

National Park Service
U.S. Department of the
Interior

Big Thicket National Preserve
Texas



Environmental Assessment

**C&E Operating, Inc.
Proposal to Directionally Drill and Produce
the Hankammer Well No. 1
from a location outside the
Neches Bottom/Jack Gore Baygall Unit,
Big Thicket National Preserve,
Hardin and Jasper Counties, Texas**



April 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: Picture taken February 10, 2005 of the proposed surface location facing east from the staked wellbore. Haigler (Dusty) Pate, National Park Service.

**Environmental Assessment
C&E Operating, Inc.
Proposal to Directionally Drill and Produce
the Hankammer Well No. 1
from a Surface Location Outside the Neches Bottom/Jack Gore Baygall Unit to
Reach a Bottomhole Location under the Unit
Big Thicket National Preserve
Hardin and Jasper Counties, Texas**

Summary: In accordance with National Park Service (NPS) regulations for nonfederal oil and gas rights, C&E Operating, Inc. (C&E) has submitted an Application for Exemption (Application) to the NPS regulations found at 36 CFR 9B to directionally drill and produce the Hankammer Well No. 1 from a surface location outside the boundary of the Neches Bottom/Jack Gore Baygall Unit (Unit) of Big Thicket National Preserve (Preserve) in Hardin County, Texas, on privately-managed forest lands, to a bottomhole location under the Unit in Jasper 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 C&E's proposal to directionally drill and produce the well. Due primarily to the use of directional drilling from a surface location 2,459 feet from the Unit, there would be no measurable effects on most Unit resources and values. Therefore, many topics, including most 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 in and outside the Unit. Impacts on Adjacent Landowners, Resources, and Uses, including cultural resources, geology and soils, lightscape management, natural soundscape, vegetation, and wildlife, would range from short- to long-term, negligible to moderate, beneficial and adverse, localized within 1500 feet of the activities occurring outside the Unit.

Public Comment:

If you wish to comment on the Environmental Assessment, please mail your comments to the address below for receipt by Monday, May 09, 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
3785 Milam
Beaumont, Texas 77701

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1.0 PURPOSE OF AND NEED FOR ACTION

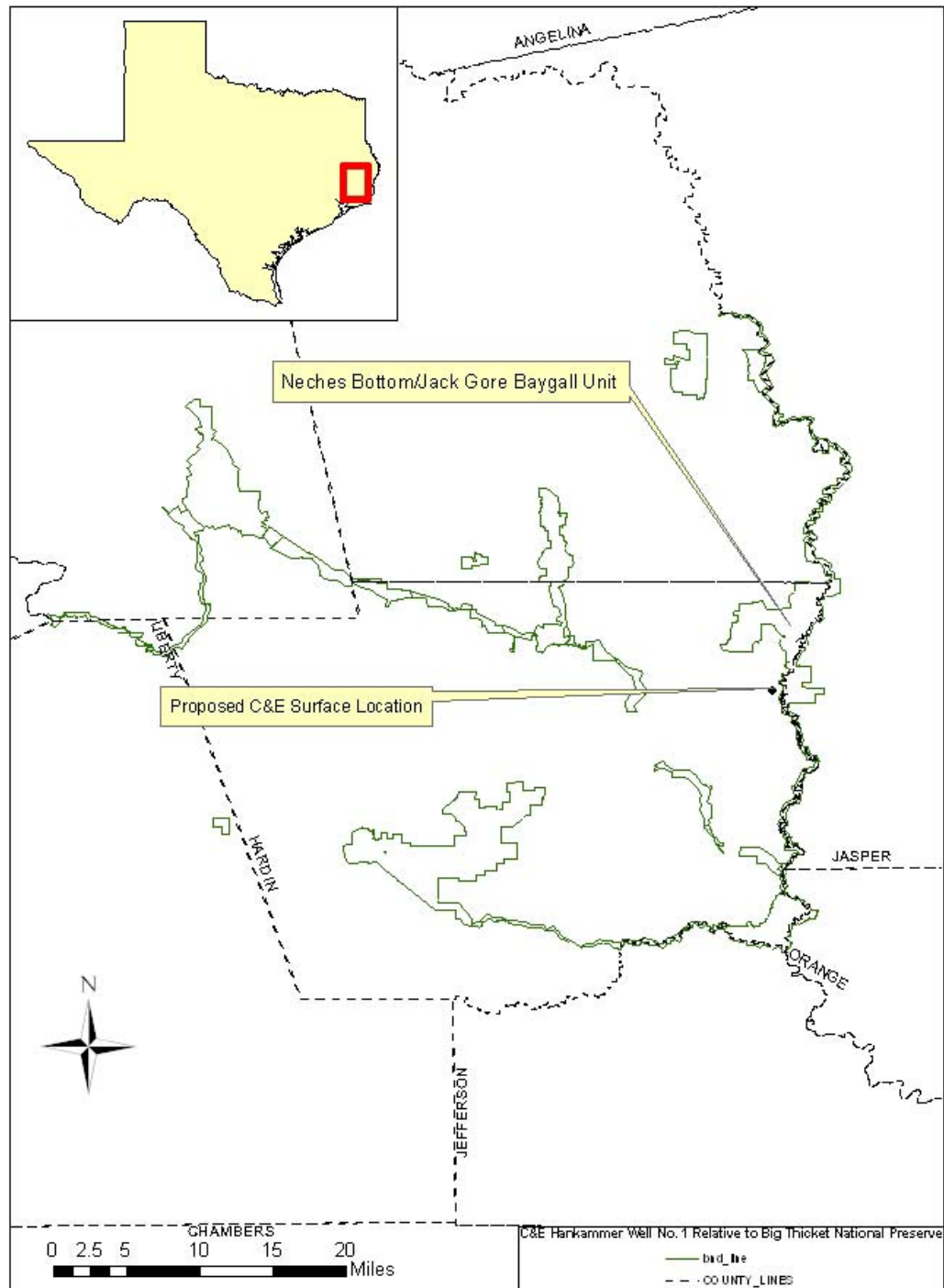
This Environmental Assessment has been prepared to comply with the National Environmental Policy Act and will be used as a framework for agency decision-making. This EA evaluates the environmental impacts of the No Action alternative and C&E's proposal to directionally drill and produce the Hankammer Well No. 1 from a surface location outside the Neches Bottom/Jack Gore Baygall 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 C&E's 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.

C&E submitted an application to the NPS describing how it proposes to directionally drill and produce the Hankammer Well No. 1 from a surface location outside the Unit to reach a bottomhole target beneath the Unit. On February 4, 2005, the NPS determined the application to be substantially complete for the NPS to proceed with its analysis and public involvement process.

Figure 1. Project Location Map



The analysis area for evaluating impacts in this EA includes:

- The direct areas of impact total approximately 7.39 acres, and include: 2.07 acres for the well/production pad; and approximately 5.32 acres that would be disturbed to install a 4-inch diameter flowline to connect to an existing pipeline should the well be placed in production. Portions of the flowline could be directionally bored under wetland areas to avoid surface disturbance at those sites. Also, approximately 2.2 miles of existing access roads would be used.
- 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 site and a 100 foot offset from the associated access roads, and flowline. 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 Neches Bottom/Jack Gore Baygall Unit and up to ½ mile contiguous to the Unit.

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 C&E, 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) identify 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 which 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 environment quality of the national park system.

Section 3 of the EA includes impairment analyses for each Unit resource or value carried forward into Section 3 for further analysis. However, because the surface location of the well would be sited 2,459 feet from the Unit boundaries, the distance mitigates impacts on most park resources and values to result in no measurable effects. Therefore, following a limited analysis in this Section of the EA to reach a determination of no measurable effects, most Unit resources and values are dismissed and are not carried forward to Section 3 for further analysis. As a result, the only impairment analysis for any park resource or value included in Section 3 of this EA is Air Quality.

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 of twelve of the 15 authorized units on approximately 88,132 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 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 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 Hankammer Well No. 1 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 wellbore would be drilled to cross into the Unit at a substantial depth so as to not cross usable quality ground water. The wellbore would cross into the Unit at a true vertical depth of approximately 4,700 feet and continue to a targeted total depth of approximately 8,000 feet below ground level. Usable quality ground water occurs from the surface to 1,950 feet in the area, with superior water quality occurring from the surface to 1,050 feet. There is no threat to park resources or values regardless of what methods and materials C&E uses to drill, case, cement, or plug and abandon the section of hole inside the Unit. Likewise, if the well becomes a producer, 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. § 1911 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)

This EA contains the analysis and documentation required under § 9.32(e), and also discloses to the public the potential impacts that could occur both inside and outside of the park.

The types of impacts considered are direct, indirect, and cumulative. Actions may be connected, cumulative, and similar.

- 1) **Connected actions** are closely related and therefore should be discussed in the EA. Actions are connected if they:
 - (i) automatically trigger other actions, which may require environmental analysis under NEPA.
 - (ii) cannot or will not proceed unless other actions are taken previously or simultaneously.
 - (iii) are interdependent parts of a larger action and depend on the larger action for their justification.

Connected actions occurring outside of the park related to the directional drilling operation inside the park include the construction of the well/production pad, gas sales/transportation line, and maintenance of the access road; drilling and completion;

hydrocarbon production and transportation; and workover operations, well plugging, and surface reclamation.

- 2) **Cumulative actions** when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same environmental document.

Cumulative actions that should be analyzed in the NEPA document include surface drilling and production operations outside of the park as well as any other activities that may have additive impacts to resources (e.g., logging, road building, construction projects, prescribed burns, etc.).

- 3) **Similar actions** when viewed with other reasonably foreseeable or proposed agency actions have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography. An agency may wish to analyze these actions in the same NEPA document. The agency should do so when the best way to assess the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement.

Similar actions could include activities such as the construction of private and public roads, drilling of water wells, and other types of construction activities.

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 2005 (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.

C&E's proposal to directionally drill the Hankammer Well No. 1 is in accordance with the goals and objectives articulated in the above mentioned planning documents.

1.3 Issues and Impact Topics Evaluated

Early in the planning and development of the directional drilling application by C&E, the NPS scoped with C&E's consultant Tim Morton and Associates, Inc., to identify the resources, values, and other concerns that could be potentially impacted by drilling and producing the Hankammer Well No. 1. In addition, early input from other federal, state and local agencies was sought. Scoping was performed with the U.S. Fish and Wildlife Service (FWS), U. S. Army Corps of Engineers (COE), Texas Commission on Environmental Quality (TCEQ), and Texas Parks and Wildlife Department. Scoping defined major issues, alternatives, potential impacts, and mitigation measures. 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 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 C&E's directional drilling application, the Preserve prepared a public scoping brochure to announce a 2-week public scoping period. On November 29, 2004, the Preserve mailed the scoping brochure to affected state, federal, and local agencies, other interested persons and organizations, and also to C&E as well as their contractor Tim Morton and Associates. The Preserve also posted the public scoping brochure to its 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 from the Lone Star Chapter of the Sierra Club. There were 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
- Adjacent Landowners, Resources, and Uses, focusing on an analysis of the following resources and values:
 - Cultural Resources
 - Geology and Soils
 - Lightscape Management
 - Natural Soundscape
 - 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, as well as the proposed operation, are located within Hardin County. 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 access road, well/production pad, and flowline; and 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.
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 road could be maintained) and/or adverse (e.g., operations could pose a threat to human health and safety and property). • 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. • Earthmoving activities associated with construction and maintenance of the access road, well/production pad and flowline 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. • 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

	<p>landowner; and the disposition of such archeological resources is at the discretion of the surface owner.</p> <ul style="list-style-type: none"> • Geology and Soils. Construction and maintenance of the access road, well/production pad, and flowline 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 7.39 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. • Lightscape Management. 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. • Natural Soundscape. Vehicles and equipment used for construction and/or maintenance of the access road, well/production pad, and flowline; and drilling, production, plugging and reclamation activities, could result in increased noise in the vicinity of the activity. • Vegetation. Vegetation would be totally removed on up to 2.07 acres in a privately-managed pine plantation that has recently been clear-cut to construct the drilling pad. The trenching operation to construct the proposed flowline would also result in the disturbance/removal of vegetation from an existing right of way along the existing access road totaling 5.32 acres. This right of way may be periodically cut over the life of the flowline. Vegetation removal could change the structure and composition of vegetative communities, and increase stormwater runoff and erosion adjacent to the proposed well/production pad and flowline. • The release of hydrocarbons and contaminating and hazardous substances could damage or kill vegetation directly, via contact with contaminants on-site, or indirectly, via pathways from contaminated areas. • 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. • Reclamation of the oil and gas site 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 flowline could result in the loss of wildlife habitat on up to 7.39 acres, increase predation in open areas; directly harm or kill wildlife; displace wildlife into adjacent habitat; and disrupt wildlife feeding, denning, nesting, and
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	<p>spawning/reproduction.</p> <ul style="list-style-type: none"> • 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 and production equipment, leaks or 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.
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I.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. Negligible impacts are generally those that would result in a change to the resource or value, but the change would be so slight that it would not be of any measurable or perceptible consequence. Minor impacts are generally those that would result in a change to the resource or value, 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.

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, Floodplains, and Wetlands in and outside the Unit
- Species of Management Concern in and outside the Unit
- Other Unit Resources and Values
 - Natural Soundscape
 - Lightscape Management
 - 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 4,700 feet true vertical depth (TVD) to a target depth of about 8,000 feet TVD, and extracting hydrocarbons and 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 line, drilling and completion; hydrocarbon production and transportation; and well plugging and surface reclamation outside the Unit.

Socioeconomics

Socioeconomic issues include the effect of drilling and producing the C&E Hankammer Well No. 1 on local and regional economies; and, the effects of the proposal on visitation in the Unit and associated revenues into the local and regional economies. The following description provides supporting data to base the cumulative impact analyses in this Section and in Section 3.

As a result of connected actions associated with the proposed operation, land use on 2.07 acres would be converted from commercial timber production to oil and gas development. If the Hankammer Well No. 1 is drilled and hydrocarbons are discovered and produced, it could result in a negligible, beneficial impact on local and regional economies.

Cumulative Impacts. 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 Neches Bottom/Jack Gore Baygall Unit is unavailable because the Preserve does not track visits to the Unit (except those generated from hunting surveys). The Unit is one of 5 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 2003-2004 hunting season, with approximately 73% of hunting surveys returned, there were 2,929 trips reported in the Unit. These numbers were not included in the visitation estimate for 2004. Other visitor uses in the Unit include canoeing Franklin Lake, Johns Lake, as well as 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 C&E's proposed directional well from a surface location outside the Unit to reach a bottomhole target beneath the Unit is required under numerous Statewide Rules administered by the Railroad Commission of Texas to take precautions to prevent accidents.

Big Thicket National Preserve lies within the Railroad Commission of Texas' (RRC) 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 15-20 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.

Seismic exploration conducted in the Unit includes two 2-D surveys in 1983 with a total line length of 36,000 feet, and a 3-D survey completed in 1999 over the southern half of the Unit.

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 1999 to the present, there were no wells drilled within the Preserve. However, 17 directional wells were drilled from surface locations outside the Preserve to reach bottomholes inside the Preserve. In addition, the NPS determined that 11 other wells, not yet drilled, are exempt from the 9B regulations under § 9.32(e). Currently, there are 3 wells developing hydrocarbons from surface locations inside the Neches Bottom/Jack Gore Baygall Unit. There are 11 wells with surface locations outside the Unit developing mineral resources under the Unit; and 6 additional wells that have been exempt from the 9B regulations but have not been drilled. Also, there are 6 wells with surface locations inside the Unit that are being reclaimed at this time. Five active transpark pipeline corridors cross the Unit.

The directional drilling and production of the Hankammer Well No. 1 and increased exploratory drilling activity and new field development from future 3-D seismic exploration in and adjacent to

the Unit would result in an overall negligible, beneficial cumulative impact on the local and regional economies.

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

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.

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 (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. The only potential prime farmland soils outside the Unit are in the proposed flowline corridor, and are not available for agricultural use. Therefore, construction of the proposed flowline would result in short-term, negligible, adverse impacts to soils in the flowline corridor; there would be no effect on prime farmland soils.

Because there are no prime and unique farmland soils in the Unit, and there would be no effect on prime farmland soils outside the Unit, this impact topic is being dismissed from further analysis in this EA.

Water Resources, Floodplains, and Wetlands in and outside the Unit

The proposed Hankammer Well No. 1 site would be located approximately 2,459 feet west of the Unit boundary in an upland area at an elevation of 37.11 feet (NGVD 29). The proposed pad area is comprised of Votaw fine sands on 0 to 1 percent slopes. Just to the east of the proposed pad are Estes-Angelina complex soils of 0 to 1 percent slopes that are frequently flooded; likely due to the high water table in the area. The proposed pad is located in an area that was most recently used to grow pine trees.

Ground Water. As per the Texas Commission on Environmental Quality, usable-quality water occurs from the land surface to a depth of 1,950 feet. The interval from the land surface to a depth of 1,050 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 4,700 feet below ground level, 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 Railroad Commission of Texas, would result in ensuring the isolation of usable-quality water zones. Therefore, the proposed in-park operations, in addition to the subsurface portion of the connected action occurring outside the Unit would have no effect on usable-quality water zones either in or outside the Unit.

Floodplains. According to the Flood Insurance Rate Map (FIRM) for Hardin County, Texas, and Incorporated Areas (1992), produced by the Federal Emergency Management Agency, the proposed surface activities would be located within the 100-year floodplain of the Neches River. However, no base flood elevations for the area have been determined.

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, approximately 5 miles downstream from the point on the river closest to the proposed operations, also reflect the regulation.

C&E selected the proposed surface location for the proposed drilling and production activities based on a combination of factors that included finding an upland area to minimize the chance of inundation by floodwaters. Based upon the streamflow and peak flow data from the Evadale gage, it is anticipated that the proposed site would not be affected by a 100-year flood event.

C&E proposes to implement best management practices to prevent or minimize the potential for any accidental release or transport of drilling fluids or other contaminants from drilling and production activities. These include: complying with all applicable provisions of the Statewide Oil and Gas Rules; complying with a SPCC plan; constructing a ring levee around the wellpad to contain run-off; containing all drilling fluids and cuttings in above-ground storage tanks as part of a closed-loop mud system; disposing of drilling mud and well cuttings off-site rather than in on-site pits; constructing a 2-foot high earthen firewall around the tank battery, separation, and treating facility to contain the volume of the largest tank plus adequate freeboard to contain precipitation; and horizontal directional drilling of the flowline sections to avoid disturbing any wetlands.

The proposed in-park operations and the subsurface portion of the connected actions would have no effect on floodplains either in or outside the Unit. There is a remote possibility that prolonged rain events could result in stormwater flowing over or breaching the firewall around the tank battery, separation and treating facility. In this event, stormwater could provide a transport mechanism for sediments or any contaminants that may be accidentally released within the bermed area to be transported off the well/production pad and outside of the analysis area into wetlands and floodplains. Such an event would have impacts ranging from short- to long-term, localized to widespread, negligible to minor, depending on the amount of water and

velocity of flow, and the amount of sediment and type and quantity of contaminants being transported. Due to the distance to the Unit boundary and the buffer of vegetation between the well/production pad and Unit boundary, water transport of sediments and contaminants would be slowed, resulting in the reduction of possible impacts within the Unit to negligible intensity levels.

Wetlands. On July 12, 2004, Donald Sagrera, a certified soil scientist, and Tim Morton, a provisionally certified wetland delineator, gathered wetland data at the proposed well site. Based on the survey, there are no jurisdictional wetlands or other waters of the United States within the proposed well/production pad area. Construction of the pad would not require fill into waters of the U.S. and therefore would not require a Section 404 permit from the U.S. Army Corps of Engineers.

Should the well be placed in production, a flowline would be placed along the existing access road approximately 2.2 miles to tie into an exiting pipeline. A trench would be dug for the 4-inch diameter line to be placed a minimum 3 feet below ground surface. Where the line would cross wetland areas, installation of the line would be accomplished by horizontal directional drilling beneath these areas to avoid disturbing wetlands. C&E expects approximately 2,300 feet of the flowline corridor to be bored under wetland areas, but a formal wetland delineation of the flowline corridor was not completed. In the event that the gas sales/transportation line is bored under wetland areas, there would be no requirement for Section 404 permitting under the Clean Water Act.

The proposed in-park operations and the subsurface portion of the connected action would have no effect on wetlands either in or outside the Unit. The connected actions could result in indirect impacts on wetlands similar to those described above in the floodplains analysis. Stormwater could transport sediments and any accidentally released contaminants into adjacent wetland areas. Mitigation measures proposed by C&E are expected to minimize the effect of the proposed operations on wetlands, resulting in short- to long-term, localized to widespread, negligible to minor adverse effects. Due to the distance to the Unit boundary and the buffer of vegetation, water transport of sediments and contaminants would be slowed, resulting in the reduction of possible impacts on wetlands within the Unit to negligible intensity levels.

In conclusion, there would be no effect from in-park operations or the subsurface activities occurring outside the Unit on the water resources, floodplains, and wetlands in or outside the Unit. Connected actions would result in the potential for stormwater transport of sediment and any accidentally released contaminants into wetlands and floodplains, with impacts ranging from short- to long-term, localized to widespread, negligible to minor, adverse impacts.

Cumulative Impacts. 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 floodplain and wetland values may be incrementally lost. Reclamation of wetlands inside or outside the Preserve may not return sites to pre-disturbance conditions. Therefore, future development (including oil and gas activities) is expected to result in cumulative, minor, adverse impacts on water resources, floodplains, and wetlands in the analysis area.

Because of the low intensity of impact on water resources, floodplains, and wetlands, these impact topics are being dismissed from further analysis in this EA.

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 lands 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 Hankammer Well No. 1 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.

Though the bottomhole of the proposed well is in Jasper County, there is no anticipated effect on the resources in this county; so a species list for Jasper County is not included in this EA.

Please see Appendix A for a current listing by the U.S. Fish and Wildlife Service of the two threatened and endangered species in Hardin County. The FWS lists the Red-Cockaded Woodpecker and Texas Trailing Phlox as endangered. Appendix B includes a listing from the Texas Parks and Wildlife Department (TPWD) of threatened, endangered, and state-identified rare species that may occur in Hardin County. The state list includes a brief description of the habitats required by these species. Please note that this list is a DRAFT document and that there are some discrepancies between the species listed as federally threatened or endangered in this list and that produced by the FWS. There is no federally-designated critical habitat in or near Big Thicket National Preserve.

The proposed in-park subsurface operations, consisting of the directionally drilled wellbore crossing into the plane of the park at a depth of approximately 4,700 feet below ground level, 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.

On July 12, 2004, Tim Morton, of Tim Morton & Associates, Inc., a regulatory and environmental consultant to C&E, surveyed the proposed wellsite for the presence of listed species and their habitat requirements. Neither species nor their required habitats were found; therefore, the surface activities for the connected actions located at least 2,459 feet from the Unit boundaries would have no effect on the two federally-listed species.

NPS determines the directional drilling and production of the Hankammer Well No. 1 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 U.S. Fish and Wildlife Service (e.g. Red-cockaded woodpecker, Texas trailing phlox). 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 the distance from the proposed surface location of the operations from the Unit (see Table 3 of this EA). 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 there would also be no impacts on listed species on adjacent lands, threatened and endangered species and other species of management concern in and outside the Unit was dismissed from further analysis in this EA.

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 a depth of 4,700 feet below ground level, and extracting hydrocarbons from beneath the Unit would have no impact on Unit resources and values.

The connected actions would be located 2,459 feet from the Unit boundaries. Because of this distance, and due to the mitigation measures proposed by C&E (listed in Table 3 in this EA), there would be no effect on the following Unit resources and values:

Natural Soundscape. Construction and maintenance of the existing access roads, well/production pad, and flowline; and production 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 30-day drilling/completion of the well from the large gasoline and diesel engines used to power the drill rig, pumps, and auxiliary equipment. Sound levels could reach 90 decibels on the drill rig. At 1,500 feet from the drill rig, sound levels would approach background levels ranging around 40 decibels (USDI, 1994, and Foch, 1999). According to Cook and Haverbeke (1974), significant tree cover is known to attenuate noise levels by magnitudes of 18-25 dBA at 300 feet from the source. Almost the entire area between the proposed drilling/production pad and the Unit boundary is wooded. It is possible on a calm day, the drilling could be heard farther than 1,500 feet from the drill rig, but elevated noise from the drilling activities is not expected to extend into the Unit. During the long-term production life of the well, occasional workover operations could occur at 5 to 10-year intervals and take 1 to 2 weeks to complete. Workovers would increase noise levels, but at much lower intensity and duration than drilling a well. Due to the distance from the Unit, noise from the connected actions is not expected to extend into the Unit and therefore, would have no effect on natural soundscape in the Unit.

Lightscape Management. Construction and maintenance of the existing access roads, well/production pad, and flowline; 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 of the well from the lighting of the drill rig for 24 hour operations. During the long-term production life of the well there could be artificial lighting installed at the site. Also, occasional workovers on the well could occur at 5 to 10-year intervals and take 1 to 2 weeks to complete. Workovers could introduce artificial lighting as well. 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, and there is a buffer of woody vegetation over almost the entire distance between the two locations. Also, this area is in the 100 year floodplain and there is very little elevation change over the distance. The vegetation would have the effect of blocking the light from the site before it reaches the Unit. Therefore, connected actions at the proposed drilling/production location would have no effect on the lightscape of the Unit.

Geology and Soils. Because C&E 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 geology and soils are limited to surface impacts from vehicle use, construction, drilling, and fluid transport at the wellpad and flowline corridor. Due to the distance of the proposed connected actions from the Unit boundary, other mitigation measures proposed by C&E, as well as the proposed casing, cementing, and completion operations, there would be no effect 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 C&E will 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 at the wellpad and flowline corridor. Due to the distance of the proposed connected actions from the Unit boundary, other mitigation measures proposed by C&E, as well as the proposed casing, cementing, and completion operations, there would be no effect on the vegetation of the Unit from any of the connected actions proposed.

Fish and Wildlife. The only Unit habitat resource or value expected to be affected by the connected actions is air quality. The effects to Unit air quality are discussed in detail in Section 3 and are expected to be negligible in intensity at the most. All other habitat resources and values in the Unit discussed above would not be affected by the proposed connected actions. Due to the low intensity of impacts to the habitat resources and values in the Unit, it is expected that the connected actions would have no effect on the fish and wildlife in the Unit.

Cultural Resources. Because the connected actions would be located well outside the Unit boundary, the NPS does not expect any impacts to archeological resources, historic structures, ethnographic resources, or cultural landscapes within the Unit. Also, the proposed connected actions would occur well outside the Unit boundary. Therefore, there would be no effect on the cultural resources of the Unit from the connected actions that are part of the proposed operation.

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. Due to the low intensity of impacts to the other resources and values in the Unit, it is expected that connected actions would have no effect on the visitor use and experience in the Unit.

Because there would be no effects on natural soundscape, lightscape management, geology and soils, vegetation, fish and wildlife, cultural resources, and visitor use and experience in the Unit, 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.

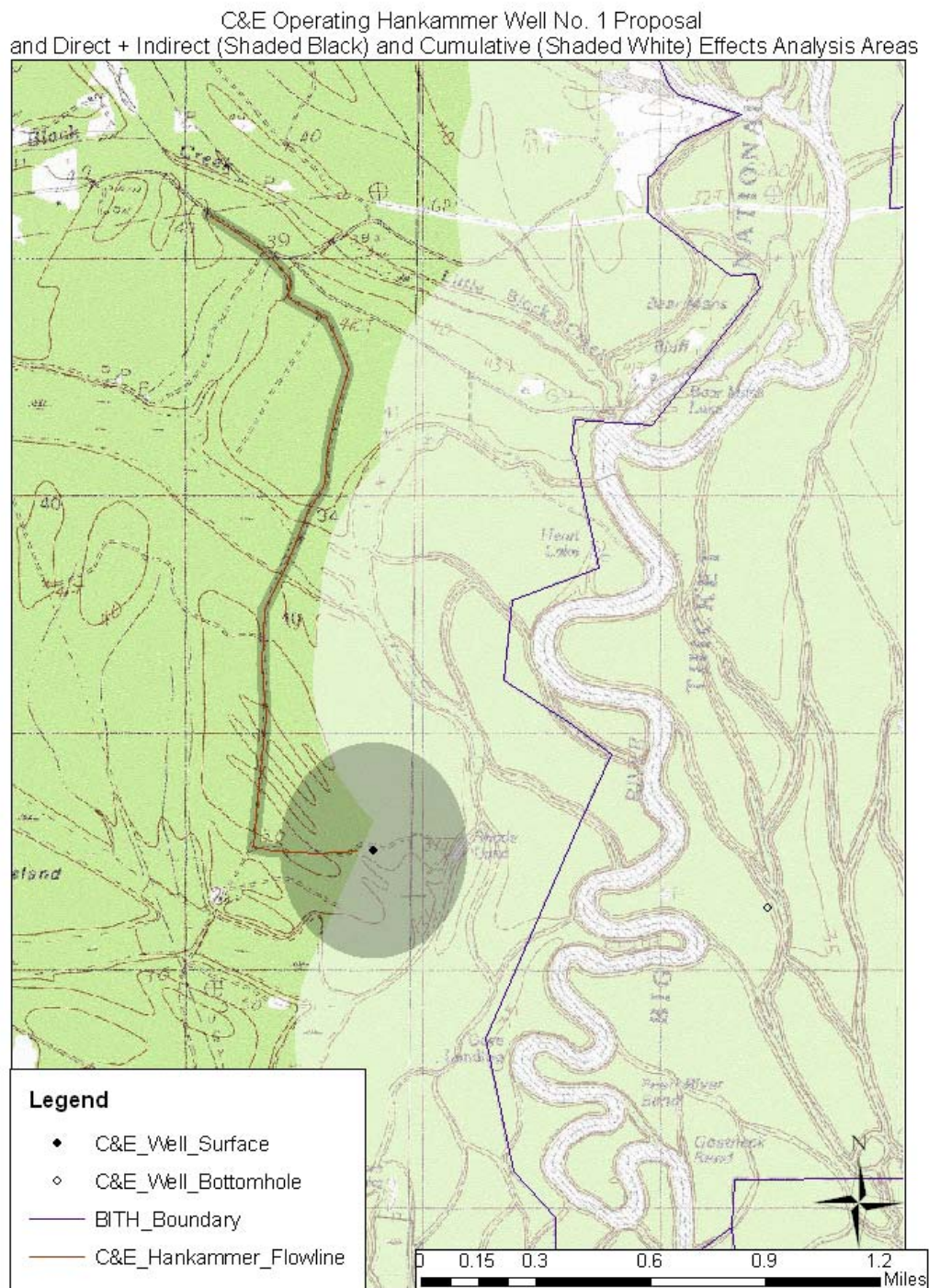
2.1 Alternative A, No Action

The no action alternative is required under the National Environmental Policy Act (NEPA) and establishes a baseline for comparing the present management direction and environmental consequences of the action alternative. Under no action, the Hankammer Well No. 1 would not be drilled.

2.2 Alternative B, Proposed Action, Application as Submitted

Under Alternative B, C&E would directionally drill the Hankammer Well No. 1 as proposed in its application. Figure 2 shows the proposed surface location and flowline route of the Hankammer Well No. 1 in relation to the Neches Bottom/Jack Gore Baygall Unit and the analysis areas.

Figure 2 Map showing the proposed surface location and flowline route of the Hankammer Well No. 1 in relation to the Neches Bottom/Jack Gore Baygall Unit and the analysis area.



2.2.1 Access

The proposed surface location of the well would be 2,459 feet west of the Neches Bottom/Jack Gore Baygall Unit boundary. No surface access in the Unit would be needed for any phase of drilling, production, transportation, or reclamation activities.

The proposed well would be located approximately 5.5 miles northeast of Silsbee, Texas. Access to the Hankammer Well No. 1 would be provided through the use of an existing logging road and portions of Trotty Horse Road. The total distance of the two roads inside the analysis area expected to be impacted by the movement of vehicles as well as installation of the proposed flowline is 11,589 feet or approximately 2.2 miles (11,589 feet x (1 mile/5,280 feet) = 2.2 miles). The majority of this distance is on Trotty Horse Road. No improvements to either road would be needed to accommodate C&E's proposed drilling and production activities.

2.2.2 Drilling

The proposed well would be drilled to a true vertical depth of approximately 8,000 feet with a measured depth of approximately 10,046 feet. C&E's proposed operations inside the Preserve would consist of directionally drilling an 8-3/4-inch hole that would enter the Neches Bottom/Jack Gore Baygall Unit at a point approximately 4,700 feet below ground level and would continue to the targeted total depth of approximately 8,000 feet below ground level.

As per TNRCC Form 0051 Depth of Usable-Quality Ground Water to be Protected, usable-quality water occurs from the land surface to a depth of 1,950 feet. The interval from the land surface to a depth of 1,050 feet contains water of superior quality which 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. C&E is expected to comply with all provisions of the Railroad Commission of Texas' statewide oil and gas rules to drill and eventually plug the well to ensure the protection of usable-quality water zones, as well as 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. Mitigation measures listed as part of the rig SPCC plan provided by C&E include - Drainage from undiked areas would be controlled as follows: the drillsite would be leveled before the rig is set; and a series of drainage ditches would be dug to course the flow of liquids back to the sump. Disposition of oil or oily effluent from secondary containment would normally be removed from the reserve pit by vacuum truck. The primary containment at the rig would be constructed of welded steel in accordance with normal industry design standards. Mud tanks would be equipped with pit level indicators and warning devices when weighted muds are used. All inlet and outlet valves would be manually operated and under the direct supervision of the designated rig supervisor. Before drilling below any casing string or during workover operations, a blowout preventions assembly and well control system would be installed that is capable of controlling and wellhead pressure that is expected to be encountered while that assembly is on the well. The casing and BOP installations would be in accordance with State and other regulatory agency requirements. Notifications, inspections, and countermeasures would be in accordance with the SPCC plan.

Drilling and completion operations should take approximately 30 days. 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 is located on managed timberland that has recently been clearcut, and would be placed directly over the existing logging road corridor. The cover photo is of the proposed location. The wellpad would measure 300 feet x 300 feet or 2.07 acres ($(300 \text{ feet} \times 300 \text{ feet}) \times (1 \text{ acre} / 43,560 \text{ feet}^2) = 2.07 \text{ acres}$). The site would be cleared and leveled by heavy machinery (bulldozer and excavator). A ring levee would be constructed around the drill site to contain runoff.

All drilling fluids and cuttings would be contained in above-ground storage tanks as part of a closed loop mud system. Disposal of drilling fluids and cuttings would occur offsite or downhole depending on C&E's acquisition of necessary permits and approvals.

Construction of the wellpad would not require fill into waters of the U.S. and therefore would not require a Section 404 permit from the U.S. Army Corps of Engineers.

2.2.3 Flowline

In the event that salable quantities of gas are discovered, an approximately 2.2 mile long (11,600 feet) 4-inch diameter flowline would be constructed along the access roads to transport product from the well to an existing pipeline. The flowline would be trenched and installed at a minimum depth of 3 feet below the surface. Temporary surface disturbance associated with the installation of the flowline is expected to affect a 20-foot wide corridor. This assumption gives an approximate area of possible surface disturbance of 231,780 feet² or 5.32 acres ($(11,589 \text{ feet} \times 20 \text{ feet} = 231,780 \text{ feet}^2)$ and $(231,780 \text{ feet}^2 \times (1 \text{ acre} / 43,560 \text{ feet}^2) = 5.32 \text{ acres})$). Where the flowline route crosses wetland areas, installation of the flowline would be accomplished by horizontal directional drilling beneath these areas. C&E expects the wetland crossings to total approximately 2,300 feet in length or about 0.4 miles; though a formal wetland delineation has not been completed.

2.2.4 Production Facilities

If salable quantities of oil and gas are discovered and the proposed well is completed as a producer of those fluids, a production facility 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 C&E's 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 which 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 C&E 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 would be reclaimed 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 original contours. The site would then be reclaimed in accordance with a surface use agreement with Temple-Inland Forest Products Corporation, the surface landowner.

In order to reduce impacts on the human environment, C&E 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 under Proposed Action (Alternative B)

No.	Mitigation Measures-Proposed Action (Alternative B)	Resource(s) Protected	Reference in § 9.32(e) Application
Project Planning and Site Construction			
1	C&E has included a Spill Prevention Control and Countermeasure (SPCC) Plan with their application.	all resources, and human health and safety	Section 5
2	C&E has sited the access road, flowline and well/production pad approximately 2,495 feet west of the Neches Bottom/Jack Gore Baygall Unit.	all resources and values in Big Thicket National Preserve	Section 3
3	C&E would construct a ring levee around the wellpad to contain run-off.	water resources, vegetation, soils	Section 3
4	C&E would schedule construction to avoid predicted rainfall events.	soils, vegetation	Section 6
Well Drilling			
5	C&E would directionally drill the well so that wellbore does not intercept useable quality groundwater inside the Preserve	groundwater in Preserve	Section 3
6	C&E would use a closed-loop containerized mud system.	water resources, soils, vegetation	Section 3
7	C&E would set surface casing according to State of Texas RRC requirements	groundwater	Section 3
8	C&E would dispose of drilling mud and	all natural resources	Section 3

No.	Mitigation Measures-Proposed Action (Alternative B)	Resource(s) Protected	Reference in § 9.32(e) Application
	well cuttings off-site or downhole depending on acquisition of necessary permits and approvals.	located on and adjacent to wellpad	
Production			
9	C&E would construct a firewall of earthen material and limestone which would be sufficiently impervious to contain spills around the tank battery, 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	Section 3
10	C&E would drain accumulated rainwater would be drained from secondary containment contingent upon the absence of any visible sheen.	water resources, soils	Section 3
11	C&E would ensure that drainage of ditches in and around the production facility would be visually inspected regularly by the facility operator.	water resources, soils	Section 3
12	C&E would use of sediment fencing and hay bales; mulching and seeding areas surrounding the site as needed.	water resources, soils	Section 6
13	C&E would notify regulatory authorities and Big Thicket Superintendent in the event of an emergency.	all natural resources	Section 1
14	C&E would bury the flowline a minimum depth of three feet along the edge of the existing road. Also, C&E would use horizontal directional drilling techniques to install the flowline sections that would travel under wetland areas.	soils, water resources, human health and safety, wildlife, geology, vegetation	Section 3
Well Plugging			
15	C&E would follow RRC Statewide rules for well plugging.	all natural resources	Section 3
Reclamation			
16	C&E would follow RRC Statewide rules for reclamation	all natural resources	Section 3
17	C&E would restore the area to original contours.	all natural resources	Section 3

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 C&E and Tim Morton and Associates, 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 a vertical well from a surface location inside the Unit directly over the bottomhole target was considered. Also considered were directional wells from surface locations 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, a new access road would have been needed. Access into the Unit from the west would have required crossing the Neches River. Access through the Unit from the east 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 C&E's directional drilling proposal, C&E has identified and applied mitigation measures, most notably directional drilling from a surface location 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.

C&E's 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 C&E 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 C&E 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 C&E, 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; precluding C&E access to develop its nonfederal oil and gas mineral interests.	Yes (+) C&E 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.	C&E would utilize 2.2 miles of existing roads to access the wellpad. No improvements to the roads would be required.
Well and Production Pad	The well and production pad would not be constructed because the wells would not be drilled.	Construction and maintenance of the well/production pad would require vegetation removal on 2.07 acres.
Flowline	The flowline would not be required because the well would not be drilled.	Should the well be productive, a 4-inch flowline would be placed along the existing access road approximately 2.2 miles to tie into an existing pipeline. Excavation of the

Actions	Alternative A No-Action	Alternative B Proposed Action
		trench to place the line would temporarily disturb up to 5.32 acres.
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 Railroad Commission of Texas requirements. Surface reclamation would be performed in accordance with lease and surface use agreements.

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 C&E Hankammer Well No. 1 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 C&E Hankammer Well No. 1 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.
Adjacent Landowners, Resources and Uses	Under Alternative A, No-Action, the C&E Hankammer Well No. 1 would not be drilled; therefore, there would be no new impacts on	Under Alternative B, Proposed Action, the C&E well would be drilled and may be completed to produce hydrocarbons. While

Impact Topic	Alternative A No-Action	Alternative B Proposed Action
	<p>adjacent landowners, resources and uses. However, existing impacts from vehicle use, commercial timber management 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; short- to long-term, localized, negligible to moderate, beneficial and adverse effects on geology and soils and vegetation; short- to long-term, localized, negligible to moderate, adverse effects on lightscape and soundscape; and short- to long-term, localized, 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, adverse effects on cultural resources; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, and vegetation; short- to long-term, localized to widespread, negligible to moderate, adverse effects on lightscape management and natural soundscape; and short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on wildlife.</p>	<p>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 flowline; 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, lightscape management, and natural soundscape; short- to long-term, localized, negligible to minor, beneficial and adverse impacts on geology and soils and vegetation; and short- to long-term, localized, negligible to minor, 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, adverse effects on cultural resources; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, and vegetation; short- to long-term, localized to widespread, negligible to moderate, adverse effects on lightscape management and natural soundscape; and short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse cumulative effects on wildlife.</p>

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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
- Adjacent Landowners, Resources, and Uses, focusing on an analysis of the following resources and values:
 - Cultural Resources
 - Geology and Soils
 - Lightscape Management
 - Natural Soundscape
 - 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 3-5).

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 road and flowline corridor) 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 Neches Bottom/Jack Gore Baygall Unit include a boat ramp on private lands at Johns Lake and 5 parking areas within the northern part of the Unit. The nearest visitor use developed area within the Unit is the Franklin Lake boat launch ramp and picnic area. It is located approximately 3.5 miles north northeast of the proposed C&E well location. It is the nearest federal government-maintained area to the proposal inside the Unit. The privately-owned Johns Lake boat launch ramp is the closest development to the proposed C&E well location. It is approximately 2 miles northeast of the site. It is possible to access the Unit from this 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. There is no hunting allowed on the southwest side of the Unit between the western bank of the Neches River and the Unit boundary. This is the portion of the Unit closest to the proposed surface operations.

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 Neches Bottom/Jack Gore Baygall 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 (Harcombe and Callaway, 1997).

Past oil and gas operations in the Unit resulted in the construction of five transpark oil and gas pipelines that predate the establishment of the Preserve. One of these pipelines will be used to transport salable quantities of produced gas to market.

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 National Park Service 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 for ground-level ozone.

The thresholds of change for the intensity of an 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
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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 readily detectable, 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 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 National Ambient Air Quality Standards (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 National Ambient Air Quality Standards (NAAQS) established under the Clean Air Act.

Conclusion for Alternative A, No Action

Under Alternative A, No Action, the C&E Hankammer Well No. 1 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.

Because there would be no major adverse impacts to 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 C&E Hankammer Well No. 1 would be drilled and possibly completed to produce hydrocarbons. Access road use, construction of the well/production pad and flowline; drilling and producing the well; any workover operations on the well; and eventual plugging/abandonment/reclamation of the C&E 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 (30-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 to 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 National Ambient Air Quality Standards (NAAQS) established under the Clean Air Act.

Cumulative Impact under Alternative B, Proposed Action

Similar to the effects discussed above under Alternative A, the primary source of cumulative impacts to 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 both localized and widespread, negligible to moderate, adverse cumulative impacts on air quality. These cumulative impacts are not expected to exceed National Ambient Air Quality Standards (NAAQS) established under the Clean Air Act.

Conclusion for Alternative B, Proposed Action

Under Alternative B, Proposed Action, the C&E Hankammer Well No. 1 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 to 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 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 National Park Service and through review of relevant literature.

Thresholds of change of the intensity of an impact are defined as follows:

Negligible:	Impacts on adjacent land uses and resources 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 adjacent land uses and resources 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 adjacent land uses and resources would result in a change that would be readily detectable, long-term, and localized. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful.

Major: Impacts on adjacent land uses and resources would result in a 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 Adjacent Landowners, Resources and Uses under Alternative A, No Action

Under Alternative A, No Action, the C&E 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, neither the surface owner (Temple-Inland) nor C&E have 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 and timber management. These activities are expected to contribute toward short- to long-term, localized, negligible to moderate, adverse impacts on any cultural resources. The surface owners in the analysis area would be responsible for their actions affecting cultural resources, and would have to coordinate with the State of Texas or any affected tribal historic preservation offices regarding those potential effects.

Geology and Soils. Votaw fine sandy soils, Cypress mucky clay, Estes-Angelina complex, Iulus-Bleakwood complex, Kenfick-Caneyhead complex, and Spurger very fine sandy 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 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 uses in the analysis area would continue with short- to long-term, localized, negligible to moderate, adverse impacts on geology and soils.

Lightscape Management. The analysis area is generally undeveloped. Therefore, it is relatively dark without sources of artificial lighting.

Existing impacts on the lightscape in the analysis area would continue as a result of vehicle use, recreational activities, development (including oil and gas activity), and commercial timber activities. The artificial lighting could interfere with views of the night sky and may affect wildlife. Light from these activities would have short- to long-term, localized, negligible to moderate, adverse effects on the lightscape of the analysis area.

Natural Soundscape. The proposed well site is located on managed timber land that has recently been clear-cut. Other timber tracts in the area may be harvested in the future. During harvesting, chainsaws, which reach approximately 135 dBA, may be used. Heavy machinery and vehicles, which can reach 90 dBA, are also used to cut, load, and remove the timber.

Existing impacts on the soundscape would continue as a result of vehicle use, recreational activities (including hunting), development (including oil and gas activity), and commercial timber activities. Elevated noise from vehicles and equipment used for these activities would result in short- to long-term, negligible to moderate, adverse impacts localized near sources.

Vegetation. The dominant overstory vegetation in the analysis area mapped by Hall and Harcombe (1997) includes sweetgum (*Liquidambar styraciflua*), basket 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*). A large portion of the vegetation in the area is planted pine (*Pinus sp.*), and some has recently been clear cut. Tim Morton and Donald Sagera listed some of the recognizable vegetation present in the debris of the logging operation at the site when completing a wetland delineation in July of 2004. Most of the above listed dominants were found. Other species noted included black gum (*Nyssa sylvatica*), yaupon holly (*I. vomitoria*), and muscadine grape (*Vitis rotundifolia*).

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. These activities would result in short- to long-term, localized, negligible to moderate, adverse impacts. Timber management activities in the analysis area could also cause long-term, localized, moderate, beneficial impacts to vegetation by producing timber.

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. The conversion of most of the land in the analysis area to managed pine plantation adds different vegetation and the process of cutting and regrowth also provides opportunities for some species while detracting from the habitat of others.

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 activities 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 artificial lighting is needed, the lighting could attract predatory species opportunistically feeding on insects drawn to the light. The beneficial effect would be to the predatory species and an 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.

Lightscape Management. Cumulative impacts on the lightscape would continue as a result of vehicle use, recreational activities, development (including oil and gas activity), and commercial

timber activities outside the Unit. The artificial lighting could interfere with views of the night sky and may affect wildlife. Light from these activities would create long-term, localized to widespread, negligible to moderate, adverse cumulative effects on the lightscape within the analysis area.

Natural Soundscape. Cumulative impacts on the natural soundscape would result primarily from oil and gas operations in and adjacent to the Unit, timber management outside the Unit, and recreational activities in and outside the Unit. Vehicles and equipment used would increase noise in the vicinity of the activity. Other possible noise sources include aircraft passing overhead and firearms during hunting season in and outside the Unit. Sound levels from these sources would range from 40 dBA (approximate ambient sound level in the Unit) to 160 dBA (for gunfire). Noise from all of these sources is expected to produce short- to long-term, negligible to moderate, adverse cumulative impacts on the soundscape, localized near sources.

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, negligible to moderate, adverse impacts on vegetation. Commercial timber and Preserve management are 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 C&E Hankammer Well No. 1 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, 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; short- to long-term, localized, negligible to moderate, beneficial and adverse effects on geology and soils and vegetation; short- to long-term, localized, negligible to moderate, adverse effects on lightscape and soundscape; and short- to long-term, localized, 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,

adverse effects on cultural resources; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, and vegetation; short- to long-term, localized to widespread, negligible to moderate, adverse effects on lightscape management and natural soundscape; and short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on wildlife.

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

Under Alternative B, Proposed Action, the C&E well would be drilled and may be completed to produce hydrocarbons. Possible effects from access road use, construction of the well/production pad and flowline; 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, lightscape management, natural soundscape, vegetation, and wildlife within the analysis area adjacent to the Unit are described below.

Cultural Resources. The NPS has no authority to require that C&E or Temple-Inland survey proposed project areas outside the Unit boundary, 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 cultural resources outside the Unit 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 flowline 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 access road, well/production pad, and flowline 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 7.39 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 site would be mechanically cleared and leveled resulting in the short-term disturbance to geology and soils on 2.07 acres. For drilling activities the pad would be covered with board mats, and if the well is a producer, crushed limestone would be imported to harden the 2.07 acre pad for production operations. If the proposed flowline is constructed there is the possible additive short-term disturbance of 5.32 acres of soils. Proposed mitigation measures to protect soils during the drilling and production activities include complying with SPCC Plans, constructing a ditch and levee around the wellpad, using a closed-loop containerized mud system, disposing of drilling mud and well cuttings off site, constructing a 2 foot firewall around the tank battery with the capacity to contain the volume of the largest tank 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 Temple-Inland would decide on the best use of the project area.

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 C&E. Therefore, the impacts on the geology and soils are expected to be short- to long-term, localized, negligible to minor, and adverse from the connected actions associated with the proposal. If the well is found to be a dry hole, or when it reaches its economic limit, the site would be reclaimed according to the surface use agreement between C&E and Temple-Inland. This proposal would result in short- to long-term, localized, minor, adverse impacts on geology and soils.

Lightscape Management. Use of proposed access roads, construction of the well/production pad and flowline; drilling and producing the well; any workover operations on the well; and eventual plugging/abandonment/ reclamation of the C&E well would have adverse effects on lightscape because of artificial lighting that may be needed to conduct those activities safely. These effects are expected to be primarily associated with the drilling phase of the proposal when 24 hour a day operations are anticipated. It is also possible that lighting would be installed at the proposed production location. The artificial lighting could interfere with views of the night sky and may affect wildlife.

Under Alternative B, the Proposed Action, the expected impacts to the lightscape of the analysis area are expected to be short- to long-term, localized, negligible to moderate, and adverse.

Natural Soundscape. Use of proposed access roads, construction of the well/production pad and flowline; drilling and producing the well; any workover operations on the well; and eventual plugging/abandonment/ reclamation of the C&E well would have adverse effects on natural soundscape in the analysis area. Vehicles and equipment used for these activities would increase noise levels. Similar to the effects on the lightscape described above, these impacts would be greatest during the proposed drilling operation because of the large diesel engines used to power the rig. It is expected noise impacts from drilling could reach up to 1,500 feet before attenuating to background levels. Possible noise impacts from the other phases of the proposed operation are expected to be of lesser intensity.

Under Alternative B, the Proposed Action, the expected impacts on natural soundscape are expected to be short- to long-term, negligible to moderate, and adverse, localized within 1,500 feet of sources.

Vegetation. Impacts on vegetation would be similar to those described above for geology and soils. Because the area is already clearcut, construction of the well/production pad would require minimal vegetation removal but would completely remove the vegetation from 2.07 acres. Timber production on that acreage would be lost until the well is plugged and abandoned and the site is reclaimed. If the well is completed and produces salable quantities of gas, an additional 5.32 acres of vegetation could be disturbed by the construction of the flowline. Therefore, the proposed activities could result in a total direct effect to vegetation on approximately 7.39 acres.

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 area are expected to be short- to long-term, localized, negligible to minor, and adverse from the connected actions.

Wildlife. The proposed operation would affect wildlife by the conversion of 2.07 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. Also possible is the short-term disturbance of approximately 5.32 acres of roadside habitat due to the construction of the proposed flowline. These activities could result in the loss of wildlife habitat on up to 7.39 acres, 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, drilling and production equipment, leaks or 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 fish and wildlife species. Artificial lighting, particularly during drilling of the well and workovers, would attract insects and their predators to the area, resulting in a short-term, localized, negligible, beneficial effect. 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, negligible to minor, 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, adverse effects on cultural resources; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, and vegetation; short- to long-term, localized to widespread, negligible to moderate, adverse effects on lightscape management and natural soundscape; and short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on wildlife.

Conclusion for Alternative B, Proposed Action

Under Alternative B, Proposed Action, the C&E 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 flowline; 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, lightscape management, and natural soundscape; short- to long-term, localized, negligible to minor, beneficial and adverse impacts on geology and soils and vegetation; and short- to long-term, localized, negligible to minor, 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, adverse effects on cultural resources; short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse effects on geology and soils, and

vegetation; short- to long-term, localized to widespread, negligible to moderate, adverse effects on lightscape management and natural soundscape; and short- to long-term, localized to widespread, negligible to moderate, beneficial and adverse cumulative effects on wildlife.

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4. o. 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.

4. 1. Individuals and Agencies Consulted

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

C&E Operating, Inc.

EBR Energy, LP

F. David Murrell

National Park Service

Big Thicket National Preserve, Beaumont, TX

Art Hutchinson, Superintendent

Curtis Hoagland, Chief, Resources Management Division

Intermountain Regional Office

Laurie Domler, NEPA/106 Specialist, Office of Planning and

Environmental Quality, Lakewood CO

Jim Bradford, Supervisory Archeologist, Cultural Resources,

Santa Fe, NM

Geologic Resources Division, Lakewood, CO

Carol McCoy, Chief, Branch of Planning, Evaluation and Permits

Edward Kassmann, Branch of Planning, Evaluation and Permits

Pat O'Dell, Petroleum Engineer, Branch of Planning, Evaluation
and Permits

Lisa Norby, Geologist, Branch of Planning, Evaluation and
Permits

Water Resources Division, Fort Collins, CO

Mike Martin, Hydrologist

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

Tim Morton and Associates, Inc.

Tim Morton, Provisionally Certified Wetlands Delineator

Donald Sagera, Certified Soil Scientist

Texas Commission on Environmental Quality

Texas Parks and Wildlife Department

U. S. Army Corps of Engineers

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 individuals, agencies, organizations, and businesses:

Chuck Rhinesmith, Alabama-Coushatta Tribe of Texas, Livingston, TX
Debbie Thomas, Alabama-Coushatta Tribe of Texas, Livingston, TX
Ellen Buchanan, Big Thicket Association, Tyler, TX
Kevin Cronin, Beaumont, TX
F. David Murrell, EBR, LP, Sugar Land, TX
National Park Service
 Linda Dansby, Regional Minerals Coordinator, Intermountain Region,
 Santa Fe, NM
 Chris Turk, Regional Environmental Quality Officer, Office of
 Planning and Environmental Quality, Intermountain Region,
 Lakewood, CO
 Carol McCoy, Chief, Branch of Planning, Evaluation and Permits,
 Geologic Resources Division, Lakewood, CO
Guy Grossman, Railroad Commission of Texas, District 3, Houston, TX
Phyllis Dunham, Regional Director, Sierra Club, Austin, TX
Brandt Mannchen, Chair, Big Thicket Committee, Lone Star Chapter, Sierra
 Club, Houston, TX
Chris Wilhite, Associate Regional Representative, Sierra Club, Austin, TX
Debra Beene, Archeologist, State Historic Preservation Office, Austin, TX
Tim Tindell, Manager, Minerals Land and Access, Temple-Inland Inc., Diboll, TX
Janice Bezanson, Texas Committee on Natural Resources, Austin, TX
Tim Morton, Tim Morton and Associates, Inc., Lafayette, LA
Bruce Bennett, U. S. Army Corps of Engineers, Galveston, TX
Edith Erfling, U. S. Fish and Wildlife Service, Clear Lake Field Office, Houston, TX

4. 3. List of Preparers

Haigler (Dusty) Pate, Oil and Gas Program Manager, Big Thicket National Preserve, Beaumont, TX

Victoria Barela, Program Assistant, Office of Minerals/Oil and Gas Support, Intermountain Region, Santa Fe, NM

Linda Dansby, Regional Minerals Coordinator, Office of Minerals/Oil and Gas Support, Intermountain Region, Santa Fe, NM

Don Hargrove, Environmental Protection Specialist, Big Cypress National Preserve, Ochopee, FL

Lisa Jameson, Biologist, Big Thicket National Preserve, Beaumont, TX

5. o. BIBLIOGRAPHY

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Appendix A

Southwest Region Ecological Services

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U.S. Fish & Wildlife Service

Endangered Species List

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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

View County List

Hardin County

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

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APPENDIX B
******* 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>Cycleptus 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 (*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 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
- 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, - Federally Listed Endangered/Threatened by Similarity of Appearance
- T/SA
- 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.