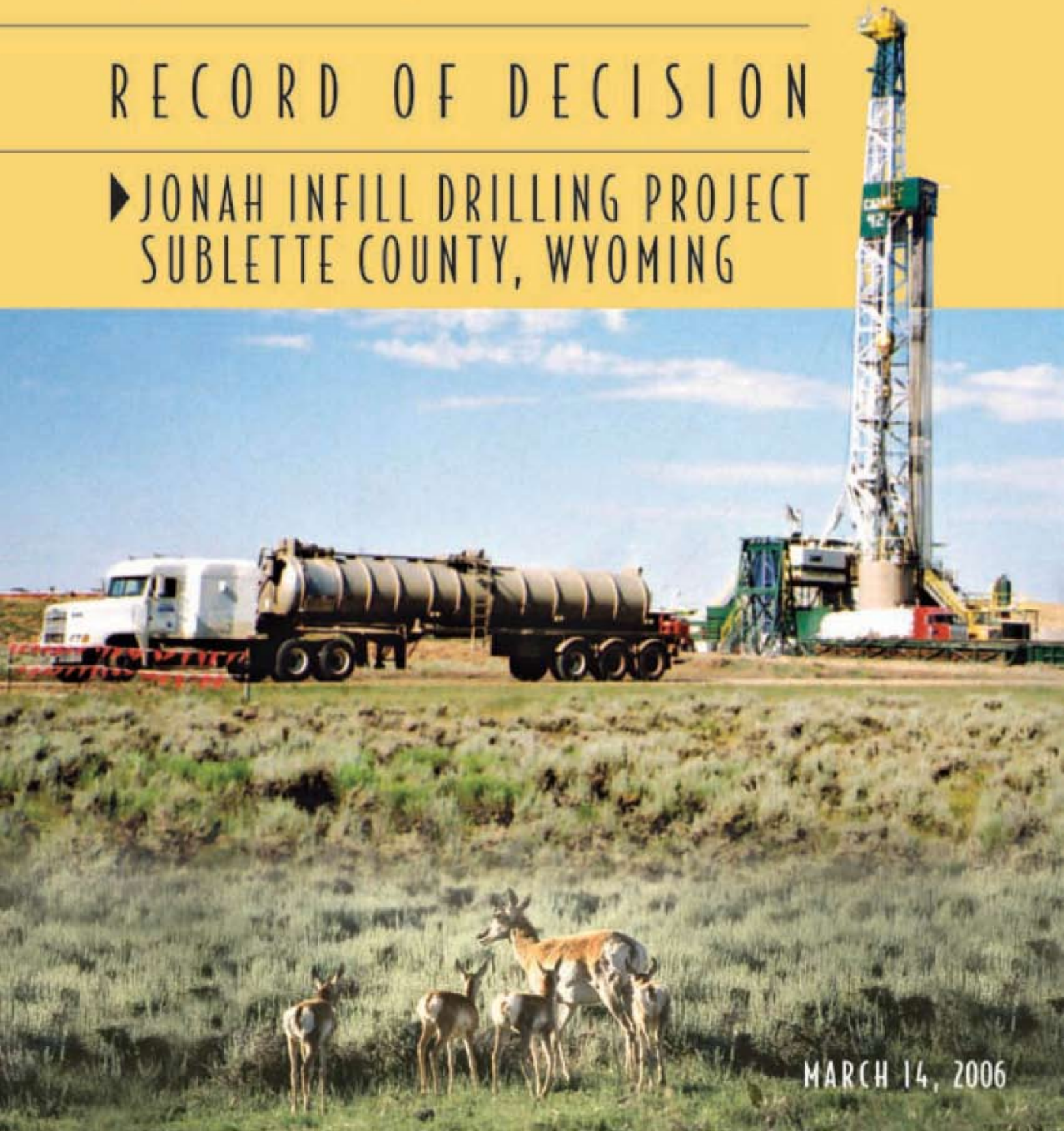
U.S. Department of the Interior

Bureau of Land Management
Pinedale and Rock Springs Field Offices

RECORD OF DECISION

JONAH INFILL DRILLING PROJECT
SUBLETTE COUNTY, WYOMING



MARCH 14, 2006

RECORD OF DECISION
FOR
JONAH INFILL DRILLING PROJECT
ENVIRONMENTAL IMPACT STATEMENT

U.S. Department of the Interior
Bureau of Land Management
Wyoming State Office
Cheyenne, Wyoming

APPROVING OFFICIAL:

Robert A. Bennett — 3/14/06
Date

Robert A. Bennett
Wyoming State Director

TABLE OF CONTENTS

SUMMARY 1

DECISION 1

REASONS FOR THE DECISION 3

MITIGATION MEASURES 8
On-site Requirements 8
Off-site Mitigation 9

PUBLIC INVOLVEMENT 9

SUMMARY OF PROPOSED ACTION AND ALTERNATIVES 11
Alternatives Considered 11
No Action Alternative 11
Proposed Action 11
Alternative A – Minimize Directional Drilling 12
Alternative B – Minimize Surface Disturbance 13
BLM Preferred Alternative 13

ALTERNATIVES CONSIDERED AND ELIMINATED FROM DETAILED STUDY 15
Draft EIS Alternatives Not Carried Forward for Final Analysis 15
Other Alternatives Considered and Eliminated from Detailed Analysis 15

ENVIRONMENTALLY PREFERRED ALTERNATIVE 16

APPEAL PROCESS 17

ERRATA 19

APPENDICES

A. Jonah Infill Drilling Project Administrative Requirements, Conditions of Approval, and Mitigation
B. Operator-Committed Practices
C. Adaptive Management in the Jonah Infill Drilling Project Area
D. U.S. Fish and Wildlife Service Concurrence Letter
E. Summary of Public Comments on the Jonah Infill Drilling Project FEIS and BLM's Responses

List of Figures

1. Jonah Infill Drilling Project Location, Sublette County, Wyoming, 2006. 2

List of Tables

1. EnCana Proposed CM Funding, Jonah Infill Drilling Project, Sublette County, Wyoming, 2006 9

RECORD OF DECISION

for the

Jonah Infill Drilling Project Environmental Impact Statement

Sublette County, Wyoming

SUMMARY

This Record of Decision (ROD) documents the Wyoming State Director's decision to approve, with minor modifications, the preferred alternative as described in the Final Jonah Infill Drilling Project (JIDP)[1] Final Environmental Impact Statement (FEIS). The JIDP FEIS analyzes various options for oil and gas recovery and resource mitigation. The decision emphasizes limiting additional surface disturbance and performing interim reclamation and off-site mitigation, performance-based outcomes for reducing impacts to air quality, cooperative air quality monitoring with the State of Wyoming, and continued resource monitoring and consultation with federal and state agencies. The ROD provides the plan for future management of the federal surface and mineral estate in the Jonah Infill Drilling Project Area (JIDPA). The JIDPA comprises approximately 30,500 acres, of which 28,580 acres is federal surface and mineral estate (94%), 1,280 acres is state surface and mineral estate (4%), and 640 acres is private surface/federal mineral (2%) estate. Figure 1 shows the location of the JIDPA. The findings in the JIDP FEIS and decisions of this ROD are based upon an open and collaborative public process. The State of Wyoming, Sublette County, individuals, stakeholders, and institutions shared their knowledge and insights about the proposed oil and gas field development with the Bureau of Land Management (BLM). Public involvement was solicited, and the BLM responses to major issues from public comments on the FEIS are presented in Appendix E.

The JIDP is consistent with the President's National Energy Policy and the Energy Policy Act of 2005 by increasing domestic energy supply and helping to reduce the country's dependence on foreign sources of oil and gas. The final project plan as described in the JIDP FEIS was recently cited by the U.S. Environmental Protection Agency (EPA) as a "model of collaboration" that successfully balances "provid[ing] greatly needed energy resources…while protecting the environment of southwestern Wyoming." The proposed project is expected to produce nearly 8 trillion cubic feet (TCF) of natural gas, providing enough natural gas to heat 96 million homes for one year and generating approximately $6.1 billion in royalties to be divided between the federal treasury and the State of Wyoming.

DECISION

The BLM adopts the *Preferred Alternative* (with modifications) for infill drilling of the JIDPA, as described in the FEIS. The Preferred Alternative involves year-round drilling of approximately 3,100 additional oil and gas wells within the existing JIDPA to recover additional energy resources while limiting the total surface disturbance within the JIDPA to 46% of the area, or a maximum of 14,030 acres, at any given time. Operators will be required to begin reclamation as soon as disturbed areas are no longer

[1] The Jonah Infill Drilling Project is the proposal of EnCana Oil & Gas (USA), Inc., BP America Production Company, and other companies (hereafter referred to as "Operators").

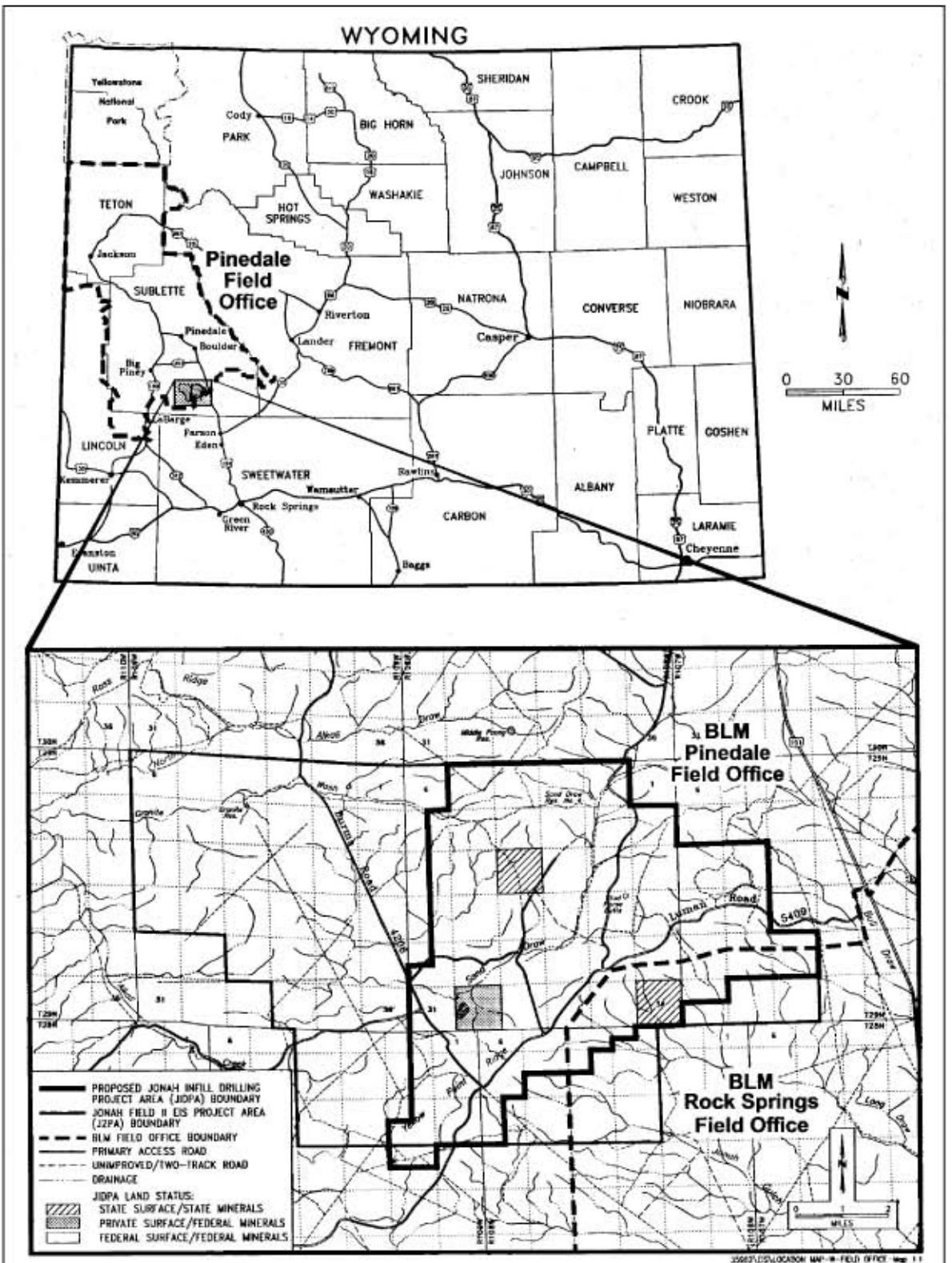


Figure 1. Jonah Infill Drilling Project Location, Sublette County, Wyoming, 2006.

needed for drilling activities. Final reclamation will be conducted as soon as sites are no longer needed for production activities. When reclaimed areas meet the objectives in FEIS Appendix B, reclaimed acres will be credited back against the total disturbed acres, up to 6,304 acres. The cumulative total disturbed area cannot exceed 20,334 acres in the JIDPA. Surface disturbance and reclamation credit will be prorated and tracked on an operated-acreage basis (i.e., leases developed by specific Operators; see Appendix A). Non-project related disturbance within the JIDPA boundaries will be allocated to Operators on an operated-acreage percentage basis.

Desired future conditions and resource management objectives will be achieved through performance-based mitigation and implementation of best management practices (BMPs). The objectives address key issues and significant impacts identified through the environmental analyses. Monitoring and surveying will determine if objectives and desired future conditions are being met.

This decision establishes the Jonah Interagency Monitoring and Mitigation Office (JIO). The objective of the JIO is to evaluate the effectiveness of guidelines, mitigation, BMPs, and monitoring. The JIO will make recommendations to the BLM on modifications to proposed projects and mitigation based on its evaluations. The BLM will use these recommendations in consultation with state and federal agencies to adapt management decisions.

This decision is consistent with both the Pinedale Resource Management Plan (RMP) and Green River RMP. This decision is not the final review or approval for actions associated with the JIDP. The Authorized Officer will review and authorize each component of the project that involves disturbance of federal lands on a site-specific basis. The methods used to evaluate and authorize each surface-disturbing activity include, but are not limited to, an Application for Permit to Drill (APD), right-of-way (ROW) grant, Sundry Notice, or Special Use Permit with the supporting environmental review.

REASONS FOR THE DECISION

The JIDP EIS was prepared in response to leaseholders' requests to exercise the terms and conditions of their respective oil and gas leases in the project area. The environmental impacts of this decision are fully disclosed in the Draft and Final EISs for the project. The decision to approve the JIDP as described in the Preferred Alternative is in conformance with the BLM land use plans for the Pinedale and Rock Springs Field Offices covering the JIDPA.

The decisions included in this ROD ensure the effective recovery of the oil and gas resource within the JIDPA. Performance-based mitigation and BMPs ensure desired future resource conditions will be achieved. Implementation of this decision will result in production of nationally significant oil and natural gas resources consistent with The National Energy Policy (May 2001). Although the proposed development requires intensive surface-disturbing activities that will result in significant impacts to resource values, including displacement and/or local extirpation of wildlife resources, long-term reestablishment of habitat value and function will occur through the proposed reclamation practices and monitoring efforts. While the intensive development will limit opportunities for other uses for many years, the long-term outcome will be full reclamation and the return of these lands to near prior existing conditions for other use opportunities in the future. In addition to the onsite mitigation, the BLM will require off-site mitigation as proposed by the project proponent, EnCana Oil & Gas (USA), Inc.

In reaching this decision, the following key issues were considered. Rationale for mitigation and actions to address each issue and reduce effects are presented.

Surface Disturbance. The total area and distribution of surface disturbance associated with further development of the JIDPA affects other resources (soils, vegetation, wildlife and wildlife habitat, cultural resources). The extent and duration of surface disturbance can adversely affect management of these resources.

- To minimize surface disturbance impacts, the Preferred Alternative employs outcome-based performance objectives and encourages development and implementation of state-of-the-art technologies for both operational and reclamation activities.

- Soil erosion and salinity transport modeling predicted no sedimentation or salinity reaching the Green or New Fork Rivers, though multiple repeated runoff events could affect these waterways. Accelerated reclamation, intensive monitoring, and use of sediment control structures will further minimize impacts. Managing surface disturbance on a field-wide basis and requiring successful interim reclamation in exchange for allowing additional disturbance provides a strong incentive for Operators to employ new technologies to reduce their operational footprint and accelerate the reclamation process to reach their total oil and gas resource recovery objectives. Reducing the operational footprint will create less overall disturbance, while accelerated reclamation will ensure vegetation is reestablished in the shortest time possible. The surface disturbance management philosophy of smaller operational footprints and accelerated reclamation efforts also benefit wildlife by limiting habitat fragmentation and returning habitat function in the shortest possible time.

- Surface disturbance impacts on cultural resource are mitigated through avoidance and, where avoidance is not possible, by recovery actions on a site-specific basis. Additionally, a programmatic agreement between the BLM, State Historic Preservation Office, and Operators is being pursued to further reduce the overall potential for impacts to cultural resources.

Socioeconomic Effects. Another issue of concern is the influx of transient workers (those workers not maintaining permanent residence) and the ability of governmental agencies to address infrastructure shortfalls such as community support facilities, hospitals and medical clinics, emergency services, housing, and roads. Gas field employees express the desire to maintain permanent residence in the area, but are concerned about continued employment opportunities in the JIDPA. Both the project proponents and local government agencies identify potential revenues from tax dollars, royalties, and jobs associated with the proposed project as benefits to the state, county, and local communities.

- The FEIS and Socioeconomic Analysis Technical Support Document contain extensive analysis of potential socioeconomic impacts. To assist local government agencies in planning, Operators will annually provide 3-year field development forecasts to the BLM. These forecasts will be made available to local government agencies to assist in local community/county/state planning efforts.

Air Quality. Ogoing and future natural gas development projects in the region are contributing to observed changes in air quality and negatively impacting the nearby Class I wilderness airsheds. Also of concern are the potential health effects on worker and area residents, the potential for excessive acid deposition, the potential impacts to nighttime stargazing, and BLM's authority for requiring air quality mitigation.

- These concerns have been extensively analyzed through air quality modeling in cooperation with the U.S. Environmental Protection Agency (EPA), Wyoming Department of Environmental Quality–Air Quality Division (WDEQ–AQD) and USDA Forest Service (USFS).

- Modeling predicts no significant impacts to public health for the air quality pollutants modeled. Worker health falls within the purview of the Occupational Safety and Health Administration.

- WDEQ is the regulatory authority to maintain and monitor compliance with state and federal air quality public health standards. BLM will continue to work in consultation with WDEQ, EPA, and the USFS to monitor air quality for public health, including ozone monitoring.

- Both modeled and monitored atmospheric deposition is within levels of acceptable change, and no significant impacts to lake chemistry from the JIDP are anticipated. Mitigation measures designed to reduce potential visibility impacts are anticipated to also reduce impacts to lake chemistry and atmospheric deposition.

- The modeling indicated potential significant adverse visibility impacts in various Class 1 areas using a reasonable-but-conservative scenario. To address this issue, the BLM, WDEQ, EPA, and USFS jointly developed performance-based mitigation requirements (see Appendix A).

- Mitigation measures designed to reduce potential visibility impacts are anticipated to also reduce impacts to stargazing.

Wildlife. Wildlife issues focus on three areas: sage-grouse impacts, pronghorn migration corridors, and habitat impacts. Overall wildlife impact strategy is discussed below, followed by a specific discussion of each of the three issues.

- After federal decisions authorizing the current level of Jonah Field development (16 well pads per section, or 40-acre spacing), the Wyoming Game and Fish Department (WGFD) issued a guidance document for oil and gas development impacts to wildlife (*Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats, December 6, 2004*). Using the definitions in this guidance, the current state of development in the Jonah Field had already reached a threshold (oil and gas development at levels greater than four well pads per 640-acre section [160-acre spacing]). The WGFD report recommends off-site mitigation to address impacts when this threshold is exceeded.

- To address the cumulative impacts within the JIDPA, this decision implements three strategies; 1) return field habitat function in the shortest time possible, 2) perform on-site mitigation to the extent practicable and employ compensatory (off-site) mitigation (CM) when complete on-site mitigation is not effective in the short-term, and 3) institute an adaptive management process to ensure monitoring and both on- and off-site mitigation are effective.

- To return habitat function as soon as possible, this decision implements a management approach that provides an incentive for rapid on-site interim and final reclamation while simultaneously allowing maximum flexibility in field development. The Operators will establish a fund for CM as part of their operation. This fund will be administered by the Jonah Interagency Monitoring and Mitigation Office (JIO) established by this ROD (see Appendix C). The JIO will evaluate monitoring and mitigation effectiveness and provide annual adaptive management recommendations as appropriate to the BLM for consideration. WGFD and the Governor of Wyoming have coordinated on these strategies.

- Sage-Grouse Impacts. Effects to this species and its habitats are an issue because of the decline from historic population levels of sage-grouse in the JIDPA and the decline in overall populations

across their range. Potential project effects to breeding, nesting, brood-rearing, and wintering habitat and habitat function were identified as potentially contributing to continued population declines. It was also noted that existing sage-grouse protection measures appear to be inadequate within the JIDPA and with the proposed increase in development, existing protection measures would be even less effective.

- The FEIS analysis disclosed the impacts from the current and alternative levels of disturbance, and recognized that the local population will likely be completely displaced and/or locally extirpated due to full field development. However, this is not anticipated to affect long-term species sustainability due to the relatively small size of the JIDPA in relation to overall habitat availability in the area. For example, the Yellowpoint lek complex (which includes the JIDPA) has seen a 25% reduction in male lek attendance compared to long-term averages, while the nearby Speedway lek complex (outside the JIDPA) has observed a 48% increase in male lek attendance. Additionally, substantial off-site CM directed at sage-grouse habitat improvements will be employed to further mitigate impacts.

- Pronghorn Migration Corridor. Sublette pronghorn herd migrations are affected by current oil and gas development. Continued development within the JIDPA and at other locations within the Sublette Herd Unit area will cumulatively affect pronghorn seasonal migrations. Hunters, wildlife enthusiasts, and wildlife management agencies all consider the maintenance of existing migratory corridors extremely important to pronghorn population maintenance.

  - The FEIS analysis disclosed that these impacts will likely affect traditional pronghorn utilization of the JIDPA on a long-term basis. As with sage-grouse, the selected action is not anticipated to affect overall species sustainability due to the project's small footprint and availability of suitable alternative habitat surrounding the JIDPA that provides adequate opportunity for animal displacement. Also, CM will be employed to implement appropriate projects, such as habitat improvement, to further mitigate impacts.

Wildlife Habitat. Respondents indicated that, with implementation of the proposed project, the JIDPA would no longer be suitable habitat for many wildlife species (e.g., threatened and endangered species, BLM-sensitive species, and raptors). Habitat loss was attributed to direct loss through surface disturbance, indirect loss through animal avoidance of areas proximal to developments, and habitat fragmentation (habitat is no longer suitable for species requiring intact habitat patches larger than what would be available if the project were constructed).

- The FEIS acknowledged that habitat impacts would be substantial due to full field development. The mitigation strategy for limiting the allowable surface disturbance is designed to ensure accelerated reclamation by the Operators and to facilitate the long-term return of habitat function. Compensatory mitigation, committed to by the Operators and accepted by the BLM as a condition of approval, should result in significant improvements to existing habitats and/or development of additional suitable habitats used by the affected species. The off-site mitigation will remain in place and offset some of the on-site impacts until such time as final reclamation of the full field development impacts occurs.

Maximize Natural Gas Recovery. The BLM was perceived as not responding to its mandate under the Mineral Leasing Act to maximize recovery of available oil and gas resources. Existing and proposed development restrictions (lease stipulations, RMP requirements, and Operator-committed practices) limit the economic feasibility of maximizing recovery of the JIDPA's natural gas resources.

- Under the Preferred Alternative, Operators will be able to achieve their proposed level of development over time, but must meet interim reclamation goals to reach these objectives. The BLM believes this approach provides a good balance between oil and gas recovery and resource protection and provides for long-term reclamation and re-establishment of native vegetation and wildlife communities.

Range/Grazing. Concerns for livestock operations in the JIDPA include direct loss of livestock forage; the potential for a reduction in permitted livestock numbers; water quality impairment at existing livestock watering sources; livestock movement restrictions/alterations due to pipeline trenches, roads, and fences; livestock management problems associated with the inability to access required area two-track routes from project-developed crowned-and-ditched roads; vehicle collisions; drinking contaminated waters from project pits; entrapment in pipeline trenches; and the increase in fugitive dust emissions potentially causing dust-induced pneumonia.

- Though the project results in the temporary and potentially long-term loss of available livestock forage (depending on the results of the Preferred Alternative's reclamation requirements), any loss of animal unit months will be determined through rangeland monitoring and, if necessary, addressed through the adaptive management process. As discussed in the FEIS, the effect(s) of other potential impacts (e.g., traffic, roads, open trenches, etc.) on grazing operations cannot be accurately predicted at this time, but it is reasonable to assume some conflicts may occur. Mitigation and/or solutions to such conflicts will also be addressed as they arise.

BLM Monitoring/Enforcement Capability. Concern was expressed that BLM would focus on drilling approvals and neglect monitoring, compliance, and resource protection responsibilities. It was suggested this may lead to undetected violations of numerous laws, rules, and regulations (e.g., Endangered Species Act, Clean Water Act, lease stipulations, RMP requirements, Operator-committed practices required under past project authorizations).

- BLM's monitoring and enforcement procedures for oil and gas exploration and development occur in three separate phases: 1) application review and processing, 2) compliance, and 3) long-term monitoring of mitigation effectiveness.

  APD processing includes review of the surface-disturbing activity application and on-site inspection of proposed locations. Resource specialists manage the various aspects of this process and ensure NEPA analyses, on-site visits, site-specific conditions of approval (COAs), and mitigation requirements are appropriate. Sufficient personnel are available to meet requirements.

  APD compliance includes inspection of road, well pad, and pipeline construction by BLM Natural Resource Specialists (NRSs) and/or Surface Compliance Specialists (SCSs) to ensure the construction complies with requirements of the surface use plan in the APD, site-specific and programmatic NEPA documentation, and the guiding land use plan. NRSs and SCSs also monitor post-drilling (interim) reclamation processes to ensure the site is adequately stabilized and habitat restoration is initiated in accordance with this ROD. APD compliance also includes rigging-up, drilling, and case-setting operations, which are randomly monitored by BLM Petroleum Engineering Technicians to ensure required safety features such as blow-out preventers operate properly and the surface casing is properly cemented to protect fresh groundwater zones.

  Long-term resource monitoring includes evaluation of the effectiveness of both on-site and off-site mitigation/reclamation to ensure the objectives of this ROD are met. The Jonah Interagency

Monitoring and Mitigation Office (JIO) was established to address these issues (see Appendix C). As an interagency office, the JIO staff (WGFD, WDEQ, Wyoming Department of Agriculture, and BLM) will have the authority to address a wide range of pertinent monitoring, mitigation, and/or compliance issues. This office will also provide the BLM with adaptive management recommendations to established procedures when existing data indicates changes are required.

One of the major concerns expressed during this analysis process by both the public and various agencies was the inability to mitigate all potential impacts in the JIDPA on-site (within the JIDPA boundaries). In response to this concern, the Operators voluntarily proffered varying levels of CM to provide a means to complete off-site mitigation that may be necessary due to the level of development authorized. Additionally, a portion of these funds will be used to establish and operate the JIO to provide project-specific monitoring and mitigation (both on- and off-site). The JIO also provides a means to ensure project monitoring and mitigation requirements are fulfilled and BLM receives relevant adaptive management recommendations periodically.

The Preferred Alternative meets one of the primary goals of the President's National Energy Policy and the Energy Policy Act of 2005, to increase domestic energy supplies and reduce the United States' dependence on foreign sources of energy. Development of these federal resources satisfies requirements of FLPMA and the Mineral Leasing Act. The leasing and subsequent production of federal oil and gas resources provides the United States, the State of Wyoming, and affected local counties with income in the form of lease royalty payments. The Preferred Alternative meets the goals of the National Energy Policy and achieves the objectives of the federal oil and gas leasing programs managed by the BLM.

This decision is made in full consideration of the public, local, state, and other federal agency input. No substantial issues remain unresolved within the scope of this proposal, as raised by government agencies, industry, groups, or individuals.

MITIGATION MEASURES

Implementation of the Jonah Infill Drilling Project will be subject to numerous mitigation measures applicable to both on-site and off-site actions. These measures are addressed in two sections, on-site requirements and off-site requirements, each of which is described below.

On-Site Requirements

On-site administrative requirements, COAs, and mitigation requirements are used to guide field development activities to compensate for, resolve, minimize, or avoid impacts to resources. Appendix A presents administrative requirements, performance-based objectives, and potential mitigation measures to be applied when supported by site-specific environmental review. Operator-committed practices, which become mandatory requirements with publication of this decision, are included in Appendix B.

Field development plans contained in Appendix B of the FEIS are also incorporated in this decision, as modified in the Errata section of this ROD. These development plans include a Transportation Plan, Reclamation Plan, and a Hazardous Materials Management Summary.

Off-Site Mitigation

Off-site or compensatory mitigation (CM) is necessary to mitigate some impacts that cannot be adequately mitigated on site. Impacts to wildlife from implementing the Preferred Alternative cannot be adequately mitigated on site. Recognizing this fact, EnCana, and potentially other Operators, committed to fund varying levels of CM depending on the amount of new surface disturbance authorized in this decision. These funding levels are included in Table 1 below for the five developments scenarios provided for in the EnCana commitment letter.

Table 1. EnCana Proposed CM Funding, Jonah Infill Drilling Project, Sublette County, Wyoming, 2006

Amount of Additional Surface Disturbance Authorized in the Jonah Drilling Project ROD	Funding Distribution		Total
	Offsite Wildlife Habitat Improvement Projects	Other Monitoring, Inspection, and Enforcement Activities	
16,200 or Greater Acres New Initial Surface Disturbance	$20.5 million	$8 million	$28.5 million
Between 12,000 and 16,199 Acres New Initial Surface Disturbance	$16.5 million	$8 million	$24.5 million
Between 11,000 and 11,999 Acres New Initial Surface Disturbance	$13.5 million	$6.2 million	$19.7 million
Between 10,000 and 10,999 Acres New Initial Surface Disturbance	$7.5 million	$4.6 million	$12.1 million
Between 8,300 and 9,999 Acres New Initial Surface Disturbance	$1.5 million	$4 million	$5.5 million

The Preferred Alternative permits a total cumulative new surface disturbance of 16,125 acres. This equates to a total commitment of $24.5 million in CM funding, to be provided as requested by the JIO Charter Members annually in increments not to exceed 20% of the total CM fund per year. These funds will be applied to off-site mitigation projects and managed by the JIO, with oversight by the Agency Managers Committee (see FEIS, Appendix F). In the event CM proffered funds are withheld, further surface disturbance allowed under this decision would not be authorized.

Project proposals will be accepted from a variety of sources: federal, state or local government agencies, educational institutions, interest groups, or individuals. Initial project selection will be by the JIO, with final approval by the BLM. Approved projects will be implemented and managed by the JIO.

PUBLIC INVOLVEMENT

In September 2002, EnCana Oil & Gas (USA), Inc. (EnCana) dba McMurray Oil Company, BP America (BP), and other natural gas operators, collectively known as the Operators, submitted a proposal to the BLM to further develop the Jonah Field by "infill" drilling natural gas wells in well spacing that would be more dense than what had been previously approved.

On March 13, 2003, the BLM's Notice of Intent (NOI) appeared in the *Federal Register* and invited the public to comment or provide research information regarding the Operators' proposal to infill drill in the Jonah natural gas field. On March 26, 2003, copies of a scoping notice describing the Proposed Action and seeking comments were mailed to appropriate government offices, elected officials, public land users, groups, newspapers, and radio and television stations. A scoping meeting was held in Pinedale, Wyoming, on April 17, 2003. An additional public meeting was held on November 13, 2003, to present to the public the draft project alternatives that had been developed for analysis in the EIS to address public concerns. On November 20, 2003, EnCana and BP jointly submitted to the BLM a revised development proposal. The Operators' proposed revised development had evolved from the proposed activities described in the March 2003 NOI.

On December 12, 2003, the BLM notified scoping participants of the Operator-proposed development plan revisions and solicited further comment. BLM's letter describing the Operators' revised proposal provided the public with a 30-day review and comment period.

Numerous issues and concerns were identified in comments received by BLM. All comments received between March 2003 and August 2004 were reviewed and analyzed. The BLM identified nine key issues based primarily upon the assumed quantity, intensity, or duration of a potential impact, and/or the level of interest in the issue. These issues were used to develop the range of alternatives analyzed in the draft environmental impact statement (DEIS).

The DEIS, including technical support documents for air quality and socioeconomics, was released to the public and a notice of availability (NOA) was published in the *Federal Register* on February 11, 2005. All documents were available in paper and electronic formats (CD-ROM), as well as being available for download from the BLM's website. The comment period ended April 12, 2005.

After publication of the DEIS, BLM determined the air quality modeling and analysis in the DEIS was inadequate to evaluate impacts. Analysis in the *Questar Year-Round Drilling Proposal Environmental Assessment* (November 2004) showed emission levels of certain pollutants within the regional airshed had increased significantly since the original DEIS data had been compiled.

The BLM in cooperation with other federal and state governments with jurisdiction determined that supplemental air quality modeling and analysis would be conducted, an air quality technical support document supplement would be published, and the results of these studies would be incorporated into the final environmental impact statement (FEIS). On April 12, 2005 BLM published its NOI in the *Federal Register* to provide supplemental air quality information for the DEIS. The supplemental air quality information became available for public review and comment in August 2005, and BLM published an NOA in the *Federal Register* and provided the public with an additional 60-day comment period.

BLM received a total of 877 separate written comment submissions (letters, e-mails, forms, etc.) on the DEIS, TSDs, and the August 2005 supplements. Within these submissions, 1,147 individual comments were identified as "substantive," or meaningful to revision of the DEIS and/or its supporting volumes. BLM responded to each of these substantive comments, which were used to guide revision of the DEIS analyses. The substantive comments resulted in BLM's decision to significantly revise the Preferred Alternative and to eliminate five of the alternatives presented in the DEIS from further consideration in the FEIS. A detailed description of the comments made on the DEIS and the process by which they were analyzed by BLM was included with the FEIS.

The FEIS was released to the public and an NOA published in the *Federal Register* on January 13, 2006. Comments were accepted on the FEIS through February 13, 2006. A total of 45 public comments were received. A summary of these comments and BLM's responses are contained in Appendix E of this ROD.

SUMMARY OF PROPOSED ACTION AND ALTERNATIVES

Alternatives Considered

The Jonah Infill Drilling Project FEIS analyzed five alternatives. They are:

1. No Action
2. Proposed Action
3. Alternative A: Minimize Directional Drilling
4. Alternative B: Minimize Surface Disturbance
5. Preferred Alternative

No Action Alternative

Under the No Action Alternative, the BLM would reject the Operators' proposal for additional field-level natural gas development on federal lands within the JIDPA. Authorizations for and impacts from previously approved or analyzed development (533 wells) and surface disturbance (497 well pads with associated roads, pipelines, and ancillary facilities) would continue. The approved surface disturbance under the No Action Alternative is 4,209 acres, including 1,409 acres of life of project (LOP) disturbance. LOP is estimated to be approximately 63 years.

However, rejection of the Operators' proposal would not preclude all additional natural gas development in the JIDPA. The No Action Alternative assumes the JIDPA would be managed as approved by existing management plans and previously approved NEPA documents. Though the extent of potential future development under this scenario is limited, it cannot be precisely predicted. Therefore, the impact analysis for the No Action Alternative assumes no new development.

The No Action Alternative serves as a benchmark enabling decision-makers and the public to compare the magnitude of environmental consequences across action alternatives.

Proposed Action

The Operators would infill drill and develop up to 3,100 new wells on a minimum of 64 well pads/section (at least 1 pad every 10 acres) with related roads, pipelines, and ancillary facilities on up to 16,200 acres of new disturbance. Drilling would begin upon issue of the ROD and continue until the total number of proposed wells has been drilled, the natural gas resources in the field have been fully developed, or economic conditions are such that it is no longer profitable to drill additional wells.

Operator reservoir modeling shows that 3,100 new wells would be necessary to adequately recover the natural gas resource present in the area. Their experience indicates that the use of directional drilling is in some cases not economically feasible and in other cases results in inadequate resource recovery.

The Proposed Action assumes that 250 wells would be developed annually (~20 rigs operating year-round). LOP would be approximately 76 years. Specific features include:

- up to 3,100 new wells on up to 11,780 acres of new disturbance (2,790 acres LOP)—assumes all 3,100 wells would be drilled from single-well pads with an estimated total disturbance of 3.8 acres and 0.9 acre LOP per single well pad;
- 465 miles of new resource roads with gathering pipelines—4,131 acres new disturbance (1,635 acres LOP);
- 8 miles of new collector/local roads—73 acres new disturbance (37 acres LOP);
- an upgrade of approximately 12 miles of the Burma Road—75 acres new disturbance (20 acres LOP);
- ancillary facilities—41 acres new disturbance (41 acres LOP) for water disposal, storage, and compressor station facilities; and
- exploration activities—100 acres new disturbance (100 acres LOP) to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool.

Following successful interim reclamation (post-drilling during production phase), LOP surface disturbance under the Proposed Action would be 6,040 acres, which includes 1,409 acres of existing disturbance.

Additionally, Operators identified a number of mitigation/development practices they would commit to in advance (see Appendix B), as well as $28.5 million in compensatory (off-site) mitigation (CM) funding.

Alternative A – Minimize Directional Drilling

Alternative A is similar to the Proposed Action in its estimated surface disturbance requirements (16,200 acres), development rate (250 wells per year) and LOP (76 years), but differs in that known areas with sensitive resources in the JIDPA would not be avoided (e.g., Sand Draw, steep slopes, raptor nest and sage grouse lek buffers). Development of natural gas resources beneath these areas would therefore not require the use of directional drilling, resulting in increased recovery of the resources by ~250 billion cubic feet over the LOP. This alternative would not necessarily provide for the RMP-required balance between gas recovery and other resource protection; therefore, project authorization under this alternative would require an RMP amendment. Other features of Alternative A include:

- Well pads, access roads, and other aboveground facilities could be located within 825 feet of active raptor nests.
- Surface disturbance and occupancy would not be prohibited within 0.25 mile of the perimeter of greater sage-grouse leks.
- Prairie dog towns would not be avoided

- The Sand Draw Conditional Surface Use restriction (formerly referred to as a No Surface Occupancy restriction) and other drainage and steep slope avoidance areas would not be maintained.

Operators committed to a number of mitigation/development practices in advance (see Appendix B) and $28.5 million in CM funding under this alternative.

Alternative B – Minimize Surface Disturbance

Surface disturbance would be reduced under Alternative B by requiring all new wells be drilled from existing well pads. Existing well pads would be enlarged and new pipelines built within existing pipeline corridors. A rate of development of 75 wells per year and an LOP of 105 years are assumed under Alternative B. Specific features include:

- expansion of existing well pads—3,081 acres new disturbance (1,044 acres LOP)— 6.2 acres new disturbance (3.0 acres LOP) per well pad expansion;

- ancillary facilities—41 acres new disturbance (41 acres LOP) for water disposal, storage, and compressor station facilities; and

- exploration activities—100 acres new disturbance (100 acres LOP) to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool.

Following successful interim reclamation, LOP surface disturbance under Alternative B would total 2,622 acres, which includes 1,409 acres of existing disturbance.

Although directional drilling under Alternative B would minimize surface disturbance and thereby benefit wildlife and other resources, it would also increase air emissions by approximately 20% over the Proposed Action and Alternative A by extending the amount of drilling time per well. Thus, Alternative B could have a greater cumulative impact on air quality resources. Additionally, Alternative B results in significantly lower oil and gas recovery rates in relation to the Proposed Action or Preferred Alternative (~1.8 trillion cubic feet of natural gas and 18 million barrels of oil).

Operator-committed practices contained in Appendix B would also apply, though no CM funding was volunteered for this level of development.

BLM Preferred Alternative

BLM revised the Preferred Alternative based on public comment and technical information received on the DEIS. The revised Preferred Alternative, and its associated outcome-based performance objectives, mitigation, and Best Management Practices (BMPs), would achieve high levels of natural gas recovery (potentially that of the Proposed Action) while minimizing impacts related to the key issues. BLM has concluded that this management approach would achieve the fewest long-term impacts while allowing recovery of the mineral resource as provided by federal laws and regulations, including FLPMA, and extant leasing stipulations.

The Preferred Alternative would limit total surface disturbance at any given time to 46% of the JIDPA, or a maximum of 14,030 acres. To mitigate surface disturbance and associated environmental impacts as quickly as possible, Operators would be required to initiate reclamation of developed well pads and road and pipeline construction ROWs pursuant to Reclamation Plan specifications (see FEIS, Appendix B). Credit would thereafter be given, on an acre-for-acre basis for areas the BLM determines have successfully been reclaimed. Under no circumstances would cumulative total surface disturbance exceed 20,334 acres over the LOP. Surface disturbance and reclamation credit will be tracked on an operated-acreage basis. Non-project related disturbance within the JIDPA boundaries will be allocated to Operators on a field-wide operated-acreage percentage basis.

For the purposes of analysis, a total of 3,100 new wells and a pace of 250 wells drilled per year are assumed, resulting in the field development phase being completed in approximately 13 years. However, the actual pace of development may be limited by air quality impact restrictions and associated mitigation, which creates the potential to increase the duration of the field development phase. For the purposes of analysis the LOP is assumed to be 76 years.

Additional provisions of the Preferred Alternative are as follows:

- An interagency mitigation and monitoring implementation group, called the Jonah Interagency Mitigation and Reclamation Office (JIO), would be established and begin working once the ROD is issued. Details of JIO composition, objectives, and operating procedures are provided in Appendix C. General provisions of the JIO are as follows:
    - Oversee implementation of mitigation and monitoring of JIDP activities, including compensatory mitigation.
    - The JIO would include BLM, WDEQ, WGFD, and the Wyoming Department of Agriculture.
    - Funding for the JIO would be provided by the Operators.
    - BLM would consider periodic JIO adaptive management recommendations to adjust COAs, monitoring, mitigation, and/or BMPs to meet field development and production objectives throughout the LOP.
- The existing Wildlife Monitoring/Protection Plan developed for the Modified Jonah II Project would be modified/updated to address activities within the JIDPA.
- To reduce potential wildlife impacts, no further improvements to the Burma Road would be authorized. That portion of the Burma Road that is currently upgraded would be maintained to BLM standards.

Following successful interim reclamation and assuming the application of the maximum reclamation credit (6,304 acres), LOP surface disturbance under the BLM Preferred Alternative would total 6,020 acres, which includes 1,409 acres of existing long-term disturbance.

Operator-committed practices as described in Appendix B would be required as COAs where appropriate. Operators would fund compensatory mitigation equal to $24.5 million based on the authorized level of new surface disturbance (16,125 acres; see Table 1).

ALTERNATIVES CONSIDERED AND ELIMINATED FROM DETAILED STUDY

Draft EIS Alternatives Not Carried Forward for Final Analysis

Of the 10 alternatives that were analyzed in detail in the Draft Environmental Impact Statement (DEIS), five of these alternatives—Alternatives C, D, E, F, and G—were not carried forward for final analysis in the FEIS. Additionally, multiple well development rates within any single alternative were not further analyzed. A description of these alternatives and development rates follows.

Alternatives C and D provided different limits to restrict well numbers and were initially considered in the DEIS to provide a range of impacts to air quality. Alternative C proposed limiting development to 1,250 new wells and well pads and an estimated surface disturbance of 6,705 acres. Alternative D would have limited the number of new wells and well pads to 2,200 and an estimated surface disturbance of 11,581 acres. Neither Alternative C nor Alternative D limited well or well pad surface density. These two alternatives were eliminated from additional analysis because neither alternative is considered reasonable: at least 3,100 additional wells would be required to fully develop the field and anything less would result in stranded resources that would most likely never be recovered. Allowing mineral resources to remain unrecovered, as would occur under these and similar alternatives, would result in waste and prevent BLM from achieving its statutory and policy goals. In addition to not fully recovering the resource, Alternatives C and D would result in impacts similar to those resulting from components of the alternatives that are carried forward in this FEIS. Specifically, these components are individual wells from closely spaced well pads under Alternative A, multiple wells from a single well pad as analyzed in Alternative B, and a combination of single and multiple well pads as analyzed under the Preferred Alternative.

Alternatives E, F, and G provided variable surface well pad spacing allowances, and were initially considered to provide a range in the amount and distribution of surface disturbance across the JIDPA. Alternative E examined drilling and developing 16 wells from 16 well pads in a section, resulting in approximately 6,386 acres of additional disturbance. Alternative F analyzed the effects of increasing the well pad density to 32 well pads per section for a total of 10,446 acres of additional disturbance. Finally, Alternative G examined the effects of 64 well pads per section (one well pad for every 10 acres) at an estimated total additional disturbance of 13,898 acres. As with Alternatives C and D, these alternatives were eliminated from further consideration in the FEIS because the anticipated impacts from the alternative actions would be similar to those resulting from components of the alternatives that are carried forward for additional analysis in this FEIS.

Alternate paces of development within each alternative were eliminated from further analyses in this FEIS because it was determined that providing this information within each alternative introduced a level of complexity which made it difficult for the public and decision-makers to assess potential impacts across the full range of alternatives. Two development rates (250 and 75 wells drilled per year) are carried forward as parts of specific alternatives analyzed in this FEIS, and with these analyses a sufficient range of resource effects (e.g., LOP, air quality, socioeconomics) is provided.

Other Alternatives Considered and Eliminated from Detailed Analysis

Many suggestions for alternatives were proposed by the public during scoping. Most of the suggested alternatives involved addressing varying well numbers, varying the rate at which the field is developed,

and varying surface disturbance. While not all the suggested well number, development rate, or surface disturbance suggestions were analyzed, the BLM used these suggestions when developing the range of alternatives.

An alternative rejecting any new development was also suggested. This was not considered reasonable, as additional development in the area would likely occur from non-federal activities (e.g., State of Wyoming land development), over which BLM has no authority. The No Action Alternative sufficiently considers no new development impacts (see FEIS, Section 2.4.1).

Action alternatives limiting the total number of wells were rejected from consideration based upon known natural gas reservoir properties indicating that an estimated 3,100 additional wells would be necessary for adequate resource recovery. Additional justification for eliminating these alternatives from detailed analyses is provided in the FEIS, Section 2.2.3.1.

Phased development alternatives suggesting a development pace slower than 75 wells per year were rejected from detailed analyses because the reduced development pace would result in recovery and operational and safety issues associated with drilling through depressurized zones (i.e., stuck pipe, mud weight variability problems, blow-out potential). It was determined that the analyzed development paces of 75 and 250 wells drilled per year provide an adequate range of development paces to assess the potential effects associated with development rate (e.g., socioeconomics, duration of habitat loss). Phased development alternatives involving systematic extraction of resources from portions of the JIDPA followed by appropriate reclamation prior to developing other areas of the JIDPA were not provided detailed analyses due to the potential for disproportionate adverse effects on resource recovery within some leaseholds (see also FEIS, Section 2.2.3.1). Allowing mineral resources to remain unrecovered would result in waste and prevent BLM from achieving its statutory and policy goals.

Two alternatives requiring all new wells to be directionally drilled and requiring no new roads were not specifically analyzed in detail because Alternative B has a similar potential effect (i.e., no new well pads, few new roads needed).

An alternative rejecting all further development in the JIDPA until all existing disturbance in the area is adequately reclaimed was not considered since this action would likely lead to considerable unrecovered resource and would unnecessarily prolong the LOP.

Numerous alternatives requiring the inclusion/exclusion of multiple resource protection, mitigation, and monitoring measures were suggested for analysis, including the application of best management practices (BMPs), the use of adaptive management procedures, and consideration of off-site CM (see FEIS, Chapter 5). Some of these additional measures have been included as components of the Proposed Action and Preferred Action alternatives and/or may be included as project requirements in the ROD. Many if not all of these suggested requirements are considered under one or more of the alternatives analyzed in detail (see also Appendices A and C of the FEIS for BLM standard mitigations, Operator-committed measures, and CM ideas).

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with Council on Environmental Quality (CEQ) regulations (40 CFR 1505.2(b)), the environmentally preferred alternative must be identified in the Record of Decision.

BLM considers the environmentally preferred alternative for the Jonah Infill Drilling Project to be the *No Action Alternative*. This alternative would result in the least amount of impact to a majority of resources within the Jonah Field. However, the No Action alternative would also fail to effectively recover known oil and gas resources. Therefore, the BLM Preferred Alternative was selected.

APPEAL PROCESS

This decision may be appealed to the Interior Board of Land Appeals, Office of the Secretary, in accordance with the regulations contained in 43 CFR 3165.4. If an appeal is filed, your notice of appeal must be filed in this office (Bureau of Land Management, State Director, P.O. Box 1828, Cheyenne, Wyoming 82003) within 30 days of the date BLM publishes their notice of the decision in the *Federal Register*. The appellant has the burden of showing that the decision appealed from is in error.

If you wish to file a petition pursuant to 43 CFR 3165.4(c) for a stay (suspension) of the effectiveness of this decision during the time that your appeal is being reviewed by the Board, the petition for a stay must accompany your notice of appeal. A petition for a stay is required to show sufficient justification based on the standards listed in 43 CFR 3165.4(c). Copies of the notice of appeal and petition for a stay must also be submitted to the Interior Board of Land Appeals and to the Rocky Mountain Regional office of the Solicitor at the same time the original documents are filed with this office. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted.

ERRATA

Modifications and Corrections to the
Jonah Infill Drilling Project Final Environmental Assessment

The section describes changes to the FEIS to correct errors or omissions and identify modifications.

Modifications

1. Abstract, page i, 3rd paragraph, line 6, change to read "Above a certain level of authorized development, ~~the~~ *several* Operators have committed to establishing a fund…". This statement is corrected to reflect that all Jonah Field Operators have not committed to compensatory mitigation.

2. Executive Summary, page iii, Proposed Action, 1st paragraph, line 8, change to read "~~The~~ *Several* Operators have committed to various mitigation…". This statement is corrected to reflect that not all Jonah Field Operators have committed to compensatory mitigation.

3. Executive Summary, page v, BLM Preferred Alternative, 1st paragraph, line 1, change to read "(i.e., ~~achieved 80% indigenous vegetative basal cover/density and species composition~~ meets reclamation performance objectives). Under no circumstances…". This statement is corrected to reflect final reclamation strategy.

4. Chapter 1, Section 1.3, page 1-4, delete 1st paragraph and all six bullets beginning with "The proposed development meets the purpose and need…to plan uses that encourage energy conservation" from this section and insert in Section 1.5.3, page 1-10, between paragraph 3 (beginning "The Notice of Intent (NOI) for this EIS…") and paragraph 4 (beginning "Specifically, the proposed project is in conformance with…"). This change better organizes the information presented.

5. Chapter 1, Section 1.5.3, page 1-10, paragraph 3, change line 6 to read "…PFO RMP ~~as updated by the ROD for the Pinedale Anticline Oil and Gas Exploration and Development Project (BLM 2000c)~~ if development at the proposed level is approved." This statement is modified to reflect current Interior Board of Land Appeals decisions.

6. Chapter 2, Section 2.3.1.1, page 2-9, Water, change 1st bullet to read "Operators would maintain ~~or restore~~ groundwater and surface water…". This bullet is changed to clarify Operators responsibilities with regards to the Clean Water Act and Wyoming Department of Environmental Quality (WDEQ) standards.

7. Chapter 2, Section 2.3.1.1, page 2-10, Reclamation, delete 1st bullet that begins "Operators would submit to BLM for approval a reclamation plan…". This requirement is unnecessary since a reclamation plan is included in the FEIS and monitoring will be accomplished by the JIO.

8. Chapter 2, Section 2.4.5, page 2-18, BLM Preferred Alternative, 2nd paragraph, line 7, change to read "(i.e., ~~achieved 80% indigenous vegetative basal cover/density and species composition~~ meets reclamation performance objectives). Under no circumstances…". This statement is corrected to reflect final reclamation strategy.

9. Chapter 2, Section 2.4.5.2, page 2-22, delete 7th bullet from top of page beginning "Operators would utilize closed drilling systems (no reserve pits)…". This bullet is unnecessary in light of defined development plans and procedures and surface disturbance management strategy.

10. Chapter 2, Section 2.4.5.2, page 2-23, delete 2nd bullet from top of page beginning "Operators would periodically demonstrate that potential impacts…". This bullet is unnecessary in light of air quality mitigation requirements included in this ROD.

11. Chapter 2, Section 2.4.5.2, page 2-24, delete 5th bullet and both sub-bullets regarding "Minimum reclamation requirements would be:" and replace with the following bullet and sub-bullets:

    - Reclamation objectives will be:

        - Rollover reclamation credit requires establishment of viable site-stabilizing plant growth (e.g., resistant to wind and water erosion) and a plant community that approximates surrounding or ecologically comparable vegetative composition to the maximum extent possible.

        - Final reclamation requires a range of species composition, diversity, cover and production equal to pre-disturbance levels.

12. Chapter 2, Section 2.4.5.2, page 2-24, change 7th bullet to read "Operators would *voluntarily seek opportunities to* participate in and support published…". This change clarifies a best management practice.

13. Chapter 2, Section 2.4.5.3, page 2-25, modify the 5th bullet to read "Institute nighttime lighting/glare restrictions (e.g., install light shades/hoods, directional lighting, colored lights, wattage limits, motion detectors; extinguish all unnecessary lighting during non-working hours), consistent with Occupational Safety and Health Administration requirements."

14. Chapter 3, Section 3.1.6.2, subsection "Groundwater Use", page 3-43, paragraph 1, change line 7 to read: "…Map 4.1). ~~No groundwater irrigation occurs in the JIDPA or CIAA~~ Some irrigation occurred within the JIDPA to support experimental reclamation procedures."

15. Chapter 5, Section 5.1.1, page 5-2, paragraph 1, change line 1 to read "The following actions could further reduce ~~overall~~ *cumulative* emissions, which in turn…".

16. Chapter 5, Section 5.1.2, subsection "Visibility", page 5-5, paragraph 3, change line 7 to read "…as soon as possible to no days with an impact greater than *or equal to* 1 deciview (dv)."

17. Appendix B, Subappendix DP-B, page DP-B-3, Section DP-B-2.1, 2nd paragraph, change line 1 to read "The reclamation success ~~standards~~ *objectives* provided in Section DP-B-2.2 ~~are the measures~~ *will be used to develop specific reclamation success criteria* that will show whether or not these goals are being met."

18. Appendix B, Subappendix DP-B, page DP-B-3, Section DP-B-2.2, delete text from entire Section beginning with "The following reclamation success standards are…" and ending with "…standards 1-5, 6d, 6e, 6f, and 7 have been achieved." Replace with the following:

"BLM will use two separate criteria for reclamation success in the JIDPA; rollover and release. When the *rollover* criteria are achieved acreage will be credited back to the Operators against the 46% surface disturbance ceiling. When the *release* criteria are achieved the Operators will be released from final bond obligation.

The specific objectives of rollover reclamation criteria include site stabilization (e.g., resistant to wind and water erosion) and establishment of a plant community that approximates surrounding or ecologically comparable vegetative composition, to the maximum extent possible.

Reclamation success standards for bond release will meet the objectives of species composition, diversity, cover and production levels equal to pre-disturbance levels.

In general, success standards may require a range of species composition, diversity and cover requirements based on varying conditions and/or locations. To deal with these unknowns, specific success criteria will be developed by the JIO, with public participation, and approved by the BLM. Final determination concerning whether or not a reclaimed area meets the rollover or release standards will be made by the Authorized Officer for the BLM.

19. Appendix B, Subappendix DP-B, Section DP-B-4.1.2.2, page DP-B-10, paragraph 1, change line 11 to read "Temporary reclamation (see Section DP-B-4.3) would be implemented immediately on all topsoil and spoil stockpiles *that would be in place more than 6 months*." This change clarifies these requirements.

20. Appendix B, Subappendix DP-B, Section DP-B-5.4, page DP-B-27, paragraph 1, change line 2 to read "…monitored qualitatively ~~(annually and after large rainstorms or snow melt runoff events)~~." This change clarifies these requirements.

APPENDIX A

JONAH INFILL DRILLING PROJECT ADMINISTRATIVE REQUIREMENTS, CONDITIONS OF APPROVAL, AND MITIGATION

APPENDIX A

JONAH INFILL DRILLING PROJECT ADMINISTRATIVE REQUIREMENTS, CONDITIONS OF APPROVAL, AND MITIGATION

All approved actions within the Jonah Infill Drilling Project Area (JIDPA) may include all or some of the following Conditions of Approval (COAs), administrative requirements, mitigation requirements, and/or Best Management Practices (BMPs).

Authorizing Actions

JIDPA Operators are responsible for adhering to all applicable federal, state, and local laws and/or regulations and for obtaining all necessary federal, state, and county permits. Absent specific revisions in this ROD, Operators will comply with the management objectives, COAs, and mitigation measures identified in the BLM Pinedale RMP ROD (BLM 1988b) and BLM Green River RMP ROD (BLM 1997b) to the extent feasible and practicable.

Land Use/Surface Disturbance

1. Surface disturbance is limited to 46% of the JIDPA at any given time, or a maximum of 14,030 acres. Disturbance will be tracked on an operated-acreage basis. Within six (6) months of the approval of the ROD, all JIDPA Operators shall provide the Authorized Officer the lease number and legal description for all acres they operate, including those acreages they individually operate and those co-operated with others.

2. Credit will be applied to the surface disturbance ceiling for operated acreages on an acre-for-acre basis for areas the BLM considers to have met reclamation objectives (see FEIS Appendix B, Reclamation Plan).

3. Total cumulative field-wide surface disturbance is limited to a maximum of 20,334 acres over the life of the project (LOP).

4. Operators will track surface disturbance acreage and provide BLM and the JIO with Federal Geographic Data Committee (FGDC)-compliant metadata and geographic information system (GIS)/global positioning system (GPS) location data for all newly developed facilities and reclaimed areas within 30 days of completion of disturbance and/or reclamation activities.

5. By January 31 each year, the Operators will provide the JIO and Authorized Officer annual operating plans that include the following information:

   a. all previous year activity to include number of wells drilled, total new surface disturbance by well pads, roads and pipelines, and current status of all reclamation activity; and

   b. plan of development for the upcoming year to include planned number of wells to be drilled and an estimate of new surface disturbance and reclamation activity.

6. Operators will inventory all roads/trails in the JIDPA not already inventoried by BLM within 1 year of the ROD for this project; GIS data will be provided to BLM and the JIO with

FGDC-compliant metadata. Operators will initiate coordination with the JIO prior to implementing this action.

7. Well pad surface disturbance will not exceed 7.0 acres for parent and multi-well pads, 4.0 acres for single-well pads, and 2.0 acres for satellite well pads, unless the Operator can demonstrate to the satisfaction of the Authorized Officer on a case-by-case basis that the size limitation for a given pad would create a significant safety concern for the workers, the public at large, or the environment. These acreages include cut-and-fill slopes, but do not include access roads and pipelines.

8. All new development and production facilities in the JIDPA will be placed at centralized locations to accommodate multiple wells, unless proven to the satisfaction of the Authorized Officer on a case-by-case basis that centralization of development and production facilities would not be technically or economically feasible, or that another method would create less environmental impact. The Operators will centralize existing development and production facilities to the extent economically feasible.

9. Centralized fracturing processes will be required for all well pads when surface density is $\geq$ 1 well pad/40 acres, and recommended when well pad surface density is < 1 pad/40 acres, unless the Operator can demonstrate to the satisfaction of the Authorized Officer that centralized fracturing is not reasonable or technically or economically feasible, or that another well completion procedure would create less surface impact.

10. Where technically and economically feasible, and at the earliest possible date, Operators will begin piping produced water and condensate from all wells in the JIDPA to an appropriate condensate collection point or sales line and an appropriate produced water treatment, disposal, or centralized transportation facility. Analyses must be provided within one (1) year of the ROD.

11. Operators are encouraged to use closed loop drilling systems for all drilling operations within the JIDPA. A closed-loop drilling system shall be used in the following circumstances:

    a. the well is completely or partially drilled using oil-based drilling mud;

    b. a groundwater aquifer is suspected or known to occur within 50 feet of the pre-disturbance ground surface (in the event groundwater is not encountered within 50 feet of the surface when the hole for the conductor pipe is drilled, the Operator may revert to a reserve pit system for this well);

    c. there is not sufficient area due to terrain features (deep drainages, cliffs, steep slopes, etc.) at the proposed well pad site for a pad with reserve pit;

    d. there is not sufficient area due to (*fill in the blank the constraining value* [*i.e., critical wildlife habitat* (*describe*), *unmitigatable cultural resource site, etc.*]) at the proposed well pad site for a pad with a reserve pit.

12. Operators will remove/vacuum fluids from reserve pits within 60 days from well completion or they must notify the Authorized Officer. In all cases, fluids will be removed as soon as practical.

13. Surface-disturbing activities shall not be conducted on slopes in excess of 25 percent or within 500 feet of surface water and/or riparian habitat.

14. No well pad, road, or other construction shall be conducted in or with frozen materials, or during periods when the soil is saturated, or when watershed damage is likely to occur.

15. No surface occupancy will be allowed within 300 feet of Sand Draw.

Air Quality

1. Tier II or equivalent diesel engine emission technologies will be required for all drill rigs at the earliest possible date.

2. The BLM will work cooperatively with state and other federal agencies, and with industry, to track emissions in the Pinedale Field Office area.

    a. BLM will track numbers of wells, numbers of drill rigs, drilling emissions, and compressor stations.

    b. The Wyoming Department of Environmental Quality, Air Quality Division (WDEQ–AQD) will continue to track permitted emissions.

    c. Operators will provide BLM with information on their drill rigs, including drilling days, horsepower, load factors, and emission factors within 10 days of the completion of drilling operations for each well.

3. Operators will demonstrate by January 31 each year that emission reductions from the Jonah Infill Drilling Project will reduce the potential impact to visibility as follows:

    a. Demonstration Period: Operators in the JIDPA will begin a 12-month demonstration period beginning with the signing of the ROD. In correspondence with BLM, WDEQ affirmed the State's position that BLM "require the use of Tier II diesel technology on drill rigs used in the Jonah area at the earliest possible date" (WDEQ 2005). Because preliminary modeling conducted for the DEIS indicated that emissions from engines for drilling rigs would have to be further reduced to attain the air quality goals stated above, BLM treats emission factors for Tier 2 engines (EPA 1998) as a reference point for the minimum control of emissions during the demonstration period. Operators in the Jonah and Pinedale fields have suggested several technologies that could achieve emissions lower than Tier 2. As part of this demonstration period, the Operators in the Jonah field will conduct emission tests on various drilling engine technologies as defined in a plan to be developed by the Operator(s) and approved by WDEQ-AQD. The results from this demonstration period will be provided to WDEQ as soon as possible, but no later than 1 year after the ROD is signed. WDEQ will then consider the emissions testing data in the determination of the appropriate Best Available Technology (BAT) for the engines associated with all drilling operations. Until such time as the WDEQ-AQD establishes appropriate BAT standards, Operators will be required to demonstrate that the impact levels from the proposed project will be less than the impact levels of the 80% emission reduction scenario as described in FEIS Section 4.1.2.5 and AQTSD Appendix G, Section G-2. Within 90 days of the ROD, the Operators will submit a plan to BLM that describes in detail how the potential impacts will be minimized.

    b. Implementation Period: All Operators will comply with WDEQ-established BAT standards.

c. In the absence of WDEQ-established BAT standards, the Operators will submit annual operating plans that report the emissions from all emitting units in order to demonstrate that the potential visibility impact from the proposed project will be less than the potential visibility impact levels of the 80% emission reduction scenario described in FEIS Section 4.1.2.5 and AQTSD Appendix G, Section G-2, at a minimum, and to demonstrate that any potential visibility impact decreases as soon as possible to no days with an impact greater than or equal to 1 deciview (dv).

d. Based upon emissions data collected during the demonstration period, BLM may run an air dispersion model, comparable to the model run for the AQIAS, to reassess air quality impacts. BLM, in conjunction with the JIO, will use the results of the model to assess whether emission controls in the JIDPA adequately control emissions to achieve the air quality goals. Annually thereafter, BLM will determine whether an additional model run is necessary based upon field-wide emissions or a comparable indicator selected by BLM (in cooperation with the JIO). Operators should continue to innovate by demonstrating and using new techniques for controlling emissions after the demonstration period.

e. The method by which the Operators will demonstrate potential project visibility impact will be determined by BLM in consultation with WDEQ, EPA, USFS, and National Park Service (NPS). BLM will rely on the Operators to determine how they will attain the reduction in potential visibility impacts from the Jonah Infill project.

f. BLM's performance objective for visibility will be attained if actual visibility monitored by the Bridger Wilderness IMPROVE aerosol sampler complies with the reasonable progress goal of the Wyoming Regional Haze State Implementation Plan.

4. In cooperation with the JIO established under the ROD, BLM will review ozone data collected in the area. If in the future air monitoring were to show ozone exceedances attributable at least in part to sources in the Jonah field, BLM will consult with WDEQ-AQD, EPA, USFS, and NPS to determine whether adaptive management would be needed to mitigate impacts.

5. BLM will continue to work cooperatively with WDEQ, EPA, USFS, and NPS to maintain and enhance concentration, atmospheric deposition, and visibility monitoring in the Pinedale Field Office area. The BLM and cooperating agencies will contribute technical expertise and financial resources to maintaining and enhancing air quality monitoring. The Operators will fund and participate in a joint industry/state/federal monitoring agreement to maintain and enhance air quality monitoring.

Wildlife

Monitoring & Inventory

1. Operators will monitor nesting of raptors, including ferruginous hawk, bald eagle, and burrowing owl; greater sage-grouse lek attendance; and occurrence of other sagebrush-obligate species within the JIDPA in coordination with Authorized Officer and the JIO.

2. Operators will inventory greater sage-grouse seasonal habitats within the JIDPA not already inventoried by BLM or WGFD within 1 year after signing of the ROD for this project; GIS data would be provided to the Authorized Officer with FGDC-compliant metadata. Operators would initiate coordination with the Authorized Officer and JIO prior to implementing this action.

3. Operators will coordinate with the Authorized Officer and JIO to review and revise the Jonah Wildlife Monitoring and Protection Plan within 1 year of the ROD for this project.

Raptors

1. Well pads, access roads, and other aboveground facilities will not be located within 825 feet of an active raptor nest, within 1,000 feet of an active ferruginous hawk nest, or within 2,640 feet of any bald eagle nest.

2. The following seasonal restrictions for surface-disturbing activities near active raptor nests/roosting sites/foraging areas will be imposed: (see Appendix A, Table A.3, of the FEIS)

3. February 1 through July 31, within 0.5 mile of all active raptor nests;

4. February 1 through July 31, within 1.0 mile of all active ferruginous hawk nests;

5. February 1 through August 15, within 1.0 mile of all active bald eagle nests;

6. November 1 through April 1, within 1.0 mile of active bald eagle communal winter roosts; and

7. November 1 through April 1, within 1.0 mile of winter forage areas.

Sage Grouse

1. Surface-disturbing and disruptive activities in greater sage-grouse winter habitat will be avoided from November 15 through March 14.

2. Surface-disturbing and disruptive activities in greater sage-grouse nesting and early brood-rearing habitat within 2.0 miles of an occupied lek, or in identified greater sage-grouse nesting and early brood-rearing habitat outside the 2.0-mile buffer will be prohibited from March 15 through July 15.

3. Surface disturbance and occupancy will be prohibited within 0.25 mile of the perimeter of greater sage-grouse leks, and human activity in these areas will be avoided between 8 p.m. and 8 a.m. from March 1 through May 15.

4. Compressor stations will be sited at least 2.0 miles away from greater sage-grouse leks and no closer than 0.5 mile to an active raptor nest.

Soils/Water

1. A groundwater monitoring program for all water wells in or affected by activities in the JIDPA will be implemented. The following specifics apply:

    a. Water wells will be tested annually for static water level, general chemical constituents as determined by the Authorized Officer, and total petroleum hydrocarbons, using WDEQ-approved methods. Annual reports will be provided to the JIO, BLM (Authorized Officer), WDEQ, and WSEO by January 31.

b. Water withdrawal volumes from all water wells utilized within the JIDPA will be monitored and annual depletion reports provided to the JIO, BLM (Authorized Officer), WSEO, and U.S. Fish and Wildlife Service (USFWS) by January 31 each year.

2. Hydraulic structures (culverts, bridges, low water crossings, silt traps, catchments, retention dams, etc.) placed in existing, natural drainage courses will be engineered and designed by a certified civil engineer to ensure the structures are stable and erosion is minimized. Cross-drain structures installed outside existing, natural drainage courses will not require certified civil engineer design.

3. All well pads, roads, pipelines, and other facilities will be engineered and constructed to minimize sediment discharge onto adjacent undisturbed land or down-channel from the JIDPA and to meet WDEQ stormwater discharge requirements.

4. Operators would provide copies of their Spill Prevention, Control, and Countermeasure (SPCC) plans and Storm Water Pollution Prevention Plans (SWPPPs) to the BLM upon request.

5. Stormwater and snowmelt water would be held on the JIDPA for as long as possible to allow for infiltration and to reduce surface flow velocity and associated sediment loads using geofabrics, jute netting, spreader dikes, retention ponds, additional armoring of existing watercourses, or other appropriate techniques.

Transportation

1. Operators will continue to encourage limiting the speed of all vehicles operated by the leaseholder, Operator, or Operator agents in the JIDPA, and will implement voluntary fugitive dust control measures on primary access roads and heavily used resource roads.

2. Project-required traffic in the JIDPA is limited to BLM-approved roads. Operators will continue to cooperate with the BLM to identify and prohibit use of two-tracks where ROWs have not been obtained.

3. Operators will utilize remote telemetry or equivalent technology at all wells to minimize well monitoring trips, unless proven to the satisfaction of the Authorized Officer on a case-by-case basis that installation of remote telemetry or equivalent technology would not be technically or economically feasible, or that another method would create less environmental impact.

Paleontological Values Protection

1. Operators will suspend all operations if previously undetected vertebrate fossil materials are discovered during surface-disturbing activities. Operations will not resume until authorization to proceed is granted by the Authorized Officer.

Reclamation

1. Operators will maximize interim (production phase) well pad reclamation by recontouring to the drilling rig anchor pins and reclaiming/revegetating to within 20 feet of the wellhead, or to within 20 feet of the wellhead, facilities, tanks, and spill containment structures on those pads with production facilities. The initiation of interim reclamation will commence within 30 days after the

last well scheduled on a pad is put into production. In the event that more than 1 year would lapse between the drilling of wells on a pad, the Authorized Officer may require temporary site stabilization measures.

2. Operators will accelerate reclamation of disturbed areas using innovative seed mixtures and application techniques, supplementing natural precipitation with sprinkler irrigation at key times, and/or other practices as approved by the Authorized Officer.

3. Operators will undertake aggressive invasive plant species and noxious weed control or removal in disturbed areas, be responsible for weed control on all disturbed areas in the JIDPA, and be responsible for consultation with the Authorized Officer and/or local authorities for acceptable weed control methods. Where applicable, a "Pesticide Use Proposal" (Form WY-04-9222-1), surfactant material safety data sheet(s), and maps and/or legal descriptions of the area to be treated will be submitted by the Operator to the Authorized Officer no later than December 1 for use the following spring/summer.

4. The following reclamation objectives will be used to determine success of reclamation. Final determination concerning whether or not a reclaimed area meets the rollover or release standards will be made by the Authorized Officer for the BLM.

    a. Rollover reclamation credit requires establishment of viable site-stabilizing plant growth (e.g., resistant to wind and water erosion) and a plant community that approximates surrounding or ecologically comparable vegetative composition to the maximum extent possible.

    b. Final reclamation requires a range of species composition, diversity, cover and production equal to pre-disturbance levels.

5. Wildlife habitat evaluations using Habitat Evaluation Procedures (HEP) and Habitat Suitability Indices (HSI) for appropriate species will be developed within 1 year of the ROD and will be used to evaluate impacts to habitat and the effectiveness of reclamation and mitigation.

6. Operators will restore those portions of pads not needed for production operations to as close to original contours as practical during interim reclamation to minimize or eliminate the need to re-disturb those reclaimed areas when wells are plugged and abandoned.

7. Operators will employ appropriate topsoil storage and replacement technology and procedures to ensure soil viability and plant rooting potential are maintained.

Noise

1. Operators will utilize flareless completions for all wells within the JIDPA unless proven to the satisfaction of the Authorized Officer on a case-by-case basis that flareless completion operations would not be technically or economically feasible or would be unsafe, and that WDEQ has issued a permit to conduct well completion flaring for that specific well.

2. As directed on a case-by-case basis by the Authorized Officer, Operators will monitor the representative noise levels of drilling, cementing, and completion operations 30 feet from the well pad boundary and provide monitoring data to the Authorized Officer within 30 days of the data collection for the establishment of noise impact charts.

3. Operators will monitor noise at noise-sensitive resource locations, as determined by the Authorized Officer, and annually report results to the Authorized Officer and JIO.

Night Lighting

1. On a site-specific basis, nighttime lighting/glare restrictions (e.g., install light shades/hoods, directional lighting, colored lights, wattage limits, motion detectors; extinguish all unnecessary lighting during non-working hours) may be required, consistent with Occupational Safety and Health Administration requirements.

Cultural/Historic Resources Protection

1. Operators will suspend all operations if previously undetected archaeological or historical materials are discovered during surface-disturbing activities. Operations will not resume until authorization to proceed is granted by the Authorized Officer.

Socioeconomic

1. Operators will provide the BLM with their 3-year operational forecasts for the JIDPA by January 31 of each year during field development. These forecasts will include estimates of total drilling activity by year.

Livestock Grazing

1. In coordination with the Authorized Officer and JIO, Operators will:
    a. Monitor the effects of livestock on reclamation projects and native vegetation including, but not limited to, forage utilization and percent composition.
    b. Monitor the effects of gas field development on livestock operations (i.e., death loss, forage quality, etc.).

Visual Resource Management

1. New production facilities would be painted a non-contrasting color which is harmonious with the surrounding landscape (i.e., shale green, unless otherwise specified by BLM on a case-by-case basis); existing production facilities would be painted that color at the earliest opportunity, and no later than when facilities are due for routine repainting.

APPENDIX B

OPERATOR-COMMITTED PRACTICES

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OPERATOR-COMMITTED PRACTICES

Existing Jonah project National Environmental Policy Act of 1969 (NEPA) documents (Bureau of Land Management [BLM] 1998, 2000a) provide various programs and policies that would be implemented to protect the environment during the development and operation of the proposed Jonah Infill Drilling Project (JIDP). Unless otherwise noted, each of the measures identified in this appendix have been agreed to by all the Operators currently working in the Jonah Infill Drilling Project Area (JIDPA). The 15 air quality-related measures listed at the very end of this document have been committed to by EnCana Oil & Gas (USA), Inc., but not yet agreed to by any of the other Operators.

Many of these environmental protection measures would be included as Conditions of Approval (COAs) in this ROD. However, by additionally including them as Operator-committed practices, the various Operators have made a commitment to implement them throughout the life-of-project (LOP), and the impact analyses provided in the JIDP EIS take into consideration the implementation of these measures based on this commitment.

Where Operator-committed practices differ from and are less rigorous than those provided in previous NEPA documents, the reason for the change is identified. If deemed appropriate by the applicable regulatory agency, the more stringent measure will be imposed.

Some of the Operator-committed practices are outside the jurisdiction of BLM. These practices are identified as *italicized text*.

In addition to Operator-committed environmental protection practices, the various JIDPA leases often contain one or more stipulations that obligate the leaseholder. These lease stipulations are mandatory and address a number of issues, including but not limited to seasonal and area restrictions for raptor nests, greater sage-grouse leks and nesting habitat, unstable soils, steep slopes, and controlled surface occupancy (see FEIS Appendix A). These lease-specific stipulations may be duplicated by the more general measures listed below.

Exceptions to Operator-committed practices may be granted if a thorough analysis by the BLM determines that the resource(s) for which the measure was developed would not be unacceptably impacted by the proposed project, or if the Operator can demonstrate to the satisfaction of the Authorized Officer on a case-by-case basis that the required mitigation or practice would not be technically or economically feasible, or that another method would create less environmental impact.

To assure compliance with the Operator-committed practices stipulated in the FEIS, this ROD, and in site-specific APDs and ROWs, each Operator will provide qualified individuals to oversee construction and drilling operations and to consult with the BLM on a case-by-case basis, as necessary, during field development.

All of the proposed Operator-committed practices identified in this section will be implemented on all federal lands and minerals within the JIDPA. Development activities on all lands would be conducted in accordance with all appropriate federal, state, and county laws, rules, and regulations.

PRECONSTRUCTION PLANNING AND DESIGN MEASURES

1. Implementation of site-specific projects would be contingent on BLM receiving, for approval/acceptance, the following plans: APD and ROW Surface Use Plans, Plans of Development, and other site-specific plans/reports (e.g., road and well pad design plans, cultural clearances, special status species clearances, etc.); Transportation Plan, Reclamation Plan, and Hazardous Materials Management Summary (see FEIS Appendices DP-A, DP-B, and DP-C). The above plans may be prepared by Operators for the JIDPA or may be submitted incrementally with each APD, ROW application, or Sundry Notice.

2. Approval of individual project components (i.e., wells, roads, pipelines, and ancillary facilities) would be contingent on completion and acceptance of a site-specific cultural resource literature search, Class III inventory report, and, as necessary, paleontological inventory; threatened, endangered, proposed, and candidate (TEP&C) and BLM Wyoming sensitive (BWS) species surveys; greater sage-grouse lek and nesting clearance; raptor nest clearance; and any other clearances that are justified for scientific data collection and pertinent to a given project.

3. Operators would include in APD, ROW, or other appropriate permit applications a discussion of site-specific mitigation and environmental protection measures and a map showing specific locations where these measures would be implemented. Final locations for these measures would be confirmed by BLM and the Operators following on-site inspections of project locations.

4. Operators would obtain all necessary federal, state, and county permits, including necessary Spill Prevention and Control Countermeasure Plans (SPCCPs) and Storm Water Pollution Prevention Plans (SWPPPs), to ensure that project development occurs in an environmentally responsible manner.

5. *EnCana Oil & Gas (USA) Inc., BP America Production Company, and potentially other Operators would voluntarily implement an off-site mitigation program in part to offset potential impacts resulting from the project. As currently identified, these projects may entail pronghorn migration corridor protection; greater sage-grouse habitat preservation, protection, and enhancement projects; raptor protection; recreational resource augmentation; conservation easement development; air quality improvement and Air Quality Related Values (AQRV) projects; on-the-ground reclamation research with an emphasis on sagebrush; and cultural resource projects. Potential program projects may be proposed by the public, BLM, state agencies, grazing permittees, or other entities. Final approval for projects on BLM-administered lands would rest solely with the BLM. See EnCana Appendix 1, Voluntary Compensatory Mitigation Proposal.*

AIR QUALITY

6. *Operators would treat primary access roads (e.g., Luman Road, Windmill Road, Burma Road, and North Jonah Road), and heavily used resource roads as necessary during high use periods, with dust suppressants (e.g., magnesium chloride) and would water construction sites and well pad access roads as necessary to control fugitive dust during the summer.*

7. *No open burning of garbage or refuse would be allowed at the well sites or other facilities. Any open burning would be conducted under the permitting provisions of Chapter 10, Section 2 of the Wyoming Air Quality Standards and Regulations.*

8. *Necessary air quality permits to construct, test, and operate facilities would be obtained from the Wyoming Department of Environmental Quality/Air Quality Division (WDEQ/AQD). All internal combustion equipment would be kept in good working order.*

9. *Operators would comply with all applicable local, state, tribal, and federal air quality laws, statutes, regulations, standards, and implementation plans, including Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS).*

10. *Operators would cooperate with WDEQ in determining regional oxides of nitrogen (NO_x) emission levels.*

11. *Operators would continue to encourage contractors and employees to obey speed limits and support local law enforcement officials in enforcing speed limits (i.e., 35 miles per hour [mph]) to reduce fugitive dust concerns, as well as for human health and safety reasons.*

12. *EnCana Oil & Gas (USA) Inc., BP America Production Company, and potentially other Operators would cooperate with the implementation of any WDEQ-mandated air quality monitoring program or emissions control program.*

TOPOGRAPHY

13. Operators would incorporate in their Surface Use Plans and Plans of Development the procedures contained in Standard Practices, Best Management Practices, and Guidelines for Surface-Disturbing Activities, guidelines for road construction contained in BLM Manual 9113 (BLM 1985, 1991), and project-specific requirements in the Transportation and Reclamation Plans for this project (FEIS Appendices DP-A and DP-B).

14. Unnecessary topographic alterations would be mitigated by avoiding, where practical, steep slopes, rugged topography, and ephemeral/intermittent drainages and by minimizing the size of disturbed areas.

15. Upon completion of construction and/or production activities, Operators would restore the topography to near pre-existing contours at well pads, roads, pipelines, and other facility sites. The Operators will comply with the requirements of all WDEQ and U.S. Environmental Protection Agency (EPA) stormwater erosion control permitting practices.

16. No well pads, roads, pipelines, or other facilities would be built within 300 feet of the edge of Sand Draw or within the tall sagebrush areas associated with this drainage, except for crossings that would be done at right angles to the channel, where practical. The number of crossings also would be minimized.

GEOLOGICAL/PALEONTOLOGICAL RESOURCES

17. At the Operator's discretion, wells, pipelines, and ancillary facilities would be designed and constructed such that they would not be damaged by moderate earthquakes. Any facilities defined as critical, according to the Uniform Building Code, would be constructed in accordance with applicable Uniform Building Code Standards for Seismic Risk Zone 2B.

18. In areas of paleontological sensitivity, a determination would be made by the BLM as to whether a survey by a qualified paleontologist is necessary prior to the disturbance. In some cases, construction monitoring, project relocation, data recovery, or other mitigation may be required to ensure that significant paleontological resources are avoided or recovered during construction.

19. If paleontological resources are uncovered during surface-disturbing activities, Operators would suspend all operations that would further disturb such materials and would immediately contact the BLM, who would arrange for a determination of significance and, if necessary, recommend a recovery or avoidance plan. Mitigation of impacts to paleontological resources would be on a case-by-case basis, and Operators would either avoid or protect paleontological resources.

20. Contractors and their workers would be instructed about the potential of encountering fossils and the steps to take if fossils are discovered during project-related activities. The illegality of removing vertebrate fossil materials from federal lands without an appropriate permit would be explained.

SOILS

21. Operators would adhere to the reclamation guidelines presented in BLM 2004. Adverse impacts to soils would be mitigated by minimizing disturbance; avoiding construction with frozen soil materials; avoiding areas with high erosion potential (e.g., unstable soils, dunal areas, slopes greater than 25%, floodplains), where practical; salvaging and selectively handling topsoil from disturbed areas; adequately protecting stockpiled topsoil and replacing it on the surface during reclamation; leaving the soil intact (scalping only) during pipeline construction, where practical; using appropriate erosion and sedimentation control techniques including, but not limited to, diversion terraces, riprap, and matting; and promptly revegetating disturbed areas using native species. Temporary erosion control measures such as temporary vegetation cover; application of mulch, netting, or soil stabilizers; and/or construction of barriers may be used in some areas to minimize wind and water erosion and sedimentation prior to vegetation establishment. Specific measures and locations would be identified in Surface Use Plans, Plans of Development, or SWPPPs prepared during APD and/or ROW application processes.

22. Pipeline ROWs would be located to minimize soil disturbance. Where practical, mitigation would include locating ROWs adjacent to access roads to minimize ROW disturbance widths or routing pipeline ROWs directly to minimize disturbance lengths; direct-line routes may be preferable in areas with high well pad densities.

23. Appropriate erosion control and revegetation measures would be employed. Grading and landscaping would be used to minimize slopes, and water bars would be installed on disturbed slopes in areas with unstable soils where seeding alone may not adequately control erosion. Erosion control and revegetation efforts would be monitored by the BLM and Operators and augmented, as necessary, to control erosion and ensure successful establishment of native vegetation.

24. Sufficient topsoil or other suitable material to facilitate revegetation would be segregated from subsoils during all construction operations requiring excavation and would be returned to the surface upon completion of operations. Soils compacted during construction would be ripped and tilled as necessary prior to reseeding. Cut-and-fill sections on all roads and along pipelines would be revegetated with native species.

25. To the extent practical and necessary, Operators would plan new ground-disturbing activities for periods when soils are not frozen and would work with the BLM on appropriate construction actions in the event that they are proposed for periods when soil frost depths exceed 6.0 inches.

26. Operators would revegetate all disturbed sites as soon as practical following disturbance.

27. Operators would restrict off-highway vehicle (OHV) activity by employees and contract workers.

28. Project-related travel would be limited to only that necessary for efficient project operation during periods when soils are saturated and excessive rutting could occur.

29. Reviews of erosion control structures, culverts, reclamation, etc., would be made by Operator personnel as required by SWPPPs and WDEQ or EPA regulations.

WATER RESOURCES

30. *Operators would comply with U.S. Army Corps of Engineers (COE) requirements when conducting operations in wetlands, riparian areas, open water areas, and ephemeral or intermittent drainages, where practical.* Where ephemeral or intermittent channels would be crossed by roads, culverts or low-water crossings would be installed at all appropriate locations as specified in the BLM Manual 9112 – Bridges and Major Culverts (BLM 1990) and Manual 9113 – Roads (BLM 1985, 1991). Channels would be crossed perpendicular (at right angles) to flow, where practical, and all stream crossing structures would be designed to carry the 25-year discharge event or other capacities as directed by BLM.

31. All non-recycled water used in association with this project would be obtained from Wyoming State Engineer's Office (WSEO)- approved groundwater wells.

32. *Operators would adhere to guidelines specified in SPCCPs.* Any spill or accidental discharge of hazardous material would be remediated. An orientation would be conducted by Operators to ensure that project personnel are aware of the potential impacts that can result from accidental spills and that they know the appropriate recourse if a spill occurs.

33. Erosion-prone areas (e.g., drainages) or high-salinity areas would be avoided where practical, and necessary construction in these areas would be done in the late summer, fall, and winter (prior to soil freezing) to avoid runoff periods. Proper containment of oil and produced water in tanks, drilling and fracturing fluids in tanks or reserve pits, and the location of staging areas for equipment storage away from drainages would prevent potential contaminants from entering surface waters.

34. Prudent use of erosion control measures, including diversion terraces, riprap, matting, temporary sediment traps, and water bars, would be employed as necessary. Interceptor dikes or waterbars would be used to control surface runoff generated at well pads, where necessary. Erosion control and construction methods would be described in APD and ROW plans, if necessary. If water is discharged into an established drainage channel, the rate of discharge would not exceed the capacity of the channel to convey the increased flow without creating erosion induced channel adjustments. Waters that do not meet applicable state or federal standards would be evaporated, treated, or disposed of at an approved disposal facility.

35. Operators would construct reserve pits with 2 feet of freeboard in cut areas or in compacted and stabilized fill. The subsoil material at proposed pit locations would be inspected to assess soil stability and permeability and whether reinforcement and/or lining are required. Prior to installation of reserve pit liners and/or fluids, reserve pits may be inspected by BLM personnel. Unlined earthen reserve pits would be used only after BLM evaluation of the pit location for distance to surface waters, depth to useable groundwater, soil type and permeability, and containment fluid content indicate no potential adverse effects to water resources.

36. If reserve pit leakage is detected, Operators would apply appropriate mitigation techniques in consultation with the BLM.

37. All wells would be cased and cemented to protect subsurface mineral and freshwater zones. Unproductive wells and wells that have completed their intended purpose would be properly abandoned and plugged using procedures identified by the Wyoming Oil and Gas Conservation Commission (WOGCC) and the BLM.

38. Channel crossings by pipelines would be constructed so that the pipe is buried at least 4 feet below the channel bottom.

39. Channel crossings by roads and pipelines would be constructed perpendicular to flow.

40. Disturbed channel beds would be reshaped to their approximate original configuration.

41. Disposal of all water (hydrostatic test water, stormwater, produced water) would be done in conformance with WDEQ/Water Quality Division (WQD) (1993), BLM *Onshore Oil and Gas Order No. 7*, and WOGCC rules and regulations.

42. Operators would prepare SWPPPs for all disturbances greater than 5 acres in size as required by WDEQ National Pollution Discharge Elimination System (NPDES) permit requirements.

43. Operators would implement SPCCPs if liquid petroleum products or other hazardous materials are stored on-site in sufficient quantities, in accordance with 40 CFR 112.

44. Any disturbances to wetlands and/or waters of the U.S. would be coordinated with the COE, and Section 404 permits would be secured as necessary prior to disturbance.

45. To mitigate potential impacts caused by flooding during the LOP, construction in flood-prone areas would be limited to late summer, fall, or winter when conditions are generally dry and flows are low or nonexistent. Additional mitigation to lessen any impacts from flooding or high flows during and after construction would include the avoidance of areas with high erosion potential (i.e., steep slopes, floodplains, unstable soils); reestablishment of existing contours where practical; avoidance of areas within 500 feet of wetland edges, riparian areas, and open water, where practical; avoidance of areas within 100 feet of ephemeral drainages, where practical; and implementation of appropriate erosion and sediment control and revegetation procedures.

46. Increased sedimentation impacts to surface waters would be avoided or minimized through construction and erosion control practices approved with each authorization and through the prompt reclamation of disturbances.

47. *EnCana Oil and Gas (USA) Inc., BP America Production Company, and potentially other Operators would conduct complete water quality analyses as described in EnCana's Proposed Groundwater Monitoring Plan (e.g., pH, alkalinity, total dissolved solids [TDS], oil and grease, benzene) on all newly developed water wells less than 300 feet in depth. Additionally, annual water quality testing new and existing project-required water wells would be implemented to detect water quality changes, and in the event adverse changes are noted, Operators would work with the BLM and the WDEQ if necessary on developing and implementing appropriate corrective actions. Water well drilling and quality analysis reports would be submitted by October 1 of each year to the BLM Pinedale Field Office (PFO), WSEO, and WDEQ/WQD for review.*

NOISE

48. All engines and compressor exhaust stacks would be muffled and maintained according to manufacturers' specifications.

49. Construction, drilling, completion, testing, and production facility installation activities would be seasonally restricted proximal to active raptor nests during the nesting period and in greater sage-grouse breeding and nesting areas, unless this restriction is unnecessary based upon site-specific reviews and the BLM grants a waiver or modification.

50. Road use and travel pattern specifications would be designed, in part, to keep traffic to a minimum and to reduce noise impacts as identified in the Transportation Plan (FEIS Appendix DP-A).

VEGETATION

51. Herbicide applications would be kept at least 500 feet from known BWS plant species populations or other distance deemed safe by the BLM.

52. Removal and disturbance of vegetation would be kept to a minimum through construction site management (e.g., using previously disturbed areas and existing easements, limiting equipment/materials storage yard and staging area sizes, etc.). Well pads and associated roads and pipelines would be located to avoid or minimize impacts in areas of high value (e.g., TEP&C or BWS species habitats, wetland/riparian areas).

53. Proper erosion and sediment control structures and techniques would be incorporated by Operators into the design of well pads, roads, pipelines, and other facilities. Revegetation using a BLM-approved, locally adapted seed mixture containing native grasses, forbs, and shrubs would begin in the first appropriate season following disturbance. Vegetation removed would be replaced with plants of similar forage value and growth form using the following procedures:

    - fall reseeding (September 15 to freeze-up), where feasible;
    - spring reseeding (post-thaw and prior to May 15) if fall seeding is not feasible;
    - deep ripping of compacted soils prior to reseeding;
    - surface pitting/roughening prior to reseeding;

- utilization of native cool-season grasses, forbs, and shrubs in the seed mix;
- interseeding of shrubs into an established stand of grasses and forbs at least 1 year after seeding the grasses and forbs;
- appropriate, approved weed control techniques;
- broadcast or drill seeding, depending on site conditions; and
- fencing of certain sensitive reclamation sites (e.g., riparian areas, steep slopes, and areas within 0.5 mile of livestock watering facilities) as determined necessary through monitoring.

54. Operators would implement the resource, mitigation, and monitoring measures found in the Transportation and Reclamation Plans (FEIS Appendices DP-A and DP-B).

55. Recontouring and seedbed preparation would occur immediately prior to reseeding on the unused portion of well pads and road ROWs and entire pipeline ROWs outside of road ROWs. In the event of uneconomic wells, Operators would initiate reclamation of the entire well pad, access road, and adjacent disturbed habitat as soon as practical. Reclamation would be monitored by the Operators and the BLM, as specified in the Reclamation Plan (FEIS Appendix DP-B), to determine and ensure successful and timely establishment of vegetation.

56. Traffic would be confined to the running surface of roads and well pads as approved in APDs and ROWs. Operators have and will continue to cooperate with the BLM to identify and prohibit use of two-tracks where ROWs have not been obtained.

57. Operators would monitor noxious weed and invasive non-native species of concern occurrence on the JIDPA and implement a noxious weed/non-native species of concern control program in cooperation with the BLM and Sublette County to ensure noxious weed and non-native species of concern invasion does not become a problem. Weed-free certification by county extension agents would be required for grain or straw used for mulching revegetated areas. Gravel and other surfacing materials used for the project would be free of noxious weeds.

58. *Operators would evaluate all project facility sites for occurrence of waters of the U.S., special aquatic sites, and wetlands, per COE requirements. All project activities would be located outside of these areas, where practical.*

59. Where wetlands, riparian areas, and ephemeral or intermittent stream channels must be disturbed, COE Section 404 permits would be obtained if necessary.

WILDLIFE AND FISHERIES

The following practices would be applied for general wildlife protection.

60. Well pads, access roads, pipelines, and ancillary facilities would be located and designed to minimize disturbances to areas of high wildlife habitat value, including wetlands and riparian areas.

61. Areas with high erosion potential and/or rugged topography (i.e., steep slopes, dunes, floodplains, unstable soils) would be avoided, where practical.

62. Removal or disturbance of vegetation would be minimized through construction site management (e.g., by utilizing previously disturbed areas, and existing ROWs where practical, designating limited equipment/materials storage yards and staging areas, vegetation scalping), and Operators would adhere to all reclamation guidelines presented in the Reclamation Plan (FEIS Appendix DP-B).

63. Operators, in consultation with representatives from BLM, Wyoming Game and Fish Department (WGFD), U.S. Fish and Wildlife Service (USFWS), and other interested groups such as area livestock operators, would adhere to the Wildlife Monitoring/Protection Plan for this project (BLM 1998: Appendix D) as annually updated (TRC Mariah 2004). The plan would be incorporated into the Operator field operations manual or handbook, a copy of which would be kept on-site in the JIDPA or with Operator personnel when on-site.

64. To minimize wildlife mortality due to vehicle collisions, Operators would continue to advise project personnel regarding appropriate speed limits (i.e., 35 mph) in the JIDPA, and roads would be reclaimed as soon as possible after they are no longer required. Some existing roads in the area may be closed and reclaimed by Operators as authorized by BLM. Potential increases in poaching would be minimized through employee and contractor education regarding wildlife laws. If violations are discovered, the offending employee or contractor would be disciplined and may be dismissed by Operators and/or prosecuted by WGFD.

65. Reserve, workover, and evaporation pits and other areas that contain hydrocarbons would be adequately protected to prevent access by migratory birds and other wildlife.

66. Firearms and dogs would not be allowed on-site during working hours. Operators would enforce their existing drug, alcohol, and firearms policies.

67. To protect plant populations and wildlife habitat, project-related travel would be restricted to established project roads; no off-road/ROW travel would be allowed, except in emergencies.

68. Wildlife-proof fencing would be utilized on reclaimed areas if it is determined that wildlife species and/or livestock are impeding successful vegetation establishment.

69. ROW fencing associated with this project would be kept to a minimum, and fences, where necessary, would meet BLM and WGFD specifications for facilitating wildlife movement.

70. Potential impacts to fisheries and wetland or riparian areas would be minimized by using proper erosion control techniques (e.g., water bars, jute netting, rip-rap, mulch). Construction within 500 feet of open water, 300 feet of Sand Draw, and 100 feet of other intermittent or ephemeral channels would be avoided, where practical. Channel crossings for roads and pipelines would be constructed during periods of low or no flow (i.e., late summer or fall). All necessary crossings would be constructed perpendicular to flow. No surface water or shallow groundwater in connection with surface water would be utilized for the project.

71. Operators would implement policies designed to control poaching and littering and would notify all employees (contract and company) that conviction of a major game violation could result in

disciplinary action. Contractors would be informed that any intentional poaching or littering within the JIDPA may result in dismissal.

The following practices would be applied for raptors.

72. Operator coordination with BLM, USFWS, and WGFD would be conducted for all mitigation activities related to raptor, TEP&C, and BWS species (and their habitats), and all permits required for relocation, removal, and/or establishment of raptor nests would be obtained.

73. Well pads, pipelines, and associated roads would be selected and designed to avoid disturbance to known active raptor nest sites, where practical.

74. Raptor nest surveys would be conducted within a 1.0-mile radius of proposed surface use or activity areas if such activities are proposed to be conducted between February 1 and July 31.

75. All surface-disturbing activity (e.g., road, pipeline, well pad construction, drilling, completion, workover operations) would be seasonally restricted from February 1 through July 31 within a 0.5-mile radius of all active raptor nests, except ferruginous hawk nests, for which the seasonal buffer would be 1.0 mile. (An active raptor nest is defined as a nest that has been occupied within the past 3 years.) The seasonal buffer distance and applicable exclusion dates may vary, depending on such factors as the activity status of the nest, species involved, prey availability, natural topographic barriers, line-of-site distance(s), and other conflicting issues such as cultural values, steep slopes, etc. Routine maintenance or emergency health and safety activities would be allowed on existing well pads.

76. Well pads, roads, ancillary facilities, and other surface structures requiring repeated human presence would not be constructed within 825 feet of active raptor nests (2,000 feet for bald eagles), where practical. Facility construction in these areas would require specific approval from the BLM.

77. Operators would notify the BLM, USFWS, and WGFD immediately if raptors are found nesting on project facilities and would cooperate with the appropriate agencies as necessary to erect artificial nesting structures.

The following practices would be applied for black-footed ferret.

78. Where practical, surface disturbance in all prairie dog towns would be avoided.

79. Specific requirements for black-footed ferret surveys are no longer specified since the entire JIDPA is included within an area identified by the USFWS as no longer requiring surveys. However, if black-footed ferrets are observed, no further project-specific surface disturbance would occur to the prairie dog complex in which the ferret(s) were observed.

The following measures would be applied for greater sage-grouse, and these measures may be modified, with Operator approval, to facilitate participation in ongoing greater sage-grouse studies.

80. Operators would avoid all surface disturbance (including pipelines) within 0.25 mile of active greater sage-grouse leks.

81. Permanent high-profile structures such as buildings and storage tanks would not be constructed within 0.25 mile of an active lek.

82. Greater sage-grouse nest surveys would be implemented during the nesting season (April 1–July 31) by a qualified biologist prior to the start of construction activities in identified greater sage-grouse nesting habitat within 2.0 miles of active leks, and if an active greater sage-grouse nest is identified, surface-disturbing activities would be delayed until nesting is completed.

83. Operators would avoid optimal greater sage-grouse nesting habitats, where practical. Optimal nesting habitat is defined as areas with sagebrush heights of 20–31 inches and cover of 15–25% and an understory (grasses and forbs) cover of >15%.

84. EnCana Oil and Gas (USA) Inc., BP America Production Company, and potentially other Operators would avoid all drilling and construction activities during the greater sage-grouse strutting period (March 1–May 15) on areas within 1.0 mile of active leks.

85. Operators would utilize directional drilling to access resources beneath the 0.25-mile active greater sage-grouse lek buffers if reserves beneath these locations are deemed economic.

86. Operators would utilize directional drilling to access resources beneath the 600-foot wide (or tall sagebrush-dominated) buffer associated with the Sand Draw protection areas if deemed economic.

87. Operators would cooperate in ongoing greater sage-grouse studies in the area.

88. Operators would cooperate with the WGFD on existing/new greater sage-grouse habitat improvement efforts within Upland Game Bird Management Area 7 (e.g., water developments).

89. To further mitigate potential adverse effects to breeding and nesting greater sage-grouse on the JIDPA, 0.5-mile facility-free buffers would be applied to greater sage-grouse lek 7 south of the JIDPA for as long as Operators continue to hold the leases for these areas. No features requiring repeated human presence would be built within this area.

LIVESTOCK/GRAZING MANAGEMENT

90. Reclamation of nonessential areas disturbed during construction activities would be accomplished in the first appropriate season after well completion. Nonessential areas include portions of the well pads not needed for production operations, the outslope portions of new road ROWs, entire pipeline ROWs outside of road ROWs, and all roads and associated disturbed areas at nonproductive well pads. Operators would repair or replace fences, cattleguards, gates, drift fences, and natural barriers that are damaged by development actions to maintain current BLM standards. Cattleguards would be used instead of gates for livestock control on most road ROWs. Livestock would be protected from pipeline trenches, and livestock access to existing water sources would be maintained.

91. BLM, in coordination with livestock permittees, would monitor livestock movements, especially regarding any impacts to livestock from roads or disturbance from construction and drilling activities. Operators in consultation with the BLM will take appropriate and reasonable measures to correct any adverse impacts, if they occur.

92. All pits containing fluids would be fenced to exclude livestock.

CULTURAL RESOURCES

93. Operators would follow the procedures established by the BLM National Programmatic Agreement/Wyoming State Protocol Agreement (ratified April 1998) for cultural resource management and regulation contained within 36 CFR 800 and would either avoid, protect, or mitigate cultural resource properties.

94. Operators would halt construction activities in the area of concern if previously undetected cultural resource properties are discovered during construction. The BLM would be notified immediately, and consultation with the Wyoming State Historic Preservation Office (SHPO) and/or the Advisory Council on Historic Preservation (ACHP) would be initiated to determine proper mitigation measures pursuant to 36 CFR § 800.13 or other Treatment Plans, Programmatic Agreements, or Discovery Plans that may direct such efforts. Construction would not resume until a Notice to Proceed is issued by the BLM.

95. If areas of religious importance, traditional cultural properties, or other sensitive Native American areas are identified in affected areas, BLM would consult with affected tribes and, in further consultation with Operators, would identify potential impacts and determine appropriate mitigative treatments on a case-by-case basis.

96. Operators in cooperation with the BLM would conduct an educational program to inform employees and contractors about the regulations concerning cultural resource management and artifact collection.

97. All recognized eligible sites, areas of Native American concern, and other recognized sensitive areas would be avoided as much as practical during development permitting. Impacts that cannot be eliminated by avoidance would be mitigated on a case-by-case basis through BLM-approved and SHPO-approved methods. Mitigation may include data recovery (including excavation) and/or Native American consultation/coordination for development in sensitive cultural resource areas, and costs for these efforts would be borne by Operators.

98. Construction in archaeologically sensitive areas during frozen ground conditions would not normally be implemented; exceptions would be considered by the Authorized Officer on a case-by-case basis.

99. Operators would work with the BLM, SHPO, and ACHP in developing and implementing appropriate Programmatic Agreements, Research Designs/ Unanticipated Discovery Plans, Treatment Plans, and/or Cultural Resource Management Plans for the protection of cultural resources in the JIDPA.

SOCIOECONOMICS

100. Operators would encourage the use of local or regional workers.

101. Where feasible, Operators would schedule concentrations of project traffic, such as truck convoys or heavy traffic flows, to avoid periods of expected heavy traffic flows associated with recreation.

102. Travel and parking would be restricted to access roads and on-site parking areas.

103. Where feasible, Operators would plan proposed development operations so that seasonal restrictions do not create a significant reduction in the level of development causing seasonal workforce layoffs (i.e., work continues at a consistent rate year-round).

LAND STATUS/USE/PRIOR RIGHTS

Mitigation to prior rights would include the following:

104. limiting drilling operations to lands leased or owned by the Operators;

105. locating wells away from known underground cables;

106. regrading and repairing roads, as necessary, in areas damaged by project activities;

107. reestablishing a level compacted surface where pipelines cross existing roads;

108. advance identification and flagging of all existing ROWs that would be crossed by proposed pipelines and roads;

109. backhoe and hand excavating at pipeline crossings until the exact locations of existing underground lines have been determined; and

110. restoring native vegetation as soon as practical.

111. Roads and pipelines would be located adjacent to existing linear facilities wherever practical; direct-line routes may be preferable in areas with high well pad densities.

112. Portions of existing roads not included in the new road ROW and not needed by other users would be reclaimed and revegetated by Operators, following Class III cultural resource surveys.

113. Adequate turnouts on new crowned-and-ditched roads would be built to provide access to existing two-tracks and other undeveloped roads.

RECREATION

114. Operators would inform their employees, contractors, and subcontractors that long-term camping (greater than 14 days) on federal lands or at federal recreation sites is prohibited.

115. Operators would direct their employees, contractors, and subcontractors to abide by all state and federal laws and regulations regarding hunting.

VISUAL RESOURCES

116. EnCana Oil and Gas (USA) Inc., BP America Production Company, and potentially other Operators would utilize existing topography to screen roads, pipeline corridors, drill rigs, wells, and production facilities from view, where practical.

117. Operators would paint all aboveground production facilities with appropriate colors (e.g., Shale Green or other environmental color required by BLM) to blend with adjacent terrain, except for structures that require safety coloration in accordance with Occupational Safety and Health Administration (OSHA) requirements.

TRANSPORTATION

118. Operators would implement the resource, mitigation, and monitoring measures found in the Transportation Plan (FEIS Appendix DP-A). Annual transportation planning would occur in coordination with efforts required for the Pinedale Anticline Project (BLM 2000b) to identify the minimum road network necessary to support annually proposed project activities; Operator construction and maintenance responsibilities; and road-specific dust abatement, construction, and surfacing requirements.

119. Existing roads would be used to the maximum extent possible and upgraded as necessary.

120. All new and improved roads not required for routine operation and maintenance of producing wells or ancillary facilities would be reclaimed as directed by the BLM, State Land Board, or private landowner. These roads would be permanently blocked, recontoured, reclaimed, and revegetated by Operators, as would disturbed areas associated with permanently plugged and abandoned wells. Reclamation of existing two-track roads would be considered on a case-by-case basis.

121. On a case-specific basis, centerline survey and construction designs would be submitted to and approved by the BLM prior to road construction.

122. Operators would comply with existing federal, state, and county requirements and restrictions to protect road networks and the traveling public.

123. Special arrangements would be made with the Wyoming Department of Transportation to transport oversize loads to the project area. Otherwise, load limits would be observed at all times to prevent damage to existing road surfaces.

124. All development activities along approved ROWs would be restricted to areas authorized in the approved ROW.

125. Available topsoil would be stripped from all road corridors prior to commencement of construction activities and would be redistributed and reseeded on backslope areas of the borrow ditch after completion of road construction activities. Borrow ditches would be reseeded in the first appropriate season after initial disturbance.

126. When practical and feasible, the Operators would maximize the use of temporary fresh water pipelines during late spring, summer, and early fall from water wells to active drill sites to decrease water hauling needs.

HEALTH AND SAFETY/HAZARDOUS MATERIALS

127. Operators would utilize WDEQ-approved portable sanitation facilities at drill sites.

128. Operators would place warning signs near hazardous areas and along roadways.

129. Operators would place dumpsters at each construction site to collect and store garbage and refuse.

130. Operators would ensure that all refuse and garbage is transported to a state-approved sanitary landfill for disposal.

131. Operators would institute a Hazard Communication Program for its employees and would require subcontractor programs in accordance with OSHA (29 CFR §1910.1200).

132. In accordance with 29 CFR §1910.1200, a Material Safety Data Sheet for every chemical or hazardous material brought on-site would be kept on file at the Operator's field office.

133. SPCCPs would be written and implemented in accordance with 40 CFR §112.

134. Chemical and hazardous materials would be inventoried and reported in accordance with 40 CFR §335. If quantities exceeding 10,000 pounds or the threshold planning quality are to be produced or stored, the appropriate Section 311 and 312 forms would be submitted at the required times to the State and County Emergency Management Coordinators and the local fire departments.

135. Any hazardous wastes, as defined by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, would be transported and/or disposed of in accordance with all applicable federal, state, and local regulations.

136. Operators would adhere to existing internal health and safety policies and procedures.

137. During routine operations, Operators would not release fracturing fluids and condensates into flare pits or surrounding areas; they would be confined in lined pits or tanks.

ADDITIONAL AIR QUALITY MEASURES

Unlike the measures listed in the preceding sections, the following 15 air quality-related measures have been committed to by EnCana Oil and Gas (USA), but not yet agreed to by any of the other Operators in the JIDPA.

1. Regular equipment maintenance, including emissions checks, and regular maintenance of roads would be conducted as necessary throughout the LOP.

2. *Operators would treat primary access roads (e.g., Luman Road, Windmill Road, Burma Road, and North Jonah Road in the JIDPA) and heavily used resource roads as appropriate with dust suppressants (e.g., magnesium chloride) and would water construction sites and well pad access roads as necessary to control fugitive dust during the summer.*

3. *No open burning of garbage or refuse would be allowed at the well sites or other facilities. Any open burning would be conducted under the permitting provisions of Chapter 10, Section 2 of the Wyoming Air Quality Standards and Regulations.*

4. Necessary air quality permits to construct, test, and operate facilities would be obtained from the Wyoming Department of Environmental Quality/Air Quality Division (WDEQ/AQD). All internal combustion equipment would be kept in good working order.

5. *Operators would comply with all applicable local, state, tribal, and federal air quality laws, statutes, regulations, standards, and implementation plans, including Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS).*

6. *Operators would cooperate with BLM and WDEQ in determining regional oxides of nitrogen (NO_x) emission levels.*

7. *Operators would continue to encourage contractors and employees to obey speed limits and support local law enforcement officials in enforcing speed limits (i.e., 35 miles per hour [mph]) to reduce fugitive dust concerns, as well as for human health and safety reasons.*

8. *Operators would cooperate with the implementation of any legally enforceable WDEQ-mandated air quality monitoring program or emissions control program.*

9. *By January 1, 2006, EnCana commits to achieve average drilling rig emissions equivalent to Tier 1 standards or better from 100% of EnCana operated or contracted drilling rigs in the Jonah Field.*

10. *By January 1, 2007, EnCana commits to achieve average drilling rig emissions equivalent to Tier 2 standards or better from 100% of EnCana operated or contracted drilling rigs in the Jonah Field.*

11. *By January 1, 2009, EnCana commits to achieve average drilling rig emissions equivalent to Tier 3 standards or better from 100% of EnCana operated or contracted drilling rigs in the Jonah Field.*

12. *By January 1, 2006, EnCana commits to capture on average through flareless completion techniques, 90% of the hydrocarbon and combustion emissions that would have previously been emitted by flaring during flowback procedures on EnCana operated natural gas wells.*

13. *Where practical and feasible, EnCana commits to reduce traffic and surface disturbance and associated dust and tailpipe emissions by utilizing hub and spoke drilling and completion techniques, centralized fracturing operations, and centralized condensate and water collection.*

14. *Wherever possible, EnCana commits to vertically drill all EnCana operated natural gas wells in the Jonah Field in order to reduce associated NO_x, SO_2, and PM_{10} emissions.*

15. *Where feasible, EnCana commits to establish plant cover for all areas disturbed by EnCana's operations within an agreed time period using accelerated and focused reclamation efforts, stabilized soil stockpiles, using mulch and geotextile fabrics to stabilize soils, if necessary, and watering areas under construction to reduce fugitive dust emissions.*

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Wyoming Department of Environmental Quality, Water Quality Division. 1993. Water Quality Rules and Regulations. Chapter I. Wyoming Department of Environmental Quality, Water Quality Division. 87 pp.

APPENDIX C

ADAPTIVE MANAGEMENT IN THE JONAH INFILL DRILLING PROJECT AREA

APPENDIX C

ADAPTIVE MANAGEMENT IN THE JONAH INFILL DRILLING PROJECT AREA

Introduction

The Bureau of Land Management (BLM) will implement an adaptive management process for the Jonah Infill Drilling Project Area (JIDPA) that will follow the framework described in this appendix. To implement this process, the Jonah Interagency Mitigation and Reclamation Office (JIO) is established and will operate as described below and in the JIO Charter (Attachment C-1) and Escrow Agreement (Attachment C-2).

The potential value of adaptive management to the National Environmental Policy Act (NEPA) process is discussed by Carpenter (1997)[1] and is strongly supported by a number of agencies at the national level, including BLM, U.S. Environmental Protection Agency (EPA), and U.S. Department of Agriculture Forest Service (USFS). Carpenter summarized as follows: "It is increasingly recognized that human interventions into natural systems seldom proceed as originally planned. Scientific uncertainties prevent environmental impacts from being reliably or precisely predicted. Thus, the style of management must provide for monitoring to guide mid-course corrections in adapting to inevitable surprises." Council on Environmental Quality (CEQ) NEPA regulations require continual monitoring.[2]

Purpose and Need

In addition to the uncertainties about how natural systems will react to human interventions, it has become apparent that current development guidelines and Conditions of Approval, and the restriction of 1 well pad/40 acres (16 well pads/640-acre section) authorized in the Modified Jonah Field II Project Area, are not adequate protection for some JIDPA resources. However, national demand makes it imperative that as much natural gas as possible be recovered from the JIDPA. Project proponents are continually striving to develop drilling and production mitigation technologies to lessen the impacts of natural gas recovery, but those technologies are largely untested. There is uncertainty regarding the short- and long-term effectiveness of these new technologies, as well as uncertainty regarding the effectiveness of the mitigations and management restrictions established in this ROD. These uncertainties require that a number of assumptions be used to predict the impacts associated with infill development; those assumptions may or may not be partially or wholly correct, which means the impact analysis may or may not be partially or wholly correct. Also, considering the expected level of impacts associated with proposed development, a significant off-site mitigation program will be necessary.

Uncertainty regarding the accuracy of the predictive assumptions and models used in the impact analysis, and uncertainty regarding how the environment will react to future development in the JIDPA using current and future untested development and mitigation technologies and untried restrictions, creates a need for a mechanism through which BLM can make incremental adjustments to field management over time, as information is gained about how area resources are reacting to new technologies and/or restrictions. That mechanism is adaptive management.

The adaptive management process allows for changes in management without further NEPA analysis, unless designated thresholds are reached. The process increases the speed at which managers learn how resources react to their decisions and development activities, and thereby increases the speed at which managers can adjust mitigation and management restrictions for unanticipated impacts, or lack thereof. The adaptive management framework has several continuous steps: decision is implemented; impacts are monitored; monitoring data are evaluated; modifications to mitigations or management restrictions are recommended, based on monitoring data; adaptive management decision is made and implemented; impacts are monitored; etc.

The purpose of this adaptive management process is to ensure that impacts of development and production are monitored, and the information from that monitoring is evaluated and incorporated, on a regular basis, into future mitigation and management decisions. One of the purposes of the JIO is to implement this adaptive management process in the JIDPA, as well as select and manage all off-site mitigation projects.

Goals and Objectives

- Determine the effects of JIDPA development on area resources;
- Determine the effectiveness of the mitigation measures contained in this ROD;
- Suggest modifications to mitigation measures to achieve the stated goals/objectives;
- Assure oil and gas-related BLM decisions regarding the JIDPA are coordinated with non-oil-and-gas-related decisions (such as grazing, recreation, etc.);
- Provide a rapid response to unnecessary and undue environmental degradation;
- Validate predictive models used in the EIS and revise the models/projections as necessary based on field observations and monitoring;
- Accurately monitor and predict cumulative impacts through BLM maintenance of a Geographic Information System (GIS) for the JIDPA, including all activities (natural gas, agricultural, recreational, etc.) on federal and non-federal lands and how they are affecting area resources;
- Provide guidance for monitoring upon which the need to initiate Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) will be determined.

Implementation Model

BLM will implement and coordinate the adaptive management process. The BLM Pinedale Field Manager will accomplish that by establishing the interagency JIO in the project ROD. The JIO will be staffed by full-time employees or contractors from BLM, Wyoming Department of Environmental Quality (WDEQ), Wyoming Game and Fish Department (WGFD), and Wyoming Department of Agriculture (WDA). Details on JIO objectives and duties are included in the JIO Charter (Attachment C-1).

JIO Functions

The JIO will be fully staffed by the agencies as soon as possible following issuance of this ROD. The scope of work for the JIO is as described in the JIO Charter (Attachment C-1).

JIO Operating Procedures

It is anticipated the JIO will be necessary for the next 5 to 15 years, with funding support provided by EnCana Oil & Gas (USA), Inc. Office oversight will be provided by an Agency Managers Committee consisting of individual agency heads or representatives from BLM, WDEQ, WGFD, and WDA. The Committee will meet at least once per year to provide senior-level guidance, evaluate past progress, and review staffing levels and future needs.

In accordance with an escrow agreement between the Wyoming Wildlife and Natural Resource Trust Account Board (an instrumentality of the State of Wyoming) and the Jonah Interagency Office Charter Members, the Board will receive and hold all compensatory mitigation funding provided by Jonah Operators (Attachment C-2). As the entity charged with selecting, implementing, and monitoring offsite mitigation, the JIO will maintain an accurate accounting of all compensatory mitigation fund expenditures and provide the Agency Managers Committee an annual financial report.

Specific JIO operational procedures will be developed by the office staff to meet defined goals and objectives.

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[1] Carpenter, R.A. 1997. "The Case for Continuous Monitoring and Adaptive Management Under NEPA." In *Environmental Policy and NEPA*. R. Clark and L. Canter, eds. Boca Raton, FL: St. Lucie Press.

[2] CEQ regulations require appropriate application of continual monitoring and assessment. Section 102(2)(B) of NEPA calls for "methods…which will insure that presently unquantified environmental amenities and values may be given appropriate consideration." CEQ regulations at 40 CFR 1505.2(c) and 1505.3(c) state, "a monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation" and that agencies "may provide for monitoring to assure that their decisions are carried out and should do so in important cases." The lead agency must, "upon request, inform cooperating or commenting agencies on progress in carrying out mitigation measures which they have proposed and which were adopted by the agency making the decision," and, "upon request, make available to the public the results of relevant monitoring."

ATTACHMENT C-1

United States Department of the Interior
Bureau of Land Management
State of Wyoming
CHARTER

1. OFFICIAL DESIGNATION: Jonah Interagency Mitigation and Reclamation Office

2. BACKGROUND: The Jonah Natural Gas Field is an area of west central Wyoming, south of the town of Pinedale, and within the Upper Green River Basin. It includes about 30,000 acres of rolling sagebrush covered lands that are about 80 percent federally managed surface and 83 percent federally managed minerals. It is an area of intense oil and gas development in 'tight sands'. The drilling spacing necessary to efficiently recover the oil and gas resource is denser than in traditional oil and gas field development. Further, the area has visual, wildlife, and other resource values that complicate resource management issues.

3. PURPOSE: The Jonah Interagency Office (Project Office) will provide the services necessary to execute plans, monitoring, and other activities necessary to assure the effectiveness of land management recommendations, reclamation actions, and mitigation in the vicinity of the Jonah Natural Gas Field in accordance with the Record of Decision (ROD) for the Jonah Infill Drilling Project. In addition the Project Office will provide oversight of funds available for reclamation monitoring and mitigation (offsite and onsite).

The scope of work for the Project Office includes the following:

- Oversee the selection and effectiveness of 30,000 – 90,000 acres of offsite mitigation
- Inspect and verify compliance on up to 15,000 acres of surface reclamation
- Inspect and monitor reclamation on up to 3,100 new well locations.
- Insure compliance with the Wyoming DEQ Air Quality and Water Quality rules and regulations
- Monitor big game and sage grouse populations
- Assure habitat restoration
- Monitor livestock utilization of existing permits
- Validate, coordinate, and oversee research
- Coordinate transportation planning
- Assure vegetation surveys/Invasive species control
- Provide information to the respective agencies and the public regarding impacts, monitoring data, and mitigation success

4. OFFICE OBJECTIVES AND DUTIES: The Project Office will be staffed by full time employees or contractors of the responsible agencies. All personnel will have primary duties related to the implementation or support of monitoring and environmental compliance and permitting, focusing on, but not limited to, air, water, wildlife, and reclamation monitoring of on-site and designated off-site mitigation acres related to Jonah Field development. Any tasks assigned to these employees or contractors outside this primary function would be supported by funds other than those described below in paragraph 10. The Bureau of Land Management will maintain the lease for the Project Office space.

Public and interagency reporting of resource conditions will occur on a regular basis. From time to time, state agencies may meet with interested citizens to inform interested stakeholders, and to discuss ongoing and anticipated mitigation and monitoring.

The BLM Project Office Coordinator will draft and submit to the Managers Committee for approval an operating plan that will prescribe standard office procedures. These standard procedures will include procedures for disbursement of Project Office funds, timing of funding requests and procedures for reporting to the Managers Committee. This initial report is due before March 31, 2006. Upon approval, these procedures will become an attachment to this Charter.

5. TERMINATION DATE: The cooperators anticipate that a need for an expanded personnel presence in the vicinity of the Jonah Natural Gas Field will continue to exist for the next 5 to 15 years. Periodically, the interagency staff will meet to review Project Office staffing needs and need for continuance of the individual staff.

6. JONAH INTERAGENCY OFFICE MANAGEMENT:

Jonah Project Office Coordinator
Bureau of Land Management
Department of the Interior
432 East Mill Street
P.O. Box 768
Pinedale, Wyoming 82941

7. ADMINISTRATIVE SUPPORT: Administrative support and funding for the Project Office will be provided by Encana Oil and Gas (USA) Inc. contributions as set forth in No. 10 below.

8. ESTIMATED ANNUAL COST: The Project Office will require approximately $600,000 annually for all personnel, support, and office costs. This is established as follows:

- Initial staffing for the office: $500,000
- Building Rental in Pinedale: $24,000
- Computers, software, furniture, technical support, and vehicles: $76,000

Each of the agencies listed in No. 9 below will employ a person/contractor to accomplish the work identified above. Annually, each of the Chartered Members in No. 9 will develop a budget. All Chartered Members will concur on budget estimates. Annually, or at another mutually agreed to interval, the duties and needs for each Project Office position will be examined by the Agency Managers Committee and mutually agreed to adjustments will be made. This could include office staffing increases, decreases, identification and expansion or contraction of duties. The primary duty location of the team is Pinedale, Wyoming.

9. JONAH INTERAGENCY OFFICE CHARTERED MEMBERS:

A. Wyoming Department of Agriculture
B. Wyoming Game and Fish Department
C. Wyoming Department of Environmental Quality
D. United States Department of the Interior/Bureau of Land Management

The Chartered Members will approve all disbursements of funds contributed by Encana Oil and Gas (USA) Inc. or other industry contributors for the purpose of wildlife habitat improvement, resource monitoring and/or other mitigation.

10. FUNDING: Encana Oil and Gas (USA) Inc. will provide funding to support the costs of the project office, for a period of 6 years. The Project Office funding mechanism will be memorialized in the Jonah Infill EIS ROD. It is expected that participating operator(s) will see timely permitting to the extent permitted by law. Other time economies related to confirmation of reclamation activities and increased public visibility of timely and successful environmental remediation and reclamation are also anticipated.

11. NATURE AND DUTIES OF THE AGENCY MANAGERS COMMITTEE: At least once per year, the Agency Managers committee, consisting of the agency heads or representatives from the Agencies in No. 9 above, and a single member of each of the oil and gas industry proponents involved in the Project Office will meet. At that annual oversight meeting, progress will be evaluated, and direction, coverage, and staffing for the next year would be considered and adopted. At a minimum, the Agency Managers committee would provide the 'big picture' needs for the Project Office. For the initial period, this would include: 1) Establish the initial mitigation and monitoring program for Air, Water, Wildlife, Livestock and Reclamation: 2) selection and utilization of appropriate software or reporting standards to insure that all data collected would be stored and utilized in meeting the monitoring commitments contained in EIS's and other environmental documents: 3) Coordination and tracking of ongoing research being conducted in the Jonah Project area to provide advice and recommendations on environmental monitoring and needed science to document the effects of Energy development: and 4) Reporting.

12. AUTHORITY: The establishment of the Project Office is in the public interest in connection with the duties and responsibilities delegated to the BLM by the Secretary of the United States Department of the Interior in managing the public lands under section 307(b) of the Federal Land Policy and Management Act of 1976, 43 USC § 1737 (b).

13. Nothing in this charter shall change the responsibilities or negotiated agreements of any State agency as it relates to dealing with impacts of development in southwest Wyoming.

Jonah Interagency Office Charter Members

For the Wyoming Department of Agriculture:

By: _____ Date Signed: 2-14-06

For the Wyoming Game and Fish Department:

By: _____ Date Signed: 2-14-06

For the Wyoming Department of Environmental Quality:

By: _____ Date Signed: 2/14/06

For the United States Department of Interior Bureau of Land Management:

By: _____ Date Signed: 2/27/06

ATTACHMENT C-2

ESCROW AGREEMENT

The Wyoming Wildlife and Natural Resource Trust Account Board ("Escrow Agent"), an instrumentality of the State of Wyoming, and the Jonah Interagency Office Charter Members ("JIOCM"), an inter-agency group organized in the Charter of the Jonah Interagency Mitigation and Reclamation Office (attached, section 9), enter into this Escrow Agreement for the purposes of mitigating the loss of wildlife habitat function caused by the development of oil and gas in the Jonah Field. All terms not otherwise defined herein shall have the meaning ascribed in the Schedule of Definitions in Exhibit A hereto.

RECITALS

A. EnCana Oil & Gas (USA) Inc. and other oil and gas companies proposed in 2002 to expand their existing, approved drilling program by increasing the density of well spacing from 40 acre spacing to 10- and 5- acre spacing (a process termed in-fill drilling). At these proposed wellhead densities, the opportunities for mitigating the impacts of development and production activities at the site of impact are reduced, sometimes to the point of ineffectiveness. Because of the recognized potential impacts to surface resources (particularly wildlife and air quality) resulting from these high-intensity gas field activities, some of the companies (collectively the "Contributing Companies") agree to deposit funds into an Escrow Account for purposes of funding a program of compensatory mitigation (sometimes referred to as "off-site" mitigation) to offset the impacts of gas field development. The Contributing Companies commit to place certain funds to be used exclusively for either the purpose of Wildlife Habitat Improvement or that of Resource Monitoring and Other Mitigation, all of which escrow funds shall constitute the Escrowed Monies (as defined in Section 1.2 hereto).

B. The Escrow Agent is authorized to enter into this Escrow Agreement pursuant to Wyo. Stat. §§ 9-15-103(a), 9-15-103(c), 9-15-104 (g)(ii) and in accordance with the criteria enumerated in Section 9 of the Rules and Regulations of the Wildlife and Natural Resource Trust Account Board adopted pursuant to Wyo. Stat. § 9-15-104(f)(vi).

C. The Escrow Agent must invest, maintain, and apply the Escrowed Monies in the manner hereinafter set forth.

NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein, the parties hereto agree as follows:

Section 1. ESCROW OF MONIES

1.1 Deposit of Monies by Contributing Companies. On or before April 1 and on each anniversary thereof, the Contributing Companies shall deposit funds with the Escrow Agent for the Jonah Field Wildlife Habitat Improvement, Monitoring and Other Mitigation Account (collectively referred to as the Escrow Account). The amount to be deposited is based on estimated

annual costs as determined by the JIOCM; the maximum yearly amount can not be more than 20% of the total EnCana Oil & Gas Inc. commitment in any one year.

1.2 Escrowed Monies. Cash funds and investments in the Escrow Account, together with any income, including interest or profit received or made by the Escrow Agent in respect of monies on deposit under this Escrow Agreement, shall constitute the "Escrowed Monies". The Escrow Agent agrees to accept the Escrowed Monies, which shall be held in trust by the Escrow Agent for the use and benefit of the Jonah Field mitigation, and shall be withdrawn and applied only on and subject to the terms set forth in Section 3 hereto.

Section 2. INVESTMENT OF ESCROWED MONIES

2.1 Permitted Investments. The Escrow Agent agrees to invest the Escrowed Monies in accordance with the State of Wyoming's master investment policy established pursuant to Wyo. Stat. § 9-4-709.

2.2 Reporting and Auditing.

(a) The Escrow Agent shall furnish to EnCana Oil & Gas (USA) Inc. and the JIOCM, on or prior to the fifteenth business day of each month, a statement showing the total amount of Escrowed Monies and Escrowed Interest on deposit in, and all deposits to, and disbursements from, the Escrow Account for the previous month.

(b) The JIOCM have the right to periodically audit the Escrow Account and may choose to exercise their right with reasonable notice and during normal business hours.

Section 3. DISBURSEMENT OF ESCROWED MONIES

The Escrow Agent shall disburse Escrowed Monies upon the receipt of, and in accordance with, written instructions from the Jonah Interagency Project Office Coordinator, such written instructions to be jointly agreed to by all Charter Members of the Jonah Interagency Office.

The Jonah Interagency Project Office Coordinator shall submit an order for disbursement no more frequently than four (4) times per month. Upon receipt of an order substantially in the form of Exhibit B hereto, executed by the Jonah Interagency Project Office Coordinator, the Escrow Agent must disburse the Escrowed Monies in the manner requested on the certificate within ten (10) business days.

Section 4. THE ESCROW AGENT.

The Escrow Agent hereby accepts the duties and responsibilities of the Escrow Agent hereunder on and subject to the following terms and conditions:

4.1 Scope of Undertaking. Escrow Agent's duties and responsibilities in connection with

this Escrow Agreement shall be purely ministerial and shall be limited to those expressly set forth in this Escrow Agreement. Escrow Agent is not a principal, participant, or beneficiary in any transaction underlying this Escrow Agreement and shall have no duty to inquire beyond the terms and provisions hereof. Escrow Agent shall have no responsibility or obligation of any kind in connection with this Escrow Agreement or the Escrowed Monies and shall not be required to deliver the Escrowed Monies or any part thereof or take any action with respect to any matters that might arise in connection therewith, other than to receive, hold, invest, reinvest and deliver the Escrowed Monies as herein provided. Escrow Agent shall not be liable for any error in judgment, any act or omission, any mistake of law or fact, or for anything it may do or refrain from doing in connection herewith. It is the intention of the parties hereto that Escrow Agent shall never be required to use, advance, or risk its own funds or otherwise incur financial liability in the performance of any of its duties or the exercise of any of its rights and powers hereunder.

4.2 Sovereign Immunity. The State of Wyoming and Escrow Agent do not waive sovereign immunity by entering into this Escrow Agreement and specifically retain immunity and all defenses available to them as sovereigns pursuant to Wyo. Stat. § 1-39-104(a) and all other state law.

4.3 Resignation; Removal; Successors.

(a) The Escrow Agent may resign and be discharged of the trusts created hereunder by mailing notice specifying the date when such resignation shall take effect to the Jonah Interagency Project Office Coordinator. Such resignation shall take effect on the day specified in such notice (being not less than 30 days after the mailing of such notice) unless previously a successor escrow agent shall have been appointed as hereinafter provided, in which event such resignation shall take effect immediately upon the appointment of such successor.

(b) The Escrow Agent may be removed and a successor escrow agent may be appointed at any time by an instrument in writing contemporaneously delivered to the Escrow Agent, or to such successor escrow agent. Such instrument must be executed by the JIOCM. The successor escrow agent must meet the qualifying criteria set forth below in Section 4.3 (c) and agree in writing to be bound by all of the terms and conditions of this Escrow Agreement.

(c) Any successor escrow agent shall be a state or national bank, financial institution, or trust company in good standing, organized under the laws of the United States of America or any State thereof, having a capital, surplus, and undivided profits aggregating at least US $500,000,000.00, unless JIOCM agrees otherwise.

4.4 Acceptance of Appointment. Every successor escrow agent appointed hereunder shall execute and deliver to its predecessor and JIOCM an instrument in writing accepting such appointment hereunder, and thereupon such successor escrow agent, without any further act, deed, or conveyance, shall become fully vested with all the estates, properties, rights, powers, trusts, duties, and obligations of its predecessor; but such predecessor shall, nevertheless, on the written request of JIOCM execute and deliver an instrument transferring to any successor escrow agent all the estates,

properties, rights, titles, powers, and trusts of such predecessor hereunder. Should any deed, conveyance, or instrument in writing from JIOCM be required to more fully and certainly vest in such successor escrow agent the estates, rights, titles, powers, and duties hereby vested, any and all such instruments in writing shall, on request of the successor escrow agent, be executed and delivered by JIOCM.

4.5 Compensation. The Escrow Agent shall be entitled to reasonable and customary compensation for all services rendered, and to reimbursement for all reasonable expenses, disbursements, and advances incurred or made by it in and about the administration of the trusts herein provided for, and in and about enforcement or other protection of this Escrow Agreement. For purposes of this Escrow Agreement, compensation shall be one quarter of one percent (0.25%) of the Escrowed Monies. For purposes of this Section, compensation shall be calculated on the total sum of Escrowed Monies deposited during the calendar year and shall be immediately payable to the Wildlife and Natural Resource Income Account on December 31 of each year.

4.6 Collection. Unless otherwise specifically indicated herein, the Escrow Agent shall proceed as soon as practicable to collect any checks or other collection items at any time deposited hereunder and be entitled to have its legal fees and costs reimbursed from Escrowed Monies.

4.7 Authority. The Escrow Agent represents and warrants that it has the necessary power and authority to execute, deliver, and perform its obligations under this Escrow Agreement.

4.8 Unenforceability. If for any reason this Escrow Agreement is rendered unworkable, unenforceable, or illegal, the Escrowed Monies, together with all interest and earnings thereon, less any accrued compensation due Escrow Agent pursuant to Section 4.5 of this Escrow Agreement, shall revert to the Successor Escrow Agent upon their appointment under Section 4.3 of this Escrow Agreement.

Section 5. MISCELLANEOUS.

5.1 Successors and Assigns. Whenever any of the parties hereto is referred to, such reference shall be deemed to include the successors and permitted assigns of such party; and all the covenants, promises, and agreements in this Escrow Agreement contained by or on behalf of the Escrow Agent shall bind and inure to the benefit of the respective successors and permitted assigns of such parties, whether so expressed or not.

5.2 Separability. The unenforceability or invalidity of any provision or provisions of this Escrow Agreement shall not render any other provision or provisions herein contained unenforceable or invalid.

5.3 Amendments. Any term, covenant, agreement, or condition of this Escrow Agreement may be amended or compliance therewith may be waived—either generally or in a particular instance, and either retrospectively or prospectively—by an instrument in writing,

executed and agreed to by Escrow Agent and JIOCM.

5.4 Notices. Any notice or other communication required or permitted to be given under this Escrow Agreement by any party hereto to any other party hereto shall be considered as properly given if in writing and (a) delivered against receipt therefore, (b) mailed by registered or certified mail, return receipt requested and postage prepaid, or (c) sent by tele-facsimile machine, in each case to the address or tele-facsimile number, as the case may be, set forth below:

If to JIOCM:	Jonah Interagency Office Project Coordinator Bureau of Land Management P.O. Box 768 Pinedale, WY 82941 - 0768
If to the Escrow Agent:	Wyoming Wildlife and Natural Resource Trust Account Board 500 East Fremont Riverton, Wyoming 82501
If to EnCana Oil & Gas (USA) Inc:	EnCana Oil & Gas (USA) Inc. Jonah Team Lead 370 17th Street Suite 1700 Denver, CO 80202

Or to such other address as any of the parties hereto may have substituted therefore by written notification to the other parties hereto in accordance with this Section 5.4. Delivery of any communication given in accordance herewith shall be effective only upon actual receipt thereof by the party or parties to whom such communication is directed. Whenever under the terms hereto the time for giving a notice or performing an act falls upon a Saturday, Sunday, or Legal Holiday, such time shall be extended to the next business day.

5.5 Governing Law. This Escrow Agreement shall be construed in accordance with and governed by the laws of the State of Wyoming.

5.6 Counterparts. This Escrow Agreement may be executed and delivered in any number of counterparts, each of such counterparts constituting an original but all together only one agreement.

5.7 Termination. JIOCM may terminate this Escrow Agreement at will, in a writing executed by the JIOCM, and the Escrow Agent shall, upon termination, pay over Escrowed Monies, less any accrued compensation as set described under Section 4.5 of this Escrow Agreement, as JIOCM shall direct.

IN WITNESS WHEREOF, the parties hereto have caused this Escrow Agreement to be executed and delivered as of the date shown in the first paragraph of this document.

Jonah Interagency Office Charter Members

For the Wyoming Department of Agriculture:

By: _____ Date Signed: 2-14-06

For the Wyoming Game and Fish Department:

By: _____ Date Signed: 2-14-06

For the Wyoming Department of Environmental Quality:

By: _____ Date Signed: 2/14/06

For the United States Department of Interior/Bureau of Land Management:

By: _____ Date Signed: 2/27/06

Approved as to form for the Wyoming State Agencies:

By: _____ Date Signed: 2-16-06
State of Wyoming Attorney General's Office

WYOMING WILDLIFE AND NATURAL RESOURCES TRUST ACCOUNT BOARD "Escrow Agent"

By _____ Date Signed: 2/23/06
Delaine Roberts, Chairman

Exhibit A to
Escrow Agreement

SCHEDULE OF DEFINITIONS

"Administrative Fees" shall mean annual administrative service fees of the Escrow Agent.

"Business day" shall mean any day that is not a Saturday, Sunday or Legal Holiday.

"Legal Holiday" shall mean any Monday through Friday in which mail is not delivered by the United States Postal Service, and any day on which the New York Stock Exchange is closed.

Exhibit B to
Escrow Agreement

ORDER TO DISBURSE

_____, 20____

Wyoming Wildlife and Natural Resource Trust Account Board

Members of the Board:

Reference is made to the Escrow Agreement of (date) _____, (the "Escrow Agreement") among the Jonah Interagency Office Charter Members ("JIOCM") and the Wyoming Wildlife and Natural Resource Trust Account Board. The authorized officer of JIOCM, in accordance with Section 3 of the Escrow Agreement, authorizes and directs you to disburse $_____ from Escrowed Monies on deposit in the Escrow Account, on the date hereto to _____, at [Bank and Account information or Address].

Very truly yours,

Jonah Interagency Office Project Coordinator

By:
Name:_____
Title: _____
Date: _____

APPENDIX D

U.S. FISH AND WILDLIFE SERVICE CONCURRENCE LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6
ES

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

DEC 19 2005

Memorandum

To: Field Manager, Bureau of Land Management, Pinedale, Wyoming
Attention: Priscilla Mecham

From: ACTING Regional Director, Region 6
U.S. Fish and Wildlife Service
Denver, Colorado

Subject: Final Biological Opinion for the Jonah Infill Drilling Project, Sublette County, Wyoming

In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), and the Interagency Cooperation Regulations (50 CFR 402), this document transmits the U.S. Fish and Wildlife Service's (USFWS) biological opinion based on our review of the proposed Jonah Infill Drilling Project (Project) located in Sublette County, Wyoming, and its effects on the endangered Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*) and their critical habitats. Your October 25, 2005, correspondence requesting initiation of formal consultation was received on October 28, 2005.

This biological opinion is based primarily on our review of the information in your request letter and supplemental information regarding the proposed actions and the estimated average annual water depletion. A complete administrative record of this consultation is on file at the USFWS Wyoming Field Office. Copies of this opinion should be provided to the applicant because the USFWS has incorporated reasonable and prudent alternatives that should be included as conditions of any authorization issued by the Bureau of Land Management (BLM) for this Project.

With respect to critical habitat, this biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Jonah Infill Drilling Project Area currently encompasses approximately 30,500 acres located in portions of Townships 28 and 29 North, Ranges 107 through 109 West, in Sublette County approximately 32 miles southeast of Pinedale and 28 miles northwest of Farson, Wyoming. There are 501 producing and shut-in natural gas wells within the Project Area as well as extensive infrastructure including roads and pipelines for natural gas production.

The proposed expansion of the existing Project includes drilling up to 3,100 new wells and 16,200 acres of new surface disturbance over the next 12.4 years. This proposed expansion includes--a minimum of 64 well pads per 640-acre section; downhole well spacing from 1 bottomhole every 5 acres to one bottomhole every 40 acres; 465 miles of new resource roads with associated pipelines; 8 miles of new collector/local roads; 41 acres of new surface disturbance for ancillary facilities; and 100 acres of new surface disturbance for exploration of other geologic formations. A total of 12,400 acre-feet of water from the Green River Basin in Wyoming will be used for well drilling, hydrostatic testing of pipelines, and dust abatement associated with this proposed expansion of the Jonah Infill Drilling Project.

An additional component of the proposed Jonah Infill Drilling Project is the Bird to Opal III compressor station and pipeline. There will be one 36-inch diameter pipeline that will be 17 miles long and two segments of 24-inch diameter pipeline that will be 51 miles long. Hydrostatic testing of these pipelines will require a total of 16.2 acre-feet of water from the Green River Basin in Wyoming.

Habitat reclamation for areas disturbed by the proposed Project is described in the Jonah Gas Field Native Habitat Surface Reclamation Project Plan. This reclamation plan will characterize the physical and biological nature of the Jonah field's soils and vegetation to be used in design site goals and prescriptions for reclamation. Six treatments have been identified for experimental vegetation plantings. Approximately 67 acre-feet of water from the Green River Basin will be used to hold topsoil in place and to provide moisture for planting and seed germination.

Consequently, the revised Jonah Infill Drilling Project and associated Project components as described above will result in a total depletion to the Green River Basin in Wyoming of 12,483 acre-feet over the 12.4 year life of the project. The average annual depletion over the life of the project is 1,006.7 acre-feet.

Our regulations define the action area as all areas directly or indirectly affected by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The subject Project water depletion would result in a loss of water from the point of removal within the Green River Basin in Wyoming, continuing downstream to the confluence with the Colorado River, and downstream to Lake Powell. Therefore, the action area designation begins at the water removal location as described above downstream to Lake Powell.

STATUS OF THE SPECIES AND CRITICAL HABITAT

COLORADO PIKEMINNOW

Species Description

The Colorado pikeminnow is the largest cyprinid fish (minnow family) native to North America and evolved as the main predator in the Colorado River system. It is an elongated pike-like fish that during predevelopment times may have grown as large as 6 feet in length and weighed nearly 100 pounds (Behnke and Benson 1983). Today, Colorado pikeminnow rarely exceed 3 feet in length or weigh more than 18 pounds; such fish are estimated to be 45 to 55 years old (Osmundson et al. 1997). The mouth of this species is large and nearly horizontal with long slender pharyngeal teeth (located in the throat), adapted for grasping and holding prey. The diet of Colorado pikeminnow longer than 3 or 4 inches consists almost entirely of other fishes (Vanicek and Kramer 1969). Males become sexually mature earlier and at a smaller size than do females, though all are mature by about age 7 and 20 inches in length (Vanicek and Kramer 1969; Seethaler 1978; Hamman 1981). Adults are strongly countershaded with a dark, olive back, and a white belly. Young are silvery and usually have a dark, wedge-shaped spot at the base of the caudal fin.

Status and Distribution

Based on early fish collection records, archaeological finds, and other observations, the Colorado pikeminnow was once found throughout warmwater reaches of the entire Colorado River Basin down to the Gulf of California, and including reaches of the upper Colorado River and its major tributaries, the Green River and its major tributaries, and the Gila River system in Arizona (Seethaler 1978). Colorado pikeminnow apparently were never found in colder, headwater areas. Seethaler (1978) indicated that the species was abundant in suitable habitat throughout the entire Colorado River Basin prior to the 1850s. No historic records exist that would indicate how far upstream Colorado pikeminnow once occurred in the Colorado River. The only reliable account of the species occurring upstream of the Price Stubb Dam near Palisade, Colorado, is from a USFWS biologist who reports having captured Colorado pikeminnow in Plateau Creek approximately 2-3 miles upstream from the Colorado River confluence while angling there around 1960 (Osmundson 2001).

By the 1970s, Colorado pikeminnow were extirpated from the entire lower basin (downstream of Glen Canyon Dam) and from portions of the upper basin of the Colorado River as a result of major alterations to the riverine environment. Having lost 75 to 80 percent of its former range (Miller 1961; Moyle 1976; Tyus 1991; Osmundson and Burnham 1998), the Colorado pikeminnow was federally listed as an endangered species in 1967 (32 FR 4001).

Colorado pikeminnow are presently restricted to the Upper Colorado River Basin and inhabit warmwater reaches of the Colorado, Green, and San Juan Rivers and associated tributaries. The species inhabits about 350 miles of the mainstem Green River from its confluence with the Colorado River upstream to the mouth of the Yampa River. In the Yampa River, its range extends upstream an additional 160 miles. Colorado pikeminnow also occur in the lowermost

104 miles of the White River, another tributary to the Green River. In the mainstem Colorado River, distribution of the species extends 201 miles upstream from the upper end of Lake Powell to Palisade, Colorado (Tyus 1982).

Colorado pikeminnow are found in the Gunnison River as far upstream as the Hartland Diversion Dam, which is a barrier to upstream fish passage, located approximately 57 miles upstream of the Redlands Diversion Dam (Burdick 1995). Colorado pikeminnow use most of the Gunnsion River between the Redlands Diversion and the Hartland Diversion (Burdick 1995). A suspected spawning area was located between river mile 32 and 33 (Burdick 1995; McAda 2003). Colorado pikeminnow larvae were collected in the Gunnison River in 1995 and 1996 (Anderson 1999). Collection of larval fish provides evidence of spawning, but does not locate specific spawning locations.

Osmundson and Burnham (1998) summarized the status and trend of the Colorado River population of Colorado pikeminnow. They found that numbers were low but new individuals were actively recruiting to the adult population, and recruitment largely occurs in pulses from infrequent strong year classes. These investigators concluded that low adult numbers and infrequent pulsed recruitment make this population vulnerable to extirpation over time from both natural fluctuations in numbers as well as from continued changes in habitat.

Threats

Major declines in Colorado pikeminnow populations occurred during the dam-building era of the 1930s through the 1960s. Behnke and Benson (1983) summarized the decline of the natural ecosystem, pointing out that dams, impoundments, and water use practices drastically modified the river's natural hydrology and channel characteristics throughout the Colorado River Basin. Dams on the mainstem broke the natural continuum of the river ecosystem into a series of disjunct segments, blocking native fish migrations, reducing temperatures downstream of dams, creating lacustrine habitat, and providing conditions that allowed competitive and predatory nonnative fishes to thrive both within the impounded reservoirs and in the modified river segments that connect them. The highly modified flow regime in the lower basin coupled with the introduction of nonnative fishes decimated populations of native fish.

Major declines of native fishes first occurred in the lower basin where large dams were constructed from the 1930s through the 1960s. In the upper basin, the following major dams were not constructed until the 1960s--Glen Canyon Dam on the mainstem Colorado River, Flaming Gorge Dam on the Green River, Navajo Dam on the San Juan River, and the Aspinall Unit Dams on the Gunnison River. To date, some native fish populations in the Upper Basin have managed to persist, while others have become nearly extirpated. River segments where native fish have declined more slowly than in other areas are those where the hydrologic regime most closely resembles the natural condition, where adequate habitat for all life phases still exists, and where migration corridors are unblocked and allow connectivity among life phases.

The Redlands Diversion Dam restricted upstream travel of Colorado pikeminnow in the lower Gunnison River between 1917 and 1996. A small remnant population persisted upstream of the dam. Five adult Colorado pikeminnow were captured in the Gunnison River between 1992 and 1994 (Burdick 1995). Earlier studies captured four adult Colorado pikeminnow in the Gunnison

River between river mile 22.1 and 31.4 (Valdez et al. 1982a). In 1996 the fish ladder was constructed around the Redlands Diversion Dam, and 62 Colorado pikeminnow have ascended the fish ladder. In addition, 1,050 Colorado pikeminnow (150-300 millimeters long) were stocked in the Gunnison River at Delta in 2003.

In the mainstem Colorado River, the magnitude of spring flows has declined by 30 to 45 percent since the early part of the century (Osmundson and Kaeding 1991; Van Steeter 1996; Pitlick et al. 1999). Such flow reduction negatively affects Colorado pikeminnow in four ways--1) reducing the river's ability to build and clean cobble bars for spawning; 2) reducing the dilution effect for waterborne contaminants from urban and agricultural sources that may interfere with reproductive success; 3) reducing the connectivity of main-channel and bottomland habitats needed for habitat diversity and productivity; and 4) providing a more benign environment for nonnative fish and invasive nonnative, bank-stabilizing shrubs (salt cedar) to persist and flourish (Osmundson and Burnham 1998). In general, the existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Nonnative fishes compete with native fishes in several ways. The capacity of a particular area to support aquatic life is limited by physical habitat conditions. Increasing the number of species in an area usually results in a smaller population of most species. The size of each species population is controlled by the ability of each life stage to compete for space and food resources and to avoid predation. Some nonnative fishes' life stages appear to have a greater ability to compete for space and food and to avoid predation in the existing altered habitat than do some native fishes' life stages.

Nonnative fishes are often stocked in and enter rivers from off-channel impoundments. The periodic introduction of these nonnative fishes into a river allows them to bypass limitations to reproduction, growth, or survival that they might encounter in the river. Consequently, populations of nonnative fishes in the river are enhanced. Endangered and other native species in the river experience greater competition and predation as a result.

Life History

The life-history phases that appear to be most critical for the Colorado pikeminnow include spawning, egg hatching, development of larvae, and the first year of life. These phases of Colorado pikeminnow development are tied closely to specific habitat requirements. Natural spawning of Colorado pikeminnow is initiated on the descending limb of the annual hydrograph as water temperatures approach or exceed 20°C (Vanicek and Kramer 1969; Hamman 1981; Haynes et al. 1984; Tyus 1990; McAda and Kaeding 1991). Temperature at initiation of spawning varies somewhat by river--in the Green River, spawning begins as temperatures exceed 20-23°C; in the Yampa River, 16-23°C (Bestgen et al. 1998); in the Colorado River, 18-22°C (McAda and Kaeding 1991). Spawning, both in the hatchery and under natural riverine conditions, generally occurs in a 2-month timeframe between late June and late August. However, in the natural system, sustained high flows during wet years may suppress river temperatures and extend spawning into September (McAda and Kaeding 1991). Conversely, during low flow years, when the water warms earlier, spawning may commence in mid-June.

Temperature has an effect on egg development and hatching success. In the laboratory, egg development was tested at five temperatures and hatching success was found to be highest at 20°C, lower at 25°C, and mortality was 100 percent at 5, 10, 15, and 30°C. In addition, larval abnormalities were twice as high at 25°C than at 20°C (Marsh 1985).

Experimental tests of temperature preference of yearling (Black and Bulkley 1985a) and adult (Bulkley et al. 1981) Colorado pikeminnow indicated that 25°C was the most preferred temperature for both life phases. Additional experiments indicated that optimum growth of yearling Colorado pikeminnow also occurs at temperatures near 25°C (Black and Bulkley 1985b). Although no such tests were conducted using adults, the tests with yearlings supported the conclusions of Jobling (1981) that the final thermal preferendum provides a good indication of optimum growth temperature, i.e., 25°C.

Most information on Colorado pikeminnow reproduction was gathered from spawning sites on the lower 20 miles of the Yampa River and in Gray Canyon on the Green River (Tyus and McAda 1984; Tyus 1985; Wick et al. 1985; Tyus 1990). Colorado pikeminnow spawn after peak runoff subsides and is probably triggered by several interacting variables such as photoperiod, temperature, flow level, and perhaps substrate characteristics. Spawning generally occurs from late June to mid-August with peak activity occurring when water temperatures are between 18 and 23°C (Haynes et al. 1984; Archer et al. 1985; Tyus 1990; Bestgen et al. 1998).

Spawning has been confirmed in the Colorado River by the presence of Colorado pikeminnow larvae in all years sampled. Larvae are distributed throughout the river although most have been found downstream of Grand Junction (McAda and Kaeding 1991; Osmundson and Burnham 1998). Aggregations of ripe adults have been found near Clifton and Grand Junction, Colorado, and near the Colorado-Utah State line (Osmundson and Kaeding 1989; McAda and Kaeding 1991; USFWS unpublished data). Suitable spawning habitat (defined below) in the Colorado River near Cataract Canyon, Professor Valley, and upstream from the Dolores River confluence indicates spawning may occur in or near these areas as well (Archer et al. 1985; Valdez 1990).

Known spawning sites in the Yampa River are characterized by riffles or shallow runs with well-washed coarse substrate (cobble containing relatively deep interstitial voids (for egg deposition) in association with deep pools or areas of slow laminar flow used as staging areas by adults (Lamarra et al. 1985; Tyus 1990). Recent investigations at a spawning site in the San Juan River by Bliesner and Lamarra (1995) and at one in the upper Colorado River (USFWS unpublished data) indicate a similar association of habitats. The most unique feature at the sites actually used for spawning, in comparison with otherwise similar sites nearby, is the degree of looseness of the cobble substrate and the depth to which the rocks are devoid of fine sediments; this appears consistent at the sites in all three rivers (Lamarra et al. 1985; Bliesner and Lamarra 1995).

Habitat Use and Preferences

Clean cobble substrates that provide interstitial spaces for eggs are necessary for spawning and egg incubation (Tyus and Karp 1989). Several studies on the cobble cleaning process have been conducted at a known spawning location in Yampa Canyon. O'Brien (1984) studied the hydraulic and sediment transport dynamics of the cobble bar within the Yampa River spawning

site and duplicated some of its characteristics in a laboratory flume study. O'Brien (1984) concluded that incipient motion of the cobble bed is required to clean cobbles for spawning and estimated that this takes discharges of about 21,500 cfs. However, Harvey et al. (1993) concluded that because flows required for incipient motion of bed material are rare (20-year return period event) and spawning occurs annually, another process must be cleaning the cobbles. Their study found that in Yampa Canyon recessional flows routinely dissect gravel bars and thereby produce tertiary bars of clean cobble at the base of the riffles. These tertiary bars are used by Colorado pikeminnow for spawning. The importance of high magnitude, low frequency discharges is in forming and maintaining the midchannel bars. Dissection of bars without redeposition by high magnitude flows would lead to conditions where spawning habitat is no longer available (Harvey et al. 1993).

It is unknown whether tertiary bars similar to those used for Colorado pikeminnow spawning in Yampa Canyon are available in the 15-mile reach of the Colorado River. There, significant motion of bed material occurs at near bankfull discharge of 22,000 cfs (Van Steeter 1996). These flows occur on average once in 4 years. Van Steeter (1996) concluded that flows of this magnitude are important because they generally remove fine sediment from the gravel matrix which maintains the invertebrate community and cleans spawning substrate.

Although the location of spawning areas in the Colorado River is not as defined as in the Yampa River, the annual presence of larvae and young-of-the-year downstream of the Walker Wildlife Area, in the Loma to Black Rocks reach and near the confluence of the Dolores River, demonstrates that spawning occurs every year. Osmundson and Kaeding (1989, 1991) reported that water temperatures in the Grand Junction area were suitable for Colorado pikeminnow spawning. In 1986, a year of high runoff, suitable temperatures for spawning (20°C) occurred in mid-August; in 1989, a year of low runoff, the mean temperature reached 20°C during the last week of June. Tyus (1990) demonstrated that Colorado pikeminnow often migrate considerable distances to spawn in the Green and Yampa Rivers, and similar though more limited movement has been noted in the mainstem Colorado River (McAda and Kaeding 1991).

Collections of larvae and young-of-the-year downstream of known spawning sites in the Green and Yampa Rivers indicate that downstream drift of larval Colorado pikeminnow occurs following hatching (Haynes et al. 1984; Nesler et al. 1988; Tyus 1990, Tyus and Haines 1991). During their first year of life, Colorado pikeminnow prefer warm, turbid, relatively deep (averaging 1.3 feet) backwater areas of zero velocity (Tyus and Haines 1991). After about 1 year, young are rarely found in such habitats, though juveniles and subadults are often located in large deep backwaters during spring runoff (USFWS, unpublished data; Osmundson and Burnham 1998).

Larval Colorado pikeminnow have been collected in the Gunnison River upstream and downstream of the Redlands Diversion Dam (Anderson 1999; Osmundson and Burnham 1998). Burdick (1997) reports that the capture of larval Colorado pikeminnow in 1995 and 1996 upstream of the Redlands Diversion Dam coupled with aggregations of radio-tagged adult fish during the spawning season confirms that spawning occurs upstream of the dam.

Information on radio-tagged adult Colorado pikeminnow during fall suggests that fish seek out deep water areas in the Colorado River (Miller et al. 1982; Osmundson and Kaeding 1989), as do many other riverine species. River pools, runs, and other deep water areas, especially in upstream reaches, are important winter habitats for Colorado pikeminnow (Osmundson et al. 1995).

Very little information is available on the influence of turbidity on the endangered Colorado River fishes. Osmundson and Kaeding (1989) found that turbidity allows use of relatively shallow habitats ostensibly by providing adults with needed cover; this allows foraging and resting in areas otherwise exposed to avian or land predators. Tyus and Haines (1991) found that young Colorado pikeminnow in the Green River preferred backwaters that were turbid. Clear conditions in these shallow waters might expose young fish to predation from wading birds or introduced sight-feeding, piscivorous fish. It is unknown whether the river was as turbid in the past as it is today. For now, it is assumed that these endemic fishes evolved under natural conditions of high turbidity; therefore, the retention of these highly turbid conditions is probably an important factor in maintaining the ability of these fish to compete with nonnatives that may not have evolved under similar conditions.

Population Dynamics

Osmundson (2002) investigated population dynamics of Colorado pikeminnow from 1991 to 2000. These years were divided into two study periods--1991 to 1994 and 1998 to 2000. The results of the investigation found that annual estimates of whole-river (the Colorado River from the confluence with the Green River upstream to the Price-Stubb Dam, including the lower 2.3 miles of the Gunnison River downstream of the Redlands Diversion Dam) population size (all fish $\geq$ 250 mm) averaged 582 fish during the earlier study period and 742 fish during the more recent study period. This represents a 27 percent increase based on these estimates. Estimates of adult fish ($\geq$ 500 mm) averaged 362 during the earlier study period and 490 during the more recent study period, representing a 35 percent increase in adult fish.

Colorado pikeminnow reproduce each year; however, strong year classes that recruit fish to the adult population are relatively rare (Osmundson and Burnham 1998). A distinct increase of subadult fish was found below Moab in 1991 and within a few years these fish were distributed throughout the Colorado River. Osmundson and Burnham (1998) concluded that these fish were the result of one or more strong year classes produced during the mid-1980s. McAda and Ryel (1999) have identified another strong year class that occurred in 1996. In both cases, the common hydrologic conditions that led to successful reproduction and first year survival was a spring and summer of moderately high flows following a year of exceptionally high-flood flows (McAda and Ryel 1999).

Critical Habitat

Critical habitat for the Colorado pikeminnow was designated in 1994 within the 100-year floodplain of the Colorado pikeminnow's historical range in the following area of the upper Colorado River (59 FR 13374). Colorado pikeminnow now only occur in the upper Colorado

River basin (upstream of Lee Ferry just below the Glen Canyon Dam). Most of Lake Powell is not suitable habitat for Colorado pikeminnow and is not designated critical habitat. The total designated miles is 1,148 and represents 29 percent of the historical habitat for the species:

> Moffat County, Colorado. The Yampa River and its 100-year floodplain from the State Highway 394 bridge in T. 6 N., R. 91 W., section 1 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
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> Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties, Utah; and Moffat County, Colorado. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (Salt Lake Meridian).
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> Rio Blanco County, Colorado; and Uintah County, Utah. The White River and its 100-year floodplain from Rio Blanco Lake Dam in T. 1 N., R. 96 W., section 6 (6th Principal Meridian) to the confluence with the Green River in T. 9 S., R. 20 E., section 4 (Salt Lake Meridian).
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> Delta and Mesa Counties, Colorado. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).
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> Mesa and Garfield Counties, Colorado; and Grand, San Juan, Wayne, and Garfield Counties, Utah. The Colorado River and its 100-year floodplain from the Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to North Wash, including the Dirty Devil arm of Lake Powell up to the full pool elevation, in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).
>
> San Juan County, New Mexico; and San Juan County, Utah. The San Juan River and its 100-year floodplain from the State Route 371 Bridge in T. 29 N., R. 13 W., section 17 (New Mexico Meridian) to Neskahai Canyon in the San Juan arm of Lake Powell in T. 41 S., R. 11 E., section 26 (Salt Lake Meridian) up to the full pool elevation.

The final critical habitat rule identified water, physical habitat, and the biological environment as the Primary Constituent Elements (PCEs) of critical habitat. The water PCE was further described as including a quantity of water of sufficient quality (i.e., temperature, dissolved oxygen, lack of contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or serve as corridors between these areas. In addition to river channels, these areas also include bottom lands, side channels, secondary channels, oxbows, backwaters, and other areas in the 100-year floodplain, which when inundated provide access to spawning, nursery, feeding, and rearing habitats. The biological environment PCE includes food supply predation, and competition. Food supply is a

function of nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to introduced nonnative fish species in many areas.

PRIMARY CONSTITUENT ELEMENT - WATER

The status of water quantity includes all historical depletions in the Upper Basin, depletions resulting from projects, which have previously undergone section 7 consultation, and depletions resulting from projects contemporaneous with this consultation. Since 1988, the USFWS has consulted on 152 projects with a potential to deplete a total of 1,729,060 acre-feet in the entire Upper Colorado River Basin, of which 1,507,202 acre-feet are historic depletions. According to the Colorado River Compact of 1922, the total flow from the Upper Colorado River Basin is approximately 16 million acre-feet in an average year. Therefore, withdrawals of approximately 11 percent of the average flow has been covered in previous biological opinions.

The status of water quality in critical habitat includes concerns regarding the following contaminants--heavy metals, selenium, salts, PAHs, and pesticides. Selenium is of particular concern because of its documented effects on fish (and wildlife) reproduction. Many chemical, physical, and biological factors affect the toxicity of environmental contaminants to biological organisms. Chemical and physical factors include contaminant type, chemical species or form, pH, water temperature, dissolved oxygen, hardness, salinity, and multiple-chemical exposure (antagonism and synergism). Duration of exposure, quantity of contaminant, and exposure pathways from the environment to the organism also affect toxicity. Some trace elements are beneficial to organisms at low concentrations but may be toxic at higher concentrations. Biological and physiological factors affecting toxicity include species, age, sex, and health of the organism.

Selenium concentrations can be elevated in areas where irrigation occurs on soils which are derived from or which overlie Upper Cretaceous marine sediments. Percolation of irrigation water through these soils and sediments leaches selenium into receiving waters. Other sources of selenium include powerplant fly ash and oil refineries. Water depletions, by reducing dilution effects, have increased the concentrations of selenium and other contaminants. In 1995, Colorado's Water Quality Control Commission reduced the chronic selenium standard from 17 µg/L to 5 µg/L. The USFWS recommended the level be lowered to 2 µg/L.

PRIMARY CONSTITUENT ELEMENT - PHYSICAL HABITAT

Physical habitat of the Colorado River in the action area has been greatly altered by changes in the timing and volume of flows, bank stabilization, diking, and diversion dams. Barriers to fish movement have been identified as a factor in the decline of the endangered fishes because they block migration routes and prevent fish from reaching spawning grounds and other important habitat. As an example, the Redlands Diversion Dam has been in place since 1918 and completely blocked upstream fish movement until 1996 when a fish ladder was installed. Large quantities of water are diverted into the Redlands Water and Power Company's Canal for power production and irrigation. Large diversions are known to divert many species of fish into canals, including the Colorado River endangered fishes (Burdick 2003). Once fish enter the Redlands

Canal, they likely enter the power turbines and are injured or killed. Fish also could be lost in the electric pumps, during canal dewatering, or transported through ditches to irrigated fields. Fish have likely been lost in the Redlands Water and Power Company's Canal since 1918.

In addition to blocking native fish migrations, dams have reduced downstream temperatures and created lacustrine habitats that provided conditions that allowed competitive and predatory nonnative fishes to thrive both within the impounded reservoirs and in the modified river segments that connect them. The highly modified flow regimes coupled with the introduction of nonnative fishes decimated populations of native fish.

Water depletions, by affecting the quantity and timing of flows, have reduced the ability of the river to create and maintain habitats and have reduced the frequency and duration of availability of certain habitats.

The formation of a variety of channel habitats, including gravel/cobble bars and substrates used by Colorado pikeminnow for spawning, is essential to ensure the availability of the range of habitats required by all endangered fish life stages to fulfill daily requirements (foraging, resting, spawning, avoiding predation, etc.) under various flow conditions. The number and distribution of these channel habitats can be described as channel habitat complexity, diversity, or heterogeneity. Osmundson and Kaeding (1991) found that adult Colorado pikeminnow in the Grand Valley prefer river segments with a complex morphometry to those that are simple. Some important physical habitats, such as inundated floodplain depressions, are located outside the channel. Floodplain depressions are principally derived from abandoned main channels, side-channels, backwaters, and meander cutoffs.

The creation of complex channel habitat and the formation and eventual abandonment of channel features from which floodplain depressions are formed occur primarily during spring runoff when flows are of sufficient size and duration to cause major changes in channel morphology through significant erosion and deposition of bed and bank materials. The reduction in the magnitude, duration, and frequency of high spring flows has slowed the rate at which channel morphology changes. Consequently, the creation of complex channel habitat and floodplain depressions has slowed. The placement of riprap and other bank stabilization measures and the construction of dikes and levees impede changes in channel morphology and contribute to the slowed creation of complex channel habitat. In addition, the construction of dikes and levees reduces existing channel habitat complexity by causing channelization of the river. Dikes and levees also isolate existing floodplain depressions from the channel during high flows. The slowed creation of complex channel habitats and new floodplain depressions, the reduction of existing channel habitat complexity, and the isolation of existing floodplain depressions have acted to reduce the quantity and quality of important habitat for endangered fishes.

Backwaters, a habitat component of the physical habitat PCE, are essential for various life stages of endangered fish. Backwaters are damaged by the deposition of fine sediments which reduces their depth and consequently their duration and frequency of inundation. Gravel and cobble substrates, used by pikeminnow for spawning, are damaged by the infiltration of fine sediments. The establishment of vegetation on backwater sediments and on bars further reduces the value of these habitats for endangered fishes. Furthermore, higher flows are required to flush sediments

from vegetated backwaters than from unvegetated ones. Osmundson and Kaeding (1991) reported observations that, on the 15-mile reach during the drought years of 1988 to 1990, backwaters were filling in with silt and spring flows were not sufficient to flush out the fine sediment. Also, they reported that tamarisk colonized sand and cobble bars. Therefore, the lower frequency of high water years decreases the frequency at which silt and sand is flushed from backwaters, fine sediments are flushed from gravel/cobble substrates, and vegetation is scoured from backwaters and bars. Flow recommendations recently developed for the Gunnison River (McAda 2003) are intended to restore and maintain in-channel critical habitats used by all life stages--1) spawning areas for adults; 2) spring, summer, autumn, and winter habitats used by subadults and adults; and 3) nursery areas used by larvae, young-of-year, and juveniles.

Summer (August-October) Habitats--Osmundson et al. (1995) reported that, in the 15-mile reach, availability of habitats did not differ significantly between periods of moderate flows and low flows. Though absolute area of habitat decreases with declining flows, relative area or percent composition of habitat types changes little. However, pikeminnow habitat use patterns did change. The fish used a greater variety of habitats during moderate flows than during low flows. During moderate flows, the fish used primarily backwaters, eddies, and pools. During low flows, the fish used slow and fast runs almost exclusively. The change in habitat use without a corresponding change in relative habitat availability indicates that other factors also influence habitat selection. These factors could include changes in quality of physical habitat features such as diversity, depth, dissolved oxygen, etc., or changes in biotic interactions. Osmundson et al. (1995) interpreted the pikeminnow behavioral changes as reflective of suboptimal conditions; the behavioral changes demonstrate the ability of the species to modify their habitat use patterns to temporarily cope with adverse conditions and do not demonstrate habitat preferences under optimum conditions.

Winter (November-March) Habitats--Osmundson et al. (1995) reported that, in the 15-mile reach, flows during the winter are usually moderate because no water is diverted for irrigation and because additional water is released through upstream dams to increase reservoir storage capacity in anticipation of spring runoff. The relative availability of slow runs and riffles during the winter was very similar to their availability during summer. As in the summer, backwaters, eddies, and pools were the preferred types of habitat in the winter. However, whereas eddies were most preferred in summer, pools were most preferred in winter. Adult pikeminnow used fewer habitat types overall during winter than during summer. Although fast runs and riffles were used during the summer, they were not used during the winter. The colder water temperatures in winter which cause lower metabolic rates may account for the avoidance of high velocity sites. Absolute area of pools increases as flows decrease and slow runs lose velocity. Because Osmundson et al. (1995) did not sample low flows in the winter, they could not determine if pools would still be preferred in the winter at lower flows.

Spring (April-July) Habitats--Osmundson and Kaeding (1989) reported that pikeminnow use of low velocity habitats such as backwaters and flooded gravel pits is greatest during the spring runoff. It is believed that pikeminnow use these habitats during the runoff to escape the high velocity, low temperature flows of the main channel. Because backwaters, flooded gravel pits, and other low velocity habitats are considerably warmer than the main channel during the runoff, these habitats allow pikeminnow to extend their growing season substantially. The earlier

warming of these habitats also may be important in enabling pikeminnow to reach spawning condition by the time flow and temperature in the main channel are optimum for spawning. Osmundson et al. (1995) reported that, in the 15-mile reach, the numbers of backwaters and flooded gravel pits increases with increasing spring flows. (Although the number of backwaters eventually decreases as increasing flows convert backwaters to side channels, the number of other low velocity habitats likely increases as increasing flows inundate additional bottomlands.) The decrease in the magnitude, duration, and frequency of high spring flows, then, decreases the quantity and the duration and frequency of availability of important low velocity, higher temperature habitat in the spring. These changes could be affecting pikeminnow growth and spawning success.

PRIMARY CONSTITUENT ELEMENT - BIOLOGICAL ENVIRONMENT

This PCE includes food supply and predation. As described in the species section above, predation and competition from nonnative fishes have been clearly implicated in the population reductions or elimination of native fishes in the Colorado River Basin (Dill 1944; Minckley and Deacon 1968; Joseph et al. 1977; Lanigan and Berry 1979; Behnke 1980; Meffe 1985; Osmundson and Kaeding 1989; Propst and Bestgen 1991; Rinne 1991). The modification of flow regimes, water temperatures, sediment levels, and other habitat conditions caused by water depletions has contributed to the establishment of nonnative fishes. During low water years, nonnative minnows capable of preying on or competing with larval endangered fishes greatly increase in numbers (Osmundson and Kaeding 1991). Thus, the biological environment PCE has been adversely affected by nonnative fishes.

Species/Critical Habitat Likely to be Affected

The Colorado pikeminnow and its critical habitat in the action area are likely to be adversely affected. The critical habitat includes the Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (Salt Lake Meridian), continuing to the Colorado River and its 100-year floodplain from the Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to North Wash, including the Dirty Devil arm of Lake Powell up to the full pool elevation, in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

RAZORBACK SUCKER

Species Description

The razorback sucker, an endemic species unique to the Colorado River Basin, was historically abundant and widely distributed within warmwater reaches throughout the Colorado River Basin. The razorback sucker is the only sucker with an abrupt sharp-edged dorsal keel behind its head. It has a large fleshy subterminal mouth that is typical of most suckers. Adults often exceed 6 pounds in weight and 2 feet in length.

Historically, razorback suckers were found in the mainstem Colorado River and major tributaries in Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming, and in Mexico (Ellis 1914; Minckley 1983). Bestgen (1990) reported that this species was once so numerous that it

was commonly used as food by early settlers and, further, that commercially marketable quantities were caught in Arizona as recently as 1949. In the Upper Basin, razorback suckers were reported in the Green River to be very abundant near Green River, Utah, in the late 1800s (Jordan 1891). An account in Osmundson and Kaeding (1989) reported that residents living along the Colorado River near Clifton, Colorado, observed several thousand razorback suckers during spring runoff in the 1930s and early 1940s. In the San Juan River drainage, Platania and Young (1989) relayed historical accounts of razorback suckers ascending the Animas River to Durango, Colorado, around the turn of the century.

Status and Distribution

The current distribution and abundance of the razorback sucker have been significantly reduced throughout the Colorado River system, due to lack of recruitment to the adult population (Holden and Stalnaker 1975; McAda and Wydoski 1980; Minckley 1983; McAda 1987; Tyus 1987; Marsh and Minckley 1989). The only substantial population exists in Lake Mohave with an estimated population of 5,000 adult razorback suckers in 2005 (Burke 2005) down from an earlier estimate of 25,000 in 1995 (Minckley 1995) and 60,000 in 1991 (Minckley et al. 1991). They do not appear to be successfully recruiting. While limited numbers of razorback suckers persist in other locations in the lower Colorado River, they are considered rare or incidental and may be continuing to decline.

In the Upper Basin, above Glen Canyon Dam, razorback suckers are found in limited numbers in both lentic and lotic environments. The largest population of razorback suckers in the Upper Basin is found in the upper Green River and lower Yampa River (Tyus 1987). Lanigan and Tyus (1989) estimated that from 758 to 1,138 razorback suckers inhabit the upper Green River. Modde et al. (1996) report no significant decrease in the population between 1982 and 1992, and the continued presence of fish smaller than 480 mm during the study period suggest some level of recruitment. In the Colorado River, most razorback suckers occur in the Grand Valley area near Grand Junction, Colorado; however, they are increasingly rare. Osmundson and Kaeding (1991) report that the number of razorback sucker captures in the Grand Junction area has declined dramatically since 1974. In 1991 and 1992, 28 adult razorback suckers were collected from isolated ponds adjacent to the Colorado River near De Beque, Colorado (Burdick 1992). The last wild razorback sucker was caught in the Grand Valley area in 1995; however, stocked razorback suckers are now captured on a regular basis in the Grand Valley area during ongoing survey efforts (C. McAda, pers. comm. 2005). The existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Anecdotal information indicates razorback sucker were once common in the Gunnison River (Kidd 1977; Quartrone 1993), and two specimens from the 1940s are in the University of Michigan Museum of Zoology (Wiltzius 1978). One razorback sucker was collected near Delta in 1975 (Wilzius 1978) and three were collected in the vicinity in 1981 (Holden et al. 1981). No razorback suckers were collected during sampling by Valdez et al. (1982a) or Burdick (1995).

A stocking program was initiated by the Recovery Program and between April 1994 and October 2001, 18,423 juvenile, sub-adult, and adult razorback suckers were stocked in the Gunnison River and 31,531 juvenile, sub-adult, and adult razorback suckers were stocked in the Colorado River (Burdick 2001a). Razorback suckers were not stocked in the Gunnison River in

2002 or 2003 due to the low water conditions, which increase the chance of fish being lost in the unscreened Redlands Canal. The goal of the stocking program is to establish a self-sustaining population of 600 individuals between Hartland Diversion and Redlands Diversion. In 2001 and 2002, six razorback suckers used the Redlands fish ladder. Razorback suckers did not use the Redlands fish ladder in 2003. In 2002, eight larval razorback suckers were collected in the Gunnison River (Osmundson 2002b). These are the first larval razorbacks suckers collected from the Colorado or Gunnison Rivers and confirm that spawning is taking place in the Gunnison River.

A marked decline in populations of razorback suckers can be attributed to construction of dams and reservoirs, introduction of nonnative fishes, and removal of large quantities of water from the Colorado River system. Dams on the mainstem Colorado River and its major tributaries have segmented the river system, blocking migration routes. Dams also have drastically altered flows, temperatures, and channel geomorphology. These changes have modified habitats in many areas so that they are no longer suitable for breeding, feeding, or sheltering. Major changes in species composition have occurred due to the introduction of numerous nonnative fishes, many of which have thrived due to man-induced changes to the natural riverine system.

Razorback suckers are in imminent danger of extirpation in the wild. The razorback sucker was listed as endangered October 23, 1991 (56 FR 54957). As Bestgen (1990) pointed out:

> "Reasons for decline of most native fishes in the Colorado River Basin have been attributed to habitat loss due to construction of mainstream dams and subsequent interruption or alteration of natural flow and physio-chemical regimes, inundation of river reaches by reservoirs, channelization, water quality degradation, introduction of nonnative fish species and resulting competitive interactions or predation, and other man-induced disturbances (Miller 1961; Joseph et al. 1977; Behnke and Benson 1983; Carlson and Muth 1989; Tyus and Karp 1989). These factors are almost certainly not mutually exclusive; therefore it is often difficult to determine exact cause and effect relationships."

The virtual absence of any recruitment suggests a combination of biological, physical, and/or chemical factors that may be affecting the survival and recruitment of early life stages of razorback suckers. Within the Upper Basin, recovery efforts endorsed by the Recovery Program include the capture and removal of razorback suckers from all known locations for genetic analyses and development of discrete brood stocks if necessary. These measures have been undertaken to develop refugia populations of the razorback sucker from the same genetic parentage as their wild counterparts such that, if these fish are genetically unique by subbasin or individual population, then separate stocks will be available for future augmentation. Such augmentation may be a necessary step to prevent the extinction of razorback suckers in the Upper Basin.

Life History

McAda and Wydoski (1980) and Tyus (1987) reported springtime aggregations of razorback suckers in off-channel habitats and tributaries; such aggregations are believed to be associated with reproductive activities. Tyus and Karp (1990) and Osmundson and Kaeding (1991)

reported off-channel habitats to be much warmer than the mainstem river and that razorback suckers presumably moved to these areas for feeding, resting, sexual maturation, spawning, and other activities associated with their reproductive cycle. Prior to construction of large mainstem dams and the suppression of spring-peak flows, low velocity, off-channel habitats (seasonally flooded bottomlands and shorelines) were commonly available throughout the Upper Basin (Tyus and Karp 1989; Osmundson and Kaeding 1991). Dams changed riverine ecosystems into lakes by impounding water, which eliminated these off-channel habitats in reservoirs. Reduction in spring-peak flows eliminates or reduces the frequency of inundation of off-channel habitats. The absence of these seasonally flooded riverine habitats is believed to be a limiting factor in the successful recruitment of razorback suckers in their native environment (Tyus and Karp 1989; Osmundson and Kaeding 1991). Wydoski and Wick (1998) identified starvation of larval razorback suckers due to low zooplankton densities in the main channel and loss of floodplain habitats which provide adequate zooplankton densities for larval food as one of the most important factors limiting recruitment.

While razorback suckers have never been directly observed spawning in turbid riverine environments within the Upper Basin, captures of ripe specimens, both males and females, have been recorded (Valdez et al. 1982b; McAda and Wydoski 1980; Tyus 1987; Osmundson and Kaeding 1989; Tyus and Karp 1989; Tyus and Karp 1990; Platania 1990; Osmundson and Kaeding 1991) in the Yampa, Green, Colorado, and San Juan Rivers. Sexually mature razorback suckers are generally collected on the ascending limb of the hydrograph from mid-April through June and are associated with coarse gravel substrates (depending on the specific location).

The quantity and frequency of availability of inundated floodplain depressions used by razorback suckers for spawning is dependent on the magnitude and frequency of spring flows necessary to inundate these areas. The decrease in the magnitude and frequency of spring flows necessary to inundate floodplain depressions is believed to be largely responsible for poor razorback sucker spawning success.

Outside of the spawning season, adult razorback suckers occupy a variety of shoreline and main channel habitats including slow runs, shallow to deep pools, backwaters, eddies, and other relatively slow velocity areas associated with sand substrates (Tyus 1987; Tyus and Karp 1989; Osmundson and Kaeding 1989; Valdez and Masslich 1989; Tyus and Karp 1990; Osmundson and Kaeding 1991).

Habitat requirements of young and juvenile razorback suckers in the wild are not well known, particularly in native riverine environments. Prior to 1991, the last confirmed documentation of a razorback sucker juvenile in the Upper Basin was a capture in the Colorado River near Moab, Utah (Taba et al. 1965). In 1991, two early juvenile (36.6 and 39.3 mm TL) razorback suckers were collected in the lower Green River near Hell Roaring Canyon (Gutermuth et al. 1994). Juvenile razorback suckers have been collected in recent years from Old Charley Wash, a wetland adjacent to the Green River (Modde 1996). Between 1992 and 1995 larval razorback suckers were collected in the middle and lower Green River and within the Colorado River inflow to Lake Powell (Muth 1995). No young razorback suckers have been collected in recent times in the Colorado River.

Population Dynamics

Captures of razorback suckers in the upper Colorado River have been so low in recent years that estimating population size is not possible. Presumably, the numbers are very low due to the low capture rates and the extensive habitat modification described above.

Critical Habitat

Critical habitat was designated in 1994 within the 100-year floodplain of the razorback sucker's historical range in the following area of the upper Colorado River (59 FR 13374). The PCEs are the same as critical habitat for Colorado pikeminnow described previously, as is the status of the PCEs. We designated 15 reaches of the Colorado River system as critical habitat for the razorback sucker. These reaches total 1,724 miles as measured along the center line of the river within the subject reaches. The designation represents approximately 49 percent of the historical habitat for the species and includes reaches of the Green, Yampa, Duchesne, Colorado, White, Gunnison. and San Juan Rivers:

> Moffat County, Colorado. The Yampa River and its 100-year floodplain from the mouth of Cross Mountain Canyon in T. 6 N., R. 98 W., section 23 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
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> Uintah County, Utah; and Moffat County, Colorado. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to Sand Wash in T. 11 S., R. 18 E., section 20 (6th Principal Meridian).
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> Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties, Utah. The Green River and its 100-year floodplain from Sand Wash at river mile 96 at T. 11 S., R. 18 E., section 20 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (6th Principal Meridian).
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> Uintah County, Utah. The White River and its 100-year floodplain from the boundary of the Uintah and Ouray Indian Reservation at river mile 18 in T. 9 S., R. 22 E., section 21 (Salt Lake Meridian) to the confluence with the Green River in T. 9 S., R 20 E., section 4 (Salt Lake Meridian).
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> Uintah County, Utah. The Duchesne River and its 100-year floodplain from river mile 2.5 in T. 4 S., R. 3 E., section 30 (Salt Lake Meridian) to the confluence with the Green River in T. 5 S., R. 3 E., section 5 (Uintah Meridian).
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> Delta and Mesa Counties, Colorado. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian).

Mesa and Garfield Counties, Colorado. The Colorado River and its 100-year floodplain from Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) including the Gunnison River and its 100-year floodplain from the Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

Grand, San Juan, Wayne, and Garfield Counties, Utah. The Colorado River and its 100-year floodplain from Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) to full pool elevation, upstream of North Wash, and including the Dirty Devil arm of Lake Powell in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

San Juan County; and Utah, San Juan County, New Mexico. The San Juan River and its 100-year floodplain from the Hogback Diversion in T. 29 N., R. 16 W., section 9 (New Mexico Meridian) to the full pool elevation at the mouth of Neskahai Canyon on the San Juan arm of Lake Powell in T. 41 S., R. 11 E., section 26 (Salt Lake Meridian).

SPECIES/CRITICAL HABITAT LIKELY TO BE AFFECTED

The razorback sucker and its critical habitat, as described below, are likely to be adversely affected by the subject Project:

Uintah County, Utah; and Moffat County, Colorado. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to Sand Wash in T. 11 S., R. 18 E., section 20 (6th Principal Meridian).

Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties, Utah. The Green River and its 100-year floodplain from Sand Wash at river mile 96 at T. 11 S., R. 18 E., section 20 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (6th Principal Meridian).

Grand, San Juan, Wayne, and Garfield Counties, Utah. The Colorado River and its 100-year floodplain from the confluence with the Green River in T. 30 S., R. 19 E., section 7 (6th Principal Meridian) to full pool elevation, upstream of North Wash, and including the Dirty Devil arm of Lake Powell in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

HUMPBACK CHUB

Species Description

The humpback chub is a medium-sized freshwater fish (less than 500 mm) of the minnow family. The adults have a pronounced dorsal hump, a narrow flattened head, a fleshy snout with an inferior-subterminal mouth, and small eyes. It has silvery sides with a brown or olive colored back.

The humpback chub is endemic to the Colorado River Basin and is part of a native fish fauna traced to the Miocene epoch in fossil records (Miller 1946; Minckley et al. 1986). Humpback chub remains have been dated to about 4000 B.C., but the fish was not described as a species until the 1940s (Miller 1946), presumably because of its restricted distribution in remote white water canyons (USFWS 1990b). Because of this, its original distribution is not known. The humpback chub was listed as endangered on March 11, 1967.

Status and Distribution

Until the 1950s, the humpback chub was known only from Grand Canyon. During surveys in the 1950s and 1960s humpback chub were found in the upper Green River including specimens from Echo Park, Island Park, and Swallow Canyon (Smith 1960; Vanicek et al. 1970). Individuals also were reported from the lower Yampa River (Holden and Stalnaker 1975), the White River in Utah (Sigler and Miller 1963), Desolation Canyon of the Green River (Holden and Stalnaker 1970), and the Colorado River near Moab (Sigler and Miller 1963).

Today the largest populations of this species occur in the Little Colorado and Colorado Rivers in the Grand Canyon, and in Black Rocks and Westwater Canyon in the upper Colorado River. Other populations have been reported in De Beque Canyon of the Colorado River, Desolation and Gray Canyons of the Green River, Yampa and Whirlpool Canyons in Dinosaur National Monument (USFWS 1990b). One individual was recently captured in the Gunnison River in a canyon-bound reach at river mile 22 (Burdick 1995).

In general, the existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Life History

Humpback chubs spawn soon after the highest spring flows when water temperatures approach 20°F (Kaeding et al. 1990; Karp and Tyus 1990; USFWS 1990b). The collection of ripe and spent fish indicated that spawning occurred in Black Rocks during June 2-15, 1980, at water temperatures of 11.5 to 16°C; in 1981, spawning occurred May 15-25, at water temperatures of 16 to 16.3°C (Valdez et al. 1982b). Humpback chub spawned in Black Rocks on the Colorado River in 1983 when maximum daily water temperatures were 12.6 to 17°C (Archer et al. 1985). In the Grand Canyon, humpback chub spawn in the spring between March and May in the Little Colorado River when water temperatures are between 16 and 22°C. Swimming abilities of young-of-the-year humpback chub were determined to be significantly reduced when laboratory water temperatures were reduced from 20 to 14°C. Many young-of-year humpback chub are displaced from the Little Colorado River into the mainstem by monsoonal floods from July through September (Valdez and Ryel 1995). Young humpback chub are found in low velocity shorelines and backwaters. Survival rates are extremely low and believed to be less than 1 in 1,000 to 2 years of age. Low water temperatures and predation are believed to be the primary factors. Valdez and Ryel (1995) estimated that 250,000 young humpback chub are consumed annually by brown trout, rainbow trout, and channel catfish.

Backwaters, eddies, and runs have been reported as common capture locations for young-of-year humpback chub (Valdez and Clemmer 1982). These data indicate that in Black Rocks and Westwater Canyon, young utilize shallow areas. Habitat suitability index curves developed by Valdez et al. (1990) indicate young-of-year prefer average depths of 2.1 feet with a maximum of 5.1 feet. Average velocities were reported at 0.2 feet per second.

Population Dynamics
The number of humpback in the Gunnison River is so low that it is not possible to do a population estimate.

Critical Habitat

Critical habitat was designated in 1994 within humpback chub historical range in the following sections of the upper Colorado River (59 FR 13374). The PCEs are the same as those described for the Colorado pikeminnow, as is the status of the PCEs. We designated seven reaches of the Colorado River system for a total of 379 miles as measured along the center line of the subject reaches. The designation represents approximately 28 percent of the historical habitat of the species and includes reaches in the Colorado, Green, and Yampa Rivers in the Upper Basin:

> Moffat County, Colorado. The Yampa River from the boundary of Dinosaur National Monument in T. 6 N., R. 99 W., section 27 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
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> Uintah County; and Colorado, Moffat County, Utah. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the southern boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).
>
> Uintah and Grand Counties, Utah. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).
>
> Grand County; and Colorado, Mesa County, Utah. The Colorado River from Black Rocks in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).
>
> Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

SPECIES/CRITICAL HABITAT LIKELY TO BE AFFECTED

The humpback chub and its critical habitat, as described below, are likely to be adversely affected by the subject Project. Although the Project depletion does not occur within the designated critical habitat for the humpback chub, the depletion would adversely affect critical habitat by reducing the amount of water flowing into designated critical habitat:

Uintah County; and Colorado, Moffat County, Utah. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the southern boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).

Uintah and Grand Counties, Utah. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).

Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

BONYTAIL

Species Description

Bonytail are medium-sized (less than 600 mm) fish in the minnow family. Adult bonytail are gray or olive colored on the back with silvery sides and a white belly. The adult bonytail has an elongated body with a long, thin caudal peduncle.

Status and Distribution

The bonytail is the rarest native fish in the Colorado River. It was listed as endangered on April 23, 1980. Formerly reported as widespread and abundant in mainstem rivers (Jordan and Evermann 1896), its populations have been greatly reduced. The fish is presently represented in the wild by a low number of old adult fish in Lake Mohave and perhaps other lower basin reservoirs (USFWS 1990a). The last known riverine area where bonytail were common was the Green River in Dinosaur National Monument, where Vanicek (1967) and Holden and Stalnaker (1970) collected 91 specimens during 1962-1966. From 1977 to 1983, no bonytail were collected from the Colorado or Gunnison Rivers in Colorado or Utah (Wick et al. 1979, 1981; Valdez et al. 1982b; Miller et al. 1984). However, in 1984, a single bonytail was collected from Black Rocks on the Colorado River (Kaeding et al. 1986). Several suspected bonytail were captured in Cataract Canyon in 1985-1987 (Valdez 1990). In 2003 one formerly stocked bonytail was captured in the Redlands fish ladder and released upstream. This is the first record of a bonytail in the Gunnison River.

The existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Life History

The bonytail is considered a species that is adapted to mainstem rivers, where it has been observed in pools and eddies (Vanicek 1967; Minckley 1973). Spawning of bonytail has never been observed in a river, but ripe fish were collected in Dinosaur National Monument during late June and early July suggesting that spawning occurred at water temperatures of about 18°C (Vanicek and Kramer 1969).

Population Dynamics
The number of bonytail in the upper Colorado River and its tributaries is so low that it is not possible to do a population estimate.

Critical Habitat

Critical habitat was designated in 1994 within the bonytail's historical range in the following sections of the upper Colorado River (59 FR 13374). The PCEs are the same as those described for the Colorado pikeminnow, as is the status of the PCEs. We designated seven reaches of the Colorado River system as critical habitat for the bonytail chub. These reaches total 312 miles as measured along the center line of the subject reaches, representing approximately 14 percent of the historical habitat of the species. Critical habitat includes portions of the Colorado, Green, and Yampa Rivers in the Upper Basin:

> Moffat County, Colorado. The Yampa River from the boundary of Dinosaur National Monument in T. 6 N., R. 99 W., section 27 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
>
> Uintah County; and Colorado, Moffat County, Utah. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).
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> Uintah and Grand Counties, Utah. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid (river mile 12) in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).
>
> Grand County, Utah; and Mesa County, Colorado. The Colorado River from Black Rocks (river mile 137) in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).
>
> Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

SPECIES/CRITICAL HABITAT LIKELY TO BE AFFECTED

The bonytail and its critical habitat, as described below, are likely to be adversely affected by the subject Project. Although the Project depletion does not occur within the designated critical habitat for the bonytail, the depletion would adversely affect critical habitat by reducing the amount of water flowing into designated critical habitat.

> Uintah County; and Colorado, Moffat County, Utah. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).

Uintah and Grand Counties, Utah. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid (river mile 12) in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).

Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all Federal, State, and private actions and other human activities in the action area; the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal section 7 consultation; and the impact of State or private actions contemporaneous with the consultation process.

In formulating this opinion, the USFWS considered adverse and beneficial effects likely to result from cumulative effects of future State and private activities that are reasonably certain to occur within the Project area, along with the direct and indirect effects of the Project and impacts from actions that are part of the environmental baseline (50 CFR 402.02 and 402.14 (g)(3)).

Because of the widespread effects of the Project on downstream areas and the large size of the action area, the environmental baseline for the four listed fish is roughly the same as the status as described above. Therefore, we are not repeating that information in this section.

FACTORS AFFECTING THE SPECIES ENVIRONMENT WITHIN THE ACTION AREA

The action area includes critical habitat for Colorado pikeminnow, razorback sucker, humpback chub, and bonytail on the Green River from the confluence of the Yampa River to the confluence with the Colorado River and downstream to Lake Powell.

Critical Habitat - Green River

Critical habitat on the Green River historically experienced high spring turbid flows and low flows throughout the rest of the year. High spring flows create and maintain the braided channels that provide a variety of important habitats. Impoundments and diversions have reduced peak discharges in various river reaches throughout the Upper Colorado River Basin since pioneer settlement of the basin, while increasing base flows in other reaches. Important spawning and nursery habitats for the razorback sucker and the Colorado pikeminnow are found along the Green River below the confluence with the Yampa River. While flows and sediment transport in the Green River have been significantly altered by the operation of Flaming Gorge Dam, the influence of the Yampa and Little Snake Rivers' more natural hydrograph partially ameliorates these adverse effects to the riverine environment of the Green River below the Yampa River confluence.

PRIMARY CONSTITUENT ELEMENT - WATER

Alteration of the natural hydrology of the action area due to existing water development projects constitute the most significant existing factor affecting the species and critical habitat. Existing projects have reduced the magnitude and frequency of peak flows, augmented summer base flows, and lowered average water temperatures in the Green River. These projects have reduced the amount and quality of spawning and nursery habitat, changed environmental cues necessary for the initiation of spawning behavior, and favored non-native fish species in the Green River. Quantity of water of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species has been substantially altered.

PRIMARY CONSTITUENT ELEMENT - PHYSICAL HABITAT

The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. Storage and diversion of water tends to reduce the peak flows, altering processes that trigger spawning behavior, maintain spawning gravels, backwaters and floodplain connectivity to the river. Reduced sediment load and associated channel changes in the Green River due to the closure of Flaming Gorge Reservoir have been documented at Jensen, Utah. Further reductions in sediment supply to the Green River may lead to reductions in the active channel width and nursery habitat for larval fish.

Historically, floodplain habitats inundated and connected to the main channel by overbank flooding during spring-runoff discharges would have been available as nursery areas for young razorback suckers in the Green River. Tyus and Karp (1990) associated low recruitment with reductions in floodplain inundation since 1962 (closure of Flaming Gorge Dam), and Modde et al. (1996) associated years of high spring discharge and floodplain inundation in the middle Green River (1983, 1984, and 1986) with subsequent suspected recruitment of young adult razorback suckers.

PRIMARY CONSTITUENT ELEMENT - BIOLOGICAL ENVIRONMENT

Oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation and competition are important elements of the biological environment. Reduction of peak flow and augmentation of summer base flows also affects the biological environment by favoring nonnative predators and competitors better adapted to more stable hydrology and reducing autochthonous nutrient inputs from floodplain habitats.

Some scientists believe (Tyus and Saunders 1996) that changes in the biological community as a result of fish introductions may currently be the most significant threat to the native fish fauna of the Colorado River Basin. The impoundment of tributaries and mainstem waters has resulted in the stocking of a number of nonnative sport and bait fishes for use by local residents and visitors to the basin. While the acceptance of these fishes has been generally favorable by the public, their presence has led to predation, competition and the general demise of native fishes (Tyus

and Saunders 1996). The stocking of nonnative warm water fishes such as channel catfish, smallmouth bass, and northern pike have resulted in the continuing high probability of predation on soft-rayed native fishes. Red shiners, for example, have been documented as preying on larval suckers, including razorbacks (Rupert et. al. 1993; Modde and Irving 1997). Other exotics such as sand shiner and fathead minnow compete for food and space in remaining habitats.

As reported by the Interagency Aquatic Nuisance Species Task Force (Aquatic Nuisance Species Task Force 1994), introductions of nonnative species into aquatic habitats has become problematic worldwide. Not unique to the Colorado River system, the threat that nonnative fishes pose to native fishes, particularly when coupled with significant changes to the physical environment, is hastening the decline of native species.

Tyus and Saunders (1996) reported species commonly identified as adversely affecting native fish populations nationwide are centrarchids such as largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), crappie (*Pomoxis* spp.), and smallmouth bass (*Micropterus dolomieu*). The second most cited group are from the family Ictaluridae, which includes channel catfish (*Ictalurus punctatus*), and bullheads (*Ameiurus* spp.). Other species such as red shiner (*Cyprinella lutrensis*) and fathead minnow (*Pimephales promelas*) also have been identified as problematic to Colorado River endangered fishes. All of these species currently inhabit the Colorado River Basin.

Since the late 1800s, over 40 species of nonnative fishes have been stocked (primarily to enhance recreational fishing opportunities) or accidentally introduced to the Upper Colorado River Basin, including the Little Snake River Basin. Many of these fishes have established resident populations because of alteration of stream flows and resultant changes in physical aquatic habitats favorable to their existence. Many of these fishes are reproducing naturally and, in some cases, out-reproducing native fishes. Presently, two-thirds of the fish species in the Colorado River system are nonnative. Nonnative fishes continue to invade endangered fish habitats through introductions, escapement, and range expansions. Some exotics are stocked in basin rivers mostly for sport fishing purposes, while other exotics are removed when encountered but still represent a major detriment to the 14 native fishes still residing in the basin.

Stocking of cold water sport fishes such as trout do not appear to have a dramatic effect on native fish populations, primarily because their habitats do not overlap significantly and they are less voracious than other warm water exotics such as bass, pike, and catfish. Recovery Implementation Program participants have concluded that continued stocking of trout does not represent any long-term threat to listed fishes. However, stocking of warm water fishes will be controlled and intensively monitored to ensure that physical barriers or other behavioral limitations will reduce the likelihood of interspecific competition and/or predation. On September 5, 1996, a stocking policy was completed by the three Upper Basin States and the USFWS to establish procedures for stocking fish within the Upper Colorado River Basin.

Critical Habitat - Colorado River from Green River Confluence to Lake Powell

Historically, the Colorado River produced high spring turbid flows that maintained critical habitat by inundating floodplains, maintaining side channels, and creating backwaters. Between the confluence with the Green River and Lake Powell the Colorado River flows through Cataract Canyon where the river cuts deeply through steep canyons and talus slopes and has deep swift runs, major rapids, large eddies, and pools. Large angular rock and steep gradient have created approximately 13 miles of rapids before the river flows into the upper end of Lake Powell where it resembles a large, deep, slow-flowing river with high sandstone walls.

Major habitat change occurred in Cataract Canyon when Lake Powell was formed by the closure of Glen Canyon Dam in 1963. Lake Powell now inundates the lower end of Cataract Canyon where there is a transition zone between riverine and lacustrine habitat. Prior to inundation by Lake Powell, Cataract Canyon's steep gradient and large rapids comprised a 35-mile reach. Except for changes in water quantity and historic flow regime, the physical habitat in portions of Cataract Canyon above Lake Powell remains largely unmodified.

PRIMARY CONSTITUENT ELEMENT - WATER

Like the Green River, the quantity of water in the Colorado River has been reduced by water development projects. Any water depletions in the Green River will adversely affect the Colorado River critical habitat below the confluence through Cataract Canyon. Flow regimes have been altered significantly in the Colorado River by numerous upstream reservoirs and water projects, many of which transport large volumes of water out of the Colorado River Basin.

Elevated selenium concentrations associated with irrigation drainwater were found in the Colorado River during NIWQP investigations (Butler et al. 1994, 1996; Butler and Osmundson 2000). These elevated selenium concentrations still occur in water, sediment, and biota, and continue to pose a risk to this PCE. Studies show that selenium concentrations in water and fish tissue are related to flows; the lower the flows the higher the selenium concentrations (Osmundson et al. 2000).

PRIMARY CONSTITUENT ELEMENT - PHYSICAL HABITAT

Westwater and Cataract canyons provide movement and migration corridors between the other relatively flat water habitats. Floodplain habitats between the canyons provide warm water, low velocity, feeding and nursery habitats. Many backwaters between Westwater Canyon and Lake Powell provide nursery habitat. Cataract Canyon provides deep eddies and pools, with swift currents and larger boulders identified as preferred habitat of humback chub (USFWS 1990b).

PRIMARY CONSTITUENT ELEMENT - BIOLOGICAL ENVIRONMENT

This PCE is impaired by the presence of nonnative fishes common in this reach of the Colorado River. Nonnative fishes occupy the same backwaters that are very important for young Colorado pikeminnow and razorback sucker. Largemouth bass (*Micropterus salmoides*) and green sunfish (*Lepomis cyanella*) are the most common large-bodied fishes that occupy backwater habitats

year-round (Osmundson 2003). The three most common small-bodies fishes found in backwaters are fathead minnow, sand shiner, and red shiner, comprising 80 to 100 percent of the fish found in Colorado River backwaters (McAda 1987).

The critical habitat units within the action area have been identified in the recovery goals for each of the four endangered fish species (USFWS 2002a, b, c, d) as essential for the conservation of the species. Colorado pikeminnow is a wide ranging species sometimes migrating extensive distances to carry out life history functions. The action area encompasses a large area of razorback sucker critical habitat. Critical habitat for humpback chub and bonytail are limited to shorter reaches of the Colorado River within critical habitat for Colorado pikeminnow and razorback sucker. These shorter reaches include unique habitats required for humpback chub and bonytail that are found in only a few other places in the Colorado River Basin.

EFFECTS OF THE ACTION

Effects to Endangered Species

The Project would adversely affect Colorado pikeminnow, razorback sucker, bonytail, and humpback chub by reducing the amount of water in the river system upon which they depend by up to 1,006.7 acre-feet/year. The effects to all four species primarily result from the effects of the action upon their habitats. In general, the proposed action would adversely affect the four listed fish by reducing the amount of water available to them, increasing the likelihood of water quality issues, increasing their vulnerability to predation, and reducing their breeding opportunities by shrinking the amount of breeding habitat within their range.

Removing 1,006.7 acre-feet of water per year from the Green and Colorado Rivers would change the natural hydrological regime that creates and maintains important fish habitats, such as spawning habitats, and reduces the frequency and duration of availability of these habitats of the four endangered fish. The reduction of available habitats will directly affect individuals of all four species by decreasing reproductive potential and foraging and sheltering opportunities. Many of the habitats required for breeding become severely diminished when flows are reduced. As a result, individual fish within the action area may not be able to find a place to breed, or will deposit eggs in less than optimal habitats more prone to failure or predation. In addition, reduction in flow rates lessens the ability of the river to inundate bottomland, a source of nutrient supply for fish productivity. Water depletions also exacerbate competition and predation by nonnative fishes by altering flow and temperature regimes that favor nonnatives.

The proposed depletion would affect the water quality in the action area by increasing concentrations of heavy metals, selenium, salts, pesticides, and other contaminants. Increases in water depletions will cause associated reductions in assimilative capacity and dilution potential for any contaminants that enter the Green and Colorado Rivers. The Project's depletion would cause a proportionate decrease in dilution, which in turn would cause a proportionate increase in heavy metal, selenium, salts, pesticides, and other contaminant concentrations in the Colorado River to Lake Powell. An increase in contaminant concentrations in the river would likely result in an increase in the bioaccumulation of these contaminants in the food chain which could adversely affect the endangered fishes, particularly the predatory Colorado pikeminnow.

Selenium is of particular concern due to its effects on fish reproduction and its tendency to concentrate in low velocity areas that are important habitats for Colorado pikeminnow and razorback suckers.

The proposed Project would adversely affect the four listed fish by resulting in a reduction of water and concomitant effects to habitat. This reduction would contribute to the cumulative reduction in high spring flows, which are essential for creating and maintaining complex channel geomorphology and suitable spawning substrates, creating and providing access to off-channel habitats, and possibly stimulating Colorado pikeminnow spawning migrations. Adequate summer and winter flows are important for providing a sufficient quantity of preferred habitats for a duration and at a frequency necessary to support all life stages of viable populations of all endangered fishes. To the extent that the Project will reduce flows, the ability of the river to provide these functions will be reduced. This reduction of water affects habitat availability and habitat quality.

To the extent that it would reduce flows and contribute to further habitat alteration, the Project would contribute to an increase in nonnative fish populations. The modification of flow regimes, water temperatures, sediment levels, and other habitat conditions caused by water depletions has contributed to the establishment of nonnative fishes. Endangered fishes within the action area would experience increased competition and predation as a result.

Effects to Critical Habitat

All four of the listed Colorado River fish require the same PCEs essential for their survival. Therefore, we are combining our analysis of all four species into one section. Because the amount of designated critical habitat varies for each of the four species, the amount of habitat will vary; however, the effects would be the same for all critical habitat within the action area.

Water, physical habitat, and the biological environment are the PCEs of critical habitat. This includes a quantity of water of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation, and competition are important elements of the biological environment.

PRIMARY CONSTITUENT ELEMENT - WATER

The Project would deplete up to 1,006.7 acre-feet of water per year from the Colorado River Basin. Removing water from the river system changes the natural hydrological regime that creates and maintains important fish habitats, such as spawning habitats, and reduces the frequency and duration of availability of these habitats of the four endangered fish. In addition, reduction in flow rates lessens the ability of the river to inundate bottomland, a source of nutrient supply for fish productivity and important nursery habitat for razorback sucker. Water depletions change flow and temperature regimes that favor nonnative fish adding to competition and predation by these nonnative fishes as discussed above.

Changes in water quantity would affect water quality, which is a PCE of critical habitat. Contaminants enter the Colorado River from various point and nonpoint sources, resulting in increased concentrations of heavy metals, selenium, salts, pesticides, and other contaminants. Increases in water depletions will cause associated reductions in assimilative capacity and dilution potential for any contaminants that enter critical habitat in the Green and Colorado Rivers.

The Project's depletion would cause a proportionate decrease in dilution, which in turn would cause a proportionate increase in heavy metal, selenium, salts, pesticides, and other contaminant concentrations in the Colorado River to Lake Powell. An increase in contaminant concentrations in the river would likely result in an increase in the bioaccumulation of these contaminants in the food chain which could adversely affect the endangered fishes, particularly the predatory Colorado pikeminnow. Selenium is of particular concern due to its effects on fish reproduction and its tendency to concentrate in low velocity areas that are important habitats for Colorado pikeminnow and razorback suckers.

PRIMARY CONSTITUENT ELEMENT - PHYSICAL HABITAT

The proposed Project would affect the physical condition of habitat for the four listed fish by resulting in a reduction of water. This reduction would contribute to the cumulative reduction in high spring flows, which are essential for creating and maintaining complex channel geomorphology and suitable spawning substrates, creating and providing access to off-channel habitats, and possibly stimulating Colorado pikeminnow spawning migrations. Adequate summer and winter flows are important for providing a sufficient quantity of preferred habitats for a duration and at a frequency necessary to support all life stages of viable populations of all endangered fishes. To the extent that the Project will reduce flows, the ability of the river to provide these functions will be reduced. This reduction of water affects habitat availability and habitat quality.

PRIMARY CONSTITUENT ELEMENT - BIOLOGICAL ENVIRONMENT

To the extent that it would reduce flows and contribute to further habitat alteration, the Project would contribute to an increase in nonnative fish populations. The modification of flow regimes, water temperatures, sediment levels, and other habitat conditions caused by water depletions has contributed to the establishment of nonnative fishes. Endangered fishes within the action area would experience increased competition and predation as a result.

CUMMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The USFWS is not aware of any future non-Federal actions not included in this action under consultation that are reasonably certain to occur in the action area.

CONCLUSION

Based upon the best scientific and commercial information that is currently available, it is the USFWS's biological opinion that the water depletions associated with the Jonah Infill Drilling Project, as described herein, are likely to jeopardize the continued existence of the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker because the listed fish are harmed from the reduction of water in their habitats resulting from the Project in the following manner:

1) Individuals using habitats diminished by the proposed water depletions could be more susceptible to predation and competition from nonnative fish;

2) Individuals may be unable to breed because reduced flows would impact habitat formulation and maintenance.

Based upon the best scientific and commercial information that is currently available, it is the USFWS's biological opinion that the water depletions associated with the Jonah Infill Drilling Project, as described herein, are likely to result in adverse modification of critical habitat for the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker because the PCEs and the functioning of the critical habitat units would be altered in the following manner:

1) Water, a PCE, would be affected by further reducing the flows in critical habitat that are needed for endangered fishes breeding, feeding and sheltering. Reduction in flows also would affect water quality by reducing dilution of contaminants.

2) Physical habitat, a PCE, would be affected by reduction in flows by reducing important habitat such as spawning bars, backwaters, and inundated floodplains.

3) Biological environment, a PCE, would be affected by the increase in nonnative fishes due to altered flow regimes.

The USFWS has developed a reasonable and prudent alternative to avoid the likelihood of jeopardy to the endangered fishes and destruction or adverse modification of their critical habitat.

REASONABLE AND PRUDENT ALTERNATIVE

Regulations (50 CFR 402.02) implementing section 7 of the ESA define reasonable and prudent alternatives as alternative actions, identified during formal consultation, 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; 3) are economically and technologically feasible; and 4) would, the USFWS believes, avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

On January 21-22, 1988, the Secretary of the Department of the Interior; the Governors of Wyoming, Colorado, and Utah; and the Administrator of the Western Area Power Administration were cosigners of a Cooperative Agreement to implement the "Recovery

Implementation Program for Endangered Fish Species in the Upper Colorado River Basin" (USFWS 1987). In 2001, the Recovery Program was extended until September 30, 2013. An objective of the Recovery Program was to recover the listed species while providing for new water development in the Upper Basin.

In order to further define and clarify processes outlined in sections 4.1.5, 4.1.6, and 5.3.4 of the Recovery Program, a section 7 Agreement (Agreement) and a Recovery Implementation Program Recovery Action Plan (Plan) was developed (USFWS 1993). The Agreement establishes a framework for conducting all future section 7 consultations on depletion impacts related to new projects and all impacts associated with historic projects in the Upper Basin. Procedures outlined in the Agreement will be used to determine if sufficient progress is being accomplished in the recovery of the endangered fishes to enable the Recovery Program to serve as a reasonable and prudent alternative to avoid jeopardy. The Plan was finalized on October 15, 1993, and has been reviewed and updated annually.

In accordance with the Agreement, the USFWS assesses the impacts of projects that require section 7 consultation and determine if progress toward recovery has been sufficient for the Recovery Program to serve as a reasonable and prudent alternative. If sufficient progress is being achieved, biological opinions are written to identify activities and accomplishments of the Recovery Program that support it as a reasonable and prudent alternative. If sufficient progress in the recovery of the endangered fishes has not been achieved by the Recovery Program, actions from the Plan are identified which must be completed to avoid jeopardy to the endangered fishes. For historic projects, these actions serve as the reasonable and prudent alternative as long as they are completed according to the schedule identified in the Plan. For new projects, these actions serve as the reasonable and prudent alternative so long as they are completed before the impact of the Project occurs. The Jonah Infill Drilling Project is considered a new project.

In determining if sufficient progress has been achieved, the USFWS considers--a) actions which result in a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction; b) status of fish populations; c) adequacy of flows; and, d) magnitude of the Project impact. In addition, the USFWS considers support activities (funding, research, information, and education, etc.) of the Recovery Program if they help achieve a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction. The USFWS evaluates progress separately for the Colorado River and Green River subbasins; however, it gives due consideration to progress throughout the Upper Basin in evaluating progress toward recovery.

The following excerpts summarize portions of the Recovery Program that address depletion impacts, section 7 consultation, and Project proponent responsibilities:

> "All future section 7 consultations completed after approval and implementation of this program (establishment of the Implementation Committee, provision of congressional funding, and initiation of the elements) will result in a one-time contribution to be paid to the USFWS by water project proponents in the amount of $10.00 per acre-foot based on the average annual depletion of the project . . . This figure will be adjusted annually for inflation [the current figure is $16.67 per acre-foot] . . . Concurrently with the completion of the Federal action which initiated the consultation, e.g., . . . issuance of a 404 permit, 10 percent of the total contribution will be provided. The balance . . . will be . . . due at the time the construction commences . . . ."

It is important to note that these provisions of the Recovery Program were based on appropriate legal protection of the instream flow needs of the endangered Colorado River fishes. The Recovery Program further states:

> ". . . it is necessary to protect and manage sufficient habitat to support self-sustaining populations of these species. One way to accomplish this is to provide long term protection of the habitat by acquiring or appropriating water rights to ensure instream flows. Since this program sets in place a mechanism and a commitment to assure that the instream flows are protected under State law, the USFWS will consider these elements under section 7 consultation as offsetting project depletion impacts."

Thus, the USFWS has determined that depletion impacts, which the USFWS has consistently maintained are likely to jeopardize the listed fishes, can be offset by--a) the water Project proponent's one-time contribution to the Recovery Program in the amount of $16.67 per acre-foot of the Project's average annual depletion; b) appropriate legal protection of instream flows pursuant to State law; and, c) accomplishment of activities necessary to recover the endangered fishes as specified under the Plan. The USFWS believes it is essential that protection of instream flows proceed expeditiously, before significant additional water depletions occur.

With respect to (a) above (i.e., depletion charge), the applicant will make a one-time payment which has been calculated by multiplying the Project's average annual depletion (acre-feet) by the depletion charge in effect at the time payment is made. For Fiscal Year 2006 (October 1, 2005, to September 30, 2006), the depletion charge is $16.67 per acre-foot for the average annual depletion which equals a total payment of $16,781.69 for this Project. The USFWS will notify the applicant of any change in the depletion charge by September 1 of each year. Ten percent of the total contribution $1,678.16, or total payment, will be provided to the USFWS's designated agent, the National Fish and Wildlife Foundation (Foundation), at the time of issuance of the Federal approvals from BLM. The balance will be due at the time the construction commences. The payment will be included by the BLM as a permit stipulation. The amount payable will be adjusted annually for inflation on October 1 of each year based on the Composite Consumer Price Index. Fifty percent of the funds will be used for acquisition of water rights to meet the instream flow needs of the endangered fishes (unless otherwise recommended by the Implementation Committee); the balance will be used to support other recovery activities for the Colorado River endangered fishes. All payments should be made to the Foundation:

Rebecca Kramer, Special Funds Program Coordinator
National Fish and Wildlife Foundation
28 Second Street, 6th Floor
San Francisco, California 94105

Each payment is to be accompanied by a cover letter that identifies the Project and biological opinion that requires the payment, the amount of payment enclosed, check number, and any special conditions identified in the biological opinion relative to disbursement or use of the funds (there are none in this instance). A copy of the cover letter and of the check is to be sent directly to the USFWS field office that issued the biological opinion. The cover letter shall identify the name and address of the payor, the name and address of the Federal Agency responsible for authorizing the Project, and the address of the USFWS office issuing the biological opinion. This information will be used by the Foundation to notify the payor, the lead Federal agency, and the USFWS that payment has been received. The Foundation is to send notices of receipt to these entities within 5 working days of its receipt of payment.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury of listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7 (o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Colorado pikeminnow, humpback chub, bonytail, and razorback sucker are harmed from the reduction of water in their habitats resulting from the Project in the following manner--1) individuals using habitats diminished by the proposed water depletions could be more susceptible to predation and competition from nonnative fish; 2) habitat conditions may be rendered unsuitable for breeding because reduced flows would impact habitat formulation and maintenance as described in the biological opinion.

Estimating the number of individuals of these species that would be taken as a result of water depletions is difficult to quantify for the following reasons--(1) determining whether an individual forwent breeding as a result of water depletions versus natural causes would be extremely difficult to determine; (2) finding a dead or injured listed fish would be difficult, due to the large size of the Project area and because carcasses are subject to scavenging; (3) natural fluctuations in river flows and species abundance may mask Project effects, and (4) effects that

reduce fecundity are difficult to quantify. Estimating the number of individuals of the four listed fishes that could be taken by the water depletions addressed in this biological opinion is not possible. However, the implementation of the Recovery Program is intended to minimize impacts of water depletions and, therefore, the reasonable and prudent alternatives outlined in the biological opinion also will serve as reasonable and prudent measures for minimizing the take that results from the 1,006.7 acre-feet/year water depletion. Any amount of water withdrawal above this level would exceed the anticipated level of incidental take.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if--1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

Thank you for your cooperation in the formulation of this biological opinion and your interest in conserving endangered species.

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APPENDIX E

SUMMARY OF PUBLIC COMMENTS ON THE JONAH INFILL DRILLING PROJECT FEIS AND BLM'S RESPONSES

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SUMMARY OF PUBLIC COMMENTS ON THE JONAH INFILL DRILLING PROJECT FEIS AND BLM'S RESPONSES

Any person who participated in the EIS process and had an interest that may be adversely affected could comment on the FEIS for the JIDP. Comments had to be filed with the BLM within 30 days from the date the EPA published the Notice of Availability of the FEIS in the *Federal Register*. The comment period began January 13, 2006 and closed on February 13, 2006. Organizations and individuals who submitted comments on the JIDP FEIS during this time are identified in Table E.1.

Table E.1. Organizations and Individuals Submitting Comments on the JIDP FEIS

Organization **(Cooperating Organization)**	**Signer** **(Additional Signer)**
BP America Production Co.	David R. Brown, Manager, Regulatory Affairs-HSSE
Biodiversity Conservation Alliance (BCA)	Suzanne H. Lewis
(Center for Native Ecosystems)	(Jacob Smith)
C.E. Brooks & Assoc., P.C. (Brooks)	Constance E. Brooks
City of Rock Springs, WY	Timothy A. Kaumo, Mayor
EnCana Oil and Gas (USA) Inc. (EnCana)	John Schopp, Vice President, North Rockies Business Unit
Gene R. George Associates, Inc.	Gene R. George, Wyoming Regulatory Issues Agent for Yates Petroleum Corp.
	Tyler H. Vanderhoef, Wyoming Regulatory Issues Agent for Yates Petroleum Corp.
Independent Petroleum Assoc. of Mountain States (IPAMS)	Andrew Bremner, Director of Government Affairs
Jonah Field Livestock Grazing Permittees	
(Hittle Land and Livestock)	(Don Rodgers Jr.)
(Rendezvous Ranch)	(John and Joy Erramouspe)
KC Harvey, LLC, Soil & Water Resources Consult. (Harvey)	Kevin Harvey, Principal Scientist
	Douglas J. Dollhopf, Associate Scientist
Petroleum Association of Wyoming (PAW)	Ericka S. Cook, Vice President
Photon-*field* Engineering	Ronald P. Walker
Public Lands Advocacy	Claire M. Moseley, Executive Director
Robert Swigle, LLC	Robert Swigle
Rocky Mountain Energy Reporter	Geraldine Minick, Publisher
Roughrider Power	Kit Jennings
State of Wyoming, Office of the Governor	David Freudenthal, Governor
State of Wyoming, Office of the State Treasurer	Cynthia Lummis, State Treasurer
Sublette County, Board of County Commissioners	Betty Fear, Chairman
Sweetwater Economic Development Association	Patricia Robbins, Director
Town of Pinedale, Wyoming	Rose Skinner, Mayor
U.S. Energy Corporation/ Crested Corporation	Keith G. Larsen, CEO

Table E.1. Continued

Organization (Cooperating Organization)	Signer (Additional Signer)
U.S. Environmental Protection Agency	Robert E. Roberts
Wyoming Contractors Assoc.	Charles E. Ware, Executive Vice President
Wyoming Outdoor Council	Bruce Pendery
(Jackson Hole Conservation Alliance)	(Tom Darin)
(Center for Native Ecosystems)	(Jacob Smith)
(Greater Yellowstone Coalition)	(Lloyd Dorsey)
(The Wilderness Society)	(Peter Aengst)
(Biodiversity Conservation Alliance)	(Suzanne Lewis)
(Environmental Defense)	(Jana Milford)
(Trout Unlimited)	(Cathy Purves)
(National Wildlife Federation,)	(Michael Saul)
(Upper Green River Valley Coalition)	(Linda Baker)
(Wyoming Wildlife Federation)	(Dave Gowdey)
Individuals	
Andrikopoulos, Judy K. & John G.	Hunkins, Raymond B.
Berg, Eric M.	Kinnison, Allan
Bousman, Cotton	MaGee, Jim
Clark, Ronald	Peckler, Matthew K.
Dibrito, Larry	Reints, Lloyd
Donham, Rita	Reimers, Rebecca
Dunn, Duane	Reynolds, Stephen A.
Henderson, Leslie F.	Swigle, Robert
Hendricks, Curtis L.	White, Monte

Issue Summary

Comments on the JIDP FEIS raised a variety of issues, including the protection of local and regional air quality, the protection of cultural resources, livestock grazing within the JIDPA, socioeconomic impacts of the JIDP on local communities, wildlife impacts, reclamation activities, BLM's legal responsibilities, and adequacy of oil and gas reservoir estimates. Significant comments and BLM responses, categorized by resource or resource use, are summarized below.

Air Quality

Several comments stated that the BLM had no authority to regulate air quality emissions. Several other comments expressed the concern that the BLM had not detailed how it would regulate air quality. In general BLM responded to all these comments similarly: "BLM recognizes that WDEQ has the authority and responsibility to regulate air quality. As the lead federal land manager, BLM has the authority and responsibility to set management guidelines for potential air quality impacts from BLM activities."

Several comments expressed technical concerns regarding air quality data, monitoring information, the appropriateness of dispersion modeling, and the scientific correctness of model assumptions and methodologies. These comments received responses similar to the following: "BLM maintains that dispersion modeling results are defensible and not inconsistent with available monitoring data. The Jonah air quality model was developed cooperatively by an interagency team of experts."

A few comments expressed concerns regarding monitoring of air quality. A typical response to these comments was that "BLM recognizes that better data might improve model predictions, and better document air quality. BLM, in consultation with the interagency air quality team and the JIO, may consider installation of additional air quality monitoring stations."

Other air quality issues include the need for additional monitoring locations, adding the Dinosaur National Monument as a sensitive receptor, double counting of emissions, visibility impacts, and funding for monitoring and BLM's annual monitoring budget.

Reclamation

Several comments were received concerning the method to be used to determine successful reclamation within the JIDPA and questioning feasibility of the metric that required "80% basal cover/density." The need to fairly allocate allowable disturbance to each leaseholder was also raised. BLM responded to these comments by recognizing the need for equitable distribution of disturbance on an "operated-acreage basis" and to establish separate "rollover" and "release" reclamation objectives.

In addition to these comments, the use of the word "restoration" instead of "reclamation," and the need for site-specific soil salvage requirements was identified in comments.

The pace of development and the need for Operators to provide baseline studies and inventories was identified as a BLM function that was being transferred to the Operators. BLM responded by "recognizing that published research was voluntary" and that "inventories were necessary to establish baseline conditions."

Livestock and Grazing

One comment suggested that loss of grazing preference and purchase of lands for off-site mitigation could result in Sublette County completely losing its agricultural base and thereby make the county dependent on the oil and gas industry. BLM responded, "BLM addresses loss of grazing preference in the FEIS and this ROD. Losses will be mitigated though adaptive management. Effects to livestock grazing and local socioeconomic structures are considered in the FEIS. Outright land purchase is not contemplated at this time." Furthermore, "The intent of mitigation of loss of wildlife habitat through compensatory mitigation is not to displace agricultural uses or operators, including the grazing of livestock."

Compensatory Mitigation and the Jonah Interagency Office

Several comments stated that BLM could not require compensatory mitigation. BLM responded to these comments similar to the following, "Compensatory mitigation is a voluntary program, but once industry agrees that they will follow this path, it does become part of the mitigation that is considered part of the implementation of the decisions." Other comments suggested that the JIO duties and procedures were not fully described, that BLM was improperly delegating its authority, and that there was no plan for

dissolving the JIO or overseeing JIO activities. All of these comments were addressed by referring the commenter to the JIO Charter in Appendix F of the FEIS.

A single comment requested that local government entities be allowed to have a member included in the JIO staff. BLM responded to this request **"**The BLM intends to conduct outreach and offer regular opportunities for local governments and other groups to participate and be informed in proceedings at the JIO. Addition to or contraction of the office members is not specifically addressed.**"**

Laws, Regulations and Policies

Numerous comments stated that the FEIS was inadequate, or did not properly follow the law. These comments alleged violation of BLM mandates under the Federal Land Policy and Management Act (FLPMA), inadequate range of alternatives, failure to provide for multiple use of the public lands, incomplete cumulative impacts analysis, and inadequate prevention of undue and unnecessary degradation. BLM does not believe that these comments are valid and further that the agency has complied with the public land laws and polices in all cases.

Reservoir Management

BLM received two comments that the recoverable reserve loss calculation in the FEIS, as a result of requiring directional drilling, was in error. BLM responded to both comments that "BLM believes the commenter**'**s analysis is flawed. BLM technical experts have reviewed and concur with the recovery numbers used in the FEIS, based on available data.**"** Other comments were received on closed loop drilling systems and on mitigation requirements under the Energy Policy Conservation Act.

Socioeconomics

One comment questioned the effects of JIDP development on local governments' infrastructure capacity. The BLM maintains it has properly disclosed and analyzed socioeconomic impacts of the various alternatives in the FEIS.

Wildlife

Several comments were received that alleged violation of FLPMA for failure to disclose impacts to wildlife. BLM disagrees with the comments that assert improper application of public land laws, including FLPMA. The BLM also "recognizes that the density of development underway and proposed for the Jonah Field results in impacts that cannot be mitigated within the field," so that off-site mitigation is the primary option for wildlife mitigation. Again, the JIO will help to oversee monitoring and mitigation efforts and provide guidance for the development. One comment requested that the U.S. Fish and Wildlife Service Letter of Concurrence be included in the ROD. This has been done.