Level 1 and 2 areas – developed recreation sites, the North Country Trail, or highly traveled corridors – also would be given the highest consideration for scenic quality.

Management activities proposed under Alternatives A (no action) would provide the same results in the Forest landscape as the existing scenic condition. Alternatives B through F propose more vegetation management and prescribed burn activities than the 1988 Forest Plan. All other management activities (i.e., mineral activity, watershed restoration, etc.) would essentially remain the same across all action alternatives. Management activities with potential to cause visual deviations from a natural-appearing landscape would be mitigated by varying their size, shape, texture, location, and frequency. Many of these activities would cause minor, short-term visual impacts. Most openings created by regeneration harvests would be designed to resemble small natural disturbances. The long-term impacts to the Forest landscape from these activities would not likely be significant because the management intensity is low and widely distributed across the Forest. Urban/suburban development and agricultural activities on private lands adjacent to the Forest would more likely have a greater impact on the WNF landscape.

Lands

Affected Environment

Background

Discussions between the State Forester of Ohio and the Chief of the Forest Service regarding the possibility of establishing a national forest in Ohio began in 1919. The Forest Service noted that there was a considerable area of “rough” land near the Ohio River that would fit the criteria set forth under the Weeks Act. After initial reconnaissance, the State and the Forest Service agreed that, because Ohio had such a small amount of available “idle and waste lands”, such lands should be designated State Forests and Parks.

No further consideration of a Federal Purchase Unit occurred until the early part of President Franklin Roosevelt’s Administration. The decline in several southeastern Ohio natural resource-based industries, combined with the Great Depression, caused many people to migrate out of the region. People were abandoning the land in record numbers, leaving much of it cutover, mined out, and eroding. Many farms offered at auction for

non-payment of taxes had no buyers. By 1933, more than 30 percent of the land in southeastern Ohio was tax delinquent.

In 1933, Federal legislation was proposed to relieve economic distress, create the Civilian Conservation Corps workforce, and increase the nation's forest resources. For the first time, Ohio indicated an interest in joining the National Forest system. Legislation, introduced in 1934 as the State Consent Bill, called for allowing the Federal Government to acquire certain lands in Ohio as a means to ensure "immediate preservation of the public peace, safety, and health of the inhabitants of the State of Ohio" (O.R.C. Section 1503.32). It further stated that enactment was necessary because the Federal Government had appropriated funds that year to purchase "submarginal land" to establish National Forests and was ready to consider Ohio lands. The bill established a process for designating lands available for Federal purchase. The bill became law in December of 1934, called the Ohio State Consent Act (O.R.C. Section 1503.32).

Field examination was conducted during 1934 of five proposed purchase units in southern Ohio, totaling 1,464,000 acres, including: Muskingum Unit, 282,000 acres; Hocking Valley Unit, 355,000 acres; McArthur Unit, 285,000 acres; Little Scioto Unit, 287,000 acres; and Symmes Creek Unit 255,000 acres.

The Purchase Unit boundaries were approved in 1935, and the headquarters office for the Ohio Purchase Units was established in Columbus. A Forest Service nursery was established near Chillicothe (no longer active) to produce trees for reforestation. The Civilian Conservation Corps (CCC) provided jobs for the unemployed and the manpower to begin reforesting hillsides and controlling erosion. These workers also constructed fire lookout towers across Ohio and strung telephone lines between them to relay messages for wildfire control.

In 1949, the five Ohio Purchase Units were consolidated into a single National Forest unit, together with the Purchase Units in Indiana. This consolidation was aimed at reducing the cost of administering the two systems. The consolidated units were known as the Wayne-Hoosier Purchase Units (Wayne of Ohio and Hoosier of Indiana). Bedford, Indiana, was headquarters for both units.

Over the next 20-years, acquisition of land to increase the size of the Forest within the five prescribed Purchase Units was a major emphasis. Restoration, including stabilizing erosion, rehabilitating damaged land, and controlling wildfires was another major emphasis.

In 1970, after several years of study, analysis, and legal process, the Wayne National Forest boundary was adjusted, and the number of Purchase Units was reduced from five to three – Athens, Marietta, and Ironton. The adjustments resulted in a reduction of the area within the proclamation boundary from 1,411,969 acres to 830,836 acres (as

calculated by the Government Land Office). At that time, the Forest owned a total of 140,250 acres within the Units. The revision was made to include some watersheds more completely, and to exclude areas where a National Forest program was no longer possible due to residential, commercial, or industrial expansion.

In 1993 the WNF was established as a separate administrative unit, with headquarters in Athens, Ohio. The 1993 Congressional Appropriations Bill directed the establishment of a Forest Supervisor's Office for the Wayne in Ohio. Some reasons for this included the need for increased customer service in Ohio and differing resource issues on the two forests.

Since the Consent Act was signed by the State of Ohio in 1934, the Forest Service has acquired 238,053 acres (as of May 9, 2003) of 853,153 acres within the proclamation boundary that comprises the WNF's current purchase area (acreages from WNF database). (Table 3 - 61).

Table 3 - 61. National Forest acreage in the 12 WNF counties, 2003

County	WNF Acres	Proclamation Acres	Total Acres in County	WNF as % of County
Athens	18,721	83,860	325,327	5.8%
Gallia	17,907	112,405	301,543	6%
Hocking	25,741	61,293	270,974	9.5%
Jackson	1,650	7,562	269,632	0.6%
Lawrence	70,765	163,314	292,375	24.2%
Monroe	24,424	143,951	292,441	8.4%
Morgan	3,354	7,803	269,725	1.2%
Noble	715	5,626	258,738	0.3%
Perry	22,336	79,710	263,841	8.5%
Scioto	11,707	33,359	394,358	3%
Vinton	1,901	27,397	265,526	0.7%
Washington	38,832	127,251	409,125	9.5%
Total	**238,053**	**853,531**	**3,613,605**	**6.6%**

Environmental Consequences

Cumulative Effects - Common to All Alternatives

The alternatives do not vary in terms of Forest's land acquisition and land ownership adjustment program. It is difficult to assess the environmental effects of public versus private land ownership. Most of the land acquired for the WNF is undeveloped forested land. There is no way to know how the uses of this land might change in the future, if it were to remain in private ownership. In general, it can be assumed that more development would occur on privately owned than on publicly owned land. These effects would be similar under all alternatives.

Starting in 2005, Federal funds will be used by the State to purchase conservation easements under the Forest Legacy Program (FLP), authorized under the Cooperative Forestry Assistance Act. The 12 counties within the Forest's proclamation boundary are included entirely in the 31-county Forest Legacy Area, identified in the Assessment of Need draft (June 15, 2004). It is not a goal of the Forest to purchase lands with FLP conservation easements. However, with cooperation from the State, private landowners and the Forest Service, conservation easements adjacent to National Forest System land could contribute to the general conservation goals of the Forest.

The goal of consolidating the WNF land base would be the same under all alternatives. Acquiring in-holdings, adjacent properties, and lands comprising essential blocks of key ownerships would promote more efficient administration, provide greater recreation opportunities, and provide larger blocks of plant and animal habitat. The need to acquire right-of-ways for road and trail access is reduced with a consolidated land pattern.

The social and economic effects of National Forest System ownership are of interest to many residents. These effects are discussed in the social and economic section of this chapter.

Minerals and Geology

Background

For over a century and a half, mineral production has been very important to the people of Ohio, providing jobs and products that sustain a higher standard of living. This economic contribution is felt statewide as well as locally. Also, the U.S. economy depends heavily on non-renewable mineral resources.

Ohio's oil and gas industry dates back to the mid-1800s, with production in 1860 from the first commercial oil well in Washington County. The first production of natural gas followed in 1884. Since then, Ohio has ranked in the top half of all states that produce oil and gas. Ohio ranks fourth nationally in the total number of wells drilled (269,790 as of 2002), superseded only by Texas, Oklahoma, and Pennsylvania.

Coal is Ohio's most valuable single mineral resource, and the State now boasts a multi-billion dollar coal industry. Since 1800, a total of 3.63 billion tons of bituminous coal have been mined in Ohio.

Industrial minerals have been produced in Ohio since before recorded history. Native Americans exploited raw materials such as flint and clays long before the arrival of European settlers. Limestone, dolomite, sand, and gravel account for over 90 percent of Ohio's industrial mineral production. Various amounts of salt, sandstone, clay, shale, gypsum, and peat comprise the remainder. Ohio ranks 3rd nationally in the production of lime and 5th in the production of crushed stone.

The WNF is located in the heart of the State's oil, gas, and coal deposits. Industrial minerals such as sand, gravel, limestone, clay, shale, sandstone, and salt are also found within the Forest. The WNF is currently comprised of 239,497 acres of Federally owned surface (this includes acreage outside the proclamation boundary) of which about 40 percent (96,246 acres) is underlain by minerals fully owned by the Federal government. Reserved and/or outstanding mineral rights wholly or partially encumber the remaining 143,251 acres.

Minerals management differs significantly from the management of renewable Forest resources such as timber, wildlife, or recreational opportunities. First, management of mineral and energy resources on the Wayne is determined in part by the type of mineral ownership (Federal minerals, reserved minerals, outstanding minerals, or any combination thereof). Second, minerals are difficult to locate and inventory. Third, development of mineral resources depends greatly on local, national, and global markets. Such uncertainties complicate out-year planning.

Legal and Administrative Framework

With the adoption of the Mining and Minerals Policy Act of 1970, Congress set a national policy of developing an economically sound and stable domestic minerals industry through private enterprise. The act calls for the "orderly economic development of domestic mineral resources" to help satisfy the industrial, security, and environmental needs of the nation. Within this context, the Forest Service has an essential role in contributing to an adequate and stable supply of mineral and energy resources while continuing to sustain the land's productivity for other uses and its capacity to support biodiversity goals.

The government's policy was restated in the National Materials and Minerals Policy, Research, and Development Act of 1980 and the Energy Security Act of 1980. These statutes direct the Secretary of Agriculture to process applications for leases and permits to explore, drill, and develop resources on National Forest System land, notwithstanding the status of a National Forest's Land and Resource Management Plan.

Executive Order 13212 (May 18, 2001) states that agencies shall take appropriate actions, to the extent consistent with applicable law, to

expedite projects that will increase the production, transmission, or conservation of energy.

Statutes, regulations, and executive orders guide Forest Service policy for the exploration and development of mineral resources on NFS land. Authority to manage the exploration and development of mineral and energy resources on NFS land is shared by the Secretaries of Agriculture and the Interior. The U.S. Dept. of the Interior (USDI) has primary responsibility for administration of general mining laws and mineral leasing, but certain leasing acts require the Secretary of Agriculture's consent. Leases may also be subject to conditions designed to ensure adequate utilization of lands for the purposes for which they were acquired or are being administered. The Forest Service has entered into interagency agreements with USDI agencies to establish cooperation and coordination in the management of Federally owned minerals within National Forests. The Forest Service is responsible for managing surface occupancy and use by those conducting mineral activities and to manage the disposal of certain mineral materials.

Mineral and energy resource management laws and regulations and associated authorities can be divided into two categories:

- Surface management authorities
- Mineral management authorities.

Major laws and regulations that authorize the Forest Service to manage surface resources in conjunction with mineral exploration and development include:

- Organic Administration Act of 1897
- Multiple-Use Sustainable-Yield Act of 1960
- Wilderness Act of 1964
- National Environmental Policy Act of 1969
- Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976
- National Forest System Land and Resource Management Planning Regulations (36 CFR 219)
- Forest Service Minerals Regulations (36 CFR 228)
- Forest Service Manual 2800.

General laws and regulations that specify the procedures and conditions under which exploration and development of mineral and energy resources on NFS land may be conducted include:

- General Mining Law of 1872 (does not apply to eastern National Forests)

- Act of March 4,1917 (Mineral Resources on Weeks Law Lands)
- Mineral Lands Leasing Act of 1920, as amended
- President's Reorganization Plan No. 3 of 1946
- Materials Act of 1947
- Mineral Leasing Act for Acquired Lands of 1947
- Multiple-Use Mining Act of 1955
- Geothermal Steam Act of 1970
- Mining and Minerals Policy Act of 1970
- Federal Coal Leasing Amendments Act of 1976
- Federal Land Policy and Management Act of 1976
- Surface Mining Control and Reclamation Act of 1977
- Energy Security Act of 1980
- National Materials and Minerals Policy, Research, and Development Act of 1980
- Federal Onshore Oil and Gas Leasing Reform Act of 1987
- Comprehensive National Energy Policy Act of 1992
- Energy Policy Act of 2005
- Forest Service Minerals Regulations (36 CFR 228, Subpart C – Disposal of Mineral Materials)
- Forest Service Manual 2800.

The authority for the administration of *reserved minerals* is 36 CFR 251.15 (1963 Secretary of Agriculture's rules and regulations that govern the exercise of mineral rights reserved in conveyances to the United States). Prior to 1963, the Secretary issued rules and regulations in 1911, 1937, and 1947 for National Forests. Companion rules and regulations were issued in 1938, 1939, and 1950 for National Grasslands. When the United States acquired surface ownership of NFS lands, the appropriate rules and regulations in effect at the time of the mineral reservation were incorporated in the deeds.

The Secretary's rules and regulations do not apply to *outstanding mineral* rights. However, the exercise of all reserved and outstanding mineral rights is subject to applicable Federal and State laws and regulations pertaining to mining, real property, and environmental protection, including the Surface Mining Control and Reclamation Act with regard to coal. In general, the Forest Service has no authority to deny the exercise of reserved or outstanding mineral rights. However, every effort must be

made to mitigate or minimize the effects of mineral exploration and development on other resources.

Codified State laws and regulations that apply to mineral activities on the WNF include:

- Ohio Revised Code, Title (15) XV Conservation of Natural Resources. Notably Chapter 1509 (Oil & Gas), Chapter 1513 (Coal Surface Mining), Chapter 1514 (Other Surface Mining), and Chapter 1561 (Mines & Quarries).
- Ohio Administrative Code, Chapter 1501:9 (Oil & Gas), and Chapter 1501:13 (Coal).

Statutory and regulatory direction divides Federal mineral resources into three categories: locatable, leasable, and saleable.

Locatable Minerals

Locatable minerals are those (such as metallic minerals) regulated by the Bureau of Land Management (BLM) pursuant to the General Mining Law of 1872, which allows mining claims to be located on public domain lands but not on acquired lands. Since eastern National Forests (including the WNF) are made up of acquired lands only, the General Mining Law of 1872 does not apply to them. On eastern National Forests, all minerals (except saleable minerals) are leasable.

Leasable Minerals

With passage on the Mineral Leasing Act of 1920, Congress established a program to provide for the exploration and development of certain minerals[1] on Federal lands, including National Forests. This Act authorizes the Secretary of the Interior to issues leases for the disposal of these minerals. The Mineral Leasing Act for Acquired Lands of 1947 extends these mineral leasing provisions to acquired National Forest System land, but requires the consent of the Secretary of Agriculture prior to leasing. In the case of coal, the Surface Mining Control and Reclamation Act of 1977 (SMCRA), as amended, gives the Office of Surface Mining (OSM) the authority to regulate coal mining operations.

[1] Coal, phosphate, sodium, potassium, oil, oil shale, gilsonite, gas, and (in Louisiana and New Mexico) sulfur. Geothermal resources were added to the list of leasable minerals by the 1970 Geothermal Steam Act.

Saleable Minerals

Mineral materials, or "common variety" minerals[2], are commodities having a low value per ton. These include sand, gravel, crushed stone, riprap, clay, and fill dirt. The Mineral Materials Act of 1947 authorizes the disposal of these minerals through a sale system on U.S. public lands. Any sale of mineral materials must be made at no less than fair market value as determined by an appraisal. The act also provides for free use (not exceeding 5,000 cubic yards, or weight equivalent) of these materials by Federal or state agencies, municipalities, non-profit associations, or individuals as long as those materials are not for commercial, industrial, or resale purposes. Disposal of mineral materials is at the discretion of the authorized officer.

[2] The Multiple Use Act Mining Act of 1955 defines "common variety mineral materials" and distinguishes them from rare varieties (uncommon variety mineral material). Uncommon variety mineral materials may be locatable under the Mining Law of 1872 on public domain lands only.

Affected Environment

Mineral Ownership

Surface and Mineral ownership on the WNF is intermixed and complex.Table 3 - 62 shows the current surface/mineral ownership within the WNF proclamation boundary and about 1,000 acres beyond it.

Seventy-two percent of the land within the proclamation boundary of the Wayne National Forest is privately owned. Sixty percent of the Federally owned surface has privately owned minerals beneath it.

Table 3 - 62. Wayne National Forest surface/mineral ownership.

Ownership			Marietta Unit (acres)	Athens Unit (acres)	Ironton District (acres)	Forest Totals (acres)
Federal Surface	Federal Minerals	100% minerals Unencumbered	8,507	10,382	43,491	62,380
		100% minerals with deed lease[1]	8,760	8,069	17,037	33,866
		Total Federal Minerals	**17,267**	**18,451**	**60,528**	**96,246**
	Private Minerals[2]	Reserved Minerals	4,384	5,663	9,182	19,229
		Outstanding Minerals	7,622	12,468	11,000	31,090
		Combination[3]	34,725	36,565	21,642	92,932
		Total Private Minerals	**46,731**	**54,696**	**41,824**	**143,251**
Total Federal Surface			**63,998**	**73,147**	**102,352**	**239,497**
Private Surface	**Federal Minerals**		7	116	708	831
	Private Minerals		204,053	195,682	214,273	614,008
Total Private Surface			**204,060**	**195,798**	**214,981**	**614,839**
Total Acres within the WNF			**268,058**	**268,945**	**317,333**	**854,336**

[1] Most of these leases appear to be inactive and/or may have expired, but their legal status is currently unknown.

[2] Reserved, Outstanding, and Combination minerals may not all be 100% private minerals. Partial Federal interests may exist as well.

[3] Combination indicates a parcel with two or more outstanding, reserved or deed lease rights.

Minerals underlying National Forest System land may be Federally or privately owned or a combination of both. Federal minerals are those to which the rights have been acquired by the Federal government through purchase, exchange, or donation. Private minerals are divided into reserved and outstanding rights. Reserved minerals are mineral rights retained by the seller when the surface is sold. Outstanding minerals are mineral rights retained by a third party prior to transfer of the surface.

Sorting out mineral rights can be very complex and may involve the following situations:

- Different individuals, entities, or groups of individuals and/or entities may own different minerals or groups of minerals. For example, the Federal government may own the oil, but the gas could be reserved in private ownership while ownership of the coal remains outstanding in other private hands.
- Each mineral or combination of minerals could be held wholly or partially by different owners.
- The ownership of a particular mineral (oil for instance) could be split into separate producing horizons. Each horizon could have one individual owning 100 percent of the mineral in question. Groups of owners could hold any conceivable combinations of partial rights.
- Minerals can be reserved forever or just for a number of years (term reservation). If a private lease is in effect when the government acquires a mineral estate, the existing lease is called a "private-acquired lease". Private-acquired leases are unique. Even though the Federal government owns the minerals and assumes the role of lessor, it cannot legally apply any of its mineral regulations because the leases were not issued by the United States (via the Bureau of Land Management).
- If the government acquires a surface with a term mineral reservation but no lease is in effect, another awkward situation may arise. If, during the time of the mineral reservation, a lease is executed by the grantor, it becomes a term private lease that expires when the minerals revert back to the government. Section 2507 of the Comprehensive National Energy Policy Act of 1992 (CNEPA) amended the Mineral Leasing Act of 1920 to allow these expiring term private leases to be converted non-discretionally and non-competitively by the BLM to Federal leases under certain conditions (the operator must request the conversion, and there must be a producing well or one capable of producing in paying quantities).

Geology

The geologic setting is the foundation for a variety of ecological elements. Geologic materials and geologic processes control or influence a host of ecological factors such as:

- Slope aspect and steepness
- The aerial extent of landforms and associated vegetation
- Distribution and composition of soil parent material

- Structure and composition of vegetation
- Physical character of wetlands, riparian areas, and stream substrates
- Quantity and quality of stream water and ground water
- The natural disturbance regime.

Surface geologic processes are an important part of the natural disturbance regime in the Forest. These processes include:

- Erosion, transport, and deposition of sediments
- Mass wasting or landsliding
- Flooding
- Changes in stream channels and groundwater flow
- Sinkholes and other features.

These processes have always been part of the natural disturbance regime and affect the Forest in varying degrees every year.

The interaction of the surface geologic processes with the different geologic formations and geologic structures produced different landforms. The Wayne National Forest lies within the Kanawha section of the Appalachian Plateau province, which in Southeastern Ohio is characterized by deeply dissected unglaciated hills that are underlain by sedimentary rocks outcropping along narrow ridges in steep-sided, V-shaped valleys. Though Southeastern Ohio escaped glaciation, its physiography was very much influenced by the glacier meltwaters draining from the north and west.

The average relief of the area (the difference between the topographical highs and lows) is between 400 and 450 feet on some parts of the Forest but much less elsewhere. The skyline formed by the tops of the high points is relatively even across the Forest, true to its “plateau” designation.

Except for recent lacustrine (lake) and fluvial (river, stream) deposits and Pleistocene glacial deposits, all exposed rocks in Ohio are of the Paleozoic Era (440 to 185 million years before the present). These include, from the oldest to the youngest, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, and Permian rocks. Paleozoic Cambrian rocks are not exposed in Ohio. The rock strata of the Mesozoic Era (Triassic, Jurassic, and Cretaceous), as well as all of the Tertiary rocks of the Cenozoic Era (Paleocene, Eocene, Oligocene, Miocene, and Pliocene) have been eroded away. The bedrock in central and western Ohio is composed predominantly of marine limestones and shales of Ordovician to Devonian age inclusively. In eastern Ohio the bedrock is mostly non-marine shales and sandstones (including coals) with lesser amounts of marine shales,

sandstones, and limestones of Mississippian to Permian age. Pennsylvanian and Permian beds at many localities were deposited under more or less cyclic successions of alternating marine and non-marine environmental conditions called cyclothems.

In Ohio, the rock strata are arranged in a great, generally north-south trending, anticline called the Cincinnati Arch, which is divided in two branches. The Kankakee branch extends northwesterly into Indiana from the Cincinnati area, and the Findley branch extends north-northeasterly from Cincinnati toward Toledo and beyond. The rock strata dip (slope) east and southeast from the crest of the Findley branch toward the Appalachian geosyncline (a great trough-like basin) underlying the Appalachian Highlands. Some smaller north-south structures affect the geology of eastern and southeastern Ohio. These are the Parkersburg-Lorain syncline and the associated Cambridge Arch. As a result of all the foregoing structures, the oldest rocks in Ohio outcrop in the western part state and the youngest outcrop in the east and southeast along the Ohio River.

Geology of the Wayne National Forest

Bedrock outcrops on the Forest are composed of clay, shale, siltstone, sandstone, conglomerate, and limestone, mostly from Pennsylvanian and Permian systems. Some Mississippian rocks also occur on the surface. Coal seams are found interbedded in the Pennsylvanian and Permian formations. These rock units – as well as the thick sequence of sedimentary rocks of Devonian, Silurian, Ordovician and Cambrian Ages – overlie an igneous and metamorphic Pre-Cambrian complex.

Formations in the vicinity of the WNF generally strike in a northeast-southwest direction and dip gently to the southeast, averaging less than five degrees.

The correlation between the Appalachian Plateau and a subsurface feature called the Appalachian Basin accounts for the southeasterly dip of rock formations underlying the WNF. This basin was probably formed by slow subsidence during the Paleozoic era. The subsidence is believed to have been most rapid towards the center of the basin, which lies southeast of the Forest. Sedimentation into the basin kept up with the subsidence during most of the basin's formation, consequently, sedimentary rock units thicken as they dip towards the basin's center, resulting in an increased dip of older (deeper) rock units.

This dip represents the only known major structural feature within the Athens and Ironton Units. However, within the Marietta Unit the major structural feature is the north-south trending Burning Springs Anticline, which has smaller features on its flanks. No large faulting is known in the area, although small faults do occur. Despite the large number of wells

drilled in the area, the stratigraphy of eastern Ohio remains poorly understood.

The known oil and/or gas producing zones in eastern Ohio include:

- "Goose Run Sand" within the Pennsylvanian Monongahela Group, Upper Sewickley Sandstone (SS)
- "1st Cow Run" within the Pennsylvanian Conemaugh Group, Cow Run SS
- "2nd Cow Run" within the Pennsylvanian Allegheny Group, Upper Freeport SS
- "Macksburg 500' " within the Pennsylvanian Allegheny Group, Clarion SS
- "Macksburg 700' " within the Pennsylvanian Pottsville Group, Homewood SS
- "Salt Sand" within the Pennsylvanian Pottsville Group, Massillon SS
- "Big Injun" within the Mississippian Cuyahoga Fm, Black Hand SS
- "Squaw Sand" within the Mississippian Cuyahoga Fm
- "Weir Sand" within the Mississippian Cuyahoga Fm, Buena Vista SS
- "Coffee Shale" within the Mississippian Sunbury Shale Fm
- "1st Berea" within the Mississippian Berea Sandstone Fm
- "Gantz" within the Devonian Ohio Shale Fm, Chagrin Shale
- "Gordon" within the Devonian Ohio Shale Fm, Chagrin Shale
- "Big Cinnamon" within the Devonian Ohio Shale Fm, Huron Shale
- Unnamed zone within the Devonian Oriskany Sandstone Fm
- Unnamed zone within the Silurian Salina Group, Bass Island Dolomite Fm
- "Newburg" within the Silurian Niagara Group, Lockport Dolomite Fm
- "Clinton" within the Silurian Albion Group, Grimsy SS
- "Medina" within the Silurian Albion Group, Whirlpool SS
- Unnamed zone within the Ordovician Trenton Limestone Fm
- Unnamed zone within the Ordovician Black River Limestone Fm
- "Gull River" within the Ordovician Black River Limestone Fm

- "St. Peter Sand" within the Ordovician Wells Creek Fm
- "Rose Run Sand" within the Ordovician Knox Dolomite Fm
- "Trempealeau" within the Cambrian Knox Dolomite Fm.

On the WNF, the three major oil and gas targets are the Berea Sandstone, the Ohio Shale, and the "Clinton"-Medina. A detailed discussion of these three targets can be found in Appendix B of the Record of Decision and Final EIS of the 1988 Forest Plan Amendment #8.

Continuous coal beds in eastern Ohio include:

- Pennsylvanian Monongahela Group, Pittsburgh No. 8
- Pennsylvanian Allegheny Group Upper Freeport No. 7 coal
- Pennsylvanian Allegheny Group Middle Kittanning No. 6 coal
- Pennsylvanian Allegheny Group Lower Kittanning No. 5 coal.

Additionally, there are as many as 15 discontinuous coal beds within the Pennsylvanian Conemaugh and Allegheny Groups.

Given the nature of the sedimentary formations outcropping or close to the surface, mineral materials (sand and gravel, dolomite, limestone, clay, etc.) are abundant on the Forest.

There are several fossiliferous marine members of the Pennsylvanian system. The marine fossils within these members consist of gastropods, corals, cephalopods, fusulinid protozoans, clams, brachiopods, bryozoans, and trilobites. These are all fairly common invertebrate fossils. A few formations have yielded fish fossils and scales as well. Plant fossils in the form of plant fragments, fern fronds, trunks, pyritized logs, stumps, spores, and roots, can be found in a variety of deposits including coal, clay, shale, sandstone, and limestone. Some formations have an abundance of plant fossils. Others only have traces, while the majority has none.

Mineral Resources

The Appalachian Basin, which includes Ohio counties covered by the WNF, gave birth to the world's oil industry and is one of the oldest commercially producing provinces in North America. Through 2003, Ohio wells have produced 1.1 billion barrels of oil and 7.92 billion Mcf of natural gas. Virtually all of the production comes from "stripper" wells and is pumped by independent producers, many of who are small family-owned businesses. Many wells, particularly in Southeastern Ohio, are completed in, and produce from, multiple reservoirs. Research completed by the Ohio Department of Natural Resources (ODNR), Divisions of Mineral Resources Management and Geological Survey, indicates that

Ohio has significant remaining producible oil and gas reserves (OOGA, 2002 and ODNR, 2003b).

Since 1800, a total of 3.65 billion tons of bituminous coal have been mined in Ohio. However, from 1970, when the production peaked at 55 million tons, the industry declined to a production of 22.5 million tons in 2000. Coal production in 2001 totaled 25.8 million tons, 48.6 percent of which was recovered from 102 surface mines with 51.4 percent from 10 underground mines. This was a 14.7 percent increase over the 2000 production figures. In 2002 coal production totaled 21 million tons an 18.6% decrease from 2001. Production in 2002 came from 95 surface mines (48.3%) and 9 underground mines (51.7%) The State Division of Geological Survey has estimated the 2003 production at 21.9 million tons.

Ohio has a long history of industrial mineral production. Industrial mineral production for 2002 totaled 137.1 million tons from 708 mining operations, a decrease of 0.9 percent from 2000. Estimated 2003 production figures were 137.1 million tons.

Mineral Development and Exploration of the Wayne National Forest

Oil and Gas Development

Most wells within the WNF are all classified as “stripper” wells, which produce small volumes of oil, gas, or both, with equally small volumes of brine as a waste product. The average stripper gas well in Ohio produces 7.4 Mcf per well each day, while the average stripper oil well produces less than one barrel of oil per day. Table 3 - 63 shows that $1,155,213 worth of oil was produced from private and Federal wells in 2002 on the WNF ($1,886,847 using 2004 oil values). The corresponding natural gas figures are $2,816,115 ($5,343,188 using 2004 gas values). These figures are based on oil and gas production for the 12 counties comprising the WNF and the percentage of NFS acres within each of these counties.

Table 3 - 63. 2002 oil and gas production (private and Federal minerals) on the WNF.

	Athens Unit	Marietta Unit	Ironton Unit	WNF Totals
2002 Oil Production (Bbl)	29,365	12,981	8,996	51,342
2002 Oil Values	$660,712	$292,081	$202,420	$1,155,213
July 2004 Oil Values	$1,079,163	$477,065	$330,619	$1,886,847
2002 Gas Production (Mcf)	208,306	377,383	240,152	825,841
2002 Gas Values	$710,322	$1,286,876	$818,917	$2,816,115
July 2004 Gas Values	$1,347,738	$2,441,669	$1,553,781	$5,343,188

Table 3 - 64 shows the royalties generated from Federally leased wells on the WNF from 1996 to 2003, and Table 3 - 65 shows the mineral revenue payments to Ohio counties made in the same period (25% of all mineral royalties received by the Federal government from lands acquired under the Weeks Act are given to the State).

Table 3 - 64. Royalty payments to counties from Federal oil and gas wells.

Unit/County	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**	**1997**	**1996**
Athens								
Athens	$4,696	$3,448	$7,344	$5,036	$4,644	$6,020	$7,608	$9,192
Hocking	$6,052	$4,424	$9,548	$6,396	$5,864	$7,544	$9,480	$11,752
Morgan	$856	$632	$1,344	$920	$872	$1,132	$1,428	$1,768
Perry	$5,376	$3,884	$8,228	$5,532	$5,208	$6,724	$8,444	$10,452
Vinton	$480	$356	$756	$516	$488	$640	$804	$956
Athens Totals	**$17,460**	**$12,744**	**$27,220**	**$18,400**	**$17,076**	**$22,060**	**$27,764**	**$34,120**
Marietta								
Washington	$9,944	$7,312	$15,580	$10,692	$10,096	$13,076	$16,452	$20,216
Monroe	$6,260	$4,568	$9,728	$6,676	$6,304	$8,172	$10,256	$12,636
Noble	$176	$132	$252	$108	$100	$136	$168	$208
Marietta Totals	**$16,380**	**$12,012**	**$25,560**	**$17,476**	**$16,500**	**$21,024**	**$26,876**	**$33,060**
Ironton								
Lawrence	$17,676	$13,044	$27,796	$19,236	$18,024	$23,240	$27,624	$34,672
Gallia	$4,352	$3,212	$6,844	$4,696	$4,436	$5,756	$7,256	$9,048
Scioto	$2,984	$2,204	$4,668	$3,148	$2,964	$3,812	$4,756	$5,784
Jackson	$436	$324	$688	$472	$444	$584	$732.00	$904
Ironton Totals	**$25,448**	**$18,784**	**$39,996**	**$27,552**	**$25,868**	**$33,392**	**$40,368**	**$50,408**
TOTALS	**$59,288**	**$43,540**	**$92,776**	**$63,428**	**$59,444**	**$76,836**	**$95,008**	**$117,588**

Table 3 - 65. Mineral revenue payments to Ohio counties

Unit/County	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**	**1997**	**1996**
Athens								
Athens	$1,174	$862	$1,836	$1,259	$1,161	$1,505	$1,902	$2,298
Hocking	$1,513	$1,106	$2,387	$1,599	$1,466	$1,886	$2,370	$2,938
Morgan	$214	$158	$336	$230	$218	$283	$357	$442
Perry	$1,344	$971	$2,057	$1,383	$1,302	$1,681	$2,111	$2,613
Vinton	$120	$89	$189	$129	$122	$160	$201	$239
Athens Totals	**$4,364**	**$3,186**	**$6,805**	**$4,600**	**$4,269**	**$5,515**	**$5,589**	**$8,530**
Marietta								
Washington	$2,486	$1,828	$3,895	$2,673	$2,524	$3,269	$4,113	$5,054
Monroe	$1,565	$1,142	$2,432	$1,669	$1,576	$2,043	$2,564	$3,159
Noble	$44	$33	$63	$27	$25	$34	$42	$52
Marietta Totals	**$4,095**	**$3,003**	**$6,390**	**$4,369**	**$4,125**	**$5,346**	**$6,719**	**$8,265**
Ironton								
Lawrence	$4,419	$3,261	$6,949	$4,809	$4,506	$5,810	$6,906	$8,668
Gallia	$1,088	$803	$1,711	$1,174	$1,109	$1,439	$1,814	$2,262
Scioto	$746	$551	$1,167	$787	$741	$953	$1,189	$1,446
Jackson	$109	$81	$172	$118	$111	$146	$183	$226
Ironton Totals	**$6,362**	**$4,696**	**$9,999**	**$6,888**	**$6,467**	**$8,348**	**$10,092**	**$12,602**
TOTALS	**$14,822**	**$10,885**	**$23,194**	**$15,857**	**$14,861**	**$19,209**	**$23,752**	**$29,397**

About 71 percent of the active leases of Federally owned minerals on the WNF are “private-acquired” leases, private lease agreements in effect when the Federal government acquired the mineral rights. These private leases constitute an outstanding contractual right that must be honored. Private-acquired leases are unique because even though the Federal Government owns the minerals and assumes the role of lessor, it cannot legally apply any of its mineral regulations since the leases were not issued by the United States (via the Bureau of Land Management). Instead, private-acquired leases are administered principally under their own lease terms, State law, and a normal lessee-lessor relationship.

Activity on Federal leases on the WNF since 1993 has been minimal. Only four new wells were drilled and six depleted producers were plugged. Oil and gas activities on outstanding and reserved mineral rights have averaged five wells drilled per year on the Forest. Over the last decade, oil and gas production in Ohio has declined steadily, from 8.3 million barrels of oil in 1993 to 5.65 million barrels in 2003, and from 136 million Mcf of gas to 94 million Mcf over the same period. The low number of new wells can be attributed to energy prices in the mid-1990s, which were some of

the lowest experienced by industry in 35 years (See Table 3 - 66). However, current energy prices are strong and have elicited increased interest in drilling new wells on Federal leases on the WNF. Ten new Applications for Permit to Drill (APD) were submitted in 2003/2004.

Table 3 - 66. Average wellhead price of oil & gas, 1993 – 2004.

Year	Oil - $/Bbl	Gas - $/Mcf
1993	$17.26	$2.48
1994	$15.59	$2.45
1995	$16.61	$2.33
1996	$19.55	$2.63
1997	$17.68	$2.74
1998	$11.73	$2.24
1999	$16.20	$2.41
2000	$26.76	$4.06
2001	$21.84	$4.49
2002	$22.50	$3.41
2003	$27.64	$5.90
2004 (July)	$36.75	$6.47

Table 3 - 67 displays the different types of leases currently active on the WNF and the associated number of producing wells. The Forest also has many inactive leases not included in this table. Their status is unknown.

Table 3 - 67. Active leases and producing wells.

Lease Type	Marietta Unit		Athens Unit		Ironton District		Forest Totals	
	Leases	Wells	Leases	Wells	Leases	Wells	Leases	Wells
Federal lease Unrestricted Mgmt. Areas[1]	33	51	14	18	1	3	48	72
Federal lease NSO Mgmt. Areas[2 & 3]	7	21	0	0	1	1	8	22
Private acquired Unrestricted Mgmt. Areas	98	232	23	75	1	1	122	308
Private acquired NSO Mgmt. Areas	19	32	1	1	0	0	20	33
Total leases/wells on Federal minerals[4]	**157**	**336**	**38**	**94**	**3**	**5**	**198**	**435**
Federal acres leased[5]		11,215		6,696		2,545		20,456
Outstanding rights Unrestricted Mgmt. Areas	164	442	35	118	4	4	203	564
Outstanding rights NSO Mgmt. Areas	23	66	7	12	1	1	31	79
Reserved rights Unrestricted Mgmt. Areas	28	61	27	79	0	0	55	140
Reserved rights NSO Mgmt. Areas	14	16	4	12	0	0	18	28
Total leases/wells on Private Minerals	**229**	**585**	**73**	**221**	**5**	**5**	**307**	**811**
Totals Leases/Wells	**386**	**921**	**111**	**315**	**8**	**10**	**505**	**1246**

[1]Management Areas 2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 6.1, 6.3, & 9.1

[2]No Surface Occupancy management areas, which includes 6.2, 7.1, 8.1, 8.2, & 9.2

[3]Existed prior to Amendment #8, which changed Mgmt. Area 6.2 to No Surface Occupancy

[4]Private acquired leases, though on Federal minerals, are not Federal leases.

[5]Acreage figures come from BLM's LR2000 database, and are somewhat lower than the acreage actually leased. This is due to possible database discrepancies coupled with the lag time involved to get private acquired lease packages from the FS to the BLM.

Literally hundreds of old, (early 1900s) abandoned oil and gas wells (so-called orphan wells) on the WNF have not been plugged or have been improperly plugged. These pose a significant potential threat to environmental health and human safety. The plugging of orphan wells on the WNF has traditionally been a cooperative effort between the State and the Forest Service and, in some cases, the Bureau of Land Management (BLM) for wells on Federal leases. However, orphan wells have been plugged at a very slow pace, as shown in Table 3 - 68.

Table 3 - 68. Orphan well plugging.

	Number of Orphan Wells Plugged			
Year	Marietta Unit	Athens Unit	Ironton District	Totals
2004	2	0	0	2
2003	0	0	0	0
2002	3	0	2	5
2001	3	0	0	3
2000	1	4	1	6
'93 to '99	0	0	0	0
1992	2	0	0	2
Totals	**11**	**4**	**3**	**18**

Coal Mining Operations

There are currently no Federal coal leases on the WNF, and there has been no demand for Federal coal resources for at least 15 years.

From 1990 to 1992, Avis Coal exercised its outstanding rights to strip-mine 220 acres on the WNF. The final bond release was in 1998.

A permit to strip mine coal on the Athens Unit was issued in 1998 under valid existing reserved rights. Approximately 80,000 tons of low-sulfur coal were removed, and reclamation was completed in the fall of 1999.

A Plan of Operations was recently approved for exploratory coal drilling in the Corning area of the Athens District involving outstanding mineral rights. On the Ironton District, one company holds valid existing rights to strip mine coal on approximately 1,200 acres of land.

Past coal mining operations have left many acres of abandoned mined lands, particularly on the Athens Unit and the Ironton District. To remedy this situation, the following has been accomplished in cooperation with many partners since 1997:

- Reclamation of 25 acres of gob piles
- Closure and reclamation of 21 subsidence areas
- Closure, or bat gating, of seven open mine portals
- Enhancement of three acres of wetland
- Restoration of two acres of stream using natural channel design concepts
- Construction and/or installation of various systems to treat acid mine drainage.

More details on the reclamation of old abandoned mines can be found in the Watershed section of Analysis of the Management Situation.

Mineral Materials

Over the last five years, there has been no mineral materials activity on the WNF. None were sold, no free-use permits were issued, and there was no in-service use of mineral materials for road maintenance, etc.

Geophysical Exploration

No recent geophysical exploration has been conducted on the Marietta Unit of the Forest, despite requests for two permits to do so in 2000 and one permit in 2002. There has been recent geophysical activity on private lands, however. On the Athens Unit, one permit was issued in 2002, resulting in 3.45 miles of line laid. Additionally, seven geophysical permits have been issued over the last 10 years. On the Ironton District, no geophysical exploration activities have been conducted recently.

Reasonably Foreseeable Development Scenario for Oil and Gas

Increased national demand for energy has driven up the price producers receive at the wellhead. Consequently there is increased interest in drilling wells on the Federally owned surface of the WNF. Based on a BLM survey of local oil and gas producers, a forecast of the total number of new wells and associated surface disturbance likely to occur on Federal surface over the next 10 years, regardless of mineral ownership (Federal, reserved or outstanding), is shown in Table 3 - 69 for the Forest's three administrative units.

Table 3 - 69. Forecasted Federal oil and gas operations over next 10 years.

Oil and Gas Activity	Athens Unit	Marietta Unit	Ironton Unit	Forest Wide
Number of new wells drilled	24	110	100	234
Miles of new access road needed	5	21	19	45
Total acres of surface disturbed by oil & gas drilling activity before reclamation	27	135	110	272
Total acres of surface needed to support drilled wells that are completed for production (excess disturbance reclaimed)	11	59	51	121
Number of depleted wells plugged	82	26	0	108
Total acres reclaimed by plugging depleted wells	45.1	14.3	0	59.4

Federally owned minerals constitute about 40 percent of the mineral ownership on the WNF. This represents the only class of mineral estate for which the Forest Service can decide whether to make the surface available for oil and gas development. The above projection of activity assumes that:

- All Federal minerals in the Forest are available for lease (unless precluded by law)
- All Federal minerals are leased on a timely basis upon request with only standard lease stipulations
- Drilling permits on Federal minerals are processed in timely fashion
- Oil and gas prices remain at or above current levels.

The entire text of the Reasonably Foreseeable Development Scenario (RFDS) for Oil and Gas can be found in Appendix G.

Minerals Indicator 1 – Leasable, Federally-Owned Minerals

Federal Leasable Minerals Management

The responsibility for managing Federal leasable mineral resources is shared by the Forest Service and the U.S. Department of the Interior's Bureau of Land Management. The BLM has a major role in issuing licenses, permits, and leases for Federal minerals and in supervising associated operations. In the case of coal, USDI's Office of Surface Mining has the authority to regulate coal mining operations. The Interior Department's agencies cooperate with the Forest Service to ensure that impacts upon surface resources are mitigated and that affected land is reclaimed.

Oil and Gas

For oil and gas, the Forest Plan makes two decisions:

- Availability of lands for future leasing [36 CFR 228.102(d)]
- The lease terms and stipulations to apply to tracts of Federally owned minerals that the Forest consents to lease. [36 CFR 228.102 (e)]

The first decision was made in Amendment #8 to the 1988 Forest Plan adopted in 1992, which made all Federally owned minerals on the Forest available for lease. None of the alternatives considered in detail would modify the availability decision.

Coal

The Surface Mining Control and Reclamation Act of 1977, as amended, prohibits surface (strip) mining of coal (subject to valid existing rights and certain exceptions) on any Federal lands within the boundaries of any National Forest east of the 100th meridian. There are currently no leases for Federally owned coal on the WNF.

Non-energy Minerals

Non-energy minerals, such as metallic minerals normally locatable on public domain lands under the Mining Law of 1872, may be leased only on the acquired lands of eastern National Forests. However, geological settings comprising sedimentary rocks, such as those found on the WNF, do not generally host such minerals. Therefore, leasing and development of such minerals on the Wayne is unlikely.

Federal Mineral Materials Management

Mineral materials are managed in accordance with 36 CFR 228, subpart C. Though limestone, dolomite, sand, and gravel account for over 90 percent of Ohio's industrial mineral production (137.1 million tons in 2002), and Ohio ranks 3rd nationally in the production of lime and 5th in the production of crushed stone, the demand for these mineral from the WNF has been non-existent for the last decade or so. That situation is expected to change little over the next decade.

Minerals Indicator 2 - Management of Private Mineral Rights on Federal Lands

An important difference in the administration of private mineral rights (reserved or outstanding rights) is that the exercise of those rights is not a privilege but a right owned by a private party. As such, the Forest Service has no role in leasing, and the BLM is not involved in the approval of an Application for Permit to Drill (APD) for privately owned oil and gas. Coal activities are regulated by OSM, through the Ohio Department of Natural Resources, in cooperation with the Forest Service.

Private mineral rights are administered so that their activities/operations are consistent with:

- Rights granted by deed
- Best management practices, to use only as much of the surface as necessary
- The Forest Plan's standards and guidelines
- In the case of reserved minerals, the appropriate Secretary of Agriculture's Rules and Regulations and Pertinent Federal and State regulations.

Environmental Consequences

Analysis Area

The area within the WNF proclamation boundary constitutes the area of analysis for the environmental effects relating to minerals issues. This look at the direct and indirect effects of implementing the 2006 Forest Plan will be limited to impacts affecting only National Forest System (NFS) land. The cumulative effects analysis, however, will include impacts off NFS land.

This section examines the impacts of implementing Forest-wide standards and guidelines and management area direction that pertain to non-mineral resources (wildlife, watershed, vegetation, recreation, etc.) but affect the exploration and development of minerals. Environmental impacts of mineral activities on other resources are analyzed within the respective sections of the affected resources.

Effects Common to All Alternatives

Direct and Indirect Effects

Direct effects immediately follow a specific action or activity and occur at the same place. Indirect effects are caused by a specific action or activity but typically occur later in time and farther in distance. Direct and indirect effects sometimes have been considered together and not identified separately. Effects relating to minerals issues were analyzed assuming reasonably foreseeable development activities (see RFDS in Appendix G).

Minerals Indicator 1 - Leasing of Federally owned mineral rights for oil and gas extraction

To protect the diverse resources of the WNF, certain constraints may be imposed on the exploration and development of mineral resources. These limitations – based on laws, regulations, and executive orders – modify standard lease rights and are made part of a new lease. They strengthen protection of identified resources and require mitigation of negative effects. All activities on Federal oil and gas leases are subject to these limitations. The different categories of limitations are listed below in descending order of control:

In **Statutorily Withdrawn** areas (such as wilderness areas), acts of Congress prevent the leasing of Federally owned minerals. The WNF contains no such areas.

To protect desired values, the **No Surface Occupancy** (NSO) stipulation prohibits use or occupancy of the land surface for oil and gas exploration and development. The Forest Plan applies NSO in two ways:

- NSO is applied to certain management areas (MA NSO).

- NSO is applied where specific conditions (e.g., steep slopes) or resources occur Forest-wide (FW NSO).

Even though an NSO stipulation prohibits surface occupation, the leased subsurface resources remain legally available if they can be accessed by other means.

Where NSO stipulations are imposed, they may affect all or only a portion of the lease, depending on the location of the lease and the values to be protected. Oil and gas activities could occur on portions of a lease not affected by the NSO designation (assuming access is not blocked by the NSO portion). Minerals underlying an NSO surface may be extracted by directional drilling if adjacent lands are available for leasing with surface occupancy or are privately owned. Directional drilling technology limits the distance a well can be located from its subsurface target, however. In some cases, directional drilling is neither technically nor economically feasible. Directionally drilled wells can be many times more expensive to drill and maintain, and their economic life is shorter than that of conventional wells.

An NSO designation on the WNF currently has the same effect as a "no leasing" designation because:

- Most of the operators are small, independent businesses with limited resources and cannot justify the cost of directional drilling or state-of-the-art mineral assessment and mapping technologies.
- Despite the large number (thousands) of wells drilled in southeastern Ohio, the stratigraphy remains poorly understood. To accurately and consistently predict targets, production rates, and the life expectancy of any well is virtually impossible.

Surface acreage with the MA NSO stipulation would vary by alternative, from a low of 20,086 acres to a high of 39,844 acres (See below). This represents 8 percent to 17 percent of WNF surface ownership, leaving 83 percent to 92 percent of the Forest's surface ownership available for both private and Federal oil and gas development. To date, about 44 percent (104,955 acres) of the Forest is underlain by Federal oil and gas rights (100% or partial ownership). This figure will increase as reserved minerals revert to Federal ownership and if more mineral estate can be purchased. In the next 10 years, 9,204 acres of reserved minerals are due to revert to Federal ownership. Additionally, about 17,000 acres of reserved minerals held by producers will eventually revert to U.S. ownership when production ceases. Even assuming that all these reserved minerals revert, increasing Federal mineral ownership by perhaps 11 percent, no more than 55 percent of the WNF surface could be leased in the next 10 years.

Table 3 - 70 shows the acres of Federally owned minerals subject to the MA NSO stipulation by alternative.

As explained above, NSO currently equates to "no leasing" on the WNF. Therefore, the MA NSO designation would result in the loss of oil and gas production from 7 to 14 wells, depending on which alternative is chosen. This represents 3 percent to 6 percent of the total number of projected new oil and gas wells over the next 10 years (See Table 3 - 69) in the Affected Environment section. This will affect royalty revenues to the U.S. Treasury, which in turn will reduce payments to the counties involved. In addition, it will affect the local revenue from oil and gas production, and from activities related to exploration and development (drilling, road and pad building, etc).

Table 3 - 70. MA NSO that would affect oil/gas exploration and development.

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. E Modified	Alt. F
Acres of No Leasing	0	0	0	0	0	0	0
NSO acres Under Mgt Area FOF	18,470	9,603	23,649	8,793	13,496	16,478	26,326
NSO acres Under Mgt Areas CA, DR, RNA, SA, & TRL	10,483	10,483	13,518	13,518	13,518	13,518	13,518
Total acres of MA NSO	28,953	20,086	37,167	22,311	27,014	29,996	39,844
Percent of Forest surface ownership with MA NSO	12%	8%	16%	9%	11%	13%	17%
Federal oil/gas ownership (100% or partial) underlying MA NSO	14,269	10,668	18,237	12,091	14,077	15,160	18,544
Percent of Federal oil & gas ownership affected by MA NSO	14%	10%	17%	12%	13%	14%	18%

Surface acreage with the FW NSO stipulation would total 4,620 acres (2% of WNF surface ownership) and be underlain by about 2,100 acres (1%) of Federally owned minerals. These acreages would not vary by alternative. The FW NSO surface acres would include:

- Water features (ponds, etc.) – 891 acres (average of 0.6 acres per water feature)
- Indiana bat hibernaculum – 119 acres (represents ¼ mile buffer around one site)
- Slopes greater than 55 percent – 3,408 acres (average of 0.2 acres per area).
- Cultural resources of known significance – 200 acres (less than 1 acre per site).

Because FW NSO areas are relatively small, neither their size nor location are likely to affect an entire lease or preclude leasing altogether on the affected leases. Also, neither type of NSO affects the exploration and development of private mineral rights underlying them.

Table 3 - 71 shows the acreage of Federal minerals (100% or partial ownership) affected by the MA NSO and FW NSO stipulations. They are broken down by the percent of NSO affecting any particular parcel. Since the 0 to 20 percent range includes zero, the acreages in that row generally represent the Federal mineral estate not covered with NSO.

Table 3 - 71. Federal minerals (complete or partial ownership) affected by MA NSO and FW NSO.

Percent of NSO	Alt. A acres	Alt. B acres	Alt. C acres	Alt. D acres	Alt. E acres	Alt. E Modified acres	Alt. F acres
0-20	85,624	89,441	81,622	87,250	86,257	85,174	80,645
21-40	4,041	4,002	3,788	3,895	3,491	3,491	4,031
41-60	1,924	1,617	1,723	2,350	1,435	1,615	1,935
61-80	1,727	1,741	2,235	2,176	2,015	2,015	2,502
81-100	11,639	8,155	15,587	9,284	11,757	12,529	15,843

Table 3 - 72 shows the acreage of MA NSO and FW NSO, and the availability of Federal oil and gas for leasing.

Table 3 - 72. Effects of MA NSO and FW NSO on availability of Federal oil/gas.

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. E Modified	Alt. F
MA NSO acres	14,269	10,668	18,237	12,091	14,077	15,160	18,544
Percent of Federal oil & gas affected by MA NSO	14%	10%	17%	12%	13%	14%	18%
Percent of WNF surface	6%	5%	8%	5%	6%	6%	8%
FW NSO acres	2,100	2,100	2,100	2,100	2,100	2,100	2,100
Percent of Federal oil & gas affected by FW NSO	2%	2%	2%	2%	2%	2%	2%
Percent of WNF surface	1%	1%	1%	1%	1%	1%	1%
Acres of Federal oil & gas available for leasing	88,586	92,187	84,618	90,764	88,778	87,695	84,311
Percent of total Federal oil & gas	84%	88%	81%	86%	85%	84%	80%
Percent of WNF surface available for Federal O&G leasing	37%	39%	36%	38%	37%	37%	35%

Timing Limitation Stipulations (Seasonal Restrictions) prohibit surface use at specific times to protect certain resource values. Seasonal restrictions do not apply to the operation and maintenance of production facilities unless analysis demonstrates continued need for mitigation that less stringent, project-specific measures cannot accomplish.

Seasonal restrictions may increase exploration costs by narrowing the window available for drilling, especially in the present situation where drilling rigs are scarce and in high demand. Development costs also may rise if a well is not completed within time limits. Stopping a drilling operation and leaving equipment idle or moving equipment to another site and then moving it back also increases costs. When a drilling proposal is submitted, on-the-ground conditions may allow an exemption to, or require an extension of, timing limitations based on seasonal conditions or habitat use.

Under **Controlled Surface Use (CSU)** stipulations, occupancy and use are allowed unless restricted by another stipulation. Certain resource values may require special operational constraints, however. These stipulations identify standards that operators must meet to mitigate potential adverse effect to surface resources. Such stipulations usually permit year-round occupancy and accessibility to leased lands. Discovery and development of oil and gas resources proceed under restrictions that mitigate impacts to other resources.

CSU compliance could increase the cost of oil and gas activities by requiring use of expensive technology to meet mitigation requirements. It could also require an operator to drill off target, possibly resulting in less production. As mentioned above, the stratigraphy in southeastern Ohio remains poorly understood. Production zones underlying the WNF are not laterally uniform and tend to be sinuous and difficult to follow.

Lease Notifications provide more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders and address special items the lessee should consider when planning operations. Lease Notifications attached to leases should not be confused with **Notices to Lessees**, which are issued by the Bureau of Land Management to implement onshore oil and gas orders. The effects of Lease Notifications are minimal since they do not impose new or additional restrictions.

The lease-specific oil and gas stipulations are found in Appendix H of the 2006 Forest Plan. They incorporate all of the above mentioned types of limitations (except the first one), and are based on the Forest-wide standards and guidelines and management area direction. These notifications/stipulations include:

- A special notification regarding all the standards and guidelines being incorporated into each lease in their entirety
- Five notifications regarding:
    - Cultural resources
    - Floodplains
    - TES species

  - Compliance with all relevant public laws and Federal regulations
  - Steep slopes and/or unstable soils

- Six NSO stipulations for the protection of the following Management Areas:
  - Future Old Forest
  - Research Natural Areas
  - Special Interest Areas
  - Candidate RNAs and SAs
  - Administrative sites, developed recreation areas, trails and associated trailheads
  - Timbre Ridge Lake

- Four NSO stipulations for the protection of the following resources:
  - Cultural areas of known significance
  - Slopes in excess of 55 percent
  - Areas of mass soil instability
  - Indiana bat hibernacula

- Seven Controlled Surface Use stipulations to protect:
  - Scenic integrity objectives
  - Known locations of Federally listed species
  - Areas of known regional sensitive species
  - Managed wildlife openings
  - Riparian areas
  - Portions of floodplains outside riparian areas
  - Slopes between 35 and 55 percent.

The potential effects of some aspects of fire management on oil and gas activities, such as prescribed burns, are routinely taken into account by incorporating mitigation measures in burn plans. This involves direct contact with all potentially affected operators/owners of wells/pipelines. Some company representatives now accompany fire crews in the field to monitor burns. Some elect to temporarily shut down their wells when prescribed burning takes place. This applies to both Federal and private oil and gas activities.

Minerals Indicator 2 - Management of National Forest System lands over privately owned mineral rights

An important difference in the administration of reserved or outstanding rights (ROR) is that the exercise of those rights is not a privilege but a legal right owned by a private party. Private mineral owners are free to develop ROR minerals on National Forest System lands in accordance with valid existing rights, severance deed rights, State and Federal laws, the Secretary of Agriculture's Rules and Regulations (for reserved mineral rights only) and an approved plan of operations.

For reserved mineral rights, the Forest Service will approve an operation permit where required by the Secretary of Agriculture's Rules and Regulations (1937, 1947, and 1963 rules). Even when a permit is not specifically required (1911 rules), the operator must still develop and submit a plan of operation for review by the Forest Service.

For outstanding minerals, a minerals operation plan will be negotiated. In negotiating the terms and conditions of an operations plan for outstanding minerals, the Forest Service may request voluntary adherence to any of the above-mentioned constraints to Federal oil and gas exploration and development.

For both reserved and outstanding minerals, certain constraints, such as those relating to threatened and endangered species and cultural resources, are not negotiable and will be enforced. On the other hand, the No Surface Occupancy designation will not apply to the exploration and development of reserved and outstanding mineral rights. The effects of any constraints applied to the exploration and development of private minerals will be the same as those described in the discussion of the management of Federally owned minerals.

With oil and gas prices on the rise, the exercise of private mineral rights on the WNF is also likely to increase. Since Reasonably Foreseeable Scenario projections of new oil and gas drilling activity were made without regard to mineral ownership, accurately assessing how many of those wells would be on private mineral rights is impossible. Currently, 35 percent of the wells on the WNF are drilled for Federal minerals, and 65 percent are drilled for private minerals, both outstanding and reserved. Given that situation, it can be expected over the next decade that about 65 percent of the 234 projected new wells (152 wells) will be drilled for private minerals. Private mineral activity often influences Federal mineral development. Private mineral developers may find trends for oil and gas production zones that appear to continue unto Federal minerals. If so, they may choose to initiate exploration projects or pursue drilling for Federal minerals as well.

The Surface Mining Control and Reclamation Act of 1977, as amended, prohibits surface (strip) mining of coal on Federal land within the boundaries of any National Forest east of the 100th meridian (Located in central Texas) subject to valid existing rights and certain exceptions. Therefore, deposits of coal on the WNF generally may be mined only by underground methods.

The Athens Unit has recently approved an operations plan for a coal exploration drilling program for private minerals in the Corning area. The initial phase will result in approximately 33 holes being drilled with another 60 to 80 test holes planned over the next couple of years. Some test holes will be drilled in the Future Old Forest management area. If exploration results are encouraging, a prospecting permit to drill on about 95 acres for Federal coal may be requested from the BLM, which in turn could lead to an application to lease Federal coal. An additional 245 acres may also be involved in the same operation when the minerals (including coal) revert back to Federal ownership in 2010. The long-term plans of the coal company are to underground mine an extensive area east and north of Corning, much of which will be under the Forest.

On the Ironton District, one company holds valid existing rights to strip mine coal on approximately 1,200 surface acres. The company plans to conduct exploratory drilling to determine the quality and quantity of coal with the possibility of strip-mining it in the future. However, legal problems make it uncertain if this company can proceed with the coal operations in the next 10 years. If they do, it will severely disturb approximately 1,200 acres.

Alternative A

Direct and Indirect Effects

Minerals Indicator 1 – Leasing of Federally owned mineral rights for oil and gas extraction

As mentioned above, only the Management Area NSO (MA NSO) varies by alternative. As indicated on Table 3 - 70, the number of surface acres affected by the MA NSO under Alternative A would total 28,953 acres, representing 12 percent of the WNF surface acreage. The acreage of Federal minerals (100% or partial) underlying the MA NSO areas totals 14,269 acres, representing 14 percent of the Federal oil and gas ownership on the Forest.

As can be seen on Table 3 - 71, selection of Alternative A could result in lost production and associated royalties from as many as 10 Federal oil and gas wells in the first decade of the 2006 Plan.

Under this alternative, 88,586 acres of Federal oil and gas (100% or partial) would be available for leasing. (See Table 3 - 72)

Minerals Indicator 2 – Management of National Forest System surface over privately owned mineral rights

Management of NFS land over privately owned mineral rights would not vary by alternative. The effects of managing privately owned mineral rights would be the same as those discussed under Issue 2 in Effects Common to all Alternatives.

Alternative B

Direct and Indirect Effects

Minerals Indicator 1 – Leasing of Federally owned mineral rights for oil and gas extraction

As indicated on Table 3 - 70, the number of surface acres affected by the MA NSO stipulation under Alternative B would total 20,086 acres, representing 8 percent of WNF surface acreage. The acreage of Federally owned mineral rights (100% or partial) underlying MA NSO areas would total 10,688 acres, representing 10 percent of Federal oil and gas ownership on the Forest.

As can be seen on Table 3 - 71, Alternative B could result in lost production and associated royalties from as many as seven Federal oil and gas wells in the first decade of the 2006 Plan.

Under this alternative, 92,187 acres of Federal oil and gas rights (100% or partial) would be available for leasing. (See Table 3 - 72)

Minerals Indicator 2 – Management of National Forest System lands over privately owned mineral rights

Management of NFS land over privately owned mineral rights would not vary by alternative. The effects of managing privately owned mineral rights would be the same as those discussed under Issue 2 in Effects Common to all Alternatives.

Alternative C

Direct and Indirect Effects

Minerals Indicator 1 – Leasing of Federally owned mineral rights for oil and gas extraction

As indicated on Table 3 - 70, the surface area affected by MA NSO under Alternative C would total 37,167 acres, representing 16 percent of WNF surface acreage. The acreage of Federal mineral rights (100% or partial) underlying the MA NSO areas would total 18,237 acres, representing 17 percent of Federal oil and gas rights on the Forest.

As shown by Table 3 - 73, implementing Alternative C could result in lost production and associated royalties from as many as 13 Federal oil and gas wells in the first decade of the 2006 Plan.

Under this alternative, 84,618 acres of Federal oil and gas rights (100% or partial) would be available for leasing. (See Table 3 - 70)

Minerals Indicator 2 – Management of National Forest System lands over privately owned mineral rights

Management of National Forest System land over privately owned mineral rights would not vary by alternative. The effects of managing privately owned mineral rights would be the same as those discussed under Issue 2 in Effects Common to all Alternatives.

Alternative D

Direct and Indirect Effects

Minerals Indicator 1 – Leasing of Federally owned mineral rights for oil and gas extraction

As indicated on Table 3 - 70, the number of surface acres affected by the MA NSO under Alternative D would total 22,311 acres, representing 9 percent of WNF surface acreage. The acreage of Federal mineral rights (100% or partial) underlying the MA NSO areas would total 12,091 acres, representing 12 percent of the Federal oil and gas mineral ownership on the Forest.

As can be seen on Table 3 - 73, implementing this alternative could result in lost production and associated royalties from as many as 7 Federal oil and gas wells in the first decade of the 2006 Plan.

Under Alternative D, 90,764 acres of Federally owned oil and gas mineral rights (100% or partial) would be available for leasing. (See Table 3 - 70)

Minerals Indicator 2 – Management of National Forest System lands over privately owned mineral rights

Management of National Forest System lands over privately owned mineral rights would not vary by alternative. The effects of managing privately owned mineral rights would be the same as those discussed under Issue 2 in Effects Common to all Alternatives.

Alternative E

Direct and Indirect Effects

Minerals Indicator 1 – Leasing of Federally owned mineral rights for oil and gas extraction

As indicated on Table 3 - 70, the number of surface acres affected by the MA NSO under Alternative E would total 27,014 acres, representing 11 percent of the WNF surface acreage. The acreage of Federally owned mineral rights (100% or partial) underlying MA NSO areas would total 14,077 acres, representing 13 percent of Federal oil and gas mineral rights ownership on the Forest.

As can be seen on Table 3 - 73, this alternative could result in lost production and associated royalties from as many as 9 Federal oil and gas wells in the first decade of the 2006 Plan.

Under this alternative, 88,778 acres of Federally owned oil and gas mineral rights (100% or partial) would be available for leasing. (Table 3 - 70)

Minerals Indicator 2 – Management of National Forest System lands over privately owned mineral rights

Management of National Forest System lands over privately owned mineral rights would not vary by alternative. The effects of managing privately owned mineral rights would be the same as those discussed under Issue 2 in Effects Common to all Alternatives.

Alternative E Modified

Direct and Indirect Effects

Minerals Indicator 1 – Leasing of Federally owned mineral rights for oil and gas extraction

As indicated on Table 3 - 68, the number of surface acres affected by the MA NSO under Alternative E would total 29,996 acres, representing 13 percent of the WNF surface acreage. The acreage of Federally owned mineral rights (100% or partial) underlying MA NSO areas would total 15,160 acres, representing 14 percent of Federal oil and gas mineral rights ownership on the Forest.

As can be seen on Table 3 - 71, this alternative could result in lost production and associated royalties from as many as 13 Federal oil and gas wells in the first decade of the 2006 Plan.

Under this alternative, 87,695 acres of Federally owned oil and gas mineral rights (100% or partial) would be available for leasing. (Table 3 - 70)

Minerals Indicator 2 – Management of National Forest System lands over privately owned mineral rights

Management of National Forest System lands over privately owned mineral rights would not vary by alternative. The effects of managing privately owned mineral rights would be the same as those discussed under Issue 2 in Effects Common to all Alternatives.

Alternative F

Direct and Indirect Effects

Minerals Indicator 1 – Leasing of Federally owned mineral rights for oil and gas extraction

As indicated on Table 3 - 68, the number of surface acres affected by the MA NSO under Alternative F would total 39,844 acres, representing 17 percent of WNF surface acreage. The acreage of Federally owned mineral rights (100% or partial) underlying the MA NSO area would totals 18,544 acres, representing 18 percent of Federally owned oil and gas mineral rights on the Forest.

As can be seen on Table 3 - 73, this alternative could result in lost production and associated royalties from as many as 14 Federal oil and gas wells in the first decade of the 2006 Plan.

Under this alternative, 84,311 acres of Federally owned oil and gas mineral rights (100% or partial) would be available for leasing. (See Table 3 - 70)

Minerals Indicator 2 - Management of National Forest System lands over privately owned mineral rights

Management of NFS land over privately owned mineral rights would not vary by alternative. The effects of managing privately owned mineral rights would be the same as those discussed under Issue 2 in Effects Common to all Alternatives.

Cumulative Effects

Minerals Indicator 1 - Leasing of Federally owned mineral rights for oil and gas

No Surface Occupancy (NSO) stipulations could mean less drilling on the WNF. Based on the RFDS developed by the Bureau of Land Management, the NSO stipulations could result in 7 to 14 less wells drilled on Federal leases. This could result in 9 to 16 fewer surface acres disturbed. A decline in production would reduce royalty revenues to the U.S. Treasury and payments to affected counties. In addition, decreased production would reduce local income realized from oil and gas operations and related activities. Most salaries paid to workers and fees paid to contractors are spent locally. Loss of domestic oil and gas production could also mean more dependence on foreign sources and higher fuel prices.

Other constraints, such as Timing Limitation Stipulations or Controlled Surface Use, would increase the costs of oil and gas activities, but not as much as NSO designations.

Table 3 - 73 of projected minerals outputs for the first decade of the 2006 Forest Plan is based in part on the RFDS and acreage designated for No Surface Occupancy in each alternative. The rational for the projected number of new oil and gas wells and associated surface disturbance, and for the number of depleted wells and associated reclaimed acres, can be found in the RFDS. The RFDS projections of new oil and gas drilling activity were made without regard to mineral ownership.

There is no way to accurately forecast how many of those wells would be drilled for Federally owned mineral and thus affected by the NSO designation. Currently, 35 percent of the wells on the WNF were drilled for Federally owned minerals, with 65 percent drilled for privately owned minerals (outstanding and reserved). Because of the small number of projected new wells, and the relatively small percentage of NSO areas on the Forest, it is theoretically possible that all of the projected new wells could be drilled outside NSO areas. Given that scenario, none of the 234 projected new wells would be affected by any of the alternatives (thus the high-end number of the ranges in Table 3 - 73). The low end numbers of the ranges were calculated by taking into account the percentage of NSO designation in each alternative and the percentage of projected new wells that may be drilled on Federal minerals, assuming random distribution of all the projected new wells.

Table 3 - 73. Projected minerals outputs for management activities for first decade.

	Management Activity	Alt. A (12% NSO)	Alt. B (8% NSO)	Alt. C (16% NSO)	Alt. D (9% NSO)	Alt. E (11% NSO)	Alt. E Modified (13%NSO)	Alt. F (17% NSO)
Oil & Gas Activities	Number of new wells	224 to 234	227 to 234	221 to 234	227 to 234	225 to 234	223 to 234	220 to 234
	Total acres of surface disturbance	260 to 272	264 to 272	257 to 272	263 to 272	262 to 272	259 to 272	256 to 272
	Acres of reclaimed disturbance[1]	144 to 151	146 to 151	142 to 151	146 to 151	145 to 151	143 to 151	142 to 151
	Net acres needed for new production	116 to 121	118 to 121	115 to 121	118 to 121	117 to 121	116 to 121	114 to 121
	Depleted wells plugged	108	108	108	108	108	108	108
	Orphan wells plugged	20	20	20	20	20	20	20
	Acres reclaimed by plugging	70	70	70	70	70	70	70
Surface Coal Mining	Total acres of surface disturbance[2]	1250	1250	1250	1250	1250	1250	1250

[1] These acres, initially needed for well development, exceed those needed to support production.

[2] Subject to valid existing rights or compatibility determinations by OSM.

Minerals Indicator 2 - Management of National Forest System surface over privately owned mineral rights

Constraints to the exploration and development of privately owned minerals underlying NFS land as the result of applying the Secretary of Agriculture's rules and regulations (in the case of reserved minerals) or negotiated terms and conditions (in the case of outstanding minerals) could increase operating costs or decrease production.

Approximately 56 percent of the WNF is underlain by reserved or outstanding mineral rights totaling approximately 133,910 acres.