventories were developed and combined with the Desolation Flats project emissions. One of the additional inventories accounted for emissions from state permitted sources that began operation between July 1995 and January 2001. Emissions for sources operating before 1995 were assumed to be included in the background monitoring data. Permit records obtained from the WDEQ-Air Quality Control Division and the CDPHE-Air Pollution Control Division provided the basis for this inventory. Both permitted emission increases and decreases were accounted for in the inventory. One notable permitted emission decrease was the installation of low NO_x burners on boiler #3 at the Naughton power plant. This control project resulted in a 1,000 ton per year decrease in NO_x emissions.

A second emission inventory addressed changes in existing well emissions that occurred between the 1995 baseline monitoring date and January 2001. To account for emissions resulting from new wells drilled in the region and the decline in production or the abandonment of existing wells, production figures between the 1995 baseline date and January 2001 were used to estimate the change in well emissions by county. Both county wide increases and decreases in well emissions were observed in this inventory.

The remaining emission inventory accounted for emissions from Reasonably Foreseeable Development (RFD). The RFD category was comprised of emissions addressed in previously approved NEPA actions that had not been constructed as of January, 2001. Table 5-1 summarizes the NEPA actions included in the analysis while Figure 5-2 presents the location of the projects. The estimated emissions from sources permitted between 1995 to 2001, along with the changes in producing well emissions and future RFD emissions were added to the Desolation Flats emissions to obtain the cumulative emissions inventory (see the Air Quality Technical Report for a more detailed discussion of the emission inventories). Table 5-2 presents a summary of the cumulative emission inventory.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Table 5-1. NEPA Approved Reasonable Foreseeable Development

Approved NEPA Action	Map Symbol	Project Area	Remaining Wells to Be Developed	Remaining Compression to Be Installed (hp)
BTA Bravo	BB	23.80	2	0
Burley	BR	3.18	16	560 ¹
CAP Big Piney - Labarge	BP	501.65	200	0
Castle Creek Unit	CC	74.92	10	0
Continental Divide/Wamsutter II	CD	3,701.32	1,768	58,100 ²
Creston/Blue Gap	CB	1,272.00	156	5,460 ³
East LaBarge	EL	22.30	9	0
Essex Mountain	EM	50.67	3	0
Fontenelle Reservoir	FR	414.63	1,017	0
Hickey-Table Mountain EA	HK	79.54	39	0
Jack Morrow Hills CAP EIS	JM	936.82	108	3,480
Jonah II EIS	J2	153.65	285	0
Miscellaneous Wells - East	WE	126.94	15	0
Miscellaneous Wells - West	WW	1,517.28	185	0
Moxa Arch	MA	972.68	1,162	17,066
Pinedale Anticline EIS	PA	798.63	700	26,000
Riley Ridge	RR	541.40	209	0
Sierra Madre	SM	76.68	9	0
South Baggs	SB	214.08	43	2,580 ⁴
Stagecoach Draw	SD	150.39	59	0
Vermillion Basin	VB	372.29	56	NO _x Specified ⁵
Bridger-Teton DEIS including the following four management areas:				
Hoback Basin	HB	326.36	10	0
Moccasin Basin	MB	234.63	5	0
Union Pass	UP	354.63	5	0
Upper Green River	GR	617.79	10	0

¹ Compression estimated at 35 hp per well

² A total of 70,000 hp was approved, the amount installed was estimated based upon well completion

³ Compression estimated at 35 hp per well

⁴ A total of 3,000 hp was approved, the amount installed was estimated based upon well completion

⁵ Compression emissions were specified at 200 tons per year NO_x

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

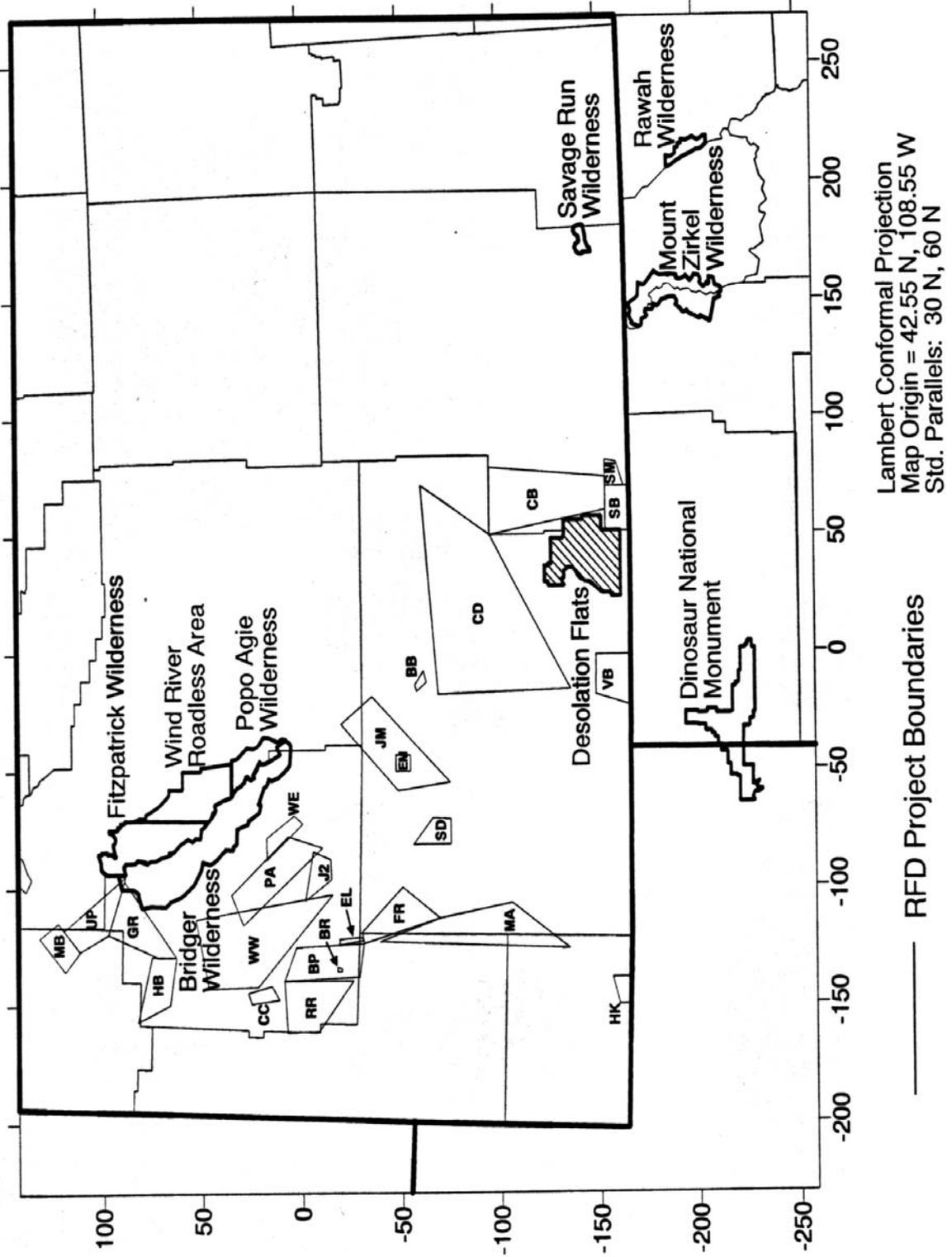


Figure 5-2. Reasonably Foreseeable Development Projects

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Table 5-2. Cumulative Emission Inventory Summary.

Inventory Category	NO _x (TPY)	SO _x (TPY)	PM ₁₀ (TPY)	PM _{2.5} (TPY)
Permitted Emission Increases Post 1995	7,011	4,305	2,110	846
Permitted Emission Decreases Post 1995 (Excluding Naughton)	(1,777)	(557)	(737)	(273)
Naughton Low NO _x Burners	(1,000)			
Regional Gas Wells Post 1995	(13)			
Desolation Flats Project	1,072	12	295	79
Reasonably Foreseeable Development	1,640			
Cumulative Emissions	6,933	3,760	1,668	652

5.3.2.2 Cumulative Far-Field Air Quality Impacts

The CALPUFF model was applied to estimate far-field air quality and Air Quality Related Value (AQRV) impacts resulting from cumulative emissions including the Desolation Flats project, state permitted emission sources, producing natural gas wells and approved NEPA actions. Potential impacts on air quality were estimated at PSD Class I and Class II sensitive receptor areas. The analyzed sensitive receptor areas were comprised of:

- Bridger Wilderness (Class I);
- Fitzpatrick Wilderness (Class I);
- Popo Agie Wilderness (Class II);
- Wind River Roadless Area (Class II);
- Dinosaur National Monument (Class II);
- Savage Run Wilderness (Class I);
- Mount Zirkel Wilderness (Class I), and
- Rawah Wilderness (Class I).

The CALPUFF model was used to estimate ambient NO₂, SO₂, PM₁₀ and PM_{2.5} concentrations to evaluate potential cumulative impacts and for comparison with applicable ambient air quality standards and PSD increments. The maximum cumulative impacts from all sources occurred at different sensitive areas depending upon the pollutant under consideration and the applied averaging time. As shown in Tables 5-3 and 5-4, the maximum cumulative impacts from all sources, including Desolation Flats, do not exceed the ambient air quality standards or the PSD Class I increments.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Table 5-3. Comparison of Cumulative Air Quality Impacts with Ambient Air Quality Standards

Pollutant and Averaging Time	Maximum Impact Location	Cumulative Impact (: g/m ³)	Monitored Back-ground Level (: g/m ³)	Maximum Impact Plus Back-ground (: g/m ³)	National Ambient Air Quality Standard (: g/m ³)	Wyoming Ambient Air Quality Standard (: g/m ³)	Colorado Ambient Air Quality Standard (: g/m ³)	Percentage of Most Stringent Ambient Air Quality Standard
NO ₂ Annual	Bridger	0.763	10	10.763	100	100	100	11%
SO ₂ 3-hr	Dinosaur	2.886	29	31.886	1,300	1,300	700	5%
SO ₂ 24-hr	Dinosaur	0.862	18	18.862	365	260	365	7%
SO ₂ Annual	Dinosaur	0.014	5	5.014	80	60	80	8%
PM ₁₀ 24-hr	Rawah	0.105	20	20.105	150	150	150	13%
PM ₁₀ Annual	Dinosaur	0.004	12	12.004	50	50	50	24%
PM _{2.5} 24-hr	Rawah	0.201	10	10.201	65	NA	NA	16%
PM _{2.5} Annual	Dinosaur	0.005	6	6.005	15	NA	NA	40%

Note: Background PM_{2.5} concentration is assumed to be one-half of PM₁₀.

Table 5-4. Comparison of Cumulative Impacts with PSD Class I Increments

Pollutant	Averaging Time	Total Project Impact (: g/m ³)	PSD Class I Increment (: g/m ³)	Percentage of Class I Increment (: g/m ³)
NO ₂	Annual	0.763	2.5	31%
SO ₂	3-hr	2.886	25	12%
SO ₂	24-hr	0.862	5	17%
SO ₂	Annual	0.014	2	0.7%
PM ₁₀	24-hr	0.105	8	1.3%
PM ₁₀	Annual	0.004	4	0.1%

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

5.3.2.3 Cumulative Visibility Impacts

The effects of cumulative emissions on visibility at the sensitive receptor areas were evaluated using the IWAQM/FLAG recommended method (see Air Quality Technical Report). In this method, visibility degradation resulting from cumulative source emissions was compared against a background visibility based on the mean of the 20 percent cleanest days from a long-term record of the IMPROVE aerosol monitoring data. The background data were previously described in Section 4.2.8. There are two thresholds of visibility change which are used for reporting purposes, the number of days in which the deciview change (delta-deciview or) dv) is 0.5 or greater and 1.0 or greater. These thresholds were also discussed in Section 4.2.8.

Table 5-5 presents a summary of the cumulative visibility impact analysis. The analysis indicates that there potentially would be a total of 25 days with greater than 0.5) dv) and 7 days with greater than 1.0) dv). Table 5-6 lists the number of days greater than 0.5 and 1.0) dv) and the maximum) dv) for each sensitive area. Note that although there are 25 days listed, the impacts exceed the thresholds in several areas on the same calendar day. There are only 14 different calendar days with impacts in any area over 0.5) dv) and 6 different calendar days with impacts over 1.0) dv). The greatest number of days greater than 0.5) dv) occurs at the Bridger Wilderness Area. However, the maximum impact of the Desolation Flats Project alone at the Bridger Wilderness area is only 0.079) dv), and that occurred on a different day (April 16, 1995) than the maximum cumulative impact (April 10, 1995). On April 10, 1995, the day of maximum cumulative visibility impact, the Desolation Flats contribution to the cumulative total) dv) at the Bridger Wilderness Area is zero) dv). On average, for the days in which the visibility impact is greater than 1.0) dv), the Desolation Flats project contribution is less than two percent, and for all days where the impact is greater than 0.5) dv), the average Desolation Flats contribution is five percent. In the absence of the Desolation Flats project, cumulative visibility impacts are reduced by two days with greater than 0.5) dv).

Table 5-5. Summary of Cumulative Visibility Impacts

Sensitive Area	Days > 0.5) dv)	Days >1.0) dv)	Maximum) dv)
Bridger Wilderness Area	9	5	2.315
Fitzpatrick Wilderness Area	3	1	1.696
Savage Run Wilderness	2	1	1.377
Popo Agie Wilderness Area	4	0	0.680
Rawah Wilderness	3	0	0.613
Dinosaur National Monument	2	0	0.572
Wind River Roadless Area	1	0	0.826
Mount Zirkel Wilderness	1	0	0.755
Total Visibility Event Days at All Areas	25	7	

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Table 5-6. Cumulative Visibility Impacts for All Days Greater Than 0.5) dv

Rank	Sensitive Area	Julian Day	Cumulative Visibility Impact () dv)	Desolation Flats Project Contribution () dv)	Percent Contribution of Desolation Flats Project
1	Bridger Wilderness	100	2.315	0.000	0%
2	Bridger Wilderness	264	1.913	0.000	0%
3	Bridger Wilderness	107	1.794	0.055	3%
4	Fitzpatrick Wilderness	100	1.696	0.000	0%
5	Bridger Wilderness	110	1.442	0.014	1%
6	Savage Run Wilderness	116	1.377	0.115	8%
7	Bridger Wilderness	86	1.334	0.000	0%
8	Bridger Wilderness	85	0.985	0.000	0%
9	Fitzpatrick Wilderness	146	0.873	0.008	1%
10	Wind River Roadless Area	110	0.826	0.015	2%
11	Mount Zirkel Wilderness	116	0.755	0.093	12%
12	Bridger Wilderness	124	0.752	0.004	1%
13	Fitzpatrick Wilderness	124	0.716	0.000	0%
14	Popo Agie Wilderness	146	0.680	0.018	3%
15	Bridger Wilderness	146	0.660	0.016	2%
16	Rawah Wilderness	116	0.613	0.076	12%
17	Rawah Wilderness	113	0.611	0.000	0%
18	Bridger Wilderness	106	0.606	0.079	13%
19	Popo Agie Wilderness	106	0.582	0.073	13%
20	Savage Run Wilderness	263	0.573	0.031	5%
21	Dinosaur National Monument	355	0.572	0.144	25%
22	Dinosaur National Monument	85	0.539	0.003	1%
23	Rawah Wilderness	263	0.536	0.043	8%
24	Popo Agie Wilderness	110	0.532	0.013	2%
25	Popo Agie Wilderness	61	0.512	0.006	1%

5.3.2.4 Cumulative Acid Deposition Impacts

The potential impacts of cumulative emission sources on acid deposition were analyzed using the Fox (1989) method (see Air Quality Technical Report). This method was used to estimate the potential change in acid neutralizing capacity (ANC) at each of 12 sensitive lakes. The cumulative potential impacts resulting from acid deposition are summarized in Table 5-7. The predicted change in sensitive lake ANC levels resulting from cumulative source acid deposition were found to be far below the levels of acceptable change.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Table 5-7. Summary of Potential Cumulative Acid Deposition Impacts

Sensitive Lake	Sensitive Area	Monitored Background ANC (: eq/l)	Level of Acceptable Change	Change In ANC (: eq/l)	Percentage of LAC
Black Joe Lake	Bridger Wilderness	69.0	10% (6.9 : eq/l)	0.246	3.56%
Deep Lake	Bridger Wilderness	61.0	10% (6.1 : eq/l)	0.256	4.19%
Hobbs Lake	Bridger Wilderness	68.0	10% (6.8 : eq/l)	0.133	1.95%
Upper Frozen Lake	Bridger Wilderness	5.7	1 : eq/l	0.271	27.1%
Ross Lake	Fitzpatrick Wilderness	61.4	10% (6.1 : eq/l)	0.073	1.19%
Lower Saddlebag	Popo Agie Wilderness	55.5	10% (5.6 : eq/l)	0.292	5.27%
Pothole A-8	Mount Zirkel Wilderness	16.0	1 : eq/l	0.194	19.4%
Seven Lakes	Mount Zirkel Wilderness	35.5	10% (3.6 : eq/l)	0.279	7.85%
Upper Slide Lake	Mount Zirkel Wilderness	24.7	1 : eq/l	0.199	19.9%
West Glacier Lake	Medicine Bow Wilderness	26.1	10% (2.6 : eq/l)	0.377	14.4%
Island Lake	Rawah Wilderness	64.6	10% (6.5 : eq/l)	0.218	3.37%
Rawah #4 Lake	Rawah Wilderness	41.2	10% (4.1 : eq/l)	0.236	5.72%

5.3.2.5 Discussion of Significance

The cumulative impact analysis predicts that the maximum criteria pollutant concentrations will not exceed federal or state ambient air quality standards. In addition, cumulative impacts are predicted to be less than the PSD Class I increments. Potential impacts to sensitive lake ANC are less than the applicable limits of acceptable change.

Visibility impacts of up to 25 days exceeding the 0.5) dv threshold are predicted as a result of cumulative emissions. However, the presence or absence of the Desolation Flats Project does not significantly change the cumulative visibility impact. On only two of the 25 days would the absence of Desolation Flats change the visibility impacts to levels below the thresholds, and these are only for days slightly over 0.5) dv. None of the) dv days over 1.0 would be changed to below the 1.0 threshold with the absence of the Desolation Flats project. Of the two days that Desolation Flats would contribute to 0.5) dv impacts, one occurs at Dinosaur National Monument while the second occurs at Rawah Wilderness.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

5.3.3 Soils

The CIA area for soils includes the DFPA and the Barrel Springs Draw and Sand Creek drainage basins. Cumulative impacts include soil impacts from ongoing activities, recently constructed projects and RFFA's.

Desolation Flats Project Area. Existing and cumulative disturbances within the DFPA are described in section 5.2.1.1 for the Proposed Action and for Alternative A. Under Alternative B (No-Action) additional surface disturbance would occur on a case-by-case basis. For both action alternatives, the cumulative post-reclamation disturbances are relatively low, (1.6 percent for the Proposed Action and 2.1 percent for Alternative A) and the successful implementation of erosion, runoff, sediment control and revegetation measures described in Section 2.5.2.11.2, Section 4.5.5 and Appendix C would minimize the contribution of the Proposed Action and alternatives to cumulative impacts on soil resources. No additional RFFA's are anticipated for the DFPA, therefore, cumulative impacts on soils within the DFPA would be similar to those described in Section 4.3.

Watershed CIA Area. Cumulative disturbances within the Barrel Springs Draw and Sand Creek drainage basins are estimated at 0.89 percent of the total watershed CIA area (see Section 5.2.3.1). The successful implementation of erosion, runoff, sediment control and revegetation measures would also minimize the contribution of the Proposed Action and alternatives to cumulative impacts on soil resources within these drainage basins.

5.3.4 Water Resources

Cumulative impacts include water resource impacts from ongoing activities, recently constructed projects, and projects likely to be implemented in the near future. Cumulative impacts are assessed for the DFPA and the watershed CIA area which includes the Sand Creek and Barrel Springs Draw drainage areas.

Desolation Flats Project Area. Existing and cumulative disturbances within the DFPA are described in section 5.2.1.1 for the Proposed Action and for Alternative A. Under Alternative B (No-Action) additional surface disturbance would occur on a case-by-case basis. Cumulative post-reclamation disturbances (1.6 percent for the Proposed Action and 2.1 percent for Alternative A) would not significantly impact surface water and groundwater quantity and quality for the reasons discussed under Section 4.4.3.1.

Watershed CIA Area. The total existing and future disturbance in the Barrel Springs Draw and Sand Creek watershed CIA (including the DFPA and portions of the Creston/Blue Gap, Continental Divide/Wamsutter II, and South Baggs project areas) was estimated at approximately 5,220 acres, or 0.89 percent of the CIA (this disturbance estimate takes reclamation and future disturbance into consideration). This cumulative disturbance would not significantly impact surface water and groundwater quantity and quality for the reasons discussed under Section 4.4.3.1. Further, sediment input into the Little Snake River would be negligible.

No serious groundwater pollution problems have been detected in the watershed CIA area. Current oil and gas exploration and development activities must comply with federal and state environmental quality laws and thus, serious water quality and quantity impacts are not expected on a cumulative scale. Section 3.4.3.1 identified current water usage in the general area of the

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Desolation Flats project to be approximately 90,000 ac-ft per year for all combined surface water and groundwater sources and uses (Collentine et al. 1981). This estimate includes uses outside the watershed CIA area. Using this estimate as an environmentally conservative indication of total existing water usage, the Desolation Flats project under Alternative A (844.2 ac-ft total) and approximately 27 percent of the Creston/Blue Gap project (714 ac-ft), 15 percent of the Continental Divide/Wamsutter II project (1047ac-ft), and 21 percent of the South Baggs project (32 ac-ft) total water usage within the CIA area could be as high as 2,637 ac-ft., or approximately 3 percent of current water usage in the general area of the Desolation Flats project. This cumulative water usage is relatively small and a relatively minor portion of total surface water and groundwater yield/availability. Therefore, cumulative impacts on surface water and groundwater quantity would not be significant.

5.3.5 Vegetation and Wetlands

The CIA area for vegetation and wetlands resources includes both the DFPA and the Barrel Springs Draw and Sand Creek watershed CIA area.

Desolation Flats Project Area. The Proposed Action and alternatives are the only RFFA's likely to occur in the DFPA. The relatively small percentage of cumulative post-reclamation disturbance in the DFPA (1.6 percent for the Proposed Action and 2.1 percent for Alternative A, see Section 5.2.1.1), coupled with successful implementation of the impact avoidance and mitigation measures outlined in Section 2.2.2.11.2, Section 4.5.5 and Appendix C would result in cumulative vegetation and wetland impacts within the DFPA below the significance thresholds established for this analysis.

Watershed CIA Area. Cumulative disturbances within the watershed CIA are estimated at 0.89 percent. Successful implementation of soils, surface water and vegetation mitigation measures would minimize the contribution of the Proposed Action and alternatives to cumulative vegetation impacts within the watershed CIA.

Although waters of the U.S. comprise less than one percent of the project area, any unpermitted impact to these waters associated with this project or other projects in the vicinity or region would add to the cumulative loss of these important areas. The historical loss of wetlands in the U.S. has been well documented as a major environmental problem; the majority of disturbance is due to agricultural diversion, urban development, and other causes (including industrial development and transportation). There has also been significant historical loss of wetlands in Wyoming. A COE-approved Section 404 permit with requirements of avoidance of waters of the U.S., including special aquatic sites and wetlands, and measures prescribed in Chapter 2, Section 4.5.5 and Appendix C would remove the potential for significant cumulative impacts to these sensitive areas.

5.3.6 Range Resources and Other Land Uses

The CIA area for range resources and other land use is the project site and immediately adjacent lands, including grazing allotments whose boundaries include portions of the DFPA and the Continental Divide/Wamsutter II or Creston/Blue Gap project areas.

Desolation Flats Project Area. Historic and existing land use on the project area includes grazing, dispersed recreation and oil and gas exploration, development and transmission. The Proposed Action and alternatives are the only RFFA within the DFPA, consequently cumulative impacts on

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

range resources and other land use within the DFPA are anticipated to be similar to those associated with the Proposed Action or alternatives.

Adjacent Areas. Several grazing allotments affected by the Desolation Flats project would also be affected by the Continental Divide/Wamsutter II and/or Creston/Blue Gap projects. Grazing allotments that occupy portions of several oil and gas project areas (e.g., Rock Springs, East Muddy, South Barrel, Flat Top Section Red Creek, Willow Creek, North Barrel I, South La Clede) could receive cumulative impacts from loss of forage associated with disturbance, which would occur if operators in several natural gas project areas simultaneously develop wells, roads and/or ancillary facilities within a particular grazing allotment. The potential for such occurrences cannot be predicted, because the timing and location of development in a particular area is uncertain. Increased traffic and field development activity in these cases would also provide greater opportunities for conflict with grazing operations. Cumulative impacts in these cases would be greater during drilling and field development and recede substantially once wells are put into production and pipeline disturbances and portions of well pad and ancillary facility disturbances are reclaimed. Long-term cumulative impacts to grazing are anticipated to be minimal. The development of new roads within allotments may be beneficial in that they may allow grazing operators better access to the allotments.

5.3.7 Wildlife

The CIA areas for wildlife resources differ with respect to species. This analysis examines the proportion of the wildlife habitat within respective CIA areas that may be disturbed from all past, present, and reasonably foreseeable future activities. Long-term disturbance, as a result of the Proposed Action, totals 2,139 acres. It was assumed that 4 well locations may be developed per section within the DFPA. However, the specific sections that would be disturbed are not currently known. Likewise, in assessing cumulative impacts, it was not possible to specifically determine where future impacts would occur within CIA areas. Therefore, estimates of total disturbance were made based upon the location of past, present, and future projects (Section 5.2.2) within the CIA areas and the expected amount of disturbance associated with each project. The proportion of the estimated total disturbance within the CIA areas was used to estimate the cumulative area of wildlife habitats that may be disturbed by past, present, and RFFA's. This analysis represents the most current and accurate estimate of cumulative impacts available at this time.

The potential for significant cumulative impacts to commonly occurring wildlife species (numerous small mammal and song bird species) is low. Monitoring of wildlife populations, and the distribution of disturbances within the CIA areas, as identified in the Wildlife Monitoring/Protection Plan (Appendix H), would allow the BLM to determine if additional mitigation measures are needed to avoid significant cumulative impacts.

5.3.7.1 Big Game

Three big game species: pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*) occur in significant numbers within the DFPA. Big game populations are managed within herd units designated for each species and cumulative impacts are discussed in the context of these areas (Figures 3-10 to 3-12). Cumulative big game habitat losses for pronghorn, mule deer, and elk herds resulting from development of the DFPA are presented in Table 5-8. These potential habitat losses include estimated disturbances associated with the actions described in Section 5.2.2 that impact the respective herd units, existing impacts, and RFFA. Monitoring of development activities and associated impacts to big game species as

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

identified in the Wildlife Monitoring/Protection Plan (Appendix H) would allow the BLM to identify whether additional mitigation measures, or further study to make such determinations, are necessary within the DFPA.

Implementation of the proposed project on the DFPA would likely affect crucial winter/yearlong and winter/yearlong range for all three big game species. The specific locations of disturbances are not known, therefore the proportions of each type of seasonal big game ranges that may be impacted are unknown. Therefore, the potential impacts to big game habitats are estimated for the portions of each herd unit that contains designated big game seasonal ranges. The cumulative disturbance to big game seasonal ranges expected to result from development activities from the combination of existing, proposed, and reasonably foreseeable future surface disturbances within each of the three big game herd units are listed in Table 5-8. Cumulative impacts to big game will include surface disturbance of habitat, but may also include such factors as increased stress due to human/wildlife encounters, potential impacts upon birth/survival rates, and possible impacts upon migration routes.

Pronghorn. Development within the DFPA under the Proposed Action would disturb a total of 2,139 acres of crucial winter/yearlong and/or winter/yearlong pronghorn habitat within the Bitter Creek Pronghorn Herd Unit. Cumulative long term surface disturbance of these seasonal ranges resulting from existing, proposed, and potential future developments within the Bitter Creek Pronghorn Herd Unit is approximately 23,088 acres (1.2% of the herd unit) under the Proposed Action (Table 5-8) and 24,249 acres (1.3% of the herd unit) under Alternative A. The population objective for the Bitter Creek Herd Unit is 25,000 animals, and cumulative impacts to pronghorn seasonal ranges within the Bitter Creek Herd Unit are not expected to significantly reduce herd unit carrying capacity. Cumulative impacts upon pronghorn migration routes within the Bitter Creek Herd Unit are expected to be minimal because no large-scale linear barriers (e.g. fences) would be constructed as a result of the Proposed Action.

Table 5-8. Estimated Cumulative Surface Disturbance (acres) within Big Game Seasonal Ranges and Wild Horse Herd Management Areas, Included within the DFPA.

	Acreage Available	Project Related Development		Cumulative Development ¹		Total Disturbance	
		Initial	LOP	Existing	Potential Future	Acres	%
Pronghorn - Bitter Creek Herd Unit							
	1,836,948	4,923	2,139	10,828	10,121	23,088	1.2
Mule Deer - Baggs Herd Unit							
	1,657,349	4,923	2,139	22,932	15,612	40,683	2.4
Elk - Petition Herd Unit							
	382,545	487	295	149	174	618	0.2
Wild Horses - Adobe Town Herd Management Area							
	466,265	4,091	1,777	2,000	600	4,377	0.9

1 - Source CD/WII EIS (USDI-BLM 1999a)

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Mule Deer. Development within the DFPA under the Proposed Action would disturb a total of 2,139 acres of crucial winter/yearlong and/or winter/yearlong mule deer habitat within the Baggs Mule Deer Herd Unit. Cumulative long term surface disturbance of these seasonal ranges resulting from existing, proposed, and potential future developments within the Baggs Herd Unit is approximately 40,683 acres (1.9% of the herd unit) under the Proposed Action (Table 5-8) and 41,844 acres (2.0% of the herd unit) under Alternative A. The population objective for the Baggs Herd Unit is 18,700 animals, and cumulative impacts to mule deer seasonal ranges within the Baggs Herd Unit are not expected to significantly reduce herd unit carrying capacity. Cumulative impacts upon mule deer migration routes within the Bitter Creek Herd Unit are expected to be minimal because no large-scale linear barriers (e.g. fences) would be constructed as a result of the Proposed Action.

Elk. A small proportion (20.8%) of the Petition Elk Herd Unit actually contains designated elk seasonal ranges. Therefore, only those projects that impact habitat in designated seasonal ranges would contribute to cumulative impacts to elk ranges. Development within the DFPA under the Proposed Action would disturb approximately 295 acres of crucial winter/yearlong and/or winter/yearlong elk habitat within the Petition Elk Herd Unit. Cumulative long term surface disturbance of these elk seasonal ranges resulting from existing, proposed, and potential future developments within the Petition Elk Herd Unit would be approximately 618 acres (0.16% of the elk seasonal ranges in the Petition Herd Unit) under the Proposed Action (Table 5-8) and 778 acres (0.2% of the elk seasonal ranges in the Petition Herd Unit) under Alternative A. The population objective for the Petition Herd Unit is 300 animals, and the estimated cumulative impacts to elk seasonal ranges are not expected to significantly reduce the carrying capacity of the Petition Herd Unit. Cumulative impacts upon elk migration routes within the Petition Herd Unit are expected to be minimal because no large-scale linear barriers (e.g. fences) would be constructed as a result of the Proposed Action.

Big Game Summary. Overall, cumulative direct disturbances to big game habitat are expected to be small within all of the herd units and thus, do not indicate a likelihood for significant impacts to pronghorn, mule deer, or elk from implementation of this project. Cumulative indirect disturbance (e.g., displacement) would likely be similar to that discussed under the Proposed Action (i.e., not significant). The degree of big game displacement would be related to the amount of drilling activity occurring at any one time. As drilling is completed and human activity is reduced, the amount of displacement would be reduced and over time big game animals would adapt to well pad facilities. Potential for long-term displacement would likely be related to the amount of human activity required for maintenance. Increased human activities and accessibility within the DFPA may influence or impede big game migrations through the area to a limited extent. However, no linear barriers (e.g. fences) would be constructed that would prevent big game migrations, therefore, impacts to big game migration routes from implementation of the Proposed Action are not anticipated to be significant. In summary, implementation of the Proposed Action is not expected to cause significant cumulative impacts to any of the big game herds within the DFPA.

5.3.7.2 Wild Horses

Approximately 1,740 wild horses resided within the Adobe Town Wild Horse HMA in 2001 (Reed 2002), and 179 in areas of other wild horse habitat outside of the Wild Horse HMA (Reed 2002, Figure 3-13). The cumulative impact analysis for wild horses resulting from ground disturbance associated with development of the DFPA is presented for that portion of the Adobe Town Wild Horse HMA encompassed by the DFPA (Table 5-8 and Figure 3-13). Within this area, existing,

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

proposed, and potential future developments would result in increased habitat loss and indirect disturbance or displacement; however, overall range conditions within the DFPA are not anticipated to decline as a result of the proposed and future development activities. Development of the DFPA under the Proposed Action is expected to result in approximately 1,777 acres (0.4%) of additional surface disturbance within the Wild Horse HMA in the long term. The cumulative long term surface disturbance resulting from existing, proposed, and potential future developments within the Adobe Town Wild Horse HMA is approximately 4,377 acres (0.9%) under the Proposed Action (Table 5-8), and increases only slightly to 5,342 acres (1.1%) under Alternative A.

Currently, wild horse numbers in the Adobe Town Wild Horse HMA are above the management objective. One management goal for wild horses is to maintain wild, free-roaming populations (Reed 2002). Increased human activity over the long-term may potentially influence the “wild” behavior of horses as they become more acclimated to human presence and activity. At this time it is not known what impacts the long-term activity within a natural gas field may have upon the behavioral patterns of wild horses. The short-term displacement of some horses utilizing areas near wells pads or roads may result in increased pressure on sensitive resource areas such as springs and water holes. However, development may result in new areas that horses may be attracted to. These areas may include new water impoundments and new vegetation on reclaimed areas. In these instances, horse use of naturally occurring sensitive areas such as springs may be reduced. It is not known how horse distribution patterns on the Adobe Town Wild Horse HMA may change as a result of development on the DFPA. The loss of habitat and disturbance to horse herds in the Adobe Town Wild Horse HMA due to the project implementation are not anticipated to result in significant cumulative impacts to wild horses.

5.3.7.3 Greater Sage-grouse

Greater sage-grouse inhabit the DFPA year-round and require a wide range of seasonal habitats. The Bitter Creek Upland Game Bird Management Area is the CIA area for greater sage-grouse breeding and nesting habitats (Figure 5-3). Surveys conducted for this project identified and inventoried greater sage-grouse severe winter relief habitat. A total of 209 acres of greater sage-grouse severe winter relief habitat was identified during the surveys and disturbance in these areas would be avoided (Figure 3-14). Severe winter relief habitat within the remainder of the Bitter Creek UGBMA has not been identified.

The area of potential nesting habitat consists of a 2-mile buffer placed around all active and historic leks within the Bitter Creek UGBMA. However, not all habitat within the 2-mile buffer around leks will be suitable nesting habitat. It is estimated that approximately 7,885 (3.1%) acres of potential nesting habitat may be disturbed within the Bitter Creek UGBMA by past, present, and reasonably foreseeable future activities (Table 5-9). Cumulative disturbances resulting from past, present, and reasonably foreseeable future developments within greater sage-grouse nesting habitat increase only slightly to 8,156 acres (3.2%) under Alternative A. The projected disturbance is a conservative calculation that likely overestimates the collective disturbance area and the resultant cumulative impacts to greater sage-grouse nesting habitat within the Bitter Creek UGBMA. The reason for this overestimation is that all known historic and active leks (Figure 5-3) were included in the disturbance area calculations, rather than only those leks known to be currently active.

The cumulative area of disturbance to greater sage-grouse leks would not increase above the area that has been disturbed from past actions, because the BLM would not allow development within 0.25 miles of active greater sage-grouse leks. Implementation of mitigation measures for greater sage-grouse identified in Chapters 2 and 4 would ensure that overall impacts to greater sage-

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

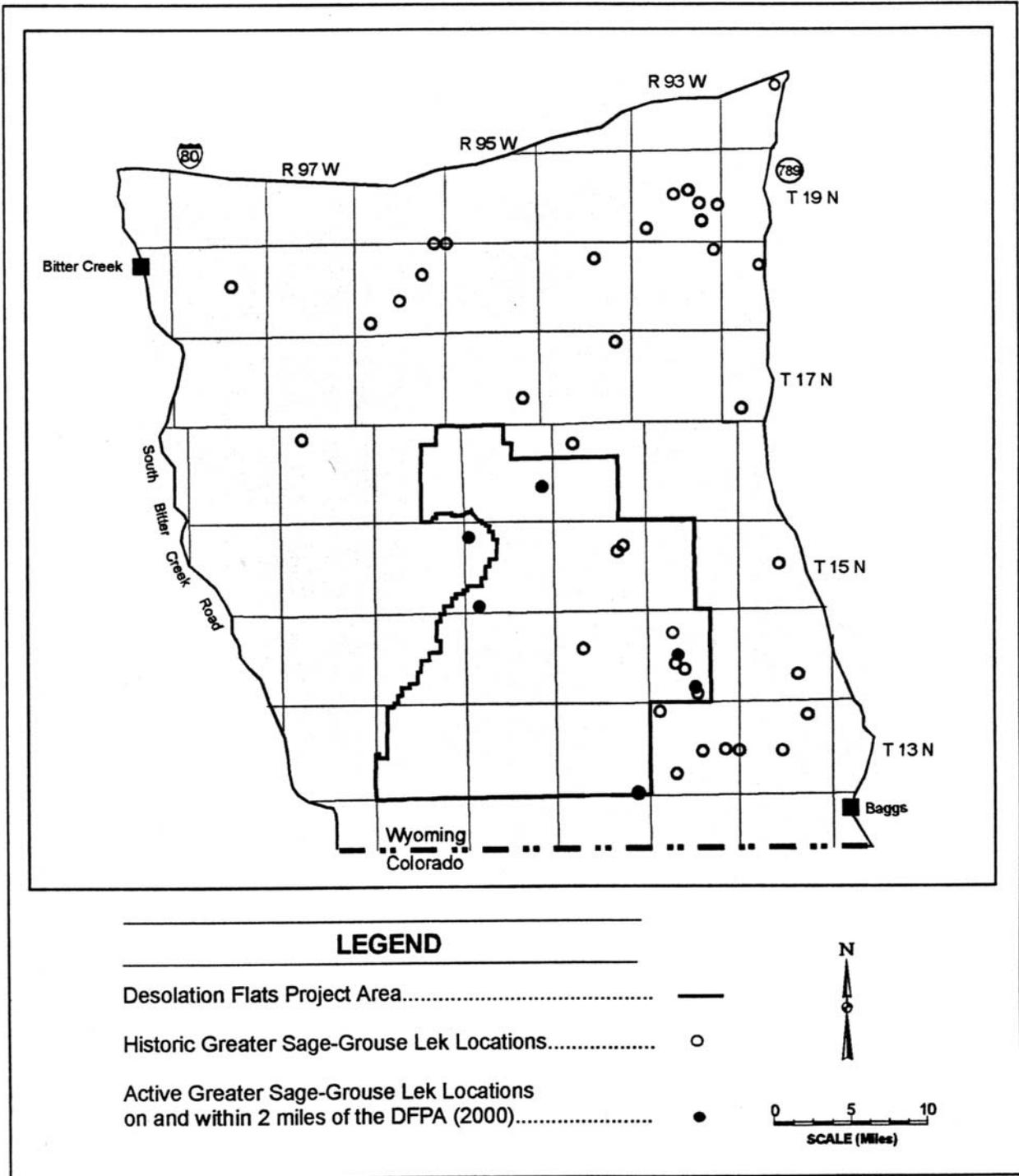


Figure 5-3. Active Greater Sage-Grouse Lek Locations within the DFPA Survey Area and other Historic Lek Locations within the Bitter Creek Upland Game Bird Management Area.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

grouse populations within the DFPA are low. The APD process provides an additional opportunity for BLM biologists to review the status of leks relative to project activities and determine necessary courses of action to ensure that no significant cumulative impacts to greater sage-grouse leks, nesting habitat, and severe winter relief habitat, occur within the Bitter Creek UGBMA.

5.3.7.4 Raptors

For the sake of consistency, the Minerals CIA area from the CD/WII EIS (USDI-BLM 1999a), plus that portion of the DFPA not previously included (29.7% of the DFPA) in that area, was used as the CIA area for raptors in this analysis. This area plus a 1-mile buffer covers approximately 2,374,625 acres.

Table 5-9. Cumulative Acreage of Surface Disturbance within the CIA Areas for Raptors and Greater Sage-grouse within the DFPA.

Species/ Habitat	Acreage Available	Project Related Development		Cumulative Development ¹		Total Disturbance	
		Initial	LOP	Existing	Potential Future	Acres	%
Greater Sage-grouse - Bitter Creek UGBMA							
Potential nesting	252,097	1,183	515	4,470	2,900	7,885	3.1
Potential breeding	5,359	0	0	500	0	500	9.3
Raptors - Cumulative Impacts Analysis Area							
Potential foraging	2,374,625	4,923	2,139	56,600	24,900	83,639	3.5
Potential nesting	2,096,231	2,360	1,024	19,640	11,300	31,964	1.5

1 - Source CD/WII EIS (USDI-BLM 1999a)

Nests. Development of the Proposed Action may result in the disturbance of 1,024 acres of potential raptor nesting areas within the DFPA over the LOP. It is estimated that collectively, approximately 31,964 acres (1.5%) of potential raptor nesting habitat may be disturbed by past, present, and reasonably foreseeable future activities (Table 5-9) under the Proposed Action. The cumulative impact would increase to approximately 32,520 acres (1.6%) under Alternative A. This analysis is conservative and likely overestimates the area of disturbance and the cumulative impacts resulting from mineral development in this area. Three main reasons account for this overestimation: (1) some of the nests within the 1-mile zone surrounding the CIA area would not end up being within 1 mile of wells drilled within the project area, (2) all nests within the CIA area were used in the analysis instead of just nests that were known to have been active during recent years, and (3) some wells would be located less than 1 mile from nests in areas where topography interrupts the line-of-sight between nests and wells. Making efforts to locate wells outside the line-of-sight of raptor nests would contribute substantially to reducing potential cumulative impacts.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Forage Habitats. All of the CIA area was assumed to be suitable raptor foraging habitat. The cumulative area of raptor foraging habitat potentially affected within the CIA would be approximately 83,639 acres (3.5% of the CIA) under the Proposed Action (Table 5-9), and 84,800 acres (3.6% of the CIA) under Alternative A. This level of cumulative impact to raptor foraging habitat is not expected to significantly reduce the available prey base.

Although the total number of raptor nests and the acreage of foraging habitat within the CIA area that are subject to potential impacts would increase with the implementation of either the Proposed Action or Alternative A, the application of: (1) existing BLM stipulations, (2) the mitigation and avoidance measures prescribed elsewhere in this EIS, and (3) the monitoring measures set forth in the Wildlife Monitoring/Protection Plan (Appendix H), are expected to protect the raptor populations within the CIA area, and significant cumulative impacts are not expected.

5.3.8 Special Status Plant, Wildlife, and Fish Species

5.3.8.1 Threatened, Endangered, and Sensitive Wildlife Species

The CIA area for threatened, endangered, and sensitive species was considered to include the Minerals CIA area used in the CD/WII EIS (USDI-BLM 1999a) plus that portion of the DFPA not previously included in that area. Potential impacts to threatened, endangered, proposed and sensitive species in this area of Wyoming are likely to be primarily associated with minerals development (see Section 5.2.2). Implementation of the Proposed Action or Alternative A would extend the area over which potential development impacts could occur, and adverse cumulative impacts to special status species could occur if development precludes use of large areas by these species. However, the application of monitoring (Wildlife Monitoring/Protection Plan for this project; Appendix H) and mitigation measures associated with each of the projects within the CIA area is expected to provide adequate protection for threatened, endangered, proposed, and sensitive species from past, present and potential future actions. These monitoring and mitigation measures have been developed through a collaborative effort among the Operators, BLM, FWS, WGFD, and other concerned parties. Through these efforts, cumulative impacts to special status wildlife species are not expected to be significant.

5.3.8.2 Threatened, Endangered, and Sensitive Fish Species

Currently, no threatened, endangered, or proposed fish species are known to exist in the DFPA, although occurrences of some of these species have been documented downstream from the DFPA (Baxter and Stone 1995). Development within the DFPA may have the potential to influence the quantity/quality of water that enters rivers downstream of the DFPA. The CIA area for threatened, endangered, and sensitive fish species is considered to be a combination of the Muddy Creek and Northwest Little Snake River (Sand Creek) watersheds (Figure 5-4). Both of these watersheds drain into the Little Snake River.

A total of 203,789 acres (87.2%) of the DFPA lies within the Northwest Little Snake River watershed, with the remaining 29,753 acres (12.8%) in the Muddy Creek watershed. Table 5-10 presents the total existing, proposed, and potential future surface disturbances expected to result from currently approved development activities (Section 5.2.2) within the two watersheds. The CIA area includes portions of Creston/Blue Gap, Continental Divide/Wamsutter, Greater Wamsutter II,

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

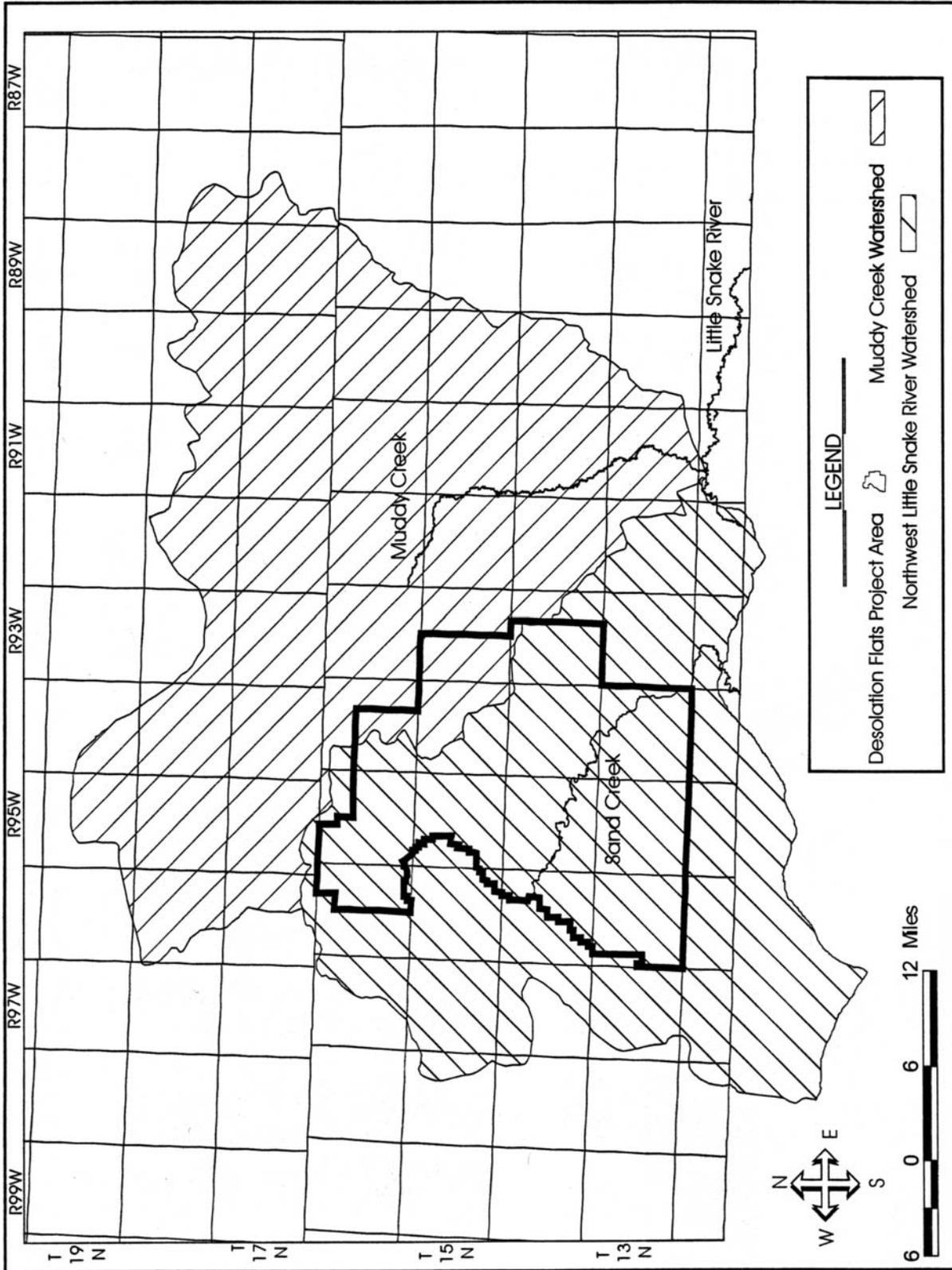


Figure 5-4 Watershed Boundaries and Major Drainages for the Desolation Flats Project Fisheries Cumulative Impact Analysis.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

and Mulligan Draw study areas. Cumulative impacts that result from all actions within the CIA area would be approximately 19,609 acres (1.7% of the CIA area) (Table 5-10) with implementation of the Proposed Action. Cumulative impacts that result from all actions within the CIA area would be approximately 20,770 acres (1.8% of the CIA area) with implementation of Alternative A. These proposed disturbances would affect a total of 15.25 miles of potential fish bearing streams within the DFPA.

If special status fish species are excluded from critical habitats, or if those habitats are degraded as a result of cumulative impacts within the CIA area, significant impacts to these species may occur. However, all permitted disturbances associated with the Desolation Flats project and other development within the CIA area would employ erosion control measures and construction techniques suitable to limit offsite soil movement and downstream degradation of fisheries habitat. The mitigation and avoidance measures set forth in this EIS to protect fisheries resources are likely be adequate to protect surface waters and special status fish species. Thus, the overall cumulative impacts to fish species found within the affected watersheds, and downstream watersheds, are not expected to be significant.

5.3.8.3 Threatened, Endangered, and Sensitive Plant Species

Suitable habitat for the Ute ladies'-tresses is not present on the DFPA, therefore implementation of the proposed project would not contribute to cumulative impacts upon this species. No significant cumulative impacts would occur to sensitive plant species or their habitat within the CIA area upon implementation of mitigation measures in this document.

Table 5-10. Acreage of Project Related and Cumulative Surface Disturbance within Affected Watersheds of the DFPA.

Watershed	Acreage Available	Project Related Development		Cumulative Development		Total Disturbance	
		Initial	LOP	Existing	Potential Future	Acres	%
Muddy Creek	656,414	630	274	7,500	4,200	11,974	1.8
Northwest Little Snake	527,767	4,293	1,865	4,370	1,400	7,635	1.4
Total	1,184,181	4,923	2,139	11,870	5,600	19,609	1.7

5.3.9 Recreation Resources

The CIA area for recreation resources includes the project site and adjacent areas in southeastern Sweetwater County and southwestern Carbon County. The DFPA would add to the substantial level of impact to the recreation resource already existing in the region. The Proposed Action and alternatives, in conjunction with the projects listed in Section 5.2.2, limit the ability of hunters and non-consumptive recreationists to adapt to changing patterns of wildlife use of the landscape, find more pristine environments, and relocate their activities in nearby areas. Disturbance in 23 square miles of the existing MVMA, an important area for recreationists seeking solitude and isolation,

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

would substantially reduce relocation options. These conditions increase the probability that hunters and other recreationists would be displaced, dissatisfied, or have a less enjoyable recreation experience.

5.3.10 Visual Resources

The CIA area for visual resources includes the project site and adjacent areas in southwestern Sweetwater County and southeastern Carbon County. The proposed action would add to the substantial level of impact to visual resources in the immediate area associated with historic and ongoing oil and natural gas development (see Section 5.2.2). Although these projects are in different viewsheds, the composite experience of those traveling through the area, particularly on back roads, is one of a highly modified landscape. Contrasts in line, form, color and texture begin to dominate the viewers experience. Views of large, relatively undisturbed patches of the characteristic Wyoming Red Desert landscape are becoming less common. These conditions would increase the likelihood that viewers, particularly back country recreationists, would be dissatisfied with the visual component of their recreation experience.

5.3.11 Cultural Resources

The CIA area for cultural resources is the project area and adjacent areas in southeastern Sweetwater County and southwestern Carbon County. No RFFA's which would disturb cultural resources in the project area are anticipated. Therefore, cumulative impacts to cultural resources would be similar to those described in Section 4.11.

5.3.12 Socioeconomic Resources

The CIA area for socioeconomic conditions includes Sweetwater and Carbon counties, and the communities of Rock Springs, Wamsutter, Rawlins and Baggs. Although Sweetwater and Carbon counties contain an abundance of oil, coal, uranium, trona and other resources, the current potential for cumulative socioeconomic effects in the CIA area is associated with the natural gas development activities listed in Section 5.2.2. Natural gas development has been ongoing for some time in Sweetwater and Carbon counties, but the pace of drilling and field development has recently accelerated in response to anticipated demand. The continued pace and duration of natural gas development in the Sweetwater and Carbon counties and the corresponding level of economic and population growth will depend in large part on future natural gas demand and prices.

Assuming historic (through 2001) cyclic levels of natural gas development, potential cumulative impacts on area socioeconomic conditions would include positive effects on local economic conditions, increased employment opportunities associated with the projects listed in Section 5.2.2, increased demand on housing resources and community services from in-migrating employees and families associated with the projects, and increased federal, state and local tax revenues generated from project infrastructure development and production. Cumulative development in the CIA also holds potential to affect local attitudes, opinions and lifestyles.

As discussed in Section 4.12, the current trend is for gas service firms and their employees to locate in Rock Springs and, to a lesser extent, Rawlins. Population levels in Sweetwater and Carbon counties and the communities of Rock Springs and Rawlins are below their peak population levels of the 1980's. Much of the infrastructure in these communities has been sized to accommodate higher levels of population therefore, significant cumulative impacts on services in these communities would not be anticipated, although strains on particular services could occur.

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

There are existing apartments and underutilized mobile home parks and motels which could serve as temporary accommodations for drilling and field development workers (Rawlins Daily Times 2000).

The communities of Wamsutter and Baggs may receive substantially higher percentages of growth (relative to their size) in response to cumulative natural gas development activities. The Wamsutter area in particular is experiencing population growth in response to British Petroleum's plans to drill approximately 200 wells per year over the next four years and 75 wells per year for the next ten years (Rawlins Daily Times 2000). Anadarko Petroleum also plans to drill 30 wells in the Wamsutter area in 2001 and several other companies have increased their drilling efforts in that area. BLM RFO officials anticipate that up to 300 wells per year could be drilled in the Wamsutter area over the next several years (Rock Springs Rocket Miner 2001b). An influx of oil and gas service workers will be required to achieve these drilling and field development levels.

Wamsutter has recently added some housing resources to accommodate growth from these activities, but area landlords and developers are reluctant to initiate large-scale housing development because of the "boom and bust" history of the town (Carnes 2002, Waldner 2002). Given the limited housing resources in Wamsutter (see Section 3.12.4), natural gas service workers are likely to seek housing accommodations in other communities. If a substantial number of new housing resources become available in Wamsutter, population growth from the Proposed Action or alternatives or from other area natural gas development would exacerbate the existing community services demand in the town.

The proximity of Baggs to the southern gas fields means that the town would receive growth pressure from cumulative natural gas development. As with Wamsutter, few housing resources are currently available in Baggs. If substantial housing is developed in response to cumulative demand, community infrastructure could be strained.

The cumulative economic effects of natural gas development in the CIA would be positive and substantial, for Sweetwater and Carbon counties, the State of Wyoming and the nation as a whole. The cumulative fiscal effects associated with natural gas development in the area would also be substantially positive. Sustained high natural gas prices coupled with increased production would provide substantial severance tax and mineral royalty revenues for the State of Wyoming and substantial property tax revenues for Carbon and Sweetwater counties and certain special districts. Natural gas-related property tax revenues would also flow to school districts, although the mechanisms of the Wyoming School Foundation funding formula may result in little or no net gain in revenues for local schools.

Municipalities receive sales and use tax revenues, but do not receive property tax revenues from natural gas development. The amount of sales and use tax revenues that small communities receive from natural gas development is correspondingly small. Therefore communities such as Wamsutter and Baggs would not have revenues from this source to expand municipal infrastructure in response to cumulative natural gas development-related growth.

The effects of cumulative natural gas development activities on local attitudes, opinions and lifestyles is likely to be mixed. Natural gas development in Sweetwater and Carbon counties would result economic opportunity, with increased employment opportunities and relatively high-paying jobs. Therefore the financial status of many residents of these counties is likely to increase, which would correspondingly increase support for cumulative development activities, particularly among

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

those segments of the community which benefit directly or indirectly from the increased economic activity. However, those residents and area visitors who prefer solitude, isolation and undeveloped vistas are likely to experience heightened levels of dissatisfaction associated with cumulative natural gas development activities. Those whose economic activities and/or lifestyles occupy the same areas as natural gas activities, such as ranchers and recreationists are among those most likely to be dissatisfied. Moreover, if area residents perceive that wildlife habitat and other resources are being degraded by development, levels of satisfaction could become greater and more widespread.

The foregoing cumulative socioeconomic analysis assumes that natural gas development in the CIA area would proceed at historic cyclic levels. Given that substantial infrastructure capacity exists in Rock Springs and Rawlins, substantial increases in the pace of development could occur before most systems would be overburdened, although certain local government services (e.g., road maintenance, emergency response) could be strained if the pace of growth exceeds the flow of revenues for gas projects or if housing becomes available in Wamsutter or Baggs, as discussed above.

Dramatic and sustained increases in natural gas demand and prices brought about by world events, changes in national energy policy or sustained high levels of economic growth could result in corresponding dramatic increases in the pace of development in the CIA area. Given the number of wells authorized in the CIA area, dramatic increases in the pace of development could result in socioeconomic impacts substantially larger than those identified above. It is conceivable that population increases associated with accelerated development could exceed housing resources and community facility and service demand even in large communities such as Rock Springs and Rawlins. In the case of such an extreme scenario, negative community impacts could be avoided or mitigated by the development and implementation of a coordinated impact plan. Natural gas companies would require a substantial period of time to mobilize to achieve large increases in the pace of development. During that time, coordinated impact planning on the part of local, state and federal government and industry could enhance the ability of communities within the CIA area to accommodate growth. Accelerated development would be accompanied by substantial increases in tax revenues, although those revenues could lag needed expenditures for community infrastructure and service improvements by several years. To mitigate this lag in revenues, local, state and federal government and industry would need to develop mechanisms to provide up-front funding for these improvements in anticipation of development.

5.3.13 Transportation

The CIA area for transportation includes the project site and the county roads and state and federal highways which provide access to the site.

Historic and existing traffic within the DFPA includes that associated with grazing uses, recreation and oil and gas exploration. This traffic is considered to be minimal and seasonal in nature. The Proposed Action and alternatives are the only RFFA's within the DFPA; therefore, cumulative transportation impacts within the project area are anticipated to be similar to those attributable to the Proposed Action or alternatives.

County roads which provide access to the DFPA, particularly SCR 23/CCR 701, the Wamsutter/Dad Road, will receive cumulative impacts from oil and gas development. The increased traffic associated with drilling and field development in the CD/WII and Creston/Blue Gap project areas, coupled with those of the Proposed Action or alternatives would accelerate maintenance

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

requirements on the Wamsutter/Dad Road, and increase the potential for accidents. A portion of the substantial tax revenues which would accrue to Sweetwater and Carbon counties from each of these projects could be used to offset costs of increased maintenance and emergency service requirements.

CCR 700 provides access to the southeastern corner of the DFPA and to the South Baggs Natural Gas project area. Because little use of CCR 700 is anticipated by DFPA operators, depending on the location and timing of wells and ancillary facilities in the southeastern portion of the DFPA, cumulative transportation impacts on this road should be minimal.

Traffic increases on I-80 and WYO 789 associated with cumulative natural gas development in southeastern Sweetwater County and southwestern Carbon County would occur. Both highways have capacity to accommodate increases in traffic before deterioration in current levels of service occur (Greisbach 2001). Cumulative increases in the probability of traffic accidents on I-80 would be negligible, given the substantial volumes of traffic already on that highway. Cumulative accident increases on WYO 789 would depend, in part, on the pace of natural gas development.

5.3.14 Health and Safety

The area of analysis for potential cumulative impacts to health and safety is the DFPA. The Proposed Action and alternatives are the only RFFA's anticipated for the project area; therefore, cumulative impacts to health and safety conditions are anticipated be similar to those described for the Proposed Action and alternatives.

5.3.15 Noise

The area for potential cumulative noise impacts is the DFPA and immediately adjacent areas. Existing sound disturbances within the DFPA and immediately adjacent areas are limited to those associated with grazing activities, dispersed recreation, aircraft flights and traffic on area roads and highways. The Proposed Action and alternatives are the only RFFAs in the DFPA that would create additional sound disturbance. Cumulative sound disturbances associated with well drilling and pipeline, road and ancillary facility construction in adjacent fields would similarly be short-term in nature. Therefore, cumulative noise impacts would be similar to those associated with the Proposed Action and alternatives.