1.0 Introduction

As the energy needs of the nation continue to grow, the onshore sedimentary basins of the United States become increasingly significant oil and natural gas sources to help meet these needs, especially for natural gas. In 2006, the U.S. consumed about 22 trillion cubic feet (TCF) of natural gas, produced domestically approximately 19 TCF, and imported the remaining 3 TCF. Onshore Federal lands produced about 11 percent of the 2006 domestic natural gas consumption. The Energy Information Administration (EIA) in its *Annual Energy Outlook 2008* Reference Case predicts that the demand for natural gas will rise to 23 TCF by 2030 of which about 3 TCF will be imported.[5]

Based on recent U.S. Geological Survey (USGS)[6] and Minerals Management Service (MMS)[7] assessments, the nation's undiscovered natural gas resources total approximately 1,056 TCF.[8] The second largest potential source for domestic natural gas production is the Outer Continental Shelf (OCS) which contains approximately 40 percent of the nation's undiscovered natural gas resources. All resources in the OCS are Federally owned and managed. The EIA data indicate that lower 48 offshore production of natural gas will peak at 4.5 TCF in 2019, driven by activity in the Gulf of Mexico. However, after 2015, lower 48 offshore production is estimated by EIA to decline to 3.5 TCF in 2030.

The nation's largest natural gas source is the nonfederal onshore lands and state waters, also containing about 40 percent of the total.[9] Onshore Federal lands contain the remaining 20 percent of the nation's domestic natural gas resources. This Inventory analyzes onshore Federal natural gas resources, totaling 214 TCF. This 214 TCF would be sufficient to meet the nation's residential consumption for about 49 years at current rates.

Similarly, the U.S. consumed about 7.5 billion barrels (Bbbls) of oil in 2006. About 60 percent of this oil was imported. Onshore Federal lands produced about 5 percent of the 2006 domestic consumption. The EIA predicts that the nation will consume 9.1 Bbbls in 2030.

The nation's undiscovered oil resources total about 139 Bbbls. Of that total, the MMS estimates that 86 Bbbls are offshore under the OCS, comprising 62 percent of the nation's resources. State waters and nonfederal onshore resources are the second largest potential source of production (21 percent) followed by Federal onshore oil resources (17 percent).

This Inventory estimates that, of the 24 Bbbls of undiscovered oil resources on Federal onshore lands, 17 Bbbls occur within Northern Alaska.

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[5] Available on the EIA website: http://www.eia.doe.gov/oiaf/aeo/pdf/earlyrelease.pdf.

[6] Available on the USGS website: http://certmapper.cr.usgs.gov/data/noga00/natl/tabular/2007/summary_07.pdf.; data as of January 2007

[7] Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2006 Update, available on the MMS website: http://www.mms.gov/revaldiv/PDFs/2006NationalAssessmentBrochure.pdf

[8] See the "Undiscovered Petroleum Resources" definition in Appendix 2.

[9] Enegis, LLC, estimate based on USGS resource data (revised since the Phase II inventory) and MMS data.

It is clear that Federal lands will be an important future domestic energy supply source. According to EIA data, the Rocky Mountain region surpassed the Gulf of Mexico in 2005 as the single largest supplier of natural gas to the nation.[10] The sedimentary basins in the Interior West are particularly significant future sources of natural gas, and the Alaska North Slope is similarly noteworthy with respect to both oil and gas. Considerable natural gas supply would become available to the lower 48 states with the building of an Alaskan natural gas pipeline, anticipated for completion in 2020.[11]

Congress directed the Secretary of the Interior to inventory the nation's Federal onshore oil and gas resources in relation to Federal actions that inhibit access to these resources. The purpose of this Inventory is to add clarity to the debate and assist energy policymakers and Federal land managers in making decisions concerning oil and gas development.

The total area of the United States is 2.4 billion acres.[12] The EPCA Phase III Inventory examines the oil and gas resource areas of the onshore U.S. which total 1.2 billion acres (Figure 1-1). These resource areas include 279 million acres of Federal land of which 184 million acres were analyzed in detail. The data on the remaining 96 million acres was extrapolated. Of the 700 million acres of Federal mineral estate (including split-estate minerals)[13] administered by the Federal government, 421 million acres are outside of those areas believed to contain oil and natural gas resources.

A full set of acronyms and abbreviations used in this report, as well as a glossary, can be found in Appendices 1 and 2, respectively.

1.1 Background

Access to Federal lands is probably the most often-cited issue affecting onshore domestic oil and gas exploration and production. The restrictions and impediments that constrain access to Federal lands are frequently a complex set of requirements that can preclude drilling or increase costs and delay activity. These restrictions include areas unavailable for leasing and areas where the minerals can be leased but the surface of the land may not be occupied thereby affecting recovery of the resources. There are also limitations on drilling activities due to a variety of environmental and socioeconomic considerations, typically manifested as lease stipulations and drilling permit conditions of approval (COAs).

Recent attempts to understand the impacts of Federal land management decisions on access to oil and gas resources began with a 1999 National Petroleum Council (NPC) study.[14] One of the objectives of the NPC study was to collect and analyze data on land use and natural gas resources for

[10] The effects of Hurricane Katrina in 2005 impacted production in the Gulf of Mexico.

[11] Annual Energy Outlook, 2008. Energy Information Administration. http://www.eia.doe.gov/oiaf/aeo/production.html.

[12] http://www.nationalatlas.gov/articles/mapping/a_general.html#one

[13] Public Lands, On-Shore Federal and Indian Minerals in Lands of the U.S. Bureau of Land Management. December 1, 2000

[14] Meeting the Challenges of the Nation's Growing Natural Gas Demand, December 1999, available on the NPC website: http://www.npc.org/reports/ng.html.

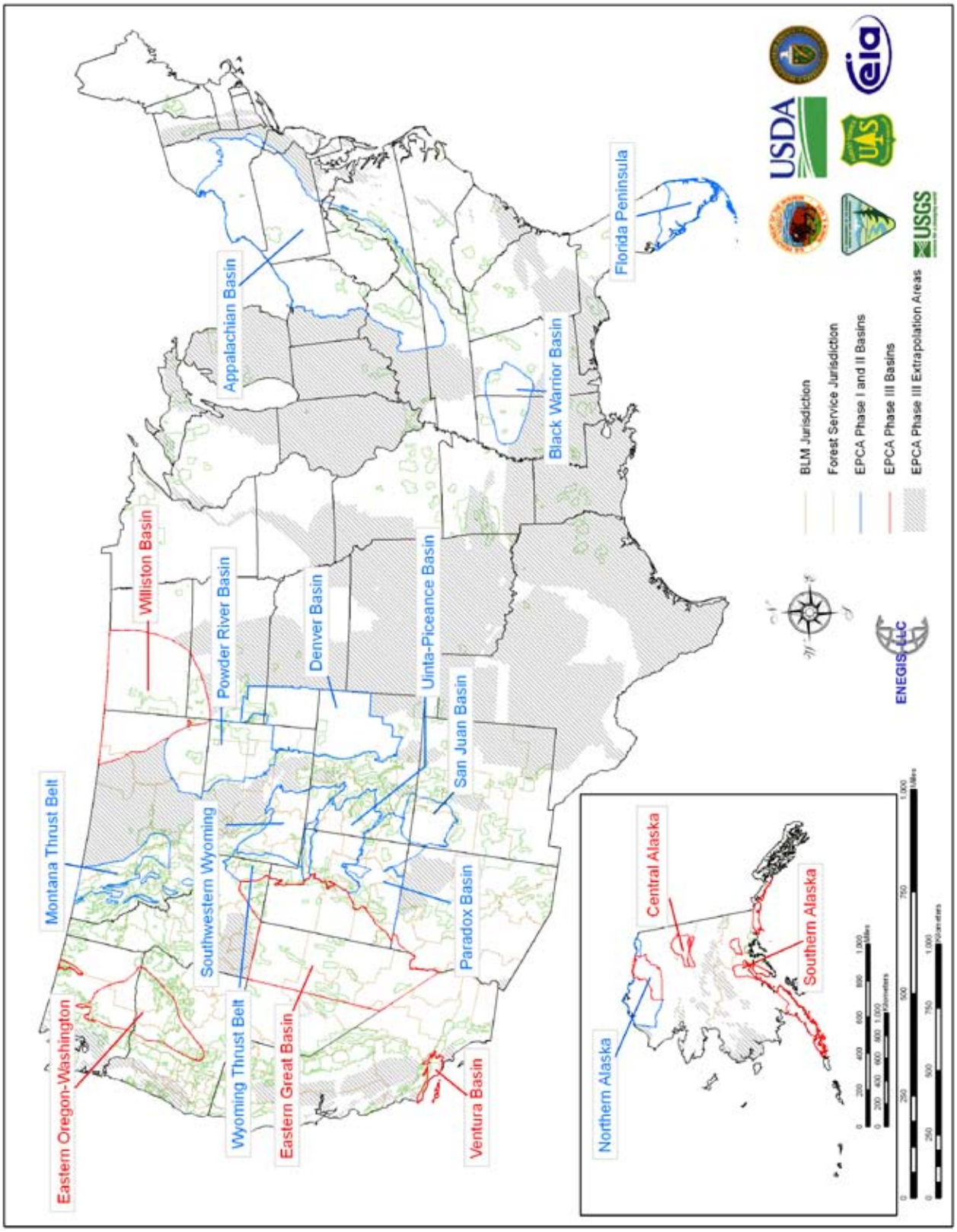

Figure 1-1. Study Area Locations

Federal lands to identify opportunities for increasing natural gas supply from this area.

In response to the NPC report, the Department of Energy (DOE), with the cooperation of the Department of the Interior (DOI) and the U.S. Department of Agriculture (USDA), embarked on an effort to assess the relationship between gas resources and land use restrictions on Federal lands. The first area studied was the Greater Green River Basin (GGRB) of Wyoming and Colorado.[15]

Both the NPC and DOE studies were substantially less comprehensive than the present Inventory. In 2000, while the DOE study was being conducted, EPCA was signed into law. Section 604 of this Act required a similar study, to be led by DOI in cooperation with the USDA and DOE, which was to include an analysis of undiscovered oil and natural gas resources and proved oil and gas reserves for all onshore Federal lands in the United States. The text of Section 604 and the related conference report are given below.

1.2 The EPCA as Amended by the Epact 2005

Sec. 604. Scientific Inventory of Oil and Gas Resources[16]

(a) In General—

The Secretary of the Interior, in consultation with the Secretaries of Agriculture and Energy, shall conduct an inventory of all onshore Federal lands. The inventory shall identify—

(1) the United States Geological Survey estimates of the oil and gas resources underlying these lands;

(2) the extent and nature of any restrictions or impediments to the development of the resources, including—

(A) impediments to the timely granting of leases;

(B) post-lease restrictions, impediments, or delays on development for conditions of approval, applications for permits to drill, or processing of environmental permits; and

(C) permits or restrictions associated with transporting the resources for entry into commerce; and

(3) the quantity of resources not produced or introduced into commerce because of the restrictions.

(b) Regular Update—

Once completed, the USGS resource estimates and the surface availability data as provided in subsection (a)(2) shall be regularly updated and made publicly available.

(c) Inventory—

The inventory shall be provided to the Committee on Resources of the House of Representatives and to the Committee on Energy and Natural Resources of the Senate within two years after the date of enactment of this section.

[15] "Federal Lands Analysis, Natural Gas Assessment, Southern Wyoming and Northwestern Colorado, Study Methodology and Results," May 2001, available on the DOE website: http://fossil.energy.gov/programs/oilgas/publications/fla/Federal_Lands_Assessment_Report.html

[16] Section 604 of EPCA was amended by Section 364 of EPAct 2005 (42 USC 6217).

(d) Assessments—
Using the inventory, the Secretary of Energy shall make periodic assessments of economically recoverable resources accounting for a range of parameters such as current costs, commodity prices, technology, and regulations.

1.3 The EPCA Phase I and II Inventories

Released in January 2003, the EPCA Phase I Inventory focused on basins of the Interior West, where most Federal onshore oil and gas resources in the lower 48 states are located.[17] The Phase I Inventory covered the Uinta-Piceance, Paradox/San Juan, Powder River, and Greater Green River Basins and the Montana Thrust Belt.

The EPCA Phase II Inventory was released in November 2006 and superseded the Phase I Inventory.[18] It includes all the Rocky Mountain basins covered by the Phase I Inventory as well as six additional basins – Northern Alaska (NPR-A and ANWR 1002), the Wyoming Thrust Belt, Denver Basin, Florida Peninsula, Black Warrior Basin and the Appalachian Basin. In addition, the Phase II Inventory adds the effect of COAs on land access.

[17] Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, January 2003, available on the BLM website: http://www.blm.gov/epca/epcaI.htm.

[18] Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to Their Development, November 2006, available on the BLM website: http://www.blm.gov/epca/epcaI.htm.

1.4 The National Petroleum Council Report, 2003

In 2003, the NPC provided an update to its 1999 natural gas study.[19] With respect to Federal land access, the NPC examined COAs in addition to lease stipulations. The study found that the COAs are more of an impediment to development than leasing stipulations. For example, in the Green River Basin, the 2003 NPC study determined that 9 percent of the resource was unavailable for leasing with an additional 31 percent "effectively" off-limits to development due to prohibitive COAs. The NPC study noted that, in addition to making leasable areas unavailable, the COAs added significant costs and delays to development. Further, it estimated that of the 238 TCF undiscovered, technically recoverable natural gas resources in the Rocky Mountain region, 69 TCF are unavailable for development while the remaining 56 TCF are affected by access-related regulatory requirements.

1.5 Approach

Similar to the Phase II Inventory, a Steering Committee, composed of representatives from the participating agencies, was responsible for overseeing the completion of the Phase III Inventory. Subsequent to the Phase II Inventory, the Steering Committee identified the next six major oil and gas geological provinces to be examined:

- Central Alaska (Yukon Flats) (YKF)
- Southern Alaska (SAK)
- Eastern Oregon-Washington (EOW)

[19] Balancing Natural Gas Policy: Fueling the Demands of a Growing Economy, National Petroleum Council, September 2003, available on the NPC website: http://www.npc.org/reports/ng.html.

- Ventura Basin (VEN)
- Eastern Great Basin (EGB)
- Williston Basin (WIL).

As with the Phase II Inventory, each of these study areas is defined by the aggregation of the USGS oil and gas resource plays for each area. The energy resource, Federal land status, and oil and gas constraints data for these areas were incorporated into a Geographic Information System (GIS) that allows derivative mapping and statistical analysis. The results presented in this report are inclusive as the Phase III Inventory incorporates and supersedes the Phase II Inventory.

1.6 Roles of the Agencies

Section 604 of EPCA designated responsibility for preparing the Inventory to the DOI, in consultation with the USDA and DOE. The Interagency Steering Committee is responsible for providing guidance for conducting the studies, recommending direction to the company contracted to support the Inventory, making decisions concerning critical parameters, reviewing the methodologies and results, and publishing the report.

The Secretary of the Interior designated the Bureau of Land Management (BLM) as the lead agency for the Inventory. The BLM maintains the oil and gas lease stipulation information and well files containing COAs for lands under its jurisdiction, and land status data for all Federally owned lands within the United States.

The USGS, also a bureau of the DOI, conducts assessments of undiscovered technically recoverable oil and natural gas. The primary source of the oil and gas resource information used in this study is the USGS National Assessment of United States Oil and Gas Resources.

The Secretary of Agriculture designated the USDA-Forest Service (FS), its primary land management agency, to contribute its information regarding oil and gas lease availability and leasing stipulations for lands within the National Forest System.

The DOE contributes its expertise and experience in guiding the design and analysis process for the Inventory. DOE's EIA contributes its analysis of proved reserves estimates and reserves growth for Federal lands.

During the course of this study (including earlier Inventory phases), members of the Steering Committee and contract personnel visited field offices within the various basins. The BLM, FS and other Federal agency personnel from more than 110 offices (Table 1-1) participated in these visits. The purpose of these visits was to inform Federal land managers about the studies and to solicit input concerning lease stipulations, COAs, and other issues of concern regarding oil and gas development. As described in Section 2, information obtained from these officials was critical to the study. Data were collected during and following the field visits.

[20] The contractor is Enegis, LLC of Fairfax, VA. They have engaged Premier Data Services of Englewood, CO as a subcontractor.

Table 1-1. Federal Land Management Offices Participating in the Inventory

Jurisdiction	Study Area*
National Forests in Alabama	BWB
Albuquerque, NM, BLM Field Office	SJB
Allegheny NF	APB
Anchorage, AK, BLM Field Office	SAK
Angeles NF	VEN
Arapaho and Roosevelt NF and Pawnee NG	DEN
Arizona Strip, AZ, BLM Field Office	EGB
Ashley NF	UPB, SWW
Bakersfield, CA, BLM Field Office	VEN
Battle Mountain, NV, BLM Field Office	EGB
Beaverhead-Deerlodge NF	MTB
Big Cypress National Preserve	FLP
Bighorn NF	PDR
Billings, MT, BLM Field Office	PDR
Bitterroot NF	MTB
Black Hills NF	PDR, DEN
Bridger-Teton NF	WTB, SWW
Buffalo, WY, BLM Field Office	PDR
Burley, ID, BLM Field Office	EGB
Butte, MT, BLM Field Office	MTB
Caribou-Targhee NF	EGB, WTB
Carson NF	SJB
Casper, WY, BLM Field Office	PDR, DEN
Cedar City, UT, BLM Field Office	EGB, PDX
Chugach NF	SAK
Cibola NF	SJB
Custer NF	PDR
Dakota Prairie NG	WIL
Daniel Boone NF	APB
Deschutes NF	EOW
Desert Range Experiment Station	EGB
Dillon, MT, BLM Field Office	MTB
Dixie NF	PDX
Elko, NV, BLM Field Office	EGB
Ely, NV, BLM Field Office	EGB
Fairbanks, AK, BLM Field Office	NAK

Jurisdiction	Study Area*
Farmington, NM, BLM Field Office	SJB
Fillmore, UT, BLM Field Office	EGB, UPB
Finger Lakes NF	APB
Fishlake NF	PDX, UPB
Flathead NF	MTB
Gallatin NF	MTB
George Washinton NF	APB
Glennallen, AK, BLM Field Office	SAK
Glenwood Springs, CO, BLM Field Office	UP, SWW
Grand Junction, CO, BLM Field Office	UPB, PDX
Grand Mesa Uncompahgre/Gunnison NF	UPB, PDX
Gunnison, CO, BLM Field Office	UPB
Helena NF	MTB
Humboldt NF	EGB
Idaho Falls, ID, BLM Field Office	WTB, EGB
Jackson, MS, BLM Field Office	FLP, BWB, APB
Jefferson NF	APB
Chugach NF	SAK
Jurisdiction	Study Area*
Kemmerer, WY, BLM Field Office	SWW, WTB
Kootenai NF	MTB
Lakeview, OR, BLM Field Office	EOW
Lander, WY, BLM Field Office	SWW
Las Vegas, NV, BLM Field Office	EGB
Lewis and Clark NF	MTB
Lewistown, MT, BLM Field Office	MTB
Little Snake, CO, BLM Field Office	UPB, SWW
Lolo NF	MTB
Los Padres NF	VEN
Malta, MT, BLM Field Office	WIL
Manti La Sal NF	UPB, EGB, PDX
Medicine Bow-Routt NF and Thunder Basin NG	UPB, PDR, SWW
Miles City, MT, BLM Field Office	PDR, WIL

Table 1-1. Federal Land Management Offices Participating in the Inventory (continued)

Jurisdiction	Study Area*
Milwaukee, WI, BLM Field Office	APB
National Forests in Mississippi	BWB
Missoula, MT, BLM Field Office	MTB
Moab, UT, BLM Field Office	UPB, PDX
Monongahela NF	APB
Monticello, UT, BLM Field Office	PDX
Nebraska NF and Oglala & Buffalo Gap NG	PDR, DEN
Newcastle, WY, BLM Field Office	PDR, DEN
North Dakota, BLM Field Office	WIL
Northern, AK, BLM Field Office	YKF, NAK
Ochoco NF	EOW
Palm Springs/South Coast, CA BLM Field Office	VEN
Pike-San Isabel NF	DEN
Pinedale, WY, BLM Field Office	SWW, WTB
Pocatello, ID, BLM Field Office	EGB, WTB
Price, UT, BLM Field Office	UPB, PDX
Prineville, OR, BLM Field Office	EOW
Rawlins, WY, BLM Field Office	SWW, DEN
Richfield, UT, BLM Field Office	UPB, EGB, PDX
Rock Springs, WY, BLM Field Office	SWW
Royal Gorge, CO, BLM Field Office	DEN
Salt Lake, UT, BLM Field Office	UPB, EGB, WTB
San Juan, CO, BLM Field Office	SJB, PDX
San Juan NF	SJB, PDX
Santa Fe NF	SJB
Sawtooth NF	EGB
South Dakota BLM Field Office	PDR, DEN, WIL
Spokane, WA, BLM Field Office	EOW
St. George, UT, BLM Field Office	PDX, EGB
Taos, NM, BLM Field Office	SJB
Tennessee Valley Authority	BWB, APB
Tongass NF	SAK
Uinta NF	UP, EGB
Umatilla NF	EOW
Uncompahgre, CO, BLM Field Office	UPB, PDX
Vale, OR, BLM Field Office	EOW
Vernal, UT, BLM Field Office	UPB
Wasatch-Cache NF	WTB, EGB, SWW
Wayne NF	APB
White River, CO, BLM Field Office	UPB, SWW
White River NF	UPB, SWW

1.7 Intended Use

This Inventory is designed to be useful to a wide range of interests. In a broad sense, it gives a picture of where oil and natural gas is estimated to occur and a quantification of what statutory and administrative constraints limit exploration and development. Agencies can use this Inventory data to identify areas of high resource potential and to examine Federal land management decisions affecting access to energy resources. This Inventory provides both the public and Federal land managers with information about the potential magnitude of oil and natural gas resources unavailable for development due to access limitations. This information can be used in conjunction with information about other resource values and the environment.

The highly detailed Federal land access data along with the oil and gas resource data are available for additional analyses by Congress, industry, environmental organizations, and other interested parties. Land withdrawals, oil and gas lease stipulations, and COAs mitigate or prevent

adverse impacts to other valuable land resources. Land management agencies can analyze this information together with existing policies and procedures to identify opportunities for improving and enhancing decisions in their land use planning, leasing, and permitting processes. Agencies can use this information to prioritize the need for additional data and analyses, and to identify opportunities for improving access to oil and gas resources. Overall, this Inventory provides fundamental information to help resolve development issues.

A fundamental product of this Inventory is the GIS database containing numerous layers of geographic data referenced by longitude and latitude. An important caution applies to the use and interpretation of the undiscovered energy resources data: the exact locations of recoverable accumulations of undiscovered oil and natural gas resources on Federal lands are unknown. For the purpose of this Inventory, it is assumed that there is a uniform distribution of the resources across the geographic extent of a given play or assessment unit.

Over the last several decades, the USGS methodology has been the government's standard for oil and gas resource estimation. The USGS assessment process estimates the volume of undiscovered oil, natural gas, and natural gas liquids that have the potential to be added to reserves during a 30-year forecast period. Assessment results are based on known or estimated geological input parameters provided by knowledgeable geologists—parameters such as trapping mechanism, source rock, reservoir quality and size of known accumulations. Because of the uncertainty about the input parameters, the assessment result is expressed as a probability distribution of potential resources in the assessment unit or geologic play. For these reasons this Inventory does not imply that the locations of accumulations of undiscovered oil and gas resources are known to occur under specific land parcels.

1.8 Products/Future Direction

The tables, data, maps (GIS products), and this summary report, describing the methodology, applied standards, results, and land access issues, are available on DVD and on the BLM (http://www.blm.gov/epca) website.

Section 604 of EPCA requires that all Federal lands of the onshore United States be inventoried. With the completion of this Phase III report, an estimated 87 percent of the onshore Federal oil and gas resources, including reserves growth, were inventoried in detail, and the results for the remaining 13 percent were extrapolated. For subsequent releases, the information and analysis for previously studied areas will be updated as the availability of new data and developments in technology warrant.