

National Park Service
U.S. Department of the Interior

Big Thicket National Preserve
Texas



ENVIRONMENTAL ASSESSMENT

**Peoples Energy Production - Texas, LP
Proposal to Directionally Drill and Produce
the Vastar Unit 2-A No. 2 Well
Beaumont Unit
Big Thicket National Preserve
Hardin and Orange Counties, Texas**



August 2005

In 1916, Congress created the National Park Service in the Department of the Interior to:

...promote and regulate the use of the Federal areas known as national parks, monuments, and reservations...by such means and measures as to conform to the fundamental purpose of said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. (NPS Organic Act, 16 U.S.C. § 1)

Cover photo: Vastar Unit 2-A No. 2 Well Proposed Surface Location, Haigler "Dusty" Pate, NPS

**Prepared by
United States Department of the Interior • National Park Service
And Azimuth Forestry Services, Inc.**

**Environmental Assessment
Peoples Energy Production - Texas, LP
Proposal to Directionally Drill and Produce
the Vastar Unit 2-A No. 2 Well
from a Surface Location Outside the Beaumont Unit
to Reach a Bottomhole Location under the Unit
Big Thicket National Preserve
Hardin and Orange Counties, Texas**

Summary: In accordance with National Park Service (NPS) regulations for nonfederal oil and gas rights, Peoples Energy Production (Peoples) has submitted an Application for Exemption (Application) to the NPS regulations found at 36 CFR 9B to directionally drill and produce the Vastar Unit 2-A No. 2 well from a surface location outside the boundary of the Beaumont Unit (Unit) of Big Thicket National Preserve (Preserve) in Orange County, Texas, on an existing well pad expanded into privately managed forest lands, to a bottomhole location under the Unit in Hardin County, Texas.

This Environmental Assessment (EA) evaluates two alternatives. Alternative A, No Action, evaluates baseline conditions in which the well would not be drilled; therefore, there would be no new impacts on the environment, but existing impacts would continue. Alternative B, Proposed Action, evaluates Peoples' proposal to directionally drill and produce the well. Due primarily to the use of directional drilling from a surface location approximately 700 feet outside the Unit, there would be no measurable effects on most Unit resources and values. Therefore some Unit resources and values have been dismissed from further analysis in this EA. Under Alternative B, there would be short- to long-term, localized to widespread, negligible to moderate, adverse impacts on air quality, natural soundscapes, lightscapes, and water resources: floodplains and wetlands in and outside the Unit. Impacts on Adjacent Landowners, Resources, and Uses, including cultural resources, geology and soils, vegetation, and wildlife would range from short- to long-term, localized to widespread, negligible to moderate, and be both beneficial and adverse.

Public Comment: If you wish to comment on the Environmental Assessment, please mail your comments to the address below for receipt by Thursday, September 29, 2005. Please note that names and addresses of people who comment become part of the public record. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment letter. We will make all submissions from organizations, businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

Superintendent
Big Thicket National Preserve
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Beaumont, Texas 77701

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1.0 PURPOSE OF AND NEED FOR ACTION

This Environmental Assessment has been prepared to comply with the National Environmental Policy Act and will be used as a framework for agency decision-making. This EA evaluates the environmental impacts of the No Action Alternative and Peoples' proposal to directionally drill and produce the Vastar Unit 2-A No. 2 well from a surface location outside the Beaumont Unit to a bottomhole target beneath the Unit. Figure 1 depicts the project location in relation to the 15 Units of the Preserve.

One of the purposes of this analysis is to determine whether Peoples' directional well would qualify for an exemption from the NPS's nonfederal oil and gas rights regulations found at 36 CFR 9B. Specifically, Section 9.32(e) governs operators that propose to develop nonfederal oil and gas rights in any Unit of the National Park System by directionally drilling a well from a surface location outside Unit boundaries to a location under federally owned or controlled lands within park boundaries. Per § 9.32(e), an operator may obtain an exemption from the 9B regulations if the Regional Director is able to determine from available data that a proposed drilling operation under the park poses "*no significant threat of damage to park resources, both surface and subsurface, resulting from surface subsidence, fracture of geological formations with resultant fresh water aquifer [sic] contamination or natural gas escape or the like.*" This EA also serves the purpose of disclosing to the public the potential impacts on the human environment, both inside and outside the Unit.

When Congress authorized the establishment of Big Thicket National Preserve on October 11, 1974, the U.S. Government acquired surface ownership of the area. Private entities retained the subsurface mineral interests on most of these lands, while the State of Texas retained the subsurface mineral interests underlying the Neches River and navigable reaches of Pine Island Bayou. Thus, the federal government does not own any of the subsurface oil and gas rights in the Preserve, yet the NPS is required by its laws, policies and regulations to protect the Preserve from any actions, including oil and gas operations, that may adversely impact or impair Preserve resources and values.

Peoples submitted an application to the NPS describing how it proposes to directionally drill and produce the Vastar Unit 2-A No. 2 well from a surface location outside the Unit to reach a bottomhole target beneath the Unit. On August 16, 2005, the Preserve Superintendent determined the application to be substantially complete for the NPS to proceed with its analysis and public involvement process.

The analysis area for evaluating impacts in this EA includes:

- The direct areas of impact total approximately 7.0 acres. This includes use of 6.5 acres of cleared property for an existing production facility, plus an additional 0.5 acres needed

for expansion of the existing facility to accommodate the Vastar Unit 2-A No. 2 well. Total acreage need for this well is estimated at 3.5 acres of the 7.00 acres of total impact area. Should the well be placed in production existing flowlines would be used, and any additional flowlines, if needed, would be placed within the existing disturbed area (old production site). Also, approximately 1.5 miles of existing paved county roads would be used (Four Oaks Ranch Road).

- The indirect area of impact for each resource or value could vary for each impact topic; but generally would not extend 1,500 feet beyond the well sites and a 100 foot offset from the associated access roads, and flowlines. The NPS selected the 1,500 foot offset because noise generated during drilling activities may require up to 1,500 feet to attenuate to background levels.

The analysis area of cumulative impacts includes the entire Beaumont Unit and up to 1/2 mile contiguous to the Unit.

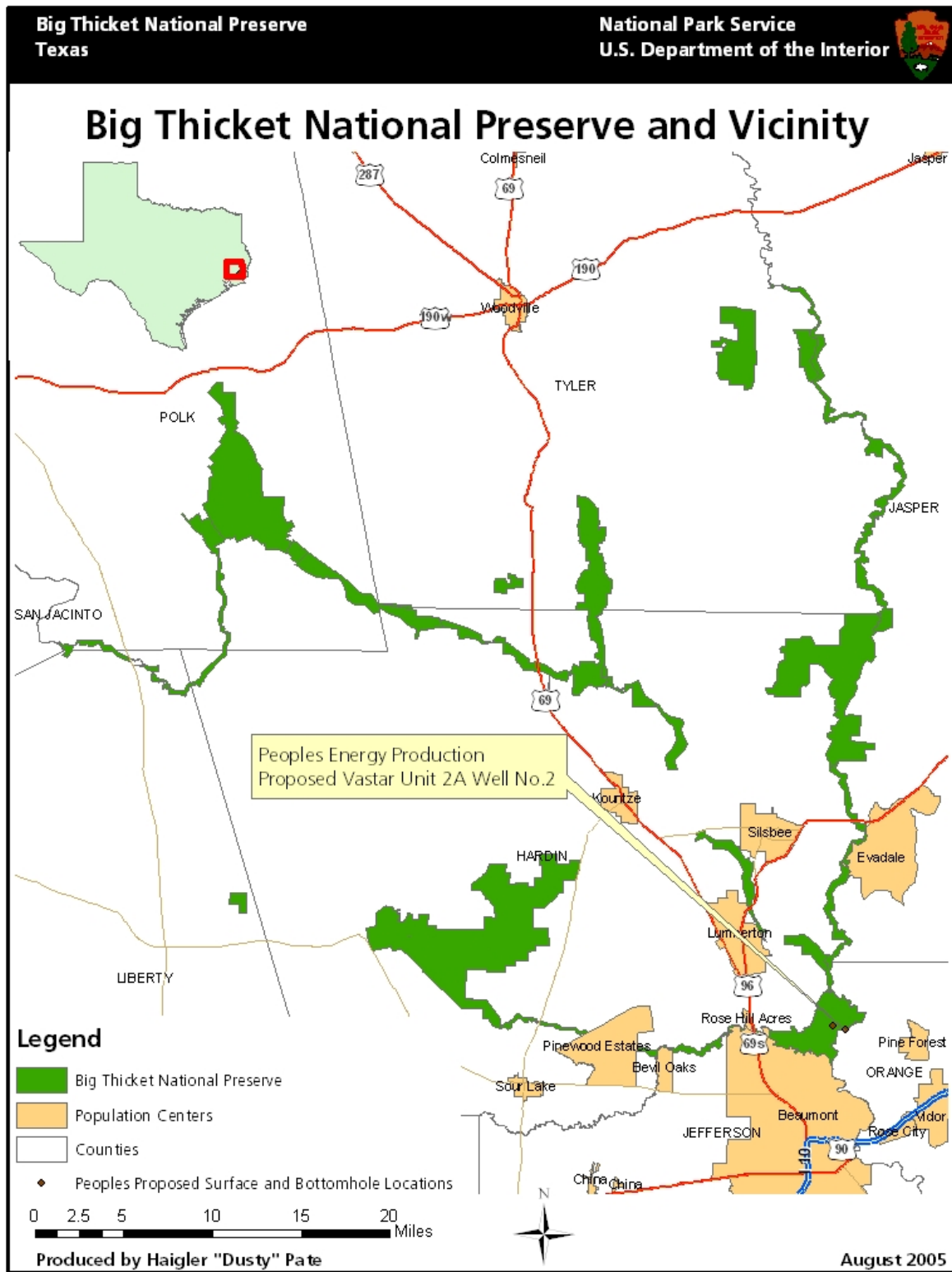


Figure 1. Project Location Map

1.1 Objectives of Taking Action

The objectives of taking action are to:

- avoid, minimize, or mitigate impacts on Unit resources and values, visitor use and experience, and human health and safety;
- prevent impairment of Unit resources and values; and,
- provide Peoples, as the lessee of nonfederal oil and gas mineral interests, reasonable access for exploration and development.

1.2 Special Mandates and Direction

The NPS evaluates project-specific directional drilling applications on a case-by-case basis by applying a variety of Current Legal and Policy Requirements prior to issuing an exemption under § 9.32(e) of the NPS Nonfederal Oil and Gas Rights Regulations (36 CFR 9B). The following discussion is a summary of the basic management direction the NPS follows for exempting directional drilling proposals that qualify under the § 9.32(e) provision.

1.2.1 NPS Organic Act and General Authorities Act – Prevention of Impairment

The NPS Organic Act of 1916 (16 U.S.C. § 1, *et seq.*) provides the fundamental management direction for all units of the National Park System. Section 1 of the Organic Act states, in part, that the NPS shall:

“...promote and regulate the use of the Federal areas known as national parks, monuments, and reservations...by such means and measure as conform to the fundamental purpose of said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” 16 U.S.C. § 1.

The National Park System General Authorities Act of 1970 (16 U.S.C. § 1a-1 *et seq.*) affirms that while all national park system units remain "distinct in character," they are "united through their interrelated purposes and resources into one national park system as cumulative expressions of a single national heritage." The Act makes it clear that the NPS Organic Act and other protective mandates apply equally to all units of the system. Subsequently, the 1978 Redwood Act Amendments to the General Authorities Act further clarified Congress' mandate to the NPS to protect park resources and values. The Amendments state, in part: “[t]he authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for

which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress.” 16 U.S.C. § 1a-1.

Current laws and policies require the analysis of potential effects to determine whether actions would impair park resources. While Congress has given the NPS the managerial discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement (enforceable by the federal courts) that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise (2001 Management Policies, § 1.4).

These authorities all prohibit an impairment of park resources and values. Not all impacts are impairments. An **impairment** is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts. The NPS Management Policies explain that an impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is:

- 1) necessary to fulfill a specific purpose identified in the establishing legislation or proclamation of the park,
- 2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- 3) identified as a goal in the park’s general management plan or other relevant NPS planning documents.

An impact would be less likely to constitute impairment to the extent that it is an unavoidable result, which cannot be reasonably further mitigated, of an action necessary to preserve or restore the integrity of park resources or values.

NPS Management Policies explain that “resources and values” mean the full spectrum of tangible and intangible attributes for which the parks are established and are being managed, including the Organic Act’s fundamental purposes (as supplemented), and any additional purposes as stated in a park’s establishing legislation. Park resources and values that are subject to the no impairment standard include the biological and physical processes that created the park and that continue to act upon it, scenic features, natural visibility, natural soundscapes and smells, water and air resources, soils, geological resources, paleontological resources, archeological resources, cultural landscapes, ethnographic resources, historic and prehistoric sites, structures and objects, museum collections, and native plants and animals. Additional

resources and values that are subject to the non-impairment standard include the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system.

Section 3.0 of the EA includes impairment analyses for each Unit resource or value carried forward into that Section for further analysis. Because the surface location of the well would be sited approximately 700 feet outside the Unit boundaries, anticipated impacts on some park resources and values would result in effects that would range from no effect to minor.

Therefore, following a limited analysis in this Section of the EA to reach this determination, some Unit resources and values are dismissed, and are not carried forward to Section 3.0 for further analysis. As a result, the impairment analysis for park resources or values included in Section 3.0 of this EA is limited to the topics Air Quality, Natural Soundscapes, Lightscape Management, and Water Resources: Wetlands and Floodplains.

1.2.2 Big Thicket National Preserve Enabling Act

The Preserve was established by the Act of October 11, 1974, Pub. L. No. 93-439, 88 Stat. 1254, codified as amended at 16 U.S.C. §§ 698-698e (2000), as the nation's first Preserve "to assure the preservation, conservation, and protection of the natural, scenic, and recreational values of a significant portion of the Big Thicket area in the State of Texas and to provide for the enhancement and public enjoyment thereof." The Big Thicket, often referred to as a "biological crossroads," is a transition zone where southwestern deserts, central plains, eastern forests, and southeastern swamps intersect. In recognition of this diversity, the Preserve was designated a Biosphere Reserve in 1978 by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). It shares this distinction among 332 biosphere reserves in 85 countries worldwide. The biosphere reserve program (Man and the Biosphere Program) is based on the concept that it is possible to achieve a sustainable balance between the conservation of biological diversity, economic development, and maintenance of associated cultural values. The Preserve includes 15 Units located in Jefferson, Hardin, Liberty, Polk, Tyler, Jasper, and Orange Counties. Within the Preserve, the United States currently owns fee simple title to the surface estate on approximately 90,000 acres of land.

The Preserve's authorizing legislation provides that the United States shall not acquire the mineral estate within the Preserve unless the Secretary of the Interior "first determines that such property or estate is subject to, or threatened with, uses which are, or would be, detrimental to the purposes and objectives of sections 698 to 698e of this title." 16 U.S.C. §§ 698a(a). However, it also directs the Secretary "to promulgate and publish such rules and regulations in the *Federal Register* as he deems necessary and appropriate to limit and control the use of, and activities on, federal lands and waters with respect to:...(2) exploration for, and extraction of, oil, gas, and other minerals" at subsection 698c(b).

One of the primary rights associated with the mineral interest is the right of reasonable access to explore for and develop the mineral interest. Exploration for or development of nonfederal oil and gas which requires access on, across, or through federally owned or controlled lands or waters within the Preserve is subject to the NPS's Nonfederal Oil and Gas Rights Regulations.

1.2.3 NPS Nonfederal Oil and Gas Regulations, 36 CFR 9B

The authority to manage and protect federal property arises from the Property Clause of the United States Constitution. The Property Clause provides that “Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States....” U.S. Const. Art. IV, § 3, cl. 2.

In 1916, Congress exercised its power under the Property Clause and passed the NPS Organic Act, 16 U.S.C. § 1 *et seq.* Section 3.0 of the Organic Act authorizes the Secretary of the Interior to “make and publish such rules and regulations as he may deem necessary or proper for the use of the parks . . .” 16 U.S.C. § 3.

Pursuant to Section 3.0 of the NPS Organic Act and individual park statutes, the Secretary of the Interior promulgated regulations at 36 CFR Part 9, Subpart B (“9B regulations”) in 1979. The 9B regulations apply to operations that require access on, across or through federally owned or controlled lands or waters in connection with non-federally owned oil and gas in all National Park System units (36 CFR § 9.30(a)). The Service’s jurisdiction under these regulations does not extend to any activities occurring outside park boundaries, even if such activities are associated with a nonfederal oil and gas operation occurring inside a park.

The NPS Nonfederal Oil and Gas Rights Regulations (36 CFR 9B) and other regulatory requirements assist park managers in managing oil and gas activities so they may be conducted in a manner consistent with the NPS mandate to protect park resources and values. The application and implementation of these regulations on the ground must be assessed parkwide for each site-specific oil and gas activity to determine if these activities have the potential to impair park resources and values.

Section 9.32(e) of the regulations governs operators that propose to develop their nonfederal oil and gas rights in a park by directionally drilling a well from a surface location outside unit boundaries to a location under federally owned or controlled lands or waters within park boundaries. It is limited in scope to those aspects of the directional drilling operation occurring within park boundaries.

Per § 9.32(e), an operator may obtain an exemption from the 9B regulations if a Regional Director is able to determine from available data that a proposed drilling operation under the park poses “*no significant threat of damage to park resources, both surface and subsurface, resulting from surface subsidence, fracture of geological formations with resultant fresh water*

aquifer [sic] contamination or natural gas escape or the like." The regulations define operations as "*all functions, work and activities within a unit in connection with exploration for and development of oil and gas resources, the right to which is not owned by the United States...*" (36 CFR § 9.31(c), underlining added). The potential impacts considered in the § 9.32(e) exemption process relate only to effects on park resources from downhole activities occurring within the boundary of the park, not threats to park resources associated with the operation outside park boundaries.

Under the regulations, the NPS may determine that 1) an operator qualifies for an exemption from the regulations with no needed mitigation to protect park resources from activities occurring within park boundaries, 2) an operator qualifies for an exemption from the regulations with needed mitigation to protect subsurface park resources from activities occurring within park boundaries, or 3) an operator must submit a proposed plan of operations and a bond to the NPS for approval. Each one of these legally permissible options is briefly described below.

- 1) **Exemption with No Mitigation** (*no approval or permit issued*): The NPS determines that the proposed operation inside the park qualifies for an exemption under § 9.32(e) without any mitigation or conditions required by the NPS on the downhole activities. This option will arise when there is no potential for surface or subsurface impacts in the park from the downhole activities (e.g., the wellbore does not intercept an aquifer within the park). Under this option, the NPS is not granting an approval or issuing a permit.
- 2) **Exemption with Mitigation** (*no approval or permit issued*): The NPS determines that the proposed operation inside the park qualifies for an exemption under § 9.32(e) if there is no potential for surface impacts to park resources from downhole operations in the park and the operator adopts mitigation measures or conditions that reduce potential impacts on subsurface resources (e.g., an aquifer) to "no measurable effect." As in option #1 above, the NPS is not granting an approval or issuing a permit.
- 3) **Plan of Operations** (*approval and "permit" issued*): This regulatory option would apply if NPS determines that it cannot make the requisite finding for a § 9.32(e) exemption because (1) impacts to surface resources are involved, or (2) impacts to subsurface resources cannot be adequately mitigated to yield "no measurable effect." This option would also apply if an operator does not apply for an exemption and the NPS does not consider granting an exemption on its own initiative. In these cases a prospective operator must submit and obtain NPS approval of a proposed plan of operations and file a bond before commencing directional drilling activities inside a park. The required plan and bond will be limited in scope to those aspects of the directional drilling operation that occur within park boundaries. As a result, many of the general plan information requirements set forth under § 9.36 will not apply. Mitigation measures and/or conditions of approval would be integral to this option.

Such mitigation could encompass the protection of cultural resources, cave/karst resources, aquifers, floodplains, wetlands and other surface resources from operations occurring inside the park. Under this option, an operator must have the NPS's approval of a proposed plan before commencing any activity in the boundaries of the park. The approved plan constitutes the operator's "permit."

The Vastar Unit 2-A No. 2 Well qualifies for an Exemption with No Mitigation because no surface access in the Unit would be needed for any phase of drilling, production, transportation, or reclamation activities; and, the wellbores would be drilled to cross into the Unit at substantial depths so as to not cross usable quality ground water. The wellbore would cross into the Unit at a true vertical depth (TVD) of approximately 4,030 feet and continue to a targeted total depth of approximately 10,440 feet TVD. Usable quality ground water occurs from the surface to 1,325 feet in the area, with superior water quality occurring from the surface to 750 feet. There is no threat to park resources or values regardless of what methods and materials Peoples uses to drill, case, cement, or plug and abandon the section of hole inside the Unit. Likewise, if the well were produced, any methods of completion, stimulation, or injection that occur inside the Preserve would not pose a significant threat of damage to Unit resources and values.

1.2.4 Protecting Park Resources from External Activities

The NPS may seek compensation under 16 U.S.C. § 191j and other appropriate statutes, if any activities outside park boundaries, including oil and gas operations, damage park resources.

1.2.5 NPS Monitoring of Nonfederal Oil and Gas Operations

The NPS ability to monitor and inspect directional drilling operations is limited to downhole operations within the park (e.g., setting and cementing casing and plugging operations, etc.). As a practical matter, monitoring of downhole activities inside the park can only be accomplished from the surface location outside the park. As a result, the NPS may need to access the surface location, and should make such access a condition of an exemption under option 2 or a condition of approval under option 3. The NPS must coordinate the timing of such access with the operator. For directional drilling operations sited outside a park, the 9B regulations provide no authority to require an operator to grant the NPS access for the purpose of observing compliance with terms unrelated to the downhole activities inside the park. When the NPS has made an upfront determination that a directional drilling operation is exempt without conditions from the regulations because of the lack of impacts, there is no 9B regulatory reason to access the surface location outside the park (option 1).

Where a state or federal agency, other than the NPS, has applied mitigation measures via their respective environmental compliance or permitting processes, that agency, not the NPS, has sole responsibility for monitoring and enforcing its mitigation measures. However, in the event the

NPS becomes aware of a compliance concern related to another agency's jurisdiction, the NPS should alert that agency in a constructive manner.

1.2.6 National Environmental Policy Act of 1969 (NEPA)

For purposes of public disclosure and education, NPS prepares NEPA documents on all directional drilling proposals submitted to the NPS. Through its NEPA analysis, the NPS assesses impacts both in and outside of the park associated with the downhole operations in addition to the connected actions outside of the park. The downhole activities occurring in the park are analyzed to determine if there is a significant threat to park resources and if a § 9.32(e) exemption should be granted. As required by NEPA, the analysis of the impacts from the connected actions occurring outside of the park are presented in addition to the downhole operations both inside and outside of the park to disclose to the public all of the potential impacts on the human environment. Cumulative impacts are presented for the analysis area which includes areas inside and outside of the park.

1.2.7 Approved Park Planning Documents

Approved park planning documents also provide a framework for determining how nonfederal oil and gas operations are conducted within Big Thicket National Preserve.

The General Management Plan (GMP) is the major planning document for all National Park System Units. The GMP sets forth the basic philosophy of the Unit, and provides strategies for resolving issues and achieving identified management objectives required for resource management and visitor use. The GMP includes environmental analysis and other required compliance documentation. A GMP was completed for Big Thicket National Preserve in 1980. The park anticipates completing a new GMP in the coming years.

The Preserve is developing a Programmatic Oil and Gas Management Plan. The Draft Plan/Environmental Impact Statement was released for public review and comment in December 2004 (69 FR 71811 and 69 FR 72214-72215 and 70 FR 2630 and 70 FR 4147-4148). The public review and comment period closed on March 10, 2005. The NPS followed the planning framework of the Preserve's Draft Plan/EIS to prepare this EA because the draft plan provides logical steps that are applicable whether or not the document is finalized.

Peoples' proposal to directionally drill the Vastar Unit 2-A No. 2 Well is in accordance with the goals and objectives articulated in the above mentioned planning documents.

1.3 Issues and Impact Topics Evaluated

In the planning and development of the directional drilling application by Peoples, the NPS scoped with Peoples' consultant Azimuth Forestry Services, Inc. to identify the resources,

values, and other concerns that could be potentially impacted by drilling and producing the Vastar Unit 2-A No. 2 well. In addition, input from other federal, state, and local agencies was sought. Scoping was performed with the U.S. Fish and Wildlife Service (FWS), Texas Commission on Environmental Quality (TCEQ), and Texas Parks and Wildlife Department (TPWD). Scoping defined the major issues, alternatives, potential impacts, and mitigation measures associated with the proposal. The scoping process has been conducted through meetings, telephone conversations, written correspondence, and on-site observations and assessments.

As per Director's Order 12, scoping, or requesting early input before the analysis formally begins, is required on all EAs prepared by the NPS. Although public scoping is encouraged where an interested or affected public exists, issuing offices are only required to involve appropriate federal, state, or local agencies, and any affected Indian tribe. The issuing office decides the method of scoping. For Peoples' directional drilling application, the Preserve prepared a public scoping brochure to announce a 2-week public scoping period. On June 9, 2005, the Preserve mailed the scoping brochure to affected state, federal, and local agencies, other interested persons and organizations, and also to Peoples and its contractor, Azimuth Forestry Services, Inc. The Preserve also posted the public scoping brochure on the NPS Planning, Environment, and Public Comment (PEPC) website.

Public scoping was conducted to seek the input of the interested public to identify if there were any additional resources and concerns that were not already listed in the public scoping brochure; and to seek input on additional reasonable alternatives in addition to the four preliminary alternatives listed in the brochure. One scoping comment letter was received regarding the Vastar 2A No. 2 Well from the Lone Star Chapter of the Houston Regional Group of the Sierra Club. The letter was dated June 14, 2005, and contained no substantive comments that resulted in new issues or alternatives for analysis in this EA that were not already listed in the public scoping brochure.

Based on scoping, the NPS identified the following impact topics for evaluation in this EA:

- Air Quality in and outside the Unit
- Natural Soundscape in and outside the Unit
- Lightscape Management in and outside the Unit
- Water Resources: Floodplains and Wetlands in and outside the Unit
- Adjacent Landowners, Resources, and Uses, focusing on an analysis of the following resources and values:

- Cultural Resources
- Geology and Soils
- Vegetation
- Wildlife

Based on the above list of impact topics, issue statements were developed to define problems or benefits pertaining to the proposal to drill and produce the directional well (see Table 1). The issue statements describe a cause and effect relationship between an activity and the impact topic.

Table 1. Issue Statements

Impact Topic	Issue Statement
Air Quality in and outside the Unit	<ul style="list-style-type: none">• Air quality in the Preserve is influenced by the Beaumont/Port Arthur/Orange and Houston/Galveston airsheds, and the Preserve is within the Nonattainment Area for ozone in Liberty, Hardin, Jefferson, and Orange Counties. Parts of the Unit and the proposed operation are located within Hardin and Orange Counties. Specific pollutants can impair visibility, injure vegetation and fish and wildlife, damage materials, and affect water quality (e.g., acidify water).• Construction and/or maintenance of the well/production pad, and flowlines along with exhaust from combustion of gasoline and diesel-powered vehicles and equipment used for drilling and production operations would increase emissions of particulate matter, which could affect air quality, including visibility in the general vicinity of the operations.• Drilling, production, transport and storage of hydrocarbons; the use of gasoline and diesel-powered engines (vehicles, generators, compressors, etc.); and maintenance activities such as use of herbicides for vegetation control on and around operations sites, would emit pollutants, including nitrogen oxides, volatile organic compounds, carbon monoxide, sulfur dioxide, particulate matter, and objectionable odors. These emissions could degrade air quality within the general vicinity of the operations and contribute toward regional air quality degradation. Nitrogen oxides and volatile organic compounds are primary precursors to ozone formation, which, depending on ambient concentrations, can have damaging effects on some vegetation and on the health of humans and wildlife.
Natural Soundscapes in and outside the Unit	<ul style="list-style-type: none">• Existing Natural Soundscapes in the project area are currently affected by human developments, which include periodic logging operations, residencies and other land management activities on properties adjacent to the pad site and automobile use on Four Oaks Ranch Road. Natural sounds are intrinsic elements of the environment that are vital to the functioning of ecosystems and can be used to determine the diversity and interactions of species within communities. Natural Soundscapes are often associated with parks and preserves and are considered important components of the visitor experience as well as the natural wildlife interactions.• Construction and/or maintenance of the well/production pad, and flowlines along with associated noise from construction and operation equipment could affect the quality of the natural soundscape in the general vicinity of the operations. This would

Table 1. Issue Statements

Impact Topic	Issue Statement
	<p>occur primarily during the construction and drilling phases but would extend on a smaller scale to the production phases.</p> <ul style="list-style-type: none"> • Vehicles and equipment used for construction and/or maintenance of the well/production pad, and flowlines; and drilling, production, plugging, and reclamation activities, could result in increased noise in the vicinity of the operations.
Lightscape Management in and outside the Unit	<ul style="list-style-type: none"> • The existing lightscape of the project area is relatively natural with only a few small residential lights and nearby lights from other active production pads in the vicinity of the proposed well location. Typical impacts to natural lightscapes include the introduction of artificial light sources such as permanent lights used at residences and oil and gas production sites, and temporary lights on vehicles and equipment. • Lights associated with construction and/or maintenance of the well/production pad, flowlines and equipment could affect the quality of the lightscape in the general vicinity of the operation. • Drilling would require the use of rig and location lighting. If the well proves to be productive, automated location lighting may be permanently installed over the producing life of the well. Artificial lighting could interfere with views of the night sky in the area of activity, and possibly affect wildlife.
Water Resources: Floodplains and Wetlands in and outside the Unit	<ul style="list-style-type: none"> • The project area is situated within the broad 100-year floodplain of the Neches River. This portion of the floodplain is characterized as a complex of forested wetlands in lower portions and mesic woodlands on slight rises and on the edges of the floodplain. Large wetland complexes occur within approximately 30 feet of the Vastar Unit 2-A No. 2 well pad. • Construction and/or maintenance/reclamation of the well/production pad and flowlines could result in soil erosion and discharges of sediments and/or pollutants into adjacent wetlands in the general vicinity of the operations. • Drilling, production, transport and storage of hydrocarbons could result in releases of those fluids or other contaminants that could have damaging effects on water resources, vegetation, and wildlife.
Adjacent Landowners, Resources, and Uses	<ul style="list-style-type: none"> • Impacts on adjacent landowners from the development of nonfederal oil and gas could be beneficial (e.g., access roads could be maintained) and/or adverse (e.g., operations could pose a threat to human health and safety and property). Increase traffic during drilling of the Vastar project could increase potential for vehicular accidents with local residents. This situation could be compounded during the period of increased visitation due to hunting season in the fall and winter months.

Table 1. Issue Statements

Impact Topic	Issue Statement
	<ul style="list-style-type: none"> • Cultural Resources. Well drilling and production activities could increase access to archeological resources and result in illegal activities such as vandalism, artifact collection, and excavation while the location is accessible. • Earthmoving activities associated with construction and maintenance of the well/production pad, and flowlines have the potential to alter the distribution, disturb, or destroy surface or buried archeological materials, and alter the condition of ethnographic resources, historic structures, and cultural landscapes, although previous disturbance has taken place when the existing production facility was built. • Leaks and spills of hydrocarbons or other hazardous and contaminating substances from vehicles and equipment along the access road or from the drilling and production activities could damage or destroy undiscovered cultural resources. • Any discovered archeological resources on adjacent lands belong to the landowners, and the disposition of such archeological resources is at the discretion of the surface owners. • Geology and Soils. Construction and maintenance the well/production pad, and flowlines could increase surface runoff; increase soil erosion, rutting, and compaction; affect the permeability of soils (and other soil characteristics); and could directly and indirectly affect the growth and regeneration of vegetation on up to 7.0 acres • Soils compacted by foot or vehicle use could reduce soil permeability, change surface drainage patterns, and hinder the penetration of plant roots. In general, clayey soils are more subject to compaction than sandy soils. • The release of hydrocarbons or other contaminating and hazardous substances from vehicles, equipment, or flowlines during drilling and production operations could alter the chemical and physical properties of the soil in the vicinity of oil and gas activities. Changes in soil properties could result directly from contact with contaminants on site, or indirectly, via runoff from contaminated areas. • Vegetation. Vegetation would be totally removed on an additional 0.5 acres (besides the existing 6.5 acres of production area) in privately managed pine plantations estimated to average approximately 35 feet in height. Vegetation removal could change the structure and composition of vegetative communities and increase storm water runoff and erosion adjacent to the proposed well/production pad and flowlines. • The release of hydrocarbons and contaminating and hazardous

Table 1. Issue Statements

Impact Topic	Issue Statement
	<p>substances could damage or kill vegetation directly, via contact with contaminants on-site, or indirectly, via pathways from contaminated areas.</p> <ul style="list-style-type: none"> • Disturbances/removal of native vegetation could lead to the unintentional spread and establishment of non-native plant species transported in or on drilling and maintenance equipment. Of special concern is Chinese tallow (<i>Sapium sebiferum</i>), a regional problem species. • Reclamation of the oil and gas sites could re-establish native vegetative communities and surface and subsurface drainage patterns necessary to support vegetative growth. • Wildlife. The construction of the drilling/production pad and flowlines could result in the loss of wildlife habitat on an additional .05 acres (besides the existing 6.5 acres of production area); increase predation in open areas; directly harm or kill wildlife; displace wildlife into adjacent habitat; and disrupt wildlife feeding, denning, nesting, and spawning/reproduction. The situation will be compounded within the Unit and surrounding area during hunting season because of increased disturbance by hunters, and increased traffic in the general area during the hunting season if drilling is conducted during this period. • Drilling, production, and maintenance activities could adversely affect wildlife over the short- to long-term. These activities could result in avoidance of the area by wildlife due to increased noise, lighting, and human presence as well as increase edge effects, increase human access, and alter wildlife species and composition. • The release of hydrocarbons or other hazardous and contaminating substances from vehicles, drilling/production equipment, leaks, and rupture of flowlines and pipelines could injure or kill wildlife. The adverse effects could become worse over time if wildlife species ingest the contaminants and are consumed by other wildlife species. • Artificial lighting could attract insects and their predators to the area. • Heavy equipment used for reclamation operations could injure or kill wildlife and degrade habitat over the short-term. However, reclamation of oil and gas sites over the long-term could re-establish native vegetation communities and surface and subsurface water quality and quantity that support wildlife populations.

1.4 Issues and Impact Topics Eliminated from Further Analysis

Impact topics are dismissed from further evaluation in this EA if:

- they do not exist in the analysis area,
- they would not be affected by the proposal, or
- through the application of mitigation measures, there would be minor or less effects from the proposal, and there is little controversy on the subject or reasons to otherwise include the topic.

The following topics have been eliminated from further analysis for the reasons described.

- Socioeconomics
- Environmental Justice
- Prime and Unique Farmland Soils in and outside the Unit
- Water Resources: Groundwater and Streamflow Characteristics in and outside the Unit
- Species of Management Concern in and outside the Unit
- Other Unit Resources and Values:
 - Geology and Soils
 - Vegetation
 - Fish and Wildlife
 - Cultural Resources
 - Visitor Use and Experience

In this section, the following terms are used:

- **In-park Operations** would consist of the wellbore crossing into the Unit at a depth of approximately 4,030 feet TVD to a target depth of about 10,440 feet TVD, and extracting hydrocarbons and other associated fluids from beneath the Unit.
- **Connected Actions** would consist of activities associated with access road maintenance; construction and maintenance of the well/production pad and gas/sales transportation lines,

drilling and completion; hydrocarbon production and transportation; and well plugging and surface reclamation outside the Unit.

1.4.1 Socioeconomics

Socioeconomic effects include the drilling and producing of the Peoples Vastar Unit 2-A No. 2 well on local and regional economies and on visitation in the Unit with associated revenues into the local and regional economies. The following description provides supporting data to base the cumulative impact analyses in Section 3.0.

Big Thicket National Preserve contributes to the local and regional economies by adding sales, taxes, and employment related to the acquisition of services, supplies, and materials needed to administer the Preserve. In addition, tourism-related expenditures contribute to the economy and also create jobs to support tourism. Throughout the Preserve in 2004, the NPS has estimated that there were a total of 106,000 visits. Specific data detailing how many of those involved visits to the Beaumont Unit are unavailable because the Preserve does not track visits to the Unit (except those generated from hunting surveys). Beaumont Unit is one of 6 Units where hunting is permitted from the opening date of the State of Texas fall hunting season through the second Sunday in January. During the 2004-2005 hunting season, with approximately 72% of hunting surveys returned, there were 769 trips reported in the Unit. These numbers were not included in the visitation estimate for 2004. Other visitor uses in the Unit include canoeing Cook's Lake, picnicking and fishing at Lakeview, as well as in the Neches River, and bird watching. In the event of a serious oil spill, release of hydrogen sulfide gas, and/or accident involving serious personal injury or death, the public could perceive that the Preserve is not a desirable place to visit. Tourism could fall, resulting in reduced revenues to the local and regional economies. However, the likelihood of this happening is relatively small because Peoples' is required under numerous Statewide Rules administered by the Railroad Commission of Texas (RRC) to take precautions to prevent accidents during the drilling and production of the well.

Big Thicket National Preserve lies within RRC's District 3. District 3 covers an area of southeastern Texas from the Piney Woods to the north, the Louisiana border to the east, the Coastal Bend to the south, and the southeastern corner of the Edwards Plateau to the west. This area has been a major site of oil and gas exploration and development for the past century. During the period from January, 2004 through January of 2005, 1,272 drilling permits were issued by the RRC in the 29 counties comprising District 3. For the 7-county area encompassing the Preserve (Hardin, Jasper, Jefferson, Liberty, Orange, Polk, and Tyler Counties) 356 drilling permits were issued, comprising 28 percent of the District-wide total. Production for 2004 in District 3 totaled 40,929,218 bbls of oil and condensate, and 647,023,981 mcf natural gas from gas wells and casingheads. In the 7-county area encompassing the Preserve, production of oil from all sources totaled 12,164,350 bbls (30 percent of the District total), and 177,198,300 mcf natural

gas from all sources (27 percent of the District total) (RRC 2004). Oil and gas exploration, development, and transportation play an important role in the local economy within the 7-county area that includes the Preserve, and are also important to the regional economy within RRC District 3.

The NPS has prepared a reasonably foreseeable development (RFD) scenario to project future oil and gas development, based on an assessment by the U.S. Geological Survey of remaining hydrocarbons beneath Big Thicket National Preserve (DOI, 1999). The RFD provides a reasonable assumption of future development of nonfederal oil and gas for park planning purposes and to provide a basis to measure potential environmental impacts. The RFD projects that initially, 3-D seismic surveys would be conducted throughout the entire Preserve, and the data obtained would be used to delineate oil and gas drilling prospects. It was assumed that approximately 29 additional wells would be drilled over the next 15 to 20 years to produce the estimated 1.21 million barrels of oil, 70.11 billion cubic feet of natural gas, and 1.02 million barrels of natural gas liquids from Tertiary and Upper Cretaceous age reservoirs underlying the Preserve. Based on an exploratory drilling success rate of approximately 50 percent, 29 additional wells are reasonably anticipated to be drilled, of which 19 could be commercially successful. The NPS acknowledges that the RFD is based solely on available production data and that more or less wells could be drilled. Under the RFD scenario, it would reasonably be anticipated that Preserve-wide, up to 267 acres could be disturbed for geophysical exploration operations; and up to 153 acres could be developed for drilling, production, and transportation operations for a total future development of 420 acres. Due to the narrow, linear nature of many of the Preserve's Units many of the drilling and production operations are anticipated to follow the existing trend for siting from surface locations outside the Preserve to access hydrocarbons beneath the Units using directional drilling technology. For some Units that are greater in size, some exploratory and development wells are expected to be sited within the Unit boundary.

Recent 3-D seismic exploration was conducted in the Unit in 1998. Approximately 63% of the Beaumont Unit was "shot" at this time. There have also been five 2-D seismic exploratory operations of varying lengths conducted in the unit in the 1980s and 1990s.

The trend over the past 5 years for drilling wells to produce oil and gas underlying the Preserve is towards directionally drilling from surface locations outside the Preserve to bottomhole targets beneath the Preserve. From 1998 through 2000, no wells were drilled in or outside the Preserve to develop the underlying hydrocarbons. From 2001 through June 2005, 19 directional wells were drilled from surface locations outside the Preserve to reach bottomhole targets beneath the Preserve. During 2004 and up to June 1, 2005, applicants received § 9.32(e) exemption determinations for 15 additional directional wells. Currently, there are no wells developing hydrocarbons from surface locations inside the Beaumont Unit, but 3 wells in the vicinity of the proposed Peoples surface operation are currently producing from formations under the Unit.

Two 6" pipeline right-of-ways cross the Beaumont Unit. One pipeline transports natural gas approximately 900 feet through the north central portion of the Unit and is currently active. The second 6" pipeline also transports natural gas and extends approximately 13,700 feet through the western half of the Beaumont Unit, however it is inactive at this time.

As a result of connected actions associated with the proposed operation, land use on approximately only 0.5 acres would be converted from commercial timber production to oil and gas development. If the Peoples well is drilled and hydrocarbons are discovered and produced, it could result in a negligible, beneficial impact on local and regional economies.

Because of the low intensity of impact, this topic is being dismissed from further analysis in this EA.

1.4.2 Environmental Justice

Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The proposed nonfederal action would not have health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Environmental Justice Guidance (1998). Therefore, environmental justice is being dismissed from further analysis in this EA.

1.4.3 Prime and Unique Farmland Soils in and outside the Unit

As a result of a substantial decrease in the amount of open farmland, Congress enacted the Farmland Protection Policy Act (FPPA) (Public Law 97-98). In August 1980, the Council on Environmental Quality directed that federal agencies must assess the effects of their actions on prime or unique farmland soils classified by the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS). Prime farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, timber, and oil seed. Unique farmland soils are those that produce specialty crop such as fruits, vegetables, and nuts. Prime and unique farmland soils are those that are actively being developed and could be converted from existing agricultural uses to nonagricultural purposes, as described above. Urban or built-up land, public land, and water areas cannot be considered prime farmland.

Soils inside the Unit cannot be considered prime and unique farmland soils because they are public lands unavailable for food or fiber production. Prime farmland soils outside the Unit occur on the proposed Vastar Unit 2-A No. 2 Well location. Approximately 0.5 acres of prime farmland soils on the proposed Vastar Unit 2-A No. 2 Well site would be converted from timber production to oil and gas facilities for the life of the well. The FPPA only applies to direct

federal actions and does not apply to the connected actions identified in this EA (i.e., the surface disturbances outside the Unit).

Because there are no prime and unique farmland soils in the Unit, and the FPPA does not apply to private projects on private properties, this impact topic is being dismissed from further analysis in this EA.

1.4.4 Water Resources: Groundwater and Streamflow Characteristics in and outside the Unit

This topic includes only groundwater and stream/drainage features. The other features of the impact topic Water Resources are analyzed in Section 3.4.

As per the TCEQ, usable-quality water occurs from the land surface to a depth of 1,325 feet. The interval from the land surface to a depth of 750 feet contains water of superior quality, which must be isolated from water in underlying beds. The proposed wellbore would cross into the Unit at a depth of approximately 4,030 feet TVD, a depth of more than 2,700 feet below the deepest usable quality zone. The application of proper well casing and cementing, and plugging and abandonment procedures, as required by the Statewide Oil and Gas Rules administered by the RRC, should result in ensuring the isolation of usable-quality water zones. Therefore, the proposed in-park operations (below surface), in addition to the subsurface portion of the connected actions occurring outside the Unit, should have no effect on usable-quality water zones either in or outside the Unit as long as RRC drilling rules to protect water quality are followed; therefore, groundwater was dismissed from further evaluation in this EA.

No surface water features, i.e. the slough adjacent to the proposed well site, would be directly impacted by the proposal. Due to mitigation measures that are part of Peoples' proposal, namely horizontal directional drilling beneath this area and ring levee construction around the pad, no direct changes to the hydrology or flow characteristics of any stream/drainage feature are anticipated. Therefore, the issue of stream and hydrology alterations was dismissed from further evaluation in this EA.

1.4.5 Species of Management Concern in and outside the Unit

Under NPS policy, the proposed operation would qualify for an exemption with no mitigation. The well would originate on private land located outside the Unit, and the wellbore would cross through the Unit at a sufficient depth to not pass through usable-quality water zones to extract nonfederally owned hydrocarbons from beneath the Unit. Therefore, the NPS has no Section 7 responsibility, nor authority, associated with the Vastar Unit 2-A No. 2 well for the proposed in-park operations for which a 9.32(e) exemption is being evaluated. As part of the NEPA analysis, however, the NPS is providing the following analysis of the effects of the connected actions on federally listed threatened and endangered species in and outside the Unit.

Also, NPS policy requires that state-listed species, and others identified as species of management concern by the park, are to be managed in parks in a manner similar to those that are federally listed. Big Thicket National Preserve does not have any species of management concern identified. Thus, federal and state-listed species will be addressed in this EA following federal law and NPS policy.

Please see Appendix A for a current listing by the FWS of the three threatened and endangered species of potential occurrence in Orange County (surface location) and nearby Hardin County (bottomhole location). The FWS lists the red-cockaded woodpecker (*Picoides borealis*) and Texas trailing phlox (*Phlox nivalis* ssp. *texensis*) as endangered in Hardin County and the bald eagle (*Haliaeetus leucocephalus*) as endangered in Orange County. Appendix B includes a listing from the TPWD of threatened, endangered, and state-identified rare species that may occur in Orange and Hardin Counties. The state list includes a brief description of the habitats required by these species. Please note that these are DRAFT documents, and that there are some discrepancies between the species listed as federally threatened or endangered in them and those produced by the FWS. There is no federally designated critical habitat in or near Big Thicket National Preserve. State listed species of concern within the Preserve that have the potential to be affected by the proposed action include paddlefish (*Polyodon spathula*), alligator snapping turtle (*Macrochelys temminckii*), blue sucker (*Cycleptus elongatus*), and creek chubsucker (*Erimyzon oblongus*), all aquatic species.

The proposed in-park subsurface operations, consisting of the directionally drilled wellbore crossing into the plane of the park at approximately 4,030 feet TVD, and extracting hydrocarbons from beneath the Unit, would have no impact on the surface of the Unit. Therefore, there would be no effect from in-park operations on species of management concern in the Unit.

Habitat assessments for rare species in and surrounding the proposed well pad and access routes were conducted in May 2005 by a biologist from Azimuth Forestry Services, Inc. No suitable habitat for the federally listed species was observed; therefore the project would have no effect on the federally listed species. An individual bald eagle is known to over-winter up river (Neches) from the Confluence boat ramp. However, its location is estimated to be more than 1500' from the proposed Vastar project, the minimum distance recommended for the primary management zone for the eagle as set forth by the Southeastern States Bald Eagle Recovery Plan (1989).

The NPS determines the directional drilling and production of the Vastar Unit 2-A No. 2 well would have no effect on federally listed threatened and endangered species or their habitat in or outside the Unit. (Nor would there be an effect on any state-listed listed species within the Unit from connected actions.) This determination is based upon a combination of factors. First, the habitat in the project area is not suitable for the species identified by FWS (e.g., red-cockaded

woodpecker, Texas trailing phlox, bald eagle). Second, the directionally drilled wellbore would cross the Unit boundary at a depth that precludes any effect on surface resources. And third, mitigation measures have been designed into the project, most importantly leaving a vegetated buffer between the proposed surface location of the operations and the Unit. This no-effect determination negates the need to prepare a Biological Assessment.

Because there would be no impacts on the Unit's listed species from in-park oil and gas operations or the connected actions, and because there would be no impacts on listed species on adjacent lands, threatened and endangered species and other species of management concern in and outside the Unit were dismissed from further analysis in this EA.

1.4.6 Other Unit Resources and Values

The proposed in-park subsurface operations, consisting of the directionally drilled wellbore crossing into the plane of the park at approximately 4,030 feet TVD, and extracting hydrocarbons from beneath the Unit, would have no impact on Unit resources and values.

The connected actions would be located outside the Unit boundaries. Because of this, and due to the mitigation measures proposed by Peoples (listed in Table 3 in this EA), there would be negligible to minor effects expected on the following Unit resources and values:

Geology and Soils. Because Peoples is expected to follow Texas RRC rules for setting and cementing surface casing to isolate usable-quality groundwater, the freshwater aquifer should be protected with the attendant protection of soils at or near the surface. Surface subsidence caused by fluid withdrawals is not a reasonable expectation because of the properties (depth, porosity, compaction, hydropressure, etc.) of the target reservoirs and adjacent overlying sediments. Subsurface fracture affecting resources at or near the surface is also not a concern because of the physical separation and geologic barriers between resources and the downhole points that could be subjected to pressures high enough to create a fracture. The effects from the connected actions to geology and soils are limited to surface impacts from vehicle use, construction, drilling, and fluid transport at the well pad and flowline corridors. Due to the fact the well pad would be outside the Unit boundaries, other mitigation measures proposed by Peoples, as well as the proposed casing, cementing, and completion operational requirements, there would be negligible to minor effects on the geology and soils of the Unit from any of the connected actions proposed.

Vegetation. The possible impacts to the vegetation of the Unit are similar to those for geology and soils. Because Peoples would follow Texas RRC rules for setting and cementing surface casing to isolate usable-quality groundwater, there is no possibility of subsidence, fracture, etc. affecting freshwater aquifers, or the surface, from the proposed wellbore outside the Unit. The effects from the connected actions to vegetation are limited to surface impacts from vehicle use,

construction, drilling, and fluid transport and flowlines at the well pad. Due to the proposed connected actions being conducted outside the Unit boundary, other mitigation measures proposed by Peoples, as well as the proposed casing, cementing, and completion operational requirements, there would be negligible to minor effects on the vegetation of the Unit from any of the connected actions proposed.

Fish and Wildlife. The Unit habitat resources or values expected to be measurably affected by the connected actions are air quality, natural soundscapes, lightscape management, floodplains, and wetlands. The effects to these Unit resources are discussed in detail in Section 3.0, and are expected to range from negligible to moderate in intensity. The measurable impacts – meaning moderate effects – on air quality, natural soundscapes, and lightscape management would occur over the short drilling phase of operations; and, if the well is placed in production, over short periods intermittently over the life of the well during workover activities. The other habitat resources and values in the Unit discussed above would not be affected, or would have negligible to minor effects as a result of the proposed connected actions. Therefore, due to the short periods that there would be measurable effects on some habitat resources, and due to the low overall intensity of impacts to the other habitat resources and values in the Unit, it is expected that the connected actions would have a negligible to minor effect on the fish and wildlife in the Unit.

Cultural Resources. Because the connected actions would be located outside the Unit boundary, the NPS does not expect any impacts to archeological resources, historic structures, ethnographic resources, or cultural landscapes within the Unit.

Visitor Use and Experience. Effects on visitor use and experience from the connected actions are expected to be similar to those for fish and wildlife in the Unit. The effects to Preserve visitors and local residents are expected to increase during the hunting season, because of increased traffic on Four Oaks Ranch Road. The Four Oaks river access and fishing area is located approximately 850 feet away from the proposed surface location of the well. The east bank of the Neches River is approximately 800 feet from the proposed drillsite at its closest point at mean high water. Hunting is not allowed within 500 feet of a navigable waterway (like the Neches River) within the Preserve. Thus, there can be no hunting activity within the analysis area other than the movement of hunters along Four Oaks Ranch Road, the Neches River, and on foot on the western bank of the river.

As discussed above in the section describing the effects to fish and wildlife, the Unit habitat resources or values expected to be measurably affected by the connected actions are air quality, natural soundscapes, lightscape management, floodplains, and wetlands. The effects to these Unit resources are discussed in detail in Section 3.0, and are expected to range from negligible to moderate in intensity. The measurable impacts – meaning moderate effects – on air quality, natural soundscapes, and lightscape management would occur over the short drilling phase of

operations; and, if the well is placed in production, over short periods intermittently over the life of the well during workover activities. The other resources and values in the Unit discussed above would not be affected, or would have negligible to minor effects as a result of the proposed connected actions. Visitors in the area could be affected by noise disturbance, emissions, and artificial lighting from the site. However, due to the short periods that there would be measurable effects on those resources, and due to the low overall intensity of impacts to the other resources and values in the Unit, it is expected that the connected actions would have a negligible to minor effect on the visitor use and experience in the Unit.

Because there would be negligible to minor effects expected to geology and soils, groundwater, vegetation, fish and wildlife, cultural resources, and visitor use and experience in the Unit as a result of the connected actions that are part of Peoples' proposal, these impact topics are being dismissed from further analysis in this EA.

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2.0 ALTERNATIVES

Two alternatives are described and evaluated in this EA, Alternative A, No Action; and Alternative B, Proposed Action, Application as Submitted. Alternatives considered but dismissed from further analysis are described and the reasons for dismissing them are given. Analyses for selecting the environmentally preferred alternative and the NPS preferred alternative are also provided. This section concludes with three (3) summary tables comparing the two alternatives.

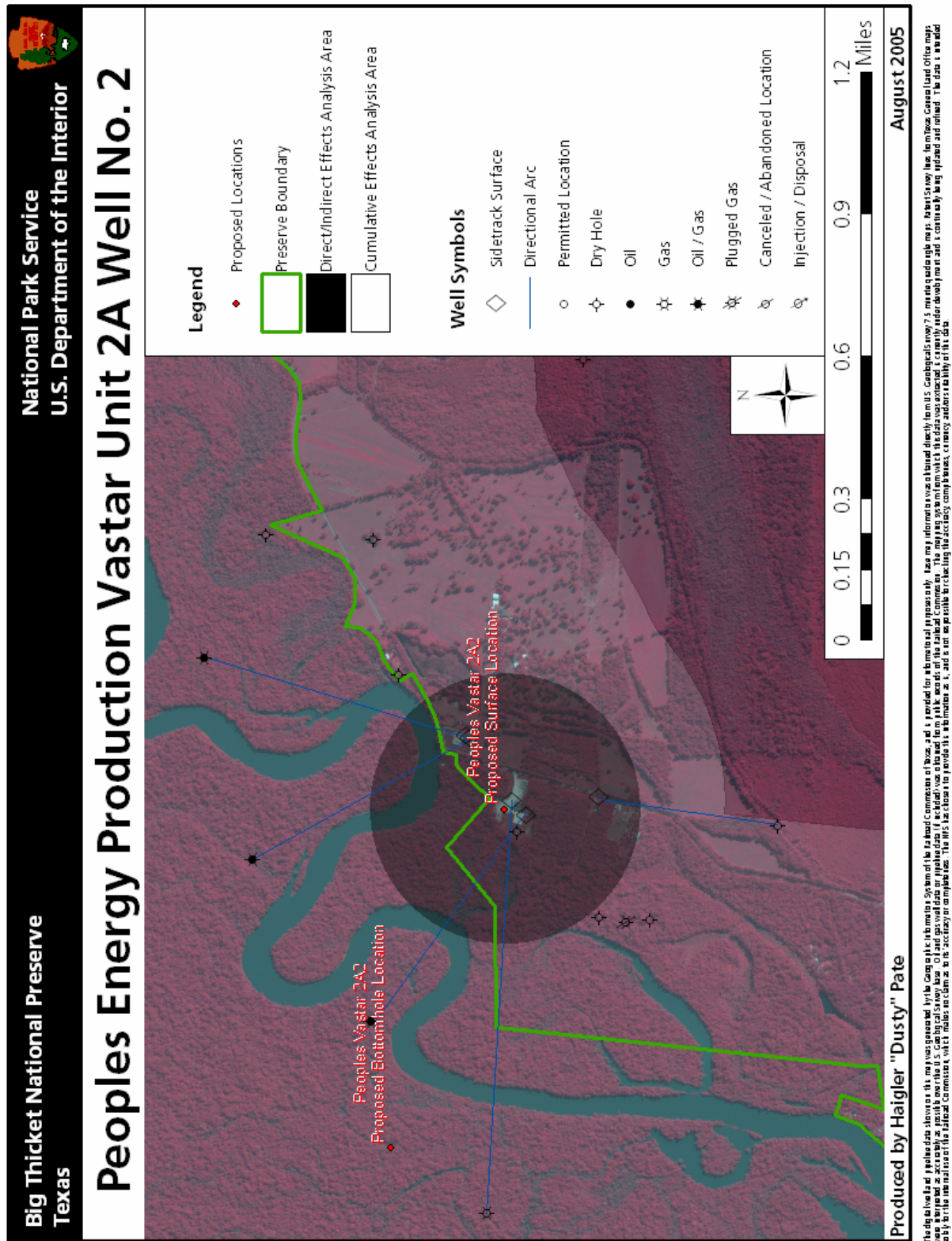
2.1 Alternative A, No Action

The no action alternative is required under NEPA, and establishes a baseline for comparing the present management direction and environmental consequences of the action alternative. Under no action, the Vastar Unit 2-A No. 2 well would not be drilled.

2.2 Alternative B, Proposed Action, Application as Submitted

Under Alternative B, Peoples would directionally drill the Vastar Unit 2-A No. 2 well as proposed in its application. Figure 2 shows the proposed surface location and access route associated with the Vastar 2-A well in relation to the Beaumont Unit and the analysis areas.

Figure 2. Map Depicting the Proposed Operation and the Direct + Indirect and Cumulative Impacts Analysis Areas in Relation to the Unit



2.2.1 Access

The proposed surface location of the Vastar Unit 2-A No. 2 well would be approximately 700 feet southeast of the Unit boundary. No surface access in the Unit would be needed for any phase of drilling, production, transportation, or reclamation activities.

The proposed Vastar Unit 2-A No. 2 well would be located approximately 6.3 miles northwest of Vidor, Texas. Access to the well would be provided through the use of an existing Farm-to Market road and a portion of Four Oaks Ranch Road. The total distance of the Four Oaks Ranch Road inside the analysis area expected to be impacted by the movement of vehicles is approximately 0.27 miles. No improvements to this road would be needed to accommodate Peoples' proposed drilling and production activities.

2.2.2 Drilling

The proposed well would be drilled to a TVD of approximately 10,440 feet with a measured depth of approximately 11,600 feet. Peoples' proposed operation inside the Preserve would consist of directionally drilling a 7 5/8-inch hole that would enter the Beaumont Unit at a point approximately 4,030 feet below ground level, and would continue to approximately 10,000 feet TVD. Then there would be a 4 1/2-inch hole drilled from that depth to the targeted total depth of approximately 10,440 feet TVD.

As per TCEQ Form 0051-Depth of Usable-Quality Ground Water to be Protected, usable-quality water occurs from the land surface to a depth of 1,325 feet. The interval from the land surface to a depth of 750 feet contains water of superior quality that must be isolated from water in underlying beds. Operations in the Unit would occur more than 2,700 feet below the deepest usable-quality water zone. Peoples is expected to comply with all provisions of the RRC's statewide oil and gas rules to drill and eventually plug the well to ensure the protection of usable-quality water zones, and to comply with a Spill Control and Countermeasures (SPCC) Plan and 40 CFR 112.7 (which deals with oil spill prevention and response at storage facilities, details the requirements of an SPCC plan, and designates the U.S. Environmental Protection Agency as the government entity responsible for implementing the regulations and ensuring compliance) for the drilling rig. Notifications, inspections, and countermeasures would be in accordance with the SPCC plan.

Drilling and completion operations should take approximately 40 days for the well. If the well is found to be a dry hole, plugging and abandonment activities should be completed in approximately the same time period.

The proposed wellpad site is partially located on managed timberland that is currently in the middle of a normal timber rotation for this region. The Vastar Unit 2-A No. 2 well pad would measure approximately 200 feet x 762 feet or 3.5 acres [(200 feet x 762 feet) x (1 acre/43,560 feet²)

= 3.5 acres]. Only the site expansion area of 0.5 acres would be cleared of vegetation, as the remaining three acres is already cleared. Heavy machinery (bulldozer and excavator) would be used for vegetation clearing and leveling. A ring levee would be constructed around the drill site to contain runoff.

Water-based mud used in conjunction with an open pit will be used to drill the well to depths below surface casing. From this point to the total depths, oil-based mud would be used in a closed-loop system. All drilling fluids and cuttings would be contained in aboveground storage tanks as part of this “closed” system. Disposal of drilling fluids and cuttings would occur offsite or downhole depending on Peoples’ acquisition of necessary permits and approvals.

Construction of the well pad would not require fill into waters of the U.S., and therefore would not require Section 404 permits from the COE.

2.2.3 Flowlines

In the event that salable quantities of gas are discovered, existing flow lines in the established production pad will be used. Depending on capacity of the existing flowlines, of 4- to 6-inch diameter flowline would be constructed only within the proposed pad location to transport product from the Vastar Unit 2-A No. 2 well to an existing pipeline. The flowlines would be trenched and installed at a minimum depth of 3 feet below the surface of the pad/production area.

2.2.4 Production Facilities

If salable quantities of oil and gas were discovered and the proposed well is completed as producers of those products, production facilities would be constructed within the area utilized to drill the well. Proposed equipment onsite would include the wellhead, separation and treating vessels, line heaters, dehydrators, water and condensate storage tanks, a series of flowlines connecting the various components of the production equipment, and sales lines and meter. The facility would be developed and maintained according to Peoples’ SPCC Plan and 40 CFR 112.7. The tank battery, separators, and other production facility installations would be provided with a means of secondary containment for the entire capacity of the largest single container and with sufficient freeboard to contain precipitation. This would be accomplished by firewalls constructed of local earthen material and limestone which would be sufficiently impervious to contain spills. Drainage of the secondary containment areas would be accomplished via drainage pipes. The drainage pipes would be equipped with valves that would be maintained in the closed and locked position. Accumulated rainwater would be drained from secondary containment contingent upon the absence of a visible sheen. Any accumulated petroleum product within the secondary containment would be removed prior to drainage of the area. Drainage of rainwater would be performed under the supervision of a Peoples representative, and a record of the inspection and drainage event would be documented.

Drainage ditches in and around the production facility would be visually inspected regularly by the facility operator. If a discharge is detected, the source of the discharge would be found and stopped. Notifications and countermeasures would be implemented in accordance with the facility SPCC plan.

2.2.5 Reclamation Plan

If the well is nonproductive, the drill site may be reclaimed and any reclamation will be in accordance with RRC Statewide Rule 8. Upon abandonment of a production facility, all equipment and related materials would be removed from the site, the well plugged in accordance with RRC Statewide Rules 13 and 14, and the area would be restored to address safety concerns, but be maintained as the site may be used at a later time to re-enter the drilling unit.

In order to reduce impacts on the human environment, Peoples has incorporated the following mitigation measures listed in Table 2 as part of its application for the proposed operations. While many of the mitigation measures are required by other state and federal requirements, the NPS does not have the regulatory authority under § 9.32(e) to require mitigation under option 1, Exemption with No Mitigation.

Table 2. Mitigation Measures Included in Peoples' Proposal

No.	Mitigation Measures-Proposed Action (Alternative B)	Resource(s) Protected
1	Peoples has included a Spill Prevention Control and Countermeasure (SPCC) Plan with their application.	all resources, and human health and safety
2	Peoples has sited all surface activities, including the access road, flowlines, and well/production pad outside of the Beaumont Unit and will retain a vegetated buffer between the pad sites and the Unit.	all resources and values in Big Thicket National Preserve
3	Peoples would construct a ring levee around the well pad to contain runoff.	water resources, vegetation, soils
4	Peoples would directionally drill the well so that wellbore does not intercept useable quality groundwater inside the Preserve.	groundwater in Preserve
5	Peoples would use a closed-loop containerized mud system below the level of surface casings.	water resources, soils, vegetation
6	Peoples would set surface casings according to Railroad Commission of Texas requirements.	groundwater
7	Peoples would dispose of drilling mud and well cuttings off-site or downhole depending on acquisition of necessary permits and approvals.	all natural resources located on and adjacent to well pad

Table 2. Mitigation Measures Included in Peoples' Proposal

No.	Mitigation Measures-Proposed Action (Alternative B)	Resource(s) Protected
8	Peoples has in place firewalls of earthen material and limestone that would be sufficiently impervious to contain spills around the tank batteries, separation and treating facility installations with secondary containment for the entire capacity of the largest single container and with sufficient freeboard to contain precipitation.	water resources, soils, vegetation
9	Peoples would drain accumulated rainwater from the ring levee contingent upon the absence of any visible sheen.	water resources, soils
10	Peoples would ensure that drainage of ditches in and around the production facilities would be visually inspected daily by the facility operators.	water resources, soils
11	Peoples would implement erosion control around the sites as needed.	water resources, soils
12	Peoples would notify regulatory authorities and the Big Thicket Superintendent in the event of an emergency.	all natural resources
13	Peoples would use existing flowlines and bury any new flowlines necessary a minimum depth of 3 feet within the existing pad. Also, Peoples activities would take place in a non-wetland surface and protect and directionally drill under any adjacent wetlands.	soils, water resources, human health and safety, wildlife, geology, vegetation
14	Peoples would follow RRC Statewide Rules for well plugging.	all natural resources
15	Peoples would follow RRC Statewide Rules for reclamation.	all natural resources

2.3 Alternatives Considered but Dismissed from Further Analysis

During the scoping process, alternative locations and methods were considered for siting the well. These alternative locations and methods were discussed in consultation with Peoples and Azimuth Forestry Services, Inc., Preserve staff, and the Regional and Washington Offices of the NPS for technical guidance. For the reasons described below, these alternatives were not subjected to further analysis.

2.3.1 Unit Alternative

Drilling one vertical well from a surface location inside the Unit directly over the bottomhole target was considered. Also considered was a directional well from a surface location within the Unit. Access into the Unit would have required an approved plan of operations. There are no existing roads inside the Unit near the locations considered; therefore, new access road(s) would have been needed. Access through the Unit would have required crossing wetlands and

floodplains. Alternative locations for siting the well within the Unit were dismissed from further analysis because they would not meet the objectives as well as those being evaluated in detail.

2.3.2 NPS Acquisition of the Mineral Rights

In the event that a proposed operation cannot be sufficiently modified to prevent the impairment of park resources and values, the NPS may seek to extinguish the associated mineral right through acquisition, subject to the appropriation of funds from Congress. With respect to Peoples' directional drilling proposal, Peoples has identified and applied mitigation measures, most notably directional drilling from surface locations outside the Unit. These mitigation measures substantially reduce the potential for adverse impacts to Unit resources and values. As a result, the acquisition of mineral rights was dismissed from further consideration in this EA.

2.4 Environmentally Preferred Alternative

Section 101 of NEPA states that "...it is the continuing responsibility of the Federal Government to...(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice; (5) achieve a balance between population and resource use which would permit high standards of living and a wide sharing of life's amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources" [42 U.S.C. § 4321 *et seq.* § 101 (b)].

The environmentally preferred alternative for drilling and producing the directional well is based on these national environmental policy goals. Under Alternative A, No Action, the well would not be drilled. Because there would be no new impacts, Alternative A would provide the greatest protection of area and Unit resources and values. Alternative A meets five of the six criteria (1 thru 4, and 6) and is therefore the environmentally preferred alternative.

Peoples' proposal, Alternative B, would have greater effects on the environment because of the drilling and production activities. Alternative B meets four of the six criteria (1, 2, 4, and 5). Although mitigating measures would reduce effects to Unit resources and values, there could still be effects, and therefore this alternative would not meet the NPS's environmental policy goals as well as the No Action Alternative.

2.5 National Park Service Preferred Alternative

The environmentally preferred alternative is Alternative A because it surpasses Alternative B in realizing the full range of national environmental policy goals as stated in § 101 of NEPA.

However, the NPS preferred alternative is Alternative B, Proposed Action, because Peoples holds a valid oil and gas lease right which, if developed, would not result in an impairment of park resources and values. The NPS believes this alternative would fulfill its park protection mandates while allowing Peoples to exercise its property right interest.

2.6 Summary of Alternatives

The following tables assess the extent to which each alternative meets objectives in taking action, summarize actions of each alternative, and summarize impacts of each alternative (see Table 3, Table 4, and Table 5 respectively).

Table 3. Extent that Each Alternative Meets Objectives

Objectives	Does Alternative A, No Action, Meet Objective?¹	Does Alternative B, Proposed Action, Meet Objective?
Avoid or minimize impacts on Unit resources and values, visitor use and experience, and human health and safety.	Yes (++) Without drilling the well, there would be no impacts.	Yes (+) Mitigation measures would avoid and minimize impacts.
Prevent impairment of Unit resources and values.	Yes (++) Without drilling the well, there would be no potential for Unit resources and values to be impaired.	Yes (+) Directional drilling and application of the mitigation measures to avoid or reduce impacts would result in no impairment of Unit resources and values.
Provide Peoples, as the lessee of nonfederal oil and gas mineral interests, access to explore for and develop oil and gas resources in a manner which will assure the natural and ecological integrity of the Preserve.	No (-) The well would not be drilled, which would preclude Peoples access to develop its nonfederal oil and gas mineral interests.	Yes (+) Peoples would drill and produce the well.

¹No-action alternative is required under NEPA to describe baseline conditions. It is acceptable for the no-action alternative to not meet all of the planning objectives.

Table 4. Summary of Actions

Actions	Alternative A No Action	Alternative B Proposed Action
Access	Access would not be required because the well would not be drilled.	Peoples would utilize 0.27 miles (in analysis area) of existing road to access the well pad. No improvements to the roads would be required.
Well and Production Pad	The well and production pad would not be constructed because the well would not be drilled.	Construction and maintenance of the well/production pad would require vegetation removal on 0.5 acres.
Flowlines	The flowlines would not be required because the well would not be drilled.	Should the well be productive, existing flowlines would be used. Any new flowlines if needed, would be placed only within an existing production area that the Vastar Unit 2-A No. 2 well would utilize, and tie into an existing pipeline. No new access roads would be needed, and no improvement to the 0.27 miles of Four Oaks Ranch Road within the analysis area would be required.
Reclamation Plan	No reclamation plan would be needed because the well would not be drilled.	The well would be plugged and abandoned in accordance with RRC requirements. Surface would be secured for safety reasons, but would be maintained for possible later use to re-enter the mineral unit.

Table 5. Summary of Impacts

Impact Topic	Alternative A No Action	Alternative B Proposed Action
Air Quality in and outside the Unit	Under Alternative A, No Action, the Peoples Vastar Unit 2-A No. 2 Well would not be drilled; therefore, there would be no new impacts on the air quality of the area. However, existing impacts from pollutants from various airsheds in the region as well as vehicle use, development, recreational uses, and commercial timber activities would continue, resulting in short- to long-term, localized to widespread, negligible to moderate, adverse impacts on air quality. Cumulative impacts from pollutants from various airsheds in the region as well as vehicle use, development, recreational uses, and commercial timber activities would continue, resulting in short- to long-term, localized to widespread, negligible to moderate, adverse impacts on air quality.	Under Alternative B, Proposed Action, the Peoples Vastar Unit 2-A No. 2 well would be drilled and possibly completed to produce hydrocarbons. While there would be no impacts on air quality from in-park operations, the connected actions would result in short- to long-term, localized to widespread, negligible to moderate, adverse impacts. Cumulative impacts would be similar to those described under No Action, with short- to long-term, localized to widespread, negligible to moderate, adverse impacts.
Natural Soundscapes in and outside the Unit	Under Alternative A, No Action, the Peoples Vastar Unit 2-A No. 2 well would not be drilled; therefore, there would be no new impacts on the natural soundscapes of the area. However, existing noise impacts from vehicle use, development, recreational uses, and commercial timber activities would continue, resulting in short- to long-term, localized to widespread, negligible to moderate, adverse impacts on natural soundscapes. Cumulative impacts from vehicle use, development, recreational uses, and commercial timber activities	Under Alternative B, Proposed Action, the Peoples Vastar Unit 2-A No. 2 well would be drilled and possibly completed to produce hydrocarbons. While there would be no impacts on natural soundscapes from in-park operations, the connected actions would result in short- to long-term, localized, negligible to moderate, adverse impacts. Cumulative impacts would be similar to those described under No Action, with short- to long-term, localized to widespread, negligible to moderate, adverse impacts.

Table 5. Summary of Impacts

Impact Topic	Alternative A No Action	Alternative B Proposed Action
	would continue, resulting in short- to long-term, localized to widespread, negligible to moderate, adverse impacts on natural soundscapes.	
Lightscape Management in and outside the Unit	Under Alternative A, No Action, the Peoples Vastar Unit 2-A No. 2 well would not be drilled; therefore, there would be no new impacts on the natural lightscapes of the area. However, existing light impacts from vehicle use, development, recreational uses, and commercial timber activities would continue, resulting in short- to long-term, localized to widespread, negligible to moderate, adverse impacts on natural lightscapes. Cumulative impacts from vehicle use, development, recreational uses, and commercial timber activities would continue, resulting in short- to long-term, localized to widespread, negligible to moderate, adverse impacts on natural lightscapes.	Under Alternative B, Proposed Action, the Peoples Vastar Unit 2-A No. 2 well would be drilled and possibly completed to produce hydrocarbons. While there would be no impacts on natural lightscapes from in-park operations, the connected actions would result in short- to long-term, localized to widespread, negligible to moderate, adverse impacts. Cumulative impacts would be similar to those described under No Action, with short- to long-term, localized to widespread, negligible to moderate, adverse impacts.
Water Resources: Floodplains and Wetlands in and outside the Unit	Under Alternative A, No Action, the Peoples Vastar Unit 2-A No. 2 well would not be drilled; therefore, there would be no new impacts on the water resources of the area. However, existing impacts from development and commercial timber activities would continue, resulting in short- to long-term, localized to widespread, negligible to moderate, adverse impacts on floodplains and wetlands. Cumulative impacts from development and commercial	Under Alternative B, Proposed Action, the Peoples Vastar Unit 2-A No. 2 well would be drilled and possibly completed to produce hydrocarbons. While there would be no impacts on floodplains and wetlands from in-park operations, the connected actions would result in short- to long-term, localized to widespread, negligible to moderate, adverse impacts. Cumulative impacts would be similar to those described under No Action, with short- to long-term,

Table 5. Summary of Impacts

Impact Topic	Alternative A No Action	Alternative B Proposed Action
	timber activities would continue, resulting in short- to long-term localized to widespread, negligible to moderate, adverse impacts on water resources, floodplains, and wetlands.	localized to widespread, negligible to moderate, adverse impacts.
Adjacent Landowners, Resources and Uses	Under Alternative A, No Action, the Peoples the Vastar Unit 2-A No. 2 well would not be drilled; therefore, there would be no new impacts on adjacent landowners, resources and uses. However, existing impacts from vehicle use, commercial timber management activities, residential activities, development (including oil and gas activity), and recreational uses would continue. The impacts from these activities could result in short- to long-term, localized, negligible to moderate, adverse effects on cultural resources, vegetation, and geology and soils; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on wildlife. Cumulative effects from commercial timber management activities, recreational uses, Preserve management, and development (including oil and gas activities) are expected to result in short- to long-term, localized, negligible to moderate, beneficial and	Under Alternative B, Proposed Action, the Peoples' well would be drilled and may be completed to produce hydrocarbons. While there would be no impacts from in-park operations, the connected actions – including use and maintenance of access roads, construction of the well/production pad and flowlines, drilling and producing the well, any workover operations on the well, and eventual plugging, abandonment and reclamation – could result in short- to long-term, localized, negligible to moderate, adverse impacts on cultural resources, short- to long-term, localized, negligible to moderate, adverse impacts on geology and soils and vegetation; and short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse impacts on wildlife. Cumulative impacts would be similar to those described under No Action, with short- to long-term, localized, negligible to moderate, beneficial and adverse effects on cultural resources; and short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, vegetation, and wildlife. Long-term impacts would be

Table 5. Summary of Impacts

Impact Topic	Alternative A No Action	Alternative B Proposed Action
	adverse effects on cultural resources; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, vegetation, and wildlife.	realized if the well continues to produce, the pad remains active and associated maintenance disturbance continues during the life of the producing well or during workovers.

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3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Methodology

During project scoping, it was determined that the following topics will be carried forward for analysis:

- Air Quality in and outside the Unit
- Natural Soundscape in and outside the Unit
- Lightscape Management in and outside the Unit
- Water Resources, Floodplains, and Wetlands in and outside the Unit
- Adjacent Landowners, Resources, and Uses, focusing on an analysis of the following resources and values:
 - Cultural Resources
 - Geology and Soils
 - Vegetation
 - Wildlife

This chapter is organized by impact topic. Under each impact topic, the affected environment is described, the methodology for assessing impacts is presented, the possible impacts under each alternative are given, a cumulative impact analysis is provided, and a conclusion is stated. The conclusion summarizes all major findings and includes an impairment analysis. Impairment analyses are only performed for park resources and values. A description of the NPS mandate to prevent impairment to park resources and values is provided in Section 1.2.1 of this EA (pages 4-6).

This section describes direct, indirect, and cumulative impacts under the two alternatives. Impacts are described in terms of context and duration. The context or extent of the impact may be **localized** (affecting the project area but not extending beyond 1,500 feet from the well/production pad or 100 feet from the access roads and flowline corridors) or **widespread** (affecting other areas of the Preserve and/or the project area). The duration of impacts could be **short-term**, ranging from days to three years in duration, or **long-term**, extending up to 20 years or longer. Generally, short-term impacts would apply to construction activities, and long-term impacts would apply to roads, production operations, and flowlines. The intensity and

type of impact is described as negligible, minor, moderate, or major, and as beneficial or adverse. Where the intensity of an impact can be described quantitatively, the numerical data are presented. However, most impact analyses are qualitative.

Cumulative Impacts

This section also assesses cumulative impacts. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

The following descriptions of park development and operations, and adjacent land uses provide the basis for analyzing cumulative impacts in this EA. These descriptions should be used in conjunction with the discussion under the heading Socioeconomics in Section 1 of this EA that describes past, present, and reasonably foreseeable oil and gas development in the analysis area.

Park Development and Operations. Park developments that support visitor uses in the Beaumont Unit include a privately owned and maintained boat ramp, and various picnic areas. The Four Oaks river access and fishing area is located approximately 850 feet away from the proposed surface location of the well within the direct/ indirect analysis area, and is the nearest federal government-maintained area to the proposed pad site. The Confluence Picnic Area/Boat Ramp is located approximately 1.78 miles southwest of the proposed Vastar Unit 2-A No. 2 well/production site. There is no fire management activity in this Unit of the Preserve. Hunting is permitted in most of the Unit from the opening date of the State of Texas fall hunting season through the second Sunday in January, and is handled via a permit system with no supporting park developments. Hunting is not allowed in the analysis area inside the Unit boundary near proposed wellsite, because there is no hunting within 500 feet of a navigable waterway (Neches River). However, hunters are expected to be present in the analysis area as they move down Four Oaks Ranch Road, the Neches River, and possibly along the western bank of the river.

Adjacent Land Uses. Residential development on adjacent lands in the area of the Unit is generally rural. For Units of the Preserve along the Neches River (like the Beaumont Unit) commercial timber, and commercial timber with oil, account for approximately 90 percent of land uses within a one-mile buffer from the center of the Neches River. Issues related to timberlands include; encroachment onto Preserve lands, public safety concerns regarding hunting clubs on adjacent timberlands, and public use of timber company roads to access the Preserve (Hall and Harcombe, 1997).

3.1 Impacts on Air Quality in and outside the Unit

Methodology

The assessment of potential impacts on air quality is based on best professional judgment and has been developed through discussions with staff from the NPS, the TCEQ, and through review of relevant literature.

Big Thicket National Preserve is designated a Class II area under the Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act. The Preserve lies within several Texas counties that are not in compliance with the National Ambient Air Quality Standard (NAAQS) for ground-level ozone.

The thresholds of change for the intensity of an air quality impact are defined as follows:

- Negligible:** Impacts would result in a change to air quality, but the change would be so slight that it would not be of any measurable or perceptible consequence, and would not affect the Preserve's designation as a Class II airshed.
- Minor:** Impacts would result in a detectable change to air quality, but the change would be small and of little consequence, and would not affect the Preserve's designation as a Class II airshed. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- Moderate:** Impacts would result in a change to air quality that would be measurable, long-term, and localized, but would not affect the Preserve's designation as a Class II airshed. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
- Major:** Impacts would result in a measurable change to air quality that would be severely adverse for long periods of time, and/or would affect the Preserve's designation as a Class II airshed. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

Impacts on Air Quality in and outside the Unit under Alternative A, No Action

The primary source of impacts on air quality would be contaminants from the Beaumont/Port Arthur/Orange airshed. There are also impacts possible from the Houston/Galveston and Lake Charles, Louisiana airsheds. The primary pollutants transported from airsheds affecting the analysis area would be volatile organic compounds and nitrogen oxides produced by these industrial and urban areas. Other air pollutants that could affect the air quality in the analysis area include carbon monoxide, sulfur dioxide, and particulate matter. Existing impacts on air quality would continue as the result of pollution from these airsheds being transported into the

analysis area. Localized effects would be contributed from vehicle use, recreational activities (including use of all-terrain vehicles, and burning of campfires), development (including oil and gas activity), and commercial timber activities. All of these existing activities/pollution sources would contribute towards localized to widespread, negligible to moderate, adverse impacts on air quality over the short- to long-term. These impacts are not expected to exceed NAAQS established under the Clean Air Act.

Cumulative Impacts under Alternative A, No Action

The primary source of air pollution would be contaminants from the Beaumont/Port Arthur/Orange, Houston/Galveston, and Lake Charles Louisiana, airsheds. In addition, existing and reasonably foreseeable activities, including vehicle use, recreational activities (including use of all-terrain vehicles, and burning of campfires), development (including oil and gas activity), and commercial timber activities, would contribute short- to long-term, localized to widespread, negligible to moderate, adverse cumulative impacts on air quality. These cumulative impacts are not expected to exceed NAAQS established under the Clean Air Act.

Conclusion for Alternative A, No Action

Under Alternative A, No Action, the Vastar Unit 2-A No. 2 Well would not be drilled; therefore, there would be no new impacts on the air quality of the area. However, existing and cumulative pollutant impacts from various airsheds in the region and from vehicle use, development, recreational use, and commercial timber activities would continue, which would result in short- to long-term, localized to widespread, negligible to moderate, adverse impacts on air quality.

Because there would be no major adverse impacts on air quality whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Big Thicket National Preserve; (2) key to the natural or cultural integrity of the Preserve; or (3) identified as a goal in the Preserve's general management plan or other relevant National Park Service planning documents, selection of Alternative A would not result in an impairment to Unit air quality.

Impacts on Air Quality in and outside the Unit under Alternative B, Proposed Action

Under Alternative B, Proposed Action, the Vastar Unit 2-A No. 2 Well would be drilled and possibly completed to produce hydrocarbons. Access road use, construction of the well/production pad and flowlines; drilling and producing the well; any workover operations on the well; and eventual plugging/abandonment/reclamation of the Peoples well would result in increases in particulate matter during ground-disturbing activities, and the use of vehicles and other machinery. Based on calculations by Hennig Production Company, Inc., for Century Resources Land, LLC, total organic compounds (TOC) emitted during a standard drilling operation lasting 30 days would be approximately 5,335 pounds or 2.6 tons. Emissions of

particulate matter, nitrogen oxides, carbon monoxide, carbon dioxide, and sulfur dioxide would be greatest during the short-term (40-day) drilling/completion of the well and workover activities (1 to 2 weeks) due to increased use of vehicles and large gasoline and diesel engines used to power the drill rig, pumps, and auxiliary equipment. If the well is completed to produce hydrocarbons, emissions would continue, but at lower levels over the life of the well. Prevailing winds are expected to dissipate emissions from the area. Depending on atmospheric conditions, the effects on air quality from the proposed operation could travel beyond the analysis area and affect the air quality in the Unit or other surrounding areas. Therefore, the effects from the proposed connected actions are expected to be short- to long-term, localized to widespread, negligible to moderate, and adverse. These impacts are not expected to exceed NAAQS established under the Clean Air Act. The accidental release of hydrocarbons and treatment chemicals from vehicles, equipment, and flowlines during drilling, production, transport, and eventual plugging and reclamation, could adversely impact air quality by emitting nitrogen oxides, volatile organic compounds, carbon monoxide, sulfur dioxide, particulate matter, and objectionable odors. Hydrocarbons could volatilize and enter the atmosphere. In the vicinity of a leak, concentrations of gas and other constituents could provide a source for explosion or fire. With the mitigation measures proposed, including prompt response in the event of a spill, there could be short-term, negligible to moderate, adverse impacts. Impacts would be localized as well as contribute to regional air quality impacts.

Cumulative Impact under Alternative B, Proposed Action

Similar to the effects discussed above under Alternative A, the primary source of cumulative impacts on air quality in the analysis area for cumulative impacts would be contaminants from the Beaumont/Port Arthur/Orange airshed. There are also cumulative impacts possible from the Houston/Galveston and Lake Charles, Louisiana airsheds. There are also localized cumulative impacts from vehicle use, recreational activities (including use of all-terrain vehicles and burning of campfires), development (including the proposed action and other oil and gas activity), and commercial timber activities occurring in the analysis area for cumulative impacts. All of these existing and reasonably foreseeable activities/pollution sources would contribute to short- to long-term, localized to widespread, negligible to moderate, adverse cumulative impacts on air quality. These cumulative impacts are not expected to exceed NAAQS established under the Clean Air Act.

Conclusion for Alternative B, Proposed Action

Under Alternative B, Proposed Action, the Vastar Unit 2-A No. 2 Well would be drilled and possibly completed to produce hydrocarbons. While there would be no impacts on air quality from in-park operations, the connected actions would result in short- to long-term, localized to widespread, negligible to moderate, adverse impacts. Cumulative impacts would be similar to

those described under No Action, with short- to long-term, localized to widespread, negligible to moderate, adverse impacts.

Because there would be no major adverse impacts on air quality whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Big Thicket National Preserve; (2) key to the natural or cultural integrity of the Preserve; or (3) identified as a goal in the Preserve's general management plan or other relevant National Park Service planning documents, selection of Alternative B would not result in an impairment to Unit air quality.

3.2 Impacts on Natural Soundscapes in and outside the Unit

Methodology

The assessment of potential impacts on natural soundscapes is based on best professional judgment and has been developed through discussions with staff from the NPS and through review of relevant literature.

In 1998, the NPS measured ambient sound levels at 11 locations in the Preserve (Foch, 1999). Sound levels ranged from 35-43 decibels in the Preserve. According to Foch (1999), background sound levels in most of the Preserve are due to rustling of leaves. Equivalent sounds would be bird calls, a library, or a drilling rig at 1,500 feet. Table 6 compares sound levels recorded at various locations in the Preserve with other sounds, including that from a drilling rig at various distances.

Table 6. Sound Level Comparison Chart*

<i>How it Feels</i>	<i>Equivalent Sounds</i>	<i>Decibels</i>	<i>Sound Levels at Various Locations in Big Thicket National Preserve</i>
Near permanent damage level from short exposure	Large caliber rifles (e.g., .243, 30-06)	140-160	
Pain to ears	.22 caliber weapon	130-140	
	Chainsaw		
Very loud	Air compressor @ 20 ft.	100	
	Garbage trucks and city buses		
Conversation stops	Power Lawnmower		
	Diesel truck @ 25 ft.		
Intolerable for phone use	Steady flow of freeway traffic	90	
	10 HP outboard motor		
	Garbage disposal		
	Near drilling rig	80	
	Automatic dishwasher		
	Muffled jet ski @ 50 ft.		
	Vacuum cleaner		
	Drilling rig @ 200 ft.	70	
	Window air conditioner outside @ 2 ft.		
Quiet	Window air conditioner in room	60	
	Drilling rig @ 800 ft.		
	Normal conversation		
Sleep interference		50	
	Quiet home in evening		
	Bird calls		Big Sandy Creek along Big Sandy Horse Trail
	Drilling rig @ 1500 ft.	40	Jack Gore Baygall Unit
	Library		Lance Rosier Unit—at end of Church House Rd.
			Turkey Creek Unit on Turkey Creek Trail and at NPS Ranch House
			Beech Creek Unit along Beech Woods Trail
	Soft whisper		
		30	
	In a quiet house at midnight		
	Leaves rustling	20	

*Modified from Draft Oil and Gas Management Plan/Environmental Impact Statement as Modified from the Final Environmental Impact Statement, Miccosukee 3-1 Exploratory Well, Broward County, Florida (USDOL)

The site for the Vastar Unit 2-A No. 2 well pad would be located approximately 700 feet southeast of the Unit boundary, partially on managed timber lands, and on an existing production site. Hunting is allowed in the Unit seasonally. Currently there are two transpark natural gas pipelines, in the Unit; one is currently operational.

There is a private residence located approximately 700 feet southeast of the Vastar Unit 2-A No. 2 well. The well pad would be located in an area where there are several other existing oil and gas operations within two miles.

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impacts on natural soundscapes would result in a change, but the change would be so slight that it would not be of any measurable or perceptible consequence.

Minor: Impacts on natural soundscapes would result in a detectable change, but the change would be small and of little consequence and would be expected to be short-term and localized. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate: Impacts on natural soundscapes would result in a change that would be measurable, long-term, and localized. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.

Major: Impacts on natural soundscapes would result in a measurable change that would have substantial consequences on a regional scale for long periods of time or to be permanent. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

Impacts on Natural Soundscapes in and outside the Unit under Alternative A, No Action

Under Alternative A, Peoples would not drill the Vastar 2-A Unit No.2 well, resulting in no new impacts on natural soundscapes. However, existing impacts to natural soundscapes would continue due to vehicle traffic in and outside the Unit, development (including oil and gas activity) in and outside the Unit, recreational activities in and outside the Unit, and commercial timber activities outside the Unit boundary.

Elevated noise from existing activities would include the use of vehicles; chainsaws, log skidders, tractors, and prescribed fires used as part of commercial timber activities; as well as aircraft and firearms. The use of chainsaws during clearcutting of the timber in the land adjacent to the Unit, and the discharge of firearms during hunting season, would introduce elevated noise levels that would reach up to 140 decibels (dBA) within the analysis area (please see Table 6).

These activities would result in sounds that occasionally exceed the ambient sound level in the Unit. The ambient sound level in the Unit, outside of hunting season, is approximately 40 dBA. These existing uses would result in localized, short-term, negligible to moderate, adverse impacts to natural soundscapes within the analysis area.

Cumulative Impacts under Alternative A, No Action

Under Alternative A, cumulative impacts to natural soundscapes would result from vehicle traffic; existing oil and gas operations both inside and outside the Unit; park operations; recreational activities in and outside the Unit; and forestry operations adjacent to the Unit. Hunting is allowed both in and outside the Unit seasonally. Although seasonal and intermittent, gun-fire produces considerable noise levels in the range of 130 to 140 dBA, depending on the caliber of weapon used (see Table 6). As a result of these activities, cumulative impacts to the natural soundscape within and outside the Unit are anticipated to be short- to long-term, localized to widespread, negligible to moderate, adverse impacts.

Conclusion for Alternative A, No Action

Under Alternative A, No Action, the Vastar Unit 2-A No. 2 well would not be drilled, resulting in no new impacts to natural soundscapes. Existing vehicle use, park maintenance activities, recreational uses (including hunting), oil and gas activities in and outside the Unit, and timber management activities adjacent to the Unit would result in localized, short-term, negligible to moderate, adverse impacts. Cumulative impacts to natural soundscapes to the Unit from recreational uses (including hunting), park maintenance activities, oil and gas activities in and outside the Unit, and timber management activities adjacent to the Unit would be short- to long-term, localized to widespread, negligible to moderate, adverse impacts.

Because there would be no major adverse impacts to natural soundscapes whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Big Thicket National Preserve; (2) key to the natural or cultural integrity of the Preserve; or (3) identified as a goal in the Preserve's general management plan or other relevant National Park Service planning documents, selection of Alternative A would not result in an impairment to Unit soundscapes.

Impacts on Natural Soundscapes in and outside the Unit under Alternative B, Proposed Action

Under Alternative B, the Vastar Unit 2-A No. 2 well would be drilled and may be completed to produce hydrocarbons. Existing impacts on the natural soundscape within the Unit would be similar to Alternative A, No Action, with localized, short-term to long-term, negligible to moderate, adverse impacts.

In-park operations would consist of 1) the wellbore for the Vastar Unit 2-A No. 2 Well crossing into the Unit at a depth of approximately 4,030 feet TVD to a target depth of about 10,440 feet TVD; 2) extracting hydrocarbons and associated fluids from beneath the Unit. There would be no impact to the natural soundscape in and outside the Unit from in-park operations.

Elevated noise would be generated by the connected actions, which would consist of construction and maintenance of the well/production pad and the sales/transportation pipelines, the drilling and completion of the well, hydrocarbon production and transportation, and well plugging and reclamation outside the Unit. These activities would result in localized and short-term increases in noise associated with vehicle traffic, heavy equipment, and ground-disturbing activities. Elevated noise would be greatest during the short-term (approximately 30 day) drilling period. The drilling rig generates noise levels reaching approximately 90 dBA (please see Table 6). Sound dissipates with distance from the source, with noise levels reaching near background levels at 1,500 feet. There is generally a 6-dBA reduction in sound level for each doubling of distance from a noise source (i.e., if the sound level at 25 feet from a source was 80 dBA, the sound level at 50 feet would be expected to be 74 dBA). Elevated noise during the drilling phase would result in localized, short-term, minor to moderate, adverse impacts on natural soundscapes within 1,500 feet of the drilling rig. The elevated noise would extend up to approximately 800 feet into the Unit during the drilling phase. If the well were productive, production operations would result in localized (within 1,500 feet of sources), short- to long-term, negligible to moderate, adverse impacts on the natural soundscapes, which includes distances beyond the Neches River banks. The natural soundscapes effects to recreationists and local residents are expected to increase during the hunting season, because of increased traffic on Four Oaks Ranch Road. Visitors fishing and canoeing on the Neches, could be affected by noise disturbance as the operation would be audible from the point of the Neches river closest to the well site.

Cumulative Impact under Alternative B, Proposed Action

Under Alternative B, cumulative impacts to natural soundscapes in the Unit would be similar to those described for Alternative A. Noise sources would include existing and future oil and gas operations in and outside the Unit, routine park maintenance operations, recreational activities including hunting in and outside the Unit, and forestry operations adjacent to the Unit, which would result in localized, short- to long-term, negligible to moderate, adverse cumulative impacts to natural soundscapes.

Conclusion for Alternative B, Proposed Action

Under Alternative B, Proposed Action, the Vastar Unit 2-A No. 2 well would be drilled and may be produced. Construction of the well/production pad and drilling and producing the well, and eventual plugging and reclamation activities would result in short- to long-term, localized,

negligible to moderate, adverse impacts on natural soundscapes in the Unit. Long-term impacts would be realized if the well continues to produce, the pad remains active and associated maintenance disturbance continues during the life of the producing well or during workover jobs. Cumulative impacts would be similar to those described for Alternative A, with short-to long-term, localized to widespread, negligible to moderate, adverse impacts.

Because there would be no major adverse impacts to natural soundscapes whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Big Thicket National Preserve; (2) key to the natural or cultural integrity of the Preserve; or (3) identified as a goal in the Preserve's general management plan or other relevant National Park Service planning documents, selection of Alternative B would not result in an impairment to Unit soundscapes.

3.3 Impacts on Lightscape Management in and outside the Unit

Methodology

The assessment of potential impacts on lightscape management is based on best professional judgment and has been developed through discussions with staff from the NPS, a general field assessment, and through review of relevant literature.

The site for the Vastar Unit 2-A No. 2 well pad would be located approximately 700 feet southeast of the Unit boundary, partially on managed timber lands, and on an existing production site.

There is a private residence located approximately 700 feet southeast of the Vastar Unit 2-A No. 2 well. The well pad would be located in an area where there are several other existing oil and gas operations within two miles. Also, other residences and rural outbuildings occur within two miles of the well pad site.

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impacts on lightscape management would result in a change, but the change would be so slight that it would not be of any measurable or perceptible consequence.

Minor: Impacts on lightscape management would result in a detectable change, but the change would be small and of little consequence and would be expected to be short-term and localized. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate: Impacts on lightscape management would result in a change that would be measurable, long-term, and localized. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.

Major: Impacts on lightscape management would result in a measurable change that would have substantial consequences on a regional scale for long periods of time or to be permanent. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

Impacts on Lightscape Management in and outside the Unit under Alternative A, No Action

Under Alternative A, Peoples would not drill the Vastar Unit 2-A No. 2 well, resulting in no new impacts on lightscape management. However, existing impacts to lightscapes of the area would continue due to existing and anticipated development outside the Unit. An increase in lighting in the analysis area would be primarily due to new development, and secondarily from log skidders and tractors used during commercial timber activities, all-terrain recreational vehicles and road traffic outside the Unit, and aircraft and oil and gas operations in and outside the Unit. Increases in light pollution in the area would result in impacts that are expected to be short- to long-term, localized to widespread, negligible to moderate, adverse impacts to the lightscape of the analysis area.

Cumulative Impacts under Alternative A, No Action

Under Alternative A, cumulative impacts to lightscape management would result from new development, commercial timber activities; all-terrain recreational vehicles, and roadway vehicle traffic outside the Unit, and existing oil and gas operations and aircraft both inside and outside the Unit. As a result of these activities, cumulative impacts to the lightscape within the analysis area are anticipated to be short- to long-term, localized to widespread, negligible to moderate, and adverse.

Conclusion for Alternative A, No Action

Under Alternative A, No Action, the Vastar Unit 2-A No. 2 well would not be drilled, resulting in no new impacts to lightscape management. Anticipated development, as well as commercial timber activities; all-terrain recreational vehicles, and roadway vehicle traffic outside the Unit, and existing oil and gas operations and aircraft both inside and outside the Unit would result in localized, short-term, negligible to moderate, adverse impacts. Cumulative impacts to lightscapes could occur as a result of development of adjacent private properties, oil and gas activities and aircraft in and outside the Unit, and timber management activities adjacent to the Unit. These activities are expected to result in short- to long-term, localized to widespread, negligible to moderate, and adverse impacts.

Because there would be no major adverse impacts to lightscape management whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Big Thicket National Preserve; (2) key to the natural or cultural integrity of the Preserve; or (3) identified as a goal in the Preserve's general management plan or other relevant National

Park Service planning documents, selection of Alternative A would not result in an impairment to Unit lightscape.

Impacts on Lightscape Management in and outside the Unit under Alternative B, Proposed Action

Under Alternative B, the Vastar Unit 2-A No. 2 well would be drilled and may be completed to produce hydrocarbons. Construction and maintenance of the well/production pad, flowlines, and production activities could result in localized and short-term increases in artificial light associated with vehicle traffic and heavy equipment. Elevated light levels would be greatest during the 30-day drilling/completion period estimated for the well from the lighting of the drill rig to allow for 24-hour operations. During the long-term production life of the well there could be smaller artificial lighting installed at the drilling/production site. Also, occasional workovers on the well could occur at 5 to 10-year intervals and take 1 to 2 weeks to complete. A workover rig could introduce artificial lighting as well, but the effects would be at lower levels relative to the initial drilling operations. While it is possible that the light from these connected actions would travel the distance between the proposed drilling/production location to the Unit boundary and thence into the Unit, the Unit is heavily vegetated, there is a buffer of woody vegetation over the distance between the pad site and the Unit boundary, and there is very little elevation change over this distance. The vegetation would have the effect of blocking some of the light from the site before it reaches the Unit. While the in-park actions at the proposed drilling/production location would have no effect on the lightscape of the Unit; the connected actions would be expected to cause short- to long-term, localized to widespread, negligible to moderate, adverse impacts to the lightscape in the analysis area.

Cumulative Impact under Alternative B, Proposed Action

Under Alternative B, cumulative impacts to lightscape management in the Unit would be similar to those described for Alternative A. Potential impacts to lightscapes would result from development of adjacent private properties, vehicle traffic; existing oil and gas operations both inside and outside the Unit; the routine maintenance of transpark oil and gas pipelines; and recreational activities in and outside the Unit. As a result of these activities, cumulative impacts to the lightscape within the analysis area are anticipated to be short- to long-term, negligible to moderate, localized to widespread, and adverse.

Conclusion for Alternative B, Proposed Action

Under Alternative B, Proposed Action, the Vastar Unit 2-A No. 2 well would be drilled, resulting in new impacts to lightscape management. Construction and maintenance of the well/production pad, and flowlines; and production activities could result in localized and short-term increases in artificial light associated with vehicle traffic and heavy equipment. Elevated light levels would be greatest during the estimated 30-day drilling/completion phase of

each well, and would be localized around the lighting on the drill rig for 24-hour operations. Because dense vegetation and flat terrain occur in the portion of the Unit potentially affected by the project and the Unit light from the connected actions at the proposed drilling/production location is expected to be partially blocked by the vegetation. There would be no effect from in-park operation, and the expected effects to the lightscape of the Unit from the connected actions is expected to be short- to long-term, localized to widespread, negligible to moderate, and adverse. Cumulative effects to lightscape management are expected to be short- to long-term, localized to widespread, negligible to moderate, and adverse. Long-term impacts would be realized if the well continues to produce, the pad remains active and associated maintenance impacts to the lightscape continues during the life of the producing well or during workover jobs.

Because there would be no major adverse impacts to lightscape management whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Big Thicket National Preserve; (2) key to the natural or cultural integrity of the Preserve; or (3) identified as a goal in the Preserve's general management plan or other relevant National Park Service planning documents, selection of Alternative B would not result in an impairment to Unit lightscape.

3.4 Impacts on Water Resources, Floodplains and Wetlands in and outside the Unit

Methodology

The assessment of potential impacts on water resources, floodplains, and wetlands is based on best professional judgment and has been developed through discussions with staff from the NPS, a field assessment, and thorough review of relevant literature. Wetland specialists from Azimuth Forestry Services, Inc. conducted field studies and an informal wetland delineation in May 2005 to determine whether any waters of the U.S. would be affected by the proposed project. Based on the survey, there are no jurisdictional wetlands or other waters of the U.S. within the proposed well expansion/production pad area. Representatives from the NPS visited the site in July of 2005, and agree with this conclusion. Surface runoff drains from the Vastar Unit 2-A No. 2 pad site via sheet flow into an unnamed tributary of the Neches River associated with Banks Bayou to the southwest of the pad location.

The proposed Vastar Unit 2-A No. 2 well would be located approximately 700 from the Unit boundary on lands associated with and adjacent to the Neches River. The elevation of the proposed pad site is approximately 8 feet above mean sea level. According to the NRCS, the proposed Vastar Unit 2-A No. 2 pad area is comprised of Spurgen loam. This soil is described as deep to very deep, well-drained, gently sloping on terraces formed in clayey and sandy alluvium. Construction of the pad site would not require fill into waters of the U.S. and therefore would

not require a Section 404 permit from the COE. However, the well pad would be situated on a terrace adjacent to large forested wetland complex on near the Unit.

According to the Flood Insurance Rate Map (FIRM) for Orange County, Texas, Unincorporated Areas (1983), produced by the Federal Emergency Management Agency, the proposed surface activities would be located within an area "... between the limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot ...".

Since 1951, the streamflow characteristics of the Neches River in the Preserve have been affected by regulation (the dam at Town Bluff that created B. A. Steinhagen Lake), and diversion from many sources (including the Lower Neches Valley Authority Canal). Changing vegetative communities of the floodplain forests of the Unit have been attributed to the regulation of the Neches (Hall 1996). Data from the gage on the Neches at Evadale, Texas also reflect the water regulation.

Peoples selected the proposed drilling/production surface location based on a combination of factors that included finding a non-wetland site and an existing pad on relatively high ground to minimize the chance of inundation by floodwaters.

The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** Impacts would result in a change to water resources, floodplains, and wetlands, but the change would be so slight that it would not be of any measurable or perceptible consequence.
- Minor:** Impacts would result in a detectable change to water resources, floodplains, and wetlands, but the change would be small and of little consequence and would be expected to be short-term and localized. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- Moderate:** Impacts would result in a change to water resources, floodplains, and wetlands that would be measurable, long-term, and localized. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.
- Major:** Impacts would result in a change to water resources, floodplains, and wetlands that would be measurable and have substantial consequences on a regional scale for long periods of time or to be permanent. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

Impacts on Water Resources, Floodplains, and Wetlands in and outside the Unit under Alternative A, No Action

Under Alternative A, Peoples would not drill the Vastar 2-A No. 2 well, resulting in no new impacts on water resources, floodplains, and wetlands. However, existing impacts to these resources due to existing/anticipated developments; recreational all-terrain vehicle use in wetlands and other water features; and timber operations outside the Unit, and oil and gas operations both in and outside the Unit, would continue. These activities are expected to result in short to long-term, localized to widespread, negligible to moderate, adverse impacts to water resources, floodplains, and wetlands in and outside the Unit within the analysis area.

Cumulative Impacts under Alternative A, No Action

Over time, protection provided to water resources, floodplains, and wetlands in the Unit is expected to improve the condition of these resources, resulting in beneficial effects. However, adjacent lands are anticipated to continue to be developed so that water resources, floodplain, and wetland values may be incrementally lost. Reclamation of wetlands inside or outside the Preserve may not return sites to pre-disturbance conditions. Under Alternative A, existing and reasonably foreseeable activities, including vehicle use, recreational activities (including use of all-terrain vehicles), development (including oil and gas activity), and commercial timber activities, would contribute short- to long-term, localized to widespread, negligible to moderate, adverse cumulative impacts on water resources, floodplains, and wetlands in and outside the Unit.

Conclusion for Alternative A, No Action

Under Alternative A, No Action, the Vastar Unit 2-A No. 2 well would not be drilled, resulting in no new impacts to water resources, floodplains, and wetlands in and outside the Unit. Existing/anticipated developments, recreational all-terrain vehicle use in wetlands and other water features, timber operations outside the Unit, and oil and gas operations both in and outside the Unit would continue to adversely affect water resources, floodplains, and wetlands in the analysis area resulting in localized, short to long-term, negligible to moderate, adverse impacts. Cumulative effects would include short- to long-term, localized to widespread, negligible to moderate, adverse impacts on water resources, floodplains, and wetlands in and outside the Unit.

Because there would be no major adverse impacts to water resources, floodplains, and wetlands whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Big Thicket National Preserve; (2) key to the natural or cultural integrity of the Preserve; or (3) identified as a goal in the Preserve's general management plan or other relevant National Park Service planning documents, selection of Alternative A would not result in an impairment to Unit water resources, floodplains, or wetlands.

Impacts on Water Resources: Floodplains, and Wetlands in and outside the Unit under Alternative B, Proposed Action

Under Alternative B, the Vastar Unit 2-A No. 2 well would be drilled and may be completed to produce hydrocarbons. The proposed Vastar Unit 2-A No. 2 well pad site is situated on level terrain within the floodplain of the Neches River, but is on relatively high ground between Banks Bayou and Weiss Canal.

Water drains from the Vastar Unit 2-A No. 2 pad site via sheet flow into a southwesterly direction into an unnamed tributary of the Neches River.

Construction and maintenance of the well/production pad, flowlines, and production activities could result in localized and short-term increases in sediment and pollutant discharges during and following precipitation events. These impacts would be associated with vehicle traffic and ground disturbances from heavy equipment. Sediment discharges and overland water flow into nearby tributary during inundating rains and unusual flooding (100 year flood) could result in water quality degradation creating effects within the preserve.

During the drilling process, raw petroleum products are generally controlled, but have the potential to be spilled on the site. In addition, numerous machines, equipment, and vehicles are used simultaneously. Many components require fuel, and/or motor oil, coolant, and other lubricants that could be spilled and then introduced into adjacent water features by surface runoff.

If the Peoples well is completed to produce natural gas in salable quantities, existing flowlines/sales lines would be used and new lines built within the existing production facility if necessary.

During the long-term production life of the well there could be additional impacts to water resources, floodplains, and wetlands in and outside the Unit from equipment failures. Routine maintenance along the pipeline corridors would include accessing the pipeline corridor by truck or ATV to inspect surface equipment, and annually excavating small sections of the lines to inspect the integrity of the pipelines. On occasion, a backhoe/front-loader would be used to excavate and replace segments of pipe. These activities could result in the discharge of sediments and pollutants during times when the work area is inundated; however, it is expected that work of this nature would be scheduled to avoid predicted rainfall events. There is a potential for the pipelines to leak or rupture, releasing hydrocarbon products and contaminating surface soils and groundwater. If leaks or spills occur during flood events, contaminants could be transported via surface waters great distances, thereby increasing flood hazards and degrading floodplain values. However, with mitigation measures and prompt response in the event of a spill, the intensity of impacts would be reduced. Access to the Lower Neches Valley Authority (LNVA) intake and supply valve located between Confluence and the

project site, could be temporarily blocked or impeded by increased vehicular traffic during the construction phase of the proposed Vastar Unit 2-A No. 2 well.

Occasional workovers on the well could occur at 5 to 10-year intervals and take 1 to 2 weeks to complete. Workover operations could potentially result in accidental spills of raw petroleum products, or introduce sediments and pollutants from equipment and/or vehicles. These impacts are expected to be at lower levels relative to the initial drilling operations.

In addition to siting the well outside of wetlands and on an area of relatively high ground to minimize potential impacts to water resources, floodplains, and wetlands, several additional mitigative measures are proposed. These measures are provided by project phase in Table 2. In general, they include strategies to prevent and respond to accidental spills, manage storm water runoff from the disturbed sites, arrange certain components of the drilling and production facilities that have greater potential for impacts (i.e., pits and tank batteries) as far from the Unit boundary as possible, and comply with all applicable Statewide Rules regulating surface and groundwater protection. There would be no effect to water resources, floodplains, and wetlands in and outside the Unit from the proposed in-park operations. The connected actions at the proposed drilling/production locations would have short- to long-term, localized to widespread, negligible to moderate, adverse impacts to water resources, floodplains, and wetlands in an outside the Unit.

Cumulative Impact under Alternative B, Proposed Action

Under Alternative B, cumulative impacts to water resources, floodplains, and wetlands in and outside the Unit would be similar to those described for Alternative A. The existing and reasonably foreseeable activities, including vehicle use, recreational activities (including use of all-terrain vehicles), development (including oil and gas activity), and commercial timber activities, would contribute short- to long-term, localized to widespread, negligible to moderate, adverse cumulative impacts on water resources, floodplains, and wetlands in and outside the Unit.

Conclusion for Alternative B, Proposed Action

Under Alternative B, the Vastar Unit 2-A No. 2 well would be drilled, resulting in new impacts to water resources, floodplains, and wetlands in and outside the Unit. Construction and maintenance of, well/production pad, and flowlines; and production activities could result in localized and short-term discharges of sediments and/or pollutants into the 100-year floodplain and wetlands. The intensity of potential impacts to water resources, floodplains, and wetlands in and outside the Unit are expected to be lessened by dense vegetation occurring in the portion of the Unit potentially affected by the project, and on surrounding private property between the pad site and Unit boundary, as well as the application of mitigation measures by Peoples. While there would be no effect expected from the proposed in-park operations, the connected actions

at the proposed drilling/production locations would have short- to long-term, localized to widespread, negligible to moderate, adverse impacts to water resources, floodplains, and wetlands in and outside the Unit. Cumulative effects would include short- to long-term, localized to widespread, negligible to moderate, adverse impacts on water resources, floodplains, and wetlands in and outside the Unit. Long-term impacts would be realized if the well continues to produce, the pad remains active and associated maintenance disturbance continues during the life of the producing well or during workovers. As long as the pad is maintained (not reclaimed) the potential of runoff and sedimentation will remain in the long-term possibly resulting in degradation of water quality in floodplains, water resources and wetlands in and outside the Unit.

Because there would be no major adverse impacts to water resources, floodplains, and wetlands whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Big Thicket National Preserve; (2) key to the natural or cultural integrity of the Preserve; or (3) identified as a goal in the Preserve's general management plan or other relevant National Park Service planning documents, selection of Alternative B would not result in an impairment to Unit water resources, floodplains, or wetlands.

3.5 Impacts on Adjacent Landowners, Resources and Uses

Methodology

The assessment of potential impacts on adjacent land uses and resources is based on best professional judgment, and has been developed through discussions with staff from the NPS, as well as through review of relevant literature.

Thresholds of change of the intensity of impacts to adjacent landowners, resources, and uses are defined as follows:

Negligible: Adjacent land uses and resources would not be impacted, or changes in land use would be so slight, local, and likely short-term as a result of non-federal oil and gas operations occurring outside the Preserve, that they would not be of any measurable or perceptible consequence.

Minor: Adjacent land uses and resources would result in a change, but the change would be small and of little consequence, short-term, and localized. Mitigation measures, if needed to offset adverse effects of nonfederal oil and gas operations occurring outside the Preserve, would be simple and successful.

Moderate: Adjacent land uses and resources would have measurable impacts that would be long-term, and of consequence, but would be relatively local. Mitigation

measures, to offset adverse effects of nonfederal oil and gas operations occurring outside the Preserve, would likely succeed.

Major: Adjacent land uses and resources would have readily measurable impacts, with substantial consequences, and be noticed on a regional scale. Mitigation measures would be necessary to offset the adverse effects of nonfederal oil and gas operations occurring outside the Preserve, and their success would not be guaranteed.

Impacts on Adjacent Landowners, Resources and Uses under Alternative A, No Action

Under Alternative A, No Action, the Vastar Unit 2-A No. 2 well would not be drilled, resulting in no new impacts on adjacent landowners, resources and uses; however, existing impacts would continue.

Cultural Resources. Insofar as the NPS is aware, Peoples (mineral and surface owner) has not completed reviews of the relevant literature or conducted physical surveys for cultural resources on lands adjacent to the Unit. It is possible that cultural resources including archeological resources, historic structures, cultural landscapes, and ethnographic resources, exist within the analysis area. The NPS has no jurisdictional authority to require that surface landowners or lessees do this.

Existing impacts on possible cultural resources in the analysis area would continue as a result of development (including oil and gas activity), off-road vehicle use, and timber management. These activities are expected to contribute toward short- to long-term, localized, negligible to moderate, adverse impacts on cultural resources. The surface owners in the analysis area would be responsible for their actions affecting cultural resources.

Geology and Soils. Camptown silt loam, Bleakwood loam, Estes-Clay and Spurger series (loam) types are all present within the analysis area.

Existing impacts on geology and soils would continue as the result of vehicle use on and off developed roads, recreational activities, development (including oil and gas activity), and commercial timber activities adjacent to the Unit. These activities could increase surface runoff; increase soil erosion, rutting and compaction; affect the permeability of soils (and other soil characteristics); and could directly and indirectly affect the growth and regeneration of vegetation. Soils compacted by foot or vehicle use could reduce soil permeability, change surface drainage patterns, and hinder the penetration of plant roots. The release of hydrocarbons or other contaminating and hazardous substances from vehicles, equipment, or flowlines could alter the chemical and physical properties of the soil in the vicinity of the release.

Changes in soil properties could result directly from contact with contaminants on site, or indirectly, via runoff from contaminated areas. It is expected that existing uses in the analysis area would continue with short- to long-term, localized, negligible to moderate, adverse impacts on geology and soils.

Vegetation. The dominant overstory vegetation in the analysis area mapped by Hall and Harcombe (1997) includes sweetgum (*Liquidambar styraciflua*), swamp chestnut oak (*Quercus michauxii*), red maple (*Acer rubrum*), and water oak (*Q. nigra*). Understory dominants include ironwood (*Carpinus caroliniana*), deciduous holly (*Ilex decidua*), and American holly (*I. opaca*). Sloughs and other wet areas would be dominated by bald cypress (*Taxodium distichum*) and tupelo (*Nyssa aquatica*). The pad sites both consist of relatively even-aged loblolly pine (*Pinus taeda*) plantations that support dense understory thickets composed of yaupon (*Ilex vomitoria*), American holly, American beautyberry (*Callicarpa americana*), saw greenbrier (*Smilax bona-nox*), muscadine grape (*Vitis rotundifolia*), red bay (*Persea palustris*), and Chinese tallow (*Sapium sebiferum*). Other species present in the canopy include Chinese tallow, water oak, southern magnolia (*Magnolia grandiflora*), and sweetgum. Herbaceous dominants include slender-leaf wood oats (*Chasmanthium laxum* var. *laxum*), Andrew's cross (*Hypericum hypericoides*), and farkleberry (*Vaccinium arboreum*).

Existing impacts on vegetation would continue as the result of vehicle use on and off developed roads, recreational activities, development (including oil and gas activity), and commercial timber activities adjacent to the Unit. These activities would contribute towards compaction, crushing and loss of vegetation. Vehicles could import non-native seed. Also, clearing activities could contribute to the introduction of non-native vegetation, especially Chinese tallow (*Sapium sebiferum*). These activities would result in short- to long-term, localized, negligible to moderate, adverse impacts.

Wildlife. As the hydrology of the analysis area creates a mosaic of soil types and vegetation, the wildlife in the analysis area should show an attendant diversity. However, the conversion of most of the land in the analysis area to managed pine plantation adds different (less diverse) vegetation to the area. The process of cutting and regrowth provides opportunities for some species while detracting from the habitat of others. The rural residences, as well as the oil and gas developments, found in the vicinity of the proposed operation are expected to have a similar effect on the wildlife in the area. On balance however, timber operations and development have probably degraded the wildlife habitat in the vicinity of the proposed surface operation.

Existing impacts on wildlife on private lands would continue as a result of vehicle use, recreational activities, timber operations, development (including oil and gas activity). These activities could result in the loss of wildlife habitat, increase predation in open areas, increase edge effects, and result in avoidance of the area by wildlife due to increased noise, lighting, and human presence. This could have the effect of directly harming or killing wildlife, displace

wildlife into adjacent habitat, or disrupt wildlife feeding, denning, nesting, and spawning/reproduction, thereby altering wildlife species and composition. The release of hydrocarbons or other hazardous and contaminating substances from vehicles, equipment, or pipelines could injure or kill wildlife. The adverse effects could become worse over time if wildlife species ingest the contaminants and are consumed by other wildlife species. Artificial lighting could attract insects and their predators to the area. These effects are expected to contribute to short- to long-term, localized, negligible to moderate, beneficial and adverse impacts on wildlife in the analysis area. For example, if the activity occurs at night and artificial lighting is needed, the lighting could attract predatory species opportunistically feeding on insects drawn to the light. The obvious beneficial effect would be to the predatory species, and the adverse effect would be to the prey species. However, this interaction is likely more complex, with both types of wildlife experiencing both types of effects from their interaction with each other and the environment.

Cumulative Impacts under Alternative A, No Action

The cumulative impact analysis area includes the entire Unit and lands contiguous to the Unit.

Cultural Resources. Cumulative impacts on cultural resources in the analysis area are expected to continue primarily as the result of ground disturbing activities, where surveys are not performed so sites can be avoided, or impacts mitigated by data recovery programs, associated with vehicle use on and off developed roads, recreational activities, development (including oil and gas activity), and commercial timber activities adjacent to the Unit. Compliance with the National Historic Preservation Act would be completed for projects undertaken within the Unit, resulting in no effect or no adverse effect on cultural resources. Therefore, it is likely that cultural resources inside the Unit in the analysis area would be given a greater degree of protection with attendant beneficial cumulative effects to those resources. Overall, it is expected that existing uses in the analysis area would continue, with short- to long-term, localized, negligible to moderate, adverse cumulative impacts to cultural resources.

Geology and Soils. Cumulative impacts on geology and soils in the analysis area are expected to continue as the result of vehicle use on and off developed roads, recreational activities, development (including oil and gas activity), and commercial timber activities adjacent to the Unit. Also, vehicle use, development, and recreational activities inside the Unit boundary are expected to contribute to the cumulative impacts on geology and soils in the analysis area. These activities could increase surface runoff; increase soil erosion, rutting and compaction; affect the permeability of soils (and other soil characteristics); and could directly and indirectly affect the growth and regeneration of vegetation. Soils compacted by foot or vehicle use could reduce soil permeability, change surface drainage patterns, and hinder the penetration of plant roots. The release of hydrocarbons or other contaminating and hazardous substances from vehicles, equipment, or flowlines during drilling and production operations could alter the

chemical and physical properties of the soil in the vicinity of oil and gas activities. Changes in soil properties could result directly from contact with contaminants on site, or indirectly, via runoff from contaminated areas. It is expected that existing and reasonably foreseeable uses in the analysis area would continue with short- to long-term, negligible to moderate, adverse cumulative impacts on geology and soils, localized near these uses.

Vegetation. Cumulative impacts on vegetation would result from the same sources as described for geology and soils. Similar to the description of cumulative impacts on geology and soil; crushing, cutting, erosion of soils, and potential contaminant spills would create short- to long-term, localized to widespread, negligible to moderate, adverse impacts on vegetation. Preserve management is expected to create long-term, widespread, moderate, beneficial cumulative effects on the vegetation in the analysis area.

Wildlife. Cumulative effects on wildlife would result from vehicle use, recreational activities, timber operations, development (including oil and gas activity), and Preserve management. These activities could result in the loss of wildlife habitat, increase predation in open areas, increase edge effects, and result in avoidance of the area by wildlife due to increased noise, lighting, and human presence. This could have the effect of directly harming or killing wildlife, displace wildlife into adjacent habitat, or disrupt wildlife feeding, denning, nesting, and spawning/reproduction, thereby altering wildlife species and composition. The release of hydrocarbons or other hazardous and contaminating substances from vehicles, equipment, or pipelines could injure or kill wildlife. The adverse effects could become worse over time if wildlife species ingest the contaminants and are consumed by other wildlife species. Artificial lighting could attract insects and their predators to the area. Effects could contribute to short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse cumulative impacts on the wildlife in the analysis area.

Conclusion for Alternative A, No Action

Under Alternative A, No Action, the Peoples the Vastar Unit 2-A No. 2 well would not be drilled; therefore, there would be no new impacts on adjacent landowners, resources and uses. However, existing impacts from vehicle use, commercial timber management activities, residential activities, development (including oil and gas activity), and recreational uses would continue. The impacts from these activities could result in short- to long-term, localized, negligible to moderate, adverse effects on cultural resources, vegetation, and geology and soils; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on wildlife. Cumulative effects from commercial timber management activities, recreational uses, Preserve management, and development (including oil and gas activities) are expected to result in short- to long-term, localized, negligible to moderate, beneficial and adverse effects on cultural resources; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, vegetation, and wildlife.

Impacts on Adjacent Landowners, Resources, and Uses under Alternative B, Proposed Action

Under Alternative B, Proposed Action, the Vastar Unit 2-A No. 2 well would be drilled and may be completed to produce hydrocarbons. Possible effects from access road use, construction of the well/production pad and possible new flowlines; drilling and producing the well; any workover operations on the well; and eventual plugging/abandonment/reclamation of the well on cultural resources, geology and soils, vegetation, and wildlife within the analysis area adjacent to the Unit are described below.

Cultural Resources. The NPS has no authority to require that Peoples (mineral and surface owner) survey proposed project areas outside the Unit boundary for cultural resources, and the NPS is unaware of any such survey at this time. Proposed ground disturbing activities could affect areas outside the Unit boundary where no cultural resource surveys have been completed. Impacts on any cultural resources present would be similar to those described under Alternative A, No Action. More specifically, ground disturbing activities associated with the construction of the proposed drilling/production pad and trenching and boring operations to install the proposed flowlines (even within the existing disturbed area) could uncover archeological resources, and unless avoided or mitigated, could result in long-term, localized, negligible to moderate, adverse impacts to those resources.

Geology and Soils. Construction and maintenance of the well/production pad and new flowlines could increase surface runoff; increase soil erosion, rutting and compaction; affect the permeability of soils (and other soil characteristics); and could directly and indirectly affect the growth and regeneration of vegetation on up to an additional 0.5 acres besides the already established production site of 6.5 acres. Soils compacted by foot or vehicle use could reduce soil permeability, change surface drainage patterns, and hinder the penetration of plant roots. The release of hydrocarbons or other contaminating and hazardous substances from vehicles, equipment, or flowlines during drilling and production operations could alter the chemical and physical properties of the soil in the vicinity of oil and gas activities. Changes in soil properties could result directly from contact with contaminants on site, or indirectly, via runoff from contaminated areas.

To construct the proposed drilling/production pad, the sites would be mechanically cleared and leveled, resulting in the short-term disturbance to geology and soils on 0.5 acres (expansion area of established production site). For drilling activities the pad would be covered with crushed rock. If the proposed flowlines are necessary construction will take place within the existing production area that is approximately 6.5 acres in size. Proposed mitigation measures to protect soils during the drilling and production activities include complying with SPCC Plans, constructing a ditch and ring levees around the well pad, disposing of drilling mud and well cuttings off site, constructing a 2-foot firewall around the tank batteries with the capacity to

contain the volume of the largest tanks plus adequate freeboard to contain precipitation, and following RRC Statewide Rules for surface casing and well plugging. If the well does not go into production, the location would be reclaimed. When the well is plugged and abandoned, the surface landowner (Peoples) would decide on the best use of the site.

Under Alternative B, the Proposed Action, the expected effects on geology and soils are expected to be confined to the direct area of impact by the application of mitigation measures by Peoples. Therefore, the impacts on the geology and soils are expected to be short- to long-term, localized, negligible to moderate, and adverse from the connected actions associated with the proposal. If the well is found to be dry hole, or if it reaches its economic limit, the site is not expected to be reclaimed, but will likely remain as a possible drill site for further production within the lease unit. This activity would result in short- to long-term, localized, negligible to moderate, adverse impacts on geology and soils.

Vegetation. Impacts on vegetation would be similar to those described above for geology and soils. The vegetation is already removed on approximately 6.5 acres within the existing production site where the Vastar Unit 2-A No. 2 well will be partially located. An additional 0.5 acres will have to have the vegetation completely removed as a result of the proposed action. Timber production on that acreage would be lost until the well is plugged and abandoned and the site is reclaimed, if so decided. If the well is completed and produces, no additional vegetation will need removal, as any new flowlines will be placed within the existing production site. The proposed activities could result in a total direct effect to vegetation on approximately 0.5 acres. During the construction/expansion phase of the existing well site, incoming trucks and utility vehicles pose the possibility of introducing non-native or invasive/exotic seed to the area.

The proposed mitigation measures described above under geology and soils are also expected to limit the effects on the vegetation to the area of direct impact. Therefore, under Alternative B, Proposed Action, impacts on vegetation are expected to be short- to long-term, localized, negligible to moderate, and adverse from the connected actions.

Wildlife. The proposed operation would affect wildlife by the conversion of 0.5 acres of managed timberland to oil and gas use during the construction of the drilling/production pad. This impact could be short- or long-term dependant on the economic viability of the well. This could result in the loss of wildlife habitat, increase predation in the open area, increase edge effects, and result in avoidance of the area by wildlife due to increased noise, lighting, and human presence. This could have the effect of directly harming or killing wildlife, displace wildlife into adjacent habitat, or disrupt wildlife feeding, denning, nesting, and spawning/reproduction, thereby altering wildlife species and composition. The release of hydrocarbons or other hazardous and contaminating substances from vehicles, drilling and production equipment, leaks or rupture of flowlines and pipelines could injure or kill wildlife.

Overland flow of water during excessive rainfall or unusual flooding periods could result in siltation of floodplains and the Neches River with materials washed from the well site. This degradation of water quality could potentially affect aquatic species within the Preserve.

Adverse effects could become worse over time if wildlife species ingest the contaminants and are consumed by other fish and wildlife species. Artificial lighting, particularly during drilling and workovers, would attract insects and their predators to the area, resulting in short-term, localized, negligible, beneficial and adverse effects. Heavy equipment used for reclamation operations could injure or kill wildlife, and degrade water quality over the short-term.

Under Alternative B, the Proposed Action, impacts on wildlife would be short- to long-term, localized to widespread, negligible to moderate, and beneficial as well as adverse.

Cumulative Impacts under Alternative B, Proposed Action

Cumulative impacts would be similar to those described under No Action, with short- to long-term, localized, negligible to moderate, beneficial and adverse effects on cultural resources; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, vegetation, and wildlife.

Conclusion for Alternative B, Proposed Action

Under Alternative B, Proposed Action, the Peoples' well would be drilled and may be completed to produce hydrocarbons. While there would be no impacts from in-park operations, the connected actions – including use and maintenance of access roads, construction of the well/production pad and flowlines, drilling and producing the well, any workover operations on the well, and eventual plugging, abandonment and reclamation – could result in short- to long-term, localized, negligible to moderate, adverse impacts on cultural resources, short- to long-term, localized, negligible to moderate, adverse impacts on geology and soils and vegetation; and short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse impacts on wildlife. Cumulative impacts would be similar to those described under No Action, with short- to long-term, localized, negligible to moderate, beneficial and adverse effects on cultural resources; and short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, vegetation, and wildlife. Long-term impacts would be realized if the well continues to produce, the pad remains active and associated maintenance disturbance continues during the life of the producing well or during workovers.

4.0 CONSULTATION AND COORDINATION

Following the 30-day public review and comment period, the NPS will consider the written comments received. Copies of the decision document will be sent to those who provide substantive comment on the EA during the public review and comment period, or to those who request a copy of the decision document. (DO-12 handbook, § 4.6A)

4.1 Individuals and Agencies Consulted

The following were consulted or contributed information during preparation of this environmental assessment:

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Railroad Commission of Texas, Oil and Gas Division, District 3

Texas Commission on Environmental Quality

Texas Parks and Wildlife Department

Dorinda Scott

U.S. Fish and Wildlife Service

4.2 List of Document Recipients

During the public review and comment period, a copy of this environmental assessment will be sent to each of the following agencies, organizations, and businesses:

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Chris Wilhite, Associate Regional Representative, Sierra Club, Austin, TX
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Appendix A

Southwest Region Ecological Services



U.S. Fish & Wildlife Service

Endangered Species List

[Back to Start](#)

List of species by county for Texas:

Counties Selected: Hardin

Select one or more counties from the following list to view a county list:

Anderson

Andrews

Angelina

Aransas





Archer

Armstrong

...

View County List

Hardin County

Common Name	Scientific Name	Listing Status	More Info	Species Image	Species Distribution Map
red-cockaded woodpecker	<i>Picoides borealis</i>	E	P		
Texas trailing phlox	<i>Phlox nivalis</i> ssp. <i>texensis</i>	E	P		

<http://fw2es.fws.gov/EndangeredSpecies/Lists/ListSpecies.cfm>8/19/2005 3:31:54 PM



U.S. Fish & Wildlife Service

Endangered Species List

[Back to Start](#)

List of species by county for Texas:

Counties Selected: Orange

Select one or more counties from the following list to view a county list:

Anderson

Andrews

Angelina

Aransas



Archer

Armstrong

...

View County List

Orange County

Common Name	Scientific Name	Listing Status	More Info	Species Image	Species Distribution Map
bald eagle	<i>Haliaeetus leucocephalus</i>	AD, T	P		

APPENDIX B

Hardin County

***** DRAFT ***** UNDER CONSTRUCTION *****
SPECIES MAY BE ADDED/DELETED WITH QUALITY CONTROL

*** AMPHIBIANS ***

Pig Frog (*Rana grylio*) – prefers permanent bodies of open water with emergent vegetation; actively mainly at night; eats insects and crustaceans; mating and egg-laying March-September; male vocalization a pig-like grunt

*** BIRDS ***

American Peregrine Falcon (<i>Falco peregrinus anatum</i>)-potential migrant; nests in west Texas	DL	E
Arctic Peregrine Falcon (<i>Falco peregrinus tundrius</i>)-potential migrant	DL	T
Bachman's Sparrow (<i>Aimophila aestivalis</i>)-inhabits mature open pine forests with grassy understory, regenerating pine clear-cuts (1-7 years post re-planting), or open habitats with a dense ground cover of grasses and forbs, or palmetto scrub; in Texas, known to occur only in the far eastern portion of the state; most abundant in forests south of Angelina National Forest		T
Bald Eagle (<i>Haliaeetus leucocephalus</i>)-found primarily near seacoasts, rivers, and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds	LT-PDL	T
Henslow's Sparrow (<i>Ammodramus henslowii</i>)-wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking		
Red-cockaded Woodpecker (<i>Picoides borealis</i>)-cavity nests in older pine (60+ years); forages in younger pine (30+ years); prefers longleaf, shortleaf, & loblolly	LE	E
Swallow-tailed Kite (<i>Elanoides forficatus</i>)-lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees		T
White-faced Ibis (<i>Plegadis chihi</i>)-prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats		T
Wood Stork (<i>Mycteria americana</i>) – forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e., active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960		T

FISHES

American Eel (<i>Anguilla rostrata</i>)-most aquatic habitats with access to ocean; spawns January-February in ocean, larva move to coastal waters, metamorphose, then females move into freshwater; muddy bottoms, still waters, large streams, lakes; can travel overland in wet areas; males in brackish estuaries		
Blue Sucker (<i>Cyprinostomus elongatus</i>)-usually inhabits channels and flowing pools with a moderate current; bottom type usually consists of exposed bedrock, perhaps in combination with hard clay, sand, and gravel; adults winter in deep pools and move upstream in spring to spawn on riffles		T

Creek Chubsucker (<i>Erimyzon oblongus</i>)-small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs; young typically in headwater rivulets or marshes; spawns in river mouths or pools, riffles, lake outlets, upstream creeks		T
Paddlefish (<i>Polyodon spathula</i>)-prefers large, free-flowing rivers, but will frequent impoundments with access to spawning sites; spawns in fast, shallow water over gravel bars; larvae may drift from reservoir to reservoir		T
Western Sand Darter (<i>Ammocrypta clara</i>)-clear to slightly turbid water of medium to large rivers that have moderate to swift currents, primarily over extensive areas of sandy substrate		

*** MAMMALS ***

Black Bear (<i>Ursus americanus</i>)-within historical range of Louisiana Black Bear in eastern Texas, Black Bear is federally listed threatened and inhabits bottomland hardwoods and large tracts of undeveloped forested areas; in remainder of Texas, Black Bear is not federally listed and inhabits desert lowlands and high elevation forests and woodlands; dens in tree hollows, rock piles, cliff overhangs, caves, or under brush piles	T/SA; NL	T
Louisiana Black Bear (<i>Ursus americanus luteolus</i>)-possible as transient; bottomland hardwoods and large tracts of inaccessible forested areas	LT	T
Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>)-catholic in habitat; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie		
Prairie Vole (<i>Microtus ochrogaster taylori</i>)-extreme northern Panhandle of Texas (specimen records from Lipscomb and Hansford counties) and western Panhandle of Oklahoma; formerly known from southeastern Texas, as well; tall-grass prairie; colonial; create series of shallow, underground burrows and surface runways under vegetation; breeding habits not well known, but probably breed throughout the year		
Rafinesque's Big-eared Bat (<i>Corynorhinus rafinesquii</i>)-roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures		T
Red Wolf (<i>Canis rufus</i>) (extirpated)-formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies	LE	E
Southeastern Myotis Bat (<i>Myotis austroriparius</i>)-roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures		

*** REPTILES ***

Alligator Snapping Turtle (<i>Macrochelys temminckii</i>)-deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October		T
Louisiana Pine Snake (<i>Pituophis ruthveni</i>)-mixed deciduous-longleaf pine woodlands; breeds April-September	C1	T
Northern Scarlet Snake (<i>Cemophora coccinea copei</i>)-mixed hardwood scrub on sandy soils; feeds on reptile eggs; semi-fossorial; active April-September		T
Sabine Map Turtle (<i>Graptemys quachitensis sabinensis</i>) – Sabine River system; rivers and related tributaries, ponds and reservoirs with abundant aquatic vegetation; basks on fallen logs and exposed roots; eats insects, crustaceans, mollusks, and aquatic plants; breeding and egg-laying March-May, with hatchlings appearing in early fall		
Texas Horned Lizard (<i>Phrynosoma cornutum</i>)-open, arid and semi-arid regions with sparse vegetation, which could include grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September		T

Timber/Canebrake Rattlesnake (*Crotalus horridus*)-swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e., grapevines or palmetto

T

*** VASCULAR PLANTS ***

Chapman's orchid (*Platanthera chapmani*)-in Texas, restricted to wetland pine savannas, one of the states most endangered habitats; flowering July-August

Long-sepaed false dragon-head (*Physostegia longisepala*) – moist, acid loams in the fire-maintained transition zone between pine flatwoods and coastal prairies; also, wet, borrow ditches along roadsides and moist areas in manmade clearings in pine woodlands; flowering early May to late June

Texas screwstem (*Bartonia texana*)-sandy soils in dry mesic pine or mixed pine-oak forests and forest borders; usually in fire-maintained longleaf pine savannas, but also in more mesic habitats; flowering (June-?)

Texas trailing phlox (*Phlox nivalis* ssp. *texensis*)-endemic; deep sandy soils in fire-maintained openings in upland longleaf pine savannas or bluejack oak woodlands; flowering March-early April LE E

White firewheel (*Gaillardia aestivalis* var. *winkleri*) – endemic; deep, loose, well-drained sands in openings in pine-oak woodlands and along unshaded margins, principally of the Village Creek watershed; flowering late spring (May-June) and sporadically through early fall

Status Key:

LE, LT	- Federally Listed Endangered/Threatened
PE, PT	- Federally Proposed Endangered/Threatened
E/SA, T/SA	- Federally Listed Endangered/Threatened by Similarity of Appearance
C1	- Federal Candidate for Listing, Category 1; information supports proposing to list as endangered/threatened
DL, PDL	- Federally Delisted/Proposed for Delisting
NL	- Not Federally Listed
E, T	- State Listed Endangered/Threatened
“blank”	- Rare, but with no regulatory listing status

Species appearing on these lists do not all share the same probability of occurrence. Some species are migrants or wintering residents only, or may be historic or considered extirpated.

Orange County

***** DRAFT ***** DRAFT ***** DRAFT***** DRAFT ***** DRAFT ***** DRAFT*****

UNDER CONSTRUCTION *** SPECIES MIGHT BE ADDED/DELETED DURING QUALITY CONTROL**

*** AMPHIBIANS ***

Pig Frog (*Rana grylio*) – prefers permanent bodies of open water with emergent vegetation; actively mainly at night; eats insects and crustaceans; mating and egg-laying March-September; male vocalization a pig-like grunt

***** BIRDS *****

Arctic Peregrine Falcon (<i>Falco peregrinus tundrius</i>) - potential migrant	DL	T
Bachman's Sparrow (<i>Aimophila aestivalis</i>) - inhabits mature open pine forests with grassy understory, regenerating pine clear-cuts (1-7 years post re-planting), or open habitats with a dense ground cover of grasses and forbs, or palmetto scrub; in Texas, known to occur only in the far eastern portion of the state; most abundant in forests south of Angelina National Forest		T
Bald Eagle (<i>Haliaeetus leucocephalus</i>) - found primarily near seacoasts, rivers, and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds	LT-PDL	T
Brown Pelican (<i>Pelecanus occidentalis</i>) - largely coastal and near shore areas, where it roosts on islands and spoil banks	LE	E
Henslow's Sparrow (<i>Ammodramus henslowii</i>) – wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking		
Interior Least Tern (<i>Sterna antillarum athalassos</i>) – this subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish & crustaceans, when breeding forages within a few hundred feet of colony	LE	E
Piping Plover (<i>Charadrius melodus</i>) - wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats	LT	T
Reddish Egret (<i>Egretta rufescens</i>) - brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear		T
Snowy Plover (<i>Charadrius alexandrinus</i>) – wintering migrant along the Texas Gulf Coast beaches and bayside mud or salt flats		
Sooty Tern (<i>Sterna fuscata</i>) – predominately “on the wing”; does not dive, but snatches small fish and squid with bill as it flies or hovers over water; breeding April-July		T
Swallow-tailed Kite (<i>Elanoides forficatus</i>) - lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees		T

White-faced Ibis (*Plegadis chihi*) - prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats T

Wood Stork (*Mycteria americana*) - forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960 T

*** BIRDS-RELATED ***

Colonial waterbird nesting areas - many rookeries active annually

Migratory songbird fallout areas - oak mottes and other woods/thickets provide foraging/roosting sites for neotropical migratory songbirds

FISH

American Eel (*Anguilla rostrata*) - most aquatic habitats with access to ocean; spawns January-February in ocean, larva move to coastal waters, metamorphose, then females move into freshwater; muddy bottoms, still waters, large streams, lakes; can travel overland in wet areas; males in brackish estuaries

Ironcolor Shiner (*Notropis chalybaeus*) - spawns April-September, eggs sink to bottom of pool; pools and slow runs of low gradient small acidic streams with sandy substrate and clear well vegetated water; feeds mainly on small insects, ingested plant material not digested

Paddlefish (*Polyodon spathula*) - prefers large, free-flowing rivers, but will frequent impoundments with access to spawning sites; spawns in fast, shallow water over gravel bars; larvae may drift from reservoir to reservoir T

*** MAMMALS ***

Black Bear (*Ursus americanus*) - within historical range of Louisiana Black Bear in eastern Texas, Black Bear is federally listed threatened and inhabits bottomland hardwoods and large tracts of undeveloped forested areas; in remainder of Texas, Black Bear is not federally listed and inhabits desert lowlands and high elevation forests and woodlands; dens in tree hollows, rock piles, cliff overhangs, caves, or under brush piles T/SA; T
NL

Louisiana Black Bear (*Ursus americanus luteolus*) - possible as transient; bottomland LT T

hardwoods and large tracts of inaccessible forested areas

Plains Spotted Skunk (*Spilogale putorius interrupta*) – catholic; in habitat; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie

Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*) - roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures T

Red Wolf (*Canis rufus*) (extirpated) - formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies LE E

Southeastern Myotis Bat (*Myotis austroriparius*) - roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures

MOLLUSKS

Creepers (Squawfoot) (*Strophitus undulatus*) - small to large streams, prefers gravel or gravel and mud in flowing water; Colorado, Guadalupe, San Antonio, Neches (historic), and Trinity (historic) River basins

Fawnsfoot (Common) (*Truncilla donaciformis*) - small and large rivers especially on sand, mud, rocky mud, and sand and gravel, also silt and cobble bottoms in still to swiftly flowing waters; Red (historic), Cypress (historic), Sabine (historic), Neches, Trinity, and San Jacinto River basins.

Little Spectaclecase (*Villosa lienosa*) - creeks, rivers, and reservoirs, sandy substrates in slight to moderate current, usually along the banks in slower currents; east Texas, Cypress through San Jacinto River basins

Louisiana Pigtoe (*Pleurobema riddellii*) - streams and moderate-size rivers, usually flowing water on substrates of mud, sand, and gravel; not generally known from impoundments; Sabine, Neches, and Trinity (historic) River basins

Rock-pocketbook (*Arcidens confragosus*) - mud, sand, and gravel substrates of medium to large rivers in standing or slow flowing water, may tolerate moderate currents and some reservoirs, east Texas, Red through Guadalupe River basins

Sandbank Pocketbook (*Lampsilis satura*) - small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms; east Texas, Big Cypress Bayou south through San Jacinto River basins; Neches River

Southern Hickorynut (*Obovaria jacksoniana*) - medium sized gravel substrates with low to moderate current; Neches, Sabine, and Cypress river basins

Texas Heelsplitter (*Potamilus amphichaenus*) - quiet waters in mud or sand and also in reservoirs. Sabine, Neches, and Trinity River basins

Texas Pigtoe (*Fusconaia askewi*) - rivers with mixed mud, sand, and fine gravel in protected areas associated with fallen trees or other structures; east Texas River basins, Sabine through Trinity rivers as well as San Jacinto River

Wabash Pigtoe (*Fusconaia flava*) – creeks to large rivers on mud, sand, and gravel from all habitats except deep shifting sands; found in moderate to swift current velocities; east Texas River basins, Red through San Jacinto River basins; elsewhere occurs in reservoirs and lakes with no flow

Wartyback (*Quadrula nodulata*) - gravel and sand-gravel bottoms in medium to large rivers and on mud; Red, Sabine, Neches River basins

*** REPTILES ***

Alligator Snapping Turtle (*Macrochelys temminckii*) - deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October T

Gulf Saltmarsh Snake (*Nerodia clarkii*) - saline flats, coastal bays, & brackish river mouths

Northern Scarlet Snake (*Cemophora coccinea copei*) - mixed hardwood scrub on sandy soils; feeds on reptile eggs; semi-fossorial; active April-September T

Sabine Map Turtle (*Graptemys quachitensis sabinensis*) – Sabine River system; rivers and related tributaries, ponds and reservoirs with abundant aquatic vegetation; basks on fallen logs and exposed roots; eats insects, crustaceans, mollusks, and aquatic plants; breeding and egg-laying March-May, with hatchlings appearing in early fall

Texas Diamondback Terrapin (*Malaclemys terrapin littoralis*) - coastal marshes, tidal flats, coves, estuaries, and lagoons behind barrier beaches; brackish and salt water; burrows into mud when inactive; may venture into lowlands at high tide

Texas Horned Lizard (*Phrynosoma cornutum*) - open, arid and semi-arid regions with sparse vegetation, which could include grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September T

Timber/Canebrake Rattlesnake (*Crotalus horridus*) - swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto

T

***** VASCULAR PLANTS *****

Chapman's orchid (*Platanthera chapmanii*) - in Texas, restricted to wetland pine savannas, one of the states most endangered habitats; flowering July-August

Long-sepaled false dragon-head (*Physostegia longisepala*) – moist, acid loams in the fire-maintained transition zone between pine flatwoods and coastal prairies; also, wet, borrow ditches along roadsides and moist areas in manmade clearings in pine woodlands; flowering early May to late June

Species appearing on these lists do not all share the same probability of occurrence. Some species are migrants or wintering residents only, or may be historic or considered extirpated.