

Chapter Six: Environmental Consequences

CHAPTER OVERVIEW

The National Environmental Policy Act (NEPA) requires that federal agencies disclose, prior to taking action, the environmental impacts of that action, feasible alternatives to that action, and any adverse environmental effects that cannot be avoided if a proposed action is implemented. In this case, the proposed federal action includes preparing for Congress, a special resource study report and recommendation on whether or not the Waco Mammoth Site should be considered for designation as a new unit of the National Park System.

The following section of this study analyzes the potential impacts of implementing four alternative management frameworks for resource protection and visitor enjoyment of the special resources of the Waco Mammoth Site. The analysis focuses specifically on the consequences of each alternative on the **fundamental resources** of the Waco Mammoth Site, the **other resources** found there, the potential **visitor experience**, the **management and operations** of each managing entity, and the surrounding **socioeconomic environment**. This analysis provides the basis for comparing the consequences of implementing any of the management alternatives so that the most effective and efficient management framework for the Waco Mammoth Site can be identified.

There are number of assumptions made in this analysis that address the general level of development required to support each management scenario. However, it is important to remember that if the site were to become a new unit of the National Park System, NPS management policies require that a General Management Plan be prepared to clearly define what resource conditions and visitor experiences should be achieved and maintained over time. General Management

Plans provide a general framework and focus for future managers and include:

- 1) Measures for the preservation of the area's special resources as well as other resources found there (types of studies, inventories, and implementation and stewardship strategies).
- 2) Types and general intensities of development associated with public enjoyment & use of the area (including general locations, timing of implementation, and associated costs).
- 3) Implementation commitments for visitor carrying capacities for all areas of the unit.
- 4) Justifications for potential boundary modifications.

This chapter begins with a description of the methods and assumptions used for analyzing each impact topic. The analysis is organized by alternative and then by impact category and topic. The existing conditions for all of the impact topics that are analyzed were identified in "Chapter Five: Affected Environment." All of the impact topics are assessed for each alternative. For each impact topic, there is a description of the specific actions under each alternative that would result in either a beneficial or adverse impact and a discussion of cumulative effects.

The impacts of each alternative are summarized in table 5 found at the end of "Chapter Four: Alternatives for Management."

METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

Methodology

Generally, the methodology for resource impact assessments follows direction

Table 7: Impact Intensity Threshold Definitions

Impact Intensity/ Impact Topic		Negligible Impact	Minor Impact	Moderate Impact	Major Impact
Fundamental Resources	In Situ Specimens and Geological Context of the Discovery Site	Impacts are at the lowest level of detection—barely perceptible and not easily measured.	Impacts are slight but detectable. The impact affects an area of the site with modest data potential.	Impacts are readily apparent. The impact affects an area of the site with high data potential.	Impacts are severe or of exceptional benefit. The impact affects an area of the site with exceptional data potential.
	Paleontology Collections (museum collections)	Impacts are at the lowest levels of detection—barely perceptible and not easily measured.	Adverse impact -would affect integrity of a few items in the museum collection but would not degrade the usefulness for future research and interpretation. Beneficial impact -would stabilize current conditions of museum collections and/or its constituent components to minimize degradation.	Adverse impact - would affect integrity of many items in the museum collection or archives and diminish the usefulness of the collection or archives for future research and interpretation. Beneficial impact -would improve conditions of museum collections, protect its constituent components from threats of degradation, and/or enhance the usefulness for research or interpretation.	Adverse impact - would affect the integrity of most items in the museum collection and destroy the usefulness of the collection and/or archives for future research and interpretation. Beneficial impact -would secure conditions of museum collections as a whole or its constituent components from threats of further degradation and enhance the usefulness for research or interpretation.
Other Resources	Soils and Prime Farmlands	Impacts are at the lowest level of detection—barely perceptible and not easily measured.	Impacts would be detectable and result in a change to soil character and productivity over a relatively small area.	Impacts would be readily apparent and result in a change to soil character and productivity over a relatively wide area.	Impacts would be readily apparent and substantially change the soil character and productivity over a majority of the study area.
	Floodplains	There would be no detectable change in a floodplain values and fluctuations or the ability to convey floodwaters.	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and local. Addition of structures within the floodplain would have a very limited potential to increase flood levels.	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be appreciable and local. Addition of structures within the floodplain would have the potential to increase flood levels.	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be considerable, and widespread. Addition or removal of structures in the floodplain would change flood levels.

Table 7: Impact Intensity Threshold Definitions

Impact Intensity/ Impact Topic		Negligible Impact	Minor Impact	Moderate Impact	Major Impact
Other Resources	Wetlands	No measurable or perceptible changes in wetland size, integrity, or continuity would occur.	The impact would be measurable or perceptible, but slight. A small change in size, integrity, or continuity could occur due to short-term indirect effects such as construction-related runoff. However, the overall viability of the resource would not be affected.	The impact would be sufficient to cause a measurable change in the size, integrity or continuity of the wetland or would result in a small, but permanent, loss or gain in wetland acreage.	The action would result in a measurable change in all three parameters (size, integrity, and continuity) or a permanent loss of large wetland areas. The impact would be substantial and highly noticeable.
	Vegetation	Individual native plants may be impacted, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.	Impacts on native plants would be measurable or perceptible, but would impact a small area. The viability of the plant community would not be impacted and the community, if left alone, would recover.	A change would occur over a relatively large area in the native plant community that would be readily measurable in terms of abundance, distribution, quantity, or quality.	Impacts on native plant communities would be readily apparent, and would substantially change vegetation community types over a large area. Changes might have effects on the viability of some species.
	Wildlife and Wildlife Habitat	There would be no observable or measurable impacts on native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural population fluctuations.	Impacts would be detectable, but they are not expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining them.	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they could be outside the natural range of variability.	Impacts on native species, their habitats, or natural processes sustaining them would be detectable, and expected to be outside the natural range of variability. Key ecosystem processes might be affected. Changes to habitat might have effects on the viability of some species.
	Special Status Species Definitions are consistent with section 7 of the Endangered Species Act.	<i>No effect:</i> The action would cause no effect on the species or critical habitat.	<i>Not likely to adversely affect:</i> The action would be expected to result in insignificant and discountable effects on a species or critical habitat (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated), or it would be completely beneficial.	<i>Likely to adversely affect:</i> The action would result in a direct or indirect adverse effect on a species or critical habitat, and the effect would not be discountable or completely beneficial.	<i>Likely to adversely affect:</i> The action would result in a direct or indirect adverse effect on a species or critical habitat, and the effect would not be discountable or completely beneficial.

Table 7: Impact Intensity Threshold Definitions

Impact Intensity/ Impact Topic	Negligible Impact	Minor Impact	Moderate Impact	Major Impact
Visitor Experience	Visitors would likely be unaware of any effects associated with implementation of the alternative.	Some characteristics of visitor use and/or experience would change, and visitors would likely be aware of the effects associated with implementation of the alternative.	Multiple characteristics of visitor experience would change. Visitors would be aware of the effects associated with implementation of the alternative.	Areas of the park containing fundamental resources are made available and accessible for visitor experience opportunities for the first time. Multiple characteristics of visitor experience would change substantially. Visitors would be aware of the effects associated with implementation of the alternative.
Management Operations (City of Waco, Mayborn Museum Complex, and National Park Service)	Impacts to an entity's operations that would be at a low level of detection and would not appreciable change their current operations.	Impact to an entity's operations that may increase (adverse) or decrease (beneficial) operational expenses, but would not require changes in current staffing levels.	Impact to an entity's operations that would be readily apparent and result in increases (adverse) or decreases (beneficial) in staffing and/or operational expenses. Programs and/or efforts would need to be re-prioritized to accommodate expanded responsibilities.	Impact to an entity's operations that would be readily apparent, result in substantial increases (adverse) or decreases (beneficial) in staffing and/or operational expenses, and would be markedly different from their current operations.
Socioeconomic Environment	Impacts to the economic environment are at the lowest level of detection—barely perceptible and not easily measured.	Impacts to the economic conditions would be slight but detectable.	Impacts to the economic conditions would be readily apparent. Any effects would result in changes to economic conditions at the Waco MSA level.	Impacts to the economic conditions would be readily apparent. Measurable changes in economic conditions at the central Texas regional level occur. The impact is severely adverse or exceptionally beneficial in the affected area.
	Impacts to the community are at the lowest level of detection—barely perceptible and not easily measured.	Impacts to the community would be detectable and only affect a small portion of the surrounding population.	Impacts would be readily apparent and affect community conditions.	Impacts to the community would be readily apparent and affect community conditions. The impact is severely adverse or exceptionally beneficial in the affected area.

IMPACT TOPICS AND CUMULATIVE EFFECTS SCENARIOS

The team’s method for analyzing each impact topic is further described below.

Also, in order to assist in the analysis of the cumulative effects resulting from the actions in each alternative, a “Cumulative Effects Scenario” was developed for each impact topic. To determine potential cumulative effects, other actions within and surrounding the Waco Mammoth Site were identified. Depending on the impact topic, the context included the central Texas region, McLennan County, the city of Waco, Baylor University’s Mayborn Museum, or the National Park Service. To establish an understanding of the cumulative effects scenario, a short description of relevant past, present, and reasonably foreseeable future actions is included under the introduction of each impact topic that follows this section.

An assessment is made to determine the *effects of these other actions* on each impact topic, which is later combined with the impacts described for each alternative under the environmental consequences section to determine the overall cumulative impact for that component of the environment. The effect of each alternative relative to the overall cumulative impact is also identified.

Fundamental Resources of the Waco Mammoth Site

This impact category considers the effects of each management alternative on the fundamental resource components that collectively represent the special resources of the Waco Mammoth Site. This was examined under two impact topics. The first examines potential impacts to the *in situ* specimens and the geologic context of the discovery site; the second examines potential impacts to the paleontological collections that include the collected specimens and the archival record (typically referred to as museum collections in the National Park Service).

Cumulative Effects Scenario for the In Situ Specimens and Geologic Context

The context for potential cumulative effects under this impact topic covers the *in situ* specimens and geologic context of the Waco Mammoth Site. Other past, present or foreseeable future actions that were considered as part of the *cumulative effect* analysis included the following activities.

Since the initial discovery of the site in 1978 through 1996, staff from Baylor University’s former Strecker Museum as well as a host of volunteers from the Waco community have actively investigated the site. Their efforts have preserved vital information relating to the geologic context of the site, and include topographic surveys of bone positions, a photographic record of excavation activities, and collected soil samples.

The recent research conducted by John Bongino as a part of his masters’ thesis through Baylor University’s Department of Geology has provided valuable additional information and interpretation of the soil stratigraphy and geologic context of the discovery site. His work has resulted in a refinement of the understanding of the circumstances surrounding the concentration of mammoths discovered there. His findings indicate that a herd of 19 adult female and juvenile mammoths succumbed in a single event, while also suggesting there were subsequent accumulations later in time.

Current actions underway by the Waco community—erecting the protective shelter over the discovery site and improving site drainage to arrest further soil erosion threatening the resource—should stabilize current conditions. This initiative will ensure the long-term protection of the geologic context by preserving the soil stratigraphy surrounding the *in situ* specimens and assuring that future scientific research opportunities could continue to provide information to enhance the understanding of this special resource. These actions will also allow for the accommodation of controlled visitor access into the shelter to view the *in situ*

mammoth specimens and protect the resource from potential vandalism.

Since all of these activities focus on areas of exceptional data potential, collectively they represent a major, long-term beneficial impact on the *in situ* specimens and geological context of the Waco Mammoth Site.

Cumulative Effects Scenario for the Paleontological Collections (museum collections)

The context for potential cumulative effects under this impact topic covers the museum collections of the Baylor University's Mayborn Museum Complex as this is the current location of the Waco Mammoth Site's paleontological collection. It also includes the museum collections of the National Park Service's Intermountain Region as some alternatives consider including the Waco Mammoth Site's collection into the museum collections of the National Park Service. Other past, present or foreseeable future actions and activities that were considered as part of the *cumulative effect* analysis include:

The construction of Baylor University's \$23 million Mayborn Museum Complex in 2004, vastly improved the conditions of the University's Strecker Museum collections. The Strecker Museum was the oldest continuously operating museum in the state until it closed in 2003, and the collections were moved to the new 35,000 square foot complex. The Waco Mammoth Site's paleontological collections and archives were previously housed within the Strecker Museum. The museum was located in the basement of Baylor University's Sid Richardson Science Building which had limitations on space (5,000 square feet), security, and climate control capabilities. This location did not provide ideal conditions for the long-term curatorial care of the collection. With the new facility, museum staff can continue to accession and catalogue for curation of prehistoric and historic objects, artifacts, works of art, archival documents, and natural history specimens from the

central Texas region. As these actions secure the condition of the collection and archives from threats of further degradation they represent a major, long-term beneficial impact on the University's central Texas museum collections.

Looking at National Park Service museum management practices, the current trend has been to provide designated centralized repositories with space for collections meeting museum standards in accordance with the approved NPS *Museum Collection Facilities Strategy, Intermountain Region* (National Park Service 2005b). Following this protocol, a number of National Park Service units within the state of Texas have made arrangements with the University of Texas at Austin to provide for the curatorial care of their paleontological collections. This represents a moderate, long-term beneficial impact on the National Park Service's Intermountain Region's museum collections as park units have not had to invest in duplicate collections storage facilities and the research community is provided a convenient centralized location to study and compare specimens found across a wide region of the state and beyond.

Other Resources of the Waco Mammoth Site

This impact category evaluated the general anticipated effects of the alternatives on several components of the natural environment such as soils and prime farmland; floodplains and wetlands; vegetation, wildlife, habitat, and special status species.

Cumulative Effects Scenario for Soils and Prime Farmlands

The context for potential cumulative effects under this impact topic covers the soils and prime farmlands within McLennan County. Other past, present or foreseeable future actions and activities that were considered as part of the *cumulative effect* analysis include:

Under current actions already underway by the Waco community, the study area would be

minimally developed to protect paleontological resources and to provide for visitor access to the Waco Mammoth Site. It is anticipated that there would be minor, long-term adverse impacts resulting from the localized loss of soil and prime farmland to accommodate the construction of the excavation shelter and infrastructure needed to protect the resource and provide for visitor access.

Looking beyond the study area, previous and continuing development activities within McLennan County have converted prime farmland into residential neighborhoods, commercial centers, industrial parks, and other uses that have resulted in major, long-term adverse impacts on these resources.

Collectively, since these changes are readily apparent and result in a change to soil character and productivity over a relatively wide area of McLennan County, they represent a moderate, long-term adverse impact on this resource.

Cumulative Effects Scenario for Floodplains and Wetlands

The context for potential cumulative effects under this impact topic covers floodplains and wetlands of the Bosque River watershed within McLennan County. Other past, present or foreseeable future actions and activities that were considered as part of the *cumulative effect* analysis include:

Looking beyond the study area, previous agricultural practices, urban and residential development have incrementally adversely affected floodplains and wetland areas within the Bosque River watershed.

The creation of Lake Waco in 1965 has provided the Waco community the benefits of flood control, water supply, and recreation. By design, the dam has altered the frequency of river flooding downstream of this structure. The creation of the Lake Waco Wetland Area has provided some mitigation for the resource impacts of the reservoir.

Since collectively these changes are readily apparent and have altered floodplain and wetland values and functions over a relatively large area of the watershed, they represent a moderate, long-term adverse impact on these resources.

Cumulative Effects Scenario for Vegetation, Wildlife, Habitat, and Special Status Species

The context for potential cumulative effects under this impact topic covers the vegetation, wildlife, habitat, and special status species of McLennan County. The following past, present or foreseeable future actions and activities were considered as part of the *cumulative effect* analysis.

Previous ranching activities and the attendant cattle grazing within the study area have altered native vegetation patterns and wildlife habitat resulting in moderately adverse although reversible effects on the site.

Under current actions underway by the Waco community, the study area would be minimally developed to protect paleontological resources and to provide for visitor access to the Waco Mammoth Site. These actions would create minor, long-term adverse impacts on existing vegetation, wildlife, habitat, and special status species by dedicating a portion of the landscape to infrastructure and thereby removing a portion of the study area's vegetation and wildlife habitat to accommodate protection and presentation of these special resources.

Looking beyond the study area, previous urban and residential development along with widespread agricultural activities within McLennan County has resulted in a substantially modified natural environment. These activities have essentially carved the county into isolated islands of native vegetation and wildlife habitat. The website Texas Handbook Online references a number of extirpated species: antelope, bison, bear, and javelins that once existed within McLennan County prior to its extensive settlement. Other actions such as the creation of Lake Waco, has resulted in a loss of habitat

for some species while creating habitat for others. The creation of the Lake Waco Wetland Area has provided some measure of mitigation for habitat loss. Future actions, such as increasing population growth and urbanization could further reduce and adversely impact these resources.

Since collectively these activities have substantially changed vegetation community types and wildlife habitat over a large area of the county resulting in a number of extirpated species and a number of designated special status species, they represent a major, long-term adverse impact on the vegetation, wildlife, habitat, and special status species of McLennan County.

Visitor Experience

Throughout the study process, the public has expressed an unwavering desire to experience the special resources of the Waco Mammoth Site. This impact topic includes various aspects of visitor use at the Waco Mammoth Site, including the effects on visitors' ability to access and experience the site's fundamental resources; opportunities for orientation, interpretation, and education; the freedom to experience the resources at one's own pace; and opportunities for the scientific community to conduct research.

Cumulative Effects Scenario for the Visitor Experience

The context for potential cumulative effects under this impact topic covers the visitor experience opportunities within the city of Waco. The following past, present or foreseeable future actions and activities were considered as part of the *cumulative effects* analysis.

Currently, visitor access to the Waco Mammoth Site is restricted and would continue to be so until the current actions already underway by the Waco community to erect an excavation shelter and provide for visitor access are completed. This would be the first time that public access would be accommodated at the site and marks a very

special milestone for members of the Waco community who have been actively involved in preservation efforts there for almost 30 years. At least 12 public events at the site would be scheduled throughout the year during the early phases of the park's establishment. However, it is assumed that this schedule would be expanded with the assistance of the Waco Mammoth Foundation. Since public access to the fundamental resources of the Waco Mammoth Site will be provided for the first time by this community effort, this represents a major, long-term, beneficial impact to the visitor experience.

There are a number of other visitor experience opportunities available for folks who live within the surrounding community and for those visiting the greater Waco area. They include Baylor University's Mayborn Museum Complex, a natural science and cultural history museum focusing on the central Texas region; Cameron Park, a 416-acre municipal park along the Bosque and Brazos river corridors; the Cameron Park Zoo, a 52-acre natural habitat zoo located along the Brazos River corridor; Lake Waco, a manmade recreational reservoir located on the Brazos River 3 miles upstream of the study area; the Dr. Pepper Museum, which commemorates the creation of this popular beverage in the Waco area as well as the soft drink industry; the Texas Ranger Hall of Fame and Museum and the contemporary headquarters station of Ranger Company F of the Texas Rangers; and the Taylor Museum of Waco History.

There are a number of foreseeable future actions planned for the Waco area that will continue to enhance visitor experience opportunities there. Renovations are planned for the Convention Center, Texas Ranger Hall of Fame, the library, and Cameron Park.

Since all of these activities collectively contribute to a greatly enhanced array of visitor experience opportunities available within the city of Waco, they represent a

major, long-term beneficial impact on the visitor experience opportunities within the city of Waco.

Management and Operations

The impact topic includes evaluating the effects of the alternatives on existing management and operations of the city of Waco, Baylor University, and National Park Service. The analysis was conducted in terms of how operations, staffing, and expenses might vary for each group under each management scenario.

Cumulative Effects Scenario for Management and Operations

The context for potential cumulative effects under this impact topic covers the management and operations of the city of Waco, Baylor University's Mayborn Museum Complex, and the National Park Service. Other past, present or foreseeable future actions and activities that were considered as part of the *cumulative effect* analysis include:

Under current actions planned by the Waco community, the construction of the excavation shelter and infrastructure to protect the resource and to accommodate visitor use, the city of Waco Parks and Recreation Department would acquire additional facility management responsibilities.

As the city of Waco grows, the need to provide for expanded city services will also grow. Depending on the health of the city's economy, this may or may not strain city budgets to maintain the level of services currently provided throughout the city. This potentially represents a minor to moderate, long-term adverse impact on the management and operations of the city of Waco.

The construction of the 35,000-square-foot Mayborn Museum Complex at Baylor University has greatly enhanced the management of the museum collections previously housed in the University's former Strecker Museum (5,000 square feet). The opening of the new museum expanded their

museum operations, which required an increase in staffing and expenses to operate and maintain this larger museum complex. This represents a minor to moderate, long-term adverse impact on the management and operations of the Mayborn Museum Complex.

The National Park Service continues management and operations of nearly 400 units nationwide. Work on reducing the backlog of deferred maintenance effects on park infrastructure throughout the system continues to be addressed. The implementation of inventory and monitoring programs for park resources continues. Operational funding levels are maintained without appreciable increases to offset the effects of inflation or new mandates, although there is the potential for increased annual funding through the Centennial Challenge program currently under consideration by Congress. NPS managers continue to balance the accommodation of visitor use with the resource protection needs of these units. This represents a minor to moderate, long-term adverse impact on the management and operations of the National Park Service.

Socioeconomic Environment

To evaluate the socioeconomic impacts of each alternative, this impact topic was broken down into two components. The first component examines the effects on the economic environment and the second component examines the effects on the surrounding community.

Economic Environment

In 2001, a report titled "*The Economic Impact of the Waco Mammoth Park on the Central Texas Region*" was prepared by Dr. Tom Kelly, economist and Director of Baylor Center for Business and Economic Research. In this study, Dr. Kelly projected that basic income would come from two sources: 1) from the construction, operations, and maintenance of the facilities and 2) from visitors traveling from outside the region and spending within the local economy.

Dr. Kelly applied the central Texas region's expenditure multiplier for construction of new educational facilities (2.325) and the expenditure multiplier for tourism visitors (2.827) according to an input-output model estimated by the Ray Perryman Group. He also projected that 10% of the visitors to the site would spend at least one additional person day (and \$80 per person) in the central Texas region.

For the purposes of this analysis, Dr. Kelly's methodology has been applied to each of the alternatives to project their economic impact. Projected visitation rates were based on the more conservative assumptions identified in the 2003 Lord Report, which projected 30,000 visitors per year after the third year of operation. The initial construction costs and annual operating costs were developed by the assumptions listed for level of development and delegation of management responsibilities identified under each alternative.

Community

This second component of the socioeconomic environment includes qualitatively analyzing the consequences of the management alternatives on the characteristics and components of the surrounding community that included adjacent landowners, the greater Waco area, and the central Texas region.

Cumulative Effects Scenario for the Socioeconomic Environment

The context for potential cumulative effects under this impact topic covers socioeconomic environment within the Waco MSA and central Texas region. Other past, present or foreseeable future actions and activities that were considered as part of the *cumulative effect* analysis include:

Under current actions planned by the Waco community, the construction of the excavation shelter and infrastructure to protect the resource and to accommodate visitor use will provide a onetime impact on the economy of the Waco MSA. Using the central Texas region's expenditure multiplier

for the construction of new educational facilities (2.325), the \$3.2 million effort could potentially provide over \$7.4 million to the Waco MSA. When visitor access is accommodated, this would also provide additional on-going beneficial economic impacts from visitor spending in the area.

Looking beyond the study area, past, present and future population growth and urban development would continue to affect the social and economic environment.

In addition to the Waco community initiative to erect a protective shelter and provide for visitor access at the Waco Mammoth Site, the community is involved in a number of other initiatives. The Greater Waco Strategic Economic Development Plan, completed in 2005, identified a number of goals to achieve a stronger, more sustainable economy and quality of life in the area. These included strengthening the economy, developing the workforce, retaining and attracting more businesses, residents, and visitors, revitalizing strategic community areas such as reinvigorating the downtown area and the Brazos riverfront.

A number of projects currently underway in the downtown area include the renovation of the Hilton Hotel, the construction of a new \$4 million building for the Greater Waco Chamber of Commerce, and a \$60 million mixed-use private development called Waco Town Square.

There are a number of foreseeable future actions planned for the Waco area. Last May (2007), city of Waco voters approved the first city bond issue in 40 years. They approved a \$63 million bond package to refurbish the Convention Center (\$17.5 million), build a new library and improve the central library (\$12 million), add two fire stations (\$6.8 million), move police headquarters (\$13 million), renovate Knox Hall at the Texas Ranger Hall of Fame (\$2 million), and renovate parks (\$11.7 million) which includes Cameron Park (\$6.9 million) which is

provided in the Council on Environmental Quality (CEQ) Regulations for Implementing the National Environmental Policy Act, Parts 1502 and 1508. Additional guidance has been provided by the National Park Service Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision Making*. The impacts from the four alternatives were evaluated in terms of their context, type, intensity, and duration as defined below.

Context and Type

Each impact topic addresses impacts on resources inside and outside the project study area; to the extent those impacts are traceable to the actions described in each alternative. If there are impacts, they can either provide a benefit (beneficial) or create a negative consequence (adverse) on a particular resource or value.

Intensity and Duration

Impacts are analyzed in terms of their intensity and their duration. The criteria used to define the thresholds for assigning intensity are presented in the Impact Intensity Threshold Definitions Matrix (Table 7). Duration can be short-term or long-term. Short-term impacts are typically impacts that last for a temporary period of time (usually not more than 1-3 years) or may be intermittent depending on the activity. Long-term impacts are those impacts that persist indefinitely beyond an action or activity.

Direct and Indirect Impacts

Direct impacts would be caused by an action and would occur at the same time and place as the action. Indirect impacts would be caused by the action and would be reasonably foreseeable but would occur later in time, at

another place, or to another resource. Impacts are assumed to be direct unless otherwise indicated.

Cumulative Impacts

Regulations implementing NEPA issued by the CEQ require the assessment of cumulative impacts in the decision-making process for federal actions. 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). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Impact Analysis

The impacts of the action alternatives (alternatives B, C, and D) describe the *difference* between implementing the no-action alternative (alternative A) and implementing the action alternatives. To understand a complete "picture" of the impacts of implementing any of the action alternatives, the reader must also take into consideration the impacts that would occur under the no-action alternative.

The study team based the impact analysis described in this chapter primarily on the information gathered through consultations with the staff of Baylor University's Mayborn Museum Complex, the city of Waco, and other agencies; guidance provided by NPS subject matter experts; a review of existing literature and studies; and professional judgment.

approaching its 100 year anniversary in 2010, Cameron Park East (\$2.1 million), and trail improvements (\$0.9 million).

The city is actively promoting the enhancement of the Brazos River Corridor throughout the downtown area as well as in the vicinity of the Waco Mammoth Site. Greenway corridors and connecting trails are planned to connect the Waco Mammoth Site with other features along the corridor.

As improvements to Waco's downtown and enhancements to their park system are implemented, it projected that this would increase business activity and tourism in the area. This in turn would generate increased visitor spending in the area and generate revenue for the business community as well as

local and state governments providing a moderate, long-term economic benefit to the Waco MSA and central Texas region.

Waco residents could potentially experience minor, long-term adverse impacts from the increase in traffic generated by these improvements. Although, it is equally expected that the enhanced range of shopping and entertainment opportunities would provide moderate, long-term benefits to the community.

Collectively, these changes represent moderate long-term beneficial impacts on the socioeconomic environment of the Waco MSA.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE A

Continue Current Management Trends (No-Action Alternative)

Impacts on Fundamental Resources of the Waco Mammoth Site

In Situ Specimens and Geologic Context of the Discovery Site

Analysis. Under this alternative, the staff at Baylor University's Mayborn Museum Complex would continue to monitor conditions and ensure the *in situ* paleontological resources are stabilized and preserved. The current moratorium on further excavation activities would remain in place. As a result of these actions, it is anticipated that there would be no impact to the current conditions of the *in situ* specimens and geologic context of the discovery site.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the *in situ* specimens and the geological context of the discovery site are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. Alternative A would have no impacts on these resources and therefore would not contribute to the effects of these other actions. Consequently, there would be no cumulative impacts to the *in situ* specimens and the geological context of the discovery site under alternative A.

Conclusion. There would be no impacts to the *in situ* specimens and geologic context of the discovery site from the actions under alternative A. Correspondingly, there would be no cumulative effect.

Paleontological Collections (Museum Collections)

Analysis. Baylor University's Mayborn Museum Complex would continue to provide climate-controlled secured storage of the paleontological collections and archives, which include the records of site excavation and research. Access to the collections would continue to be convenient. Specimens in plaster jackets would continue to be stored

but not prepared as the museum does not have preparation laboratory for paleontological specimens. In the reasonably foreseeable future for protection and preservation of these resources, it is expected that the current conditions would remain unchanged and therefore there would be no impact to these resources.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the Mayborn Museum's museum collections are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. Alternative A would have no impacts on these resources and therefore would not contribute to the effects of these other actions. Consequently, there would be no cumulative impacts to paleontological collections of the Mayborn Museum under alternative A.

Conclusion. There would be no impact to the paleontological collections and archives of the Waco Mammoth Site from the actions under alternative A. Correspondingly, there would be no cumulative effect.

Impacts on Other Resources

Soils including Prime Farmlands

Analysis. Under this alternative, it is assumed that the study area would not be further developed, thereby preserving a majority of the soils and prime farmland found there. Consequently, there would be no impact to the current condition of these resources.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the soils and prime farmland of McLennan County are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. Alternative A would have no impacts on these resources and therefore would not contribute to the effects of these other actions. Consequently,

there would be no cumulative impacts to soils and prime farmland of McLennan County under alternative A.

Conclusion. There would be no impact to the soils and prime farmland within the study area from the actions under alternative A. Correspondingly, there would be no cumulative effect.

Floodplains and Wetlands

Analysis. Under this alternative, there are no management actions or activities proposed within the floodplain or potential wetlands along the Bosque River section of the study area. Consequently, there would be no impact to the current condition of these resources.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the floodplains and wetlands of the Bosque River watershed within McLennan County are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. Alternative A would have no impacts on these resources and therefore would not contribute to the effects of these other actions. Consequently, there would be no cumulative impacts to floodplains and wetlands of the Bosque River watershed within McLennan County under this alternative.

Conclusion. There would be no impact to the floodplains and potential wetlands found within the study area from the actions under alternative A. Correspondingly, there would be no cumulative effect.

Vegetation, Wildlife, Habitat, and Special Status Species

Analysis. Under this alternative, it is assumed that the study area would not be further developed, thereby preserving a majority of the vegetation and wildlife habitat found there. It is also assumed that resource management strategies would not be developed for these resources such as conducting inventories to determine the composition of native, nonnative, and/or special status species inhabiting the study area;

or developing management strategies for restoring native vegetation patterns and enhancing wildlife habitat. Consequently, it is anticipated that there would be no impact to the current condition of these resources.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the vegetation, wildlife, habitat, and special status species of McLennan County are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. Alternative A would have no impacts on these resources and therefore would not contribute to the effects of these other actions. Consequently, there would be no cumulative impacts to vegetation, wildlife, habitat, and special status species of McLennan County under alternative A.

Conclusion. There would be no impact to the vegetation, wildlife, and wildlife habitat; and no effect on special status species within the study area from the actions under alternative A. Correspondingly, there would be no cumulative effect.

Impacts on Visitor Experience

Analysis. Under alternative A, the city of Waco and Baylor University would continue to accommodate visitor access to the Waco Mammoth Site through scheduled public events at the site. It is also assumed that they would continue working through local community efforts to enhance visitor enjoyment and understanding. These efforts would result in ongoing, negligible to minor, beneficial impacts on the visitor experience.

School groups of the central Texas region would benefit from the added although limited opportunity to engage in onsite educational opportunities.

The expectation for the area surrounding the core paleontological site, which is owned by Baylor University, is that it will not be developed for visitor use but simply provide a natural buffer for the protection and preservation of the core paleontological site.

Consequently, there would be no impacts to the visitor experience in this area.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting visitor experience opportunities within the Waco area are described in the “Impact Topics and Cumulative Effects Scenario” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term beneficial cumulative impacts since a number of projects have greatly enhanced the visitor experience opportunities found within the city. Although alternative A adds a unique component to this mix, it is nonetheless a very small increment due to the limited schedule of visitor access to the site when compared to the vast array of engaging visitor experience opportunities already available within the Waco area.

Conclusion. Alternative A would result in negligible to minor, long-term beneficial impacts to the visitor experience opportunities at the Waco Mammoth Site. The cumulative effect of this alternative on the visitor experience opportunities within the Waco area would be very small.

Impacts on Management and Operations

Analysis. Under this no-action alternative, the management and operations of the Waco Mammoth Site would continue through the partnership efforts of the city of Waco and Baylor University. It is assumed that existing staffing levels would remain the same and programs to recruit and train volunteers would not be initiated. It is also assumed that once the excavation shelter is complete, visitation to the site would be accommodated with existing staff during at least 12 public events scheduled throughout the year. The city of Waco Parks and Recreation Department would acquire additional facility management responsibilities with the new excavation shelter added to their inventory of park structures to operate and maintain. There would be minor, long-term adverse

impacts on the city of Waco operations resulting from the need to maintain a new facility.

Baylor University would continue to provide for the curatorial care of the *in situ* specimens at the site and the paleontological collections within their Mayborn Museum Complex. It would also be expected that museum staff would continue to assist in conducting public events at the site. It is anticipated that there would be relatively little change in how they currently manage and operate the site.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting management and operations of the city of Waco and Baylor University’s Mayborn Museum are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in minor to moderate, long-term adverse cumulative impacts on the operations of the city of Waco and Baylor University’s Mayborn Museum Complex. The contribution of alternative A relative to these cumulative impacts is expected to be a very small increment.

Conclusion. The impacts of alternative A on management and operations would vary depending on the managing entity. There could be minor, long-term, adverse impacts on the city of Waco operations and negligible, long-term, adverse impacts on Baylor University’s Mayborn Museum Complex operations. Overall, the cumulative effect of this alternative on the management and operations of the city of Waco and Baylor University’s Mayborn Museum complex is very small.

Impacts on Socioeconomic Environment

Analysis. Under this alternative, the city of Waco and Baylor University would accommodate limited visitor access to the Waco Mammoth Site during at least 12 public events scheduled throughout the year. It is expected that this minimal level of visitor

access to the site would not measurably contribute to the range of tourism opportunities or visitor spending within the city.

Communities in the central Texas region would benefit from the added although limited educational outreach programs.

Residents living in the surrounding area may experience increased traffic congestion during scheduled public events at the site. However, impacts would be minimal since access to the site would be by New Steinbeck Bend Road, a local arterial connector road that currently experiences low volume traffic as the surrounding areas are mostly undeveloped.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the socioeconomic environment of the Waco MSA are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term beneficial cumulative impacts on the Waco MSA socioeconomic environment. The incremental effect of alternative A relative to these cumulative impacts would be a very small component when compared to the vast array of other economic activity and community initiatives previously completed or underway.

Conclusion. The impacts of alternative A would be negligible to minor, (intermittent) short-term beneficial on the Waco MSA economic environment resulting from increased visitor spending within the community during those times when public events are scheduled at the site. Impacts to the communities within the central Texas region would be negligible, (intermittent) short-term beneficial impacts resulting from limited educational outreach programs. Impacts would be negligible to minor, (intermittent) short-term adverse to the residents of the surrounding area due to increased traffic congestion generated during times when public events are scheduled at the site. Overall, the cumulative effect of this alternative on the economic environment of the Waco MSA and the communities of the central Texas region would be very small.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE B

Partnerships Led by the City of Waco

Impacts on Fundamental Resources of the Waco Mammoth Site

In Situ Specimens and Geologic Context of the Discovery Site

Analysis. Similar to alternative A, the staff at Baylor University's Mayborn Museum Complex would continue to monitor conditions and ensure the *in situ* paleontological resources are stabilized and preserved. What is different under this alternative is that the current moratorium on excavation activities may be lifted to allow for controlled investigations of the site. Technical assistance from the National Park Service would be provided to help guide the stabilization, preservation, and controlled investigation efforts. These changes would enhance resource conditions and promote a greater understanding of the paleontological resource. As this would affect areas with high data potential, these actions would result in moderate, long-term, beneficial impacts.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the *in situ* specimens and the geological context of the discovery site are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term, beneficial cumulative impacts on the *in situ* specimens and geologic context of the discovery site. The contribution of alternative B relative to these cumulative impacts would be an appreciably beneficial component.

Conclusion. Impacts would be moderate, long-term, and beneficial on the *in situ* specimens and geologic context of the discovery site from the actions under alternative B. The cumulative effect of this alternative on the *in situ* specimens and geologic context of the discovery site would be an appreciable benefit.

Paleontological Collections (Museum Collections)

Analysis. Similar to alternative A, the actions under this alternative call for continued storage of the paleontological collections and archives at Baylor University's Mayborn Museum Complex. Paleontological collections, including the archived records of excavation, would continue under adequate temperature, humidity, and security conditions and controls. Access to the collections would continue to be convenient because storage would continue at the Mayborn Museum Complex of Baylor University.

However, under alternative B, technical assistance from the National Park Service could be provided to assist Mayborn Museum staff develop protocols and methodologies for initiating preparation and cataloging of the specimens currently housed in plaster jackets as well as the smaller fragments and soil samples in card board boxes. It is assumed that climate-controlled space could be dedicated for a specimen preparation laboratory within the Mayborn Museum or the preparation lab could be incorporated into the city's proposed environmental education center at the site. This would benefit future researchers as access to prepared specimens would be made possible for the first time. It would also provide a benefit for the public as select fossils could be cast for exhibit purposes. This change would result in a moderate, long-term, beneficial impact on paleontological collections of the Waco Mammoth Site under this alternative.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the Mayborn museum collections and archives are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in minor,

long-term, beneficial cumulative impacts to the Mayborn Museum's central Texas collection as specimen preparation activities could be conducted on fossils found in other areas of the region unconnected with the Waco Mammoth Site. The incremental effect of alternative B relative to these cumulative impacts would be appreciably beneficial.

Conclusion. Impacts would be moderate, long-term, and beneficial on the paleontological collections of the Waco Mammoth Site under alternative B. The cumulative effect of this alternative on the Mayborn Museum's central Texas collection would be an appreciable benefit.

Impacts on Other Resources

Soils including Prime Farmlands

Analysis. Under this alternative, the city envisions additional park development to provide for an environmental education center and connecting trails to the Bosque River to compliment the paleontological features of the site. To accommodate this additional park infrastructure, there would be localized loss of soils and prime farmland within the study area. It is anticipated that these changes would occur over a relatively small percentage of the study area (less than 5-10%) and that the majority of the site would remain undeveloped and managed as a nature preserve. These changes would result in minor, long-term, adverse impacts to soils and potentially minor, long-term, adverse impacts to prime farmland in the study area.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the soils and prime farmland of McLennan County are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, adverse cumulative impacts on the soils and prime farmland of McLennan County as these changes are readily apparent and occur throughout the county. The incremental effect of alternative B

relative to these cumulative impacts would be a very small component.

Conclusion. Impacts would be minor, long-term, and adverse on soils and potentially minor, long-term, and adverse on the prime farmland in the study area. The cumulative effect of this alternative on the soils and prime farmland of McLennan County would be very small.

Floodplains and Wetlands

Analysis. Under this alternative, the city's long-range vision for accommodating water taxi service along the Bosque River and connecting to regional trailways along the Brazos River Corridor would entail a minor level of development on a portion of the study area adjacent to the Bosque River. Features such as a boat dock and trails may be constructed within the floodplain and wetlands areas and would affect relatively small, localized areas of these resources. This would result in negligible to minor, long-term, adverse impacts. The city would be required to consult and coordinate with the Army Corp of Engineers to obtain permits for these activities.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the floodplains and wetlands of the Bosque River watershed within McLennan County are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, adverse cumulative impacts on the floodplains and wetlands of the Bosque River watershed, as these changes are readily apparent and have occurred throughout the watershed. The incremental effect of alternative B relative to these cumulative impacts would be a very small component.

Conclusion. Impacts from the actions under alternative B would be negligible to minor, long-term, and adverse to the floodplains and potential wetlands found within the study area. The cumulative effect of this alternative

on the floodplains and wetlands of the Bosque River watershed within McLennan County would be very small.

Vegetation, Wildlife, Habitat, and Special Status Species

Analysis. Under this alternative, the city envisions additional park development to provide for an environmental education center and connecting trails to the Bosque River to compliment the paleontological features of the site. There would be minor, long-term, adverse impacts on vegetation, wildlife, and wildlife habitat over a localized area of the site to accommodate park development. It is anticipated that these changes would occur over a relatively small percentage of the study area (less than 5% – 10%) and that the majority of the site would remain undeveloped and managed as a nature preserve.

There could be on-going minor, adverse impacts to vegetation and wildlife from the increase in human activities at the site that may result in the dispersal of wildlife and habitat degradation.

When more detailed site planning is initiated, consultation with US Fish and Wildlife Service and the state of Texas would be needed to assess the potential for impacting special status species.

As part of the environmental education focus of this alternative, resource management plans could be initiated by the city and Baylor University for the undeveloped portions of the site such as conducting inventories to determine the composition of native, non-native, and/or special status species inhabiting the study area; and developing management strategies for restoring native vegetation patterns and enhancing wildlife habitat. This would result in moderate, long-term, beneficial impacts for these resources.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the vegetation, wildlife, habitat, and special status species of McLennan County

are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term, adverse cumulative impacts as substantial changes to vegetation communities and wildlife habitat over a large area of the county have resulted in a number of extirpated species and the designation of a number of special status species. The incremental effect of alternative B relative to these cumulative impacts would provide a small beneficial offset to the countywide loss of native vegetation and wildlife habitat by providing restoration and enhancement of these resources over a majority of the 109-acre study area.

Conclusion. Impacts would be minor to moderate, long-term, and adverse or beneficial, depending on the particular action being taken under alternative B. There could be minor, long-term, adverse impacts on vegetation, wildlife, and wildlife habitat over a localized area of the site to accommodate park development and increased human activity. Moderate, long-term, beneficial impacts are anticipated when resource management strategies are implemented to restore native vegetation and enhance wildlife habitat throughout the study area. The cumulative effect of this alternative on the vegetation, wildlife, habitat, and special status species of McLennan County would provide a small beneficial offset.

Impacts on Visitor Experience

Analysis. Under alternative B, visitor experience opportunities at the Waco Mammoth Site would expand markedly. Instead of the limited operational schedule (12 scheduled events) described under alternative A, visitors to the site would be accommodated on a daily basis.

Under the three action alternatives, the visitor experience would be governed by a tripartite division of labor and responsibility among the city of Waco, Baylor University, and the National Park Service. In particular, under

this alternative, the National Park Service would likely become involved by providing technical assistance in cooperation with the city and university to interpret the core paleontological site to visitors once the Waco Mammoth Site achieves National Natural Landmark status, which would be actively pursued under this alternative. The educational quality of probable exhibits at the core paleontological site and educational outreach programs would be enhanced by NPS input.

It is projected there would be moderate, long-term, beneficial impacts to the communities within the central Texas region and within the scientific community. This would be realized by enhancing onsite access and interpretation of the Waco Mammoth Site, encouraging research activities to help broaden the understanding of what occurred there, and enhancing educational opportunities for local and regional school groups.

For the area surrounding the core paleontological site, which the city of Waco could potentially acquire from Baylor University, the city could pursue ideas involving environmental education and recreation. Visitors would benefit from this expanded range of visitor opportunities.

Change from the no-action alternative under this alternative involves the potential of enhanced and expanded site-interpretation mechanisms, educational outreach programs, and environmental educational and recreational facilities. This would provide on-going benefits to the visitor experience.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting visitor experience opportunities within the Waco area are described in the “Impact Topics and Cumulative Effects Scenario” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term, beneficial cumulative impacts since a number of projects have greatly enhanced the range of visitor

experience opportunities found within the city. Under alternative B, the study area would be available daily to the visiting public and represents an appreciable beneficial increment to the vast array of engaging visitor experience opportunities found in the Waco area.

Conclusion. Under alternative B, the impact to the visitor experience would be moderate, long-term, and beneficial. The cumulative effect of this alternative on the visitor experience opportunities within the Waco area would be an appreciable benefit.

Impacts on Management and Operations

Analysis. Under this alternative, the existing cooperative management arrangement between the city of Waco and Baylor University is expanded with additional partners, with the city assuming the lead responsibility for managing the site as a city park. The city of Waco envisions additional park development to provide for an environmental education center and connecting trails to the Bosque River to compliment the paleontological features of the site. This would result in an expanded range of management responsibilities for the city of Waco Parks Department, requiring increases in staff and park operational funds. Impacts to the city of Waco’s operations would be moderate, long-term, and adverse with the need to hire additional staff and allocate additional operational funding for managing a new city park.

Similar to alternative A, Baylor University’s Mayborn Museum Complex would continue to provide for the curatorial care of the *in situ* specimens at the site and the paleontological collections within their Mayborn Museum Complex. However, under this alternative the Mayborn Museum staff would take on a more active role for initiating a preparation program for the collected specimen, initiating resource management strategies for the other resources of the site, and developing onsite interpretive and educational programs as well as educational outreach programs. The impacts

on Baylor University's Mayborn Museum Complex operations would be moderate, long-term, and adverse with the need to hire additional staff and allocate additional operational funding to accommodate an expanded range of management responsibilities.

Under this alternative, the National Park Service could provide technical assistance to the city and university in the areas of resource management, interpretation, and educational outreach. This would be accomplished through existing programs and staffing of the service. The impacts to the National Park Service operations would be minor, short-term, and adverse resulting from the need to allocate additional funding to support technical assistance activities and travel costs.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting management and operations of the city of Waco, Baylor University's Mayborn Museum Complex, and the National Park Service are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in minor to moderate, long-term, adverse cumulative impacts on the city of Waco, Baylor's Mayborn Museum Complex, and National Park Service's operations. The contribution of alternative B relative to these cumulative impacts would be a small component.

Conclusion. Under alternative B, impacts on management and operations would vary depending on the managing entity. The impacts to operations at the city of Waco and Baylor University's Mayborn Museum would be moderate, long-term, and adverse. The impacts to the National Park Service's operations would be minor, short-term, and adverse. The cumulative effect of this alternative on the management and operations of the city of Waco, the Mayborn Museum, and the National Park Service would be small.

Impacts on Socioeconomic Environment

Analysis. Under this alternative, the city of Waco and Baylor University would expand visitor access to the Waco Mammoth Site. Instead of the limited operational schedule (12 scheduled events) described under alternative A, the site would be open 7 days a week. Depending on the level of marketing employed to promote the site, the park would have the potential to attract large numbers of long-distance travelers – the types of visitors who patronize hotels, restaurants, and other commercial establishments. This would provide an economic benefit for area businesses. It is projected that the construction phase (\$8.1 million) would add \$18.8 million to the central Texas region. Staff and operation budgets (\$345,000) would have an on-going economic impact of \$0.98 million. The economic impact of visitor spending would be \$0.68 million. The total economic impact of this alternative would amount to a one-time impact of \$20.46 million with a continuing annual impact of \$1.66 million to the central Texas region. This would result in a moderate, long-term, beneficial impact on the Waco economic environment resulting from enhanced tourism and increased spending in the area generated by the daily influx of visitors to the site and the addition of new employment opportunities for managing and maintaining a new city park.

Communities in the central Texas region would benefit from enhanced educational outreach programs.

It is expected that this enhanced level of visitor access to the site would noticeably expand the range of tourism opportunities within the city and thereby beneficially impacting local community life.

Residents living in the surrounding area may experience increased traffic congestion on a daily basis. However, impacts would be minimal since access to the site would be by New Steinbeck Bend Road, a local arterial connector road that currently experiences low

volume traffic as the surrounding areas are mostly undeveloped.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the socioeconomic environment of the Waco MSA and central Texas region are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, beneficial cumulative impacts on the Waco MSA socioeconomic environment. The incremental effect of alternative B relative to these cumulative impacts would be a small component when compared to the vast array

of other economic activity and community initiatives previously completed or underway.

Conclusion. Under alternative B, there would be moderate, long-term, beneficial impacts on the Waco economic environment and the communities within the central Texas region. There would be minor, long-term, adverse impacts on the residents of adjacent neighborhoods and businesses resulting from increased traffic congestion generated daily along New Steinbeck Bend Road. The cumulative effect of this alternative on the economic environment of the Waco MSA and the communities of the central Texas region would be small.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE C

Partnerships Led by the National Park Service

Impacts on the Fundamental Resources of the Waco Mammoth Site

In Situ Specimens and Geologic Context of the Discovery Site

Analysis. Under alternative C, the National Park Service would assume management responsibilities for geologic context of the discovery site. This would include monitoring the conditions of the *in situ* specimens and perhaps exploring other areas within the excavation shelter to acquire additional information about the circumstances of the site. These changes would enhance resource conditions and promote a greater understanding of the paleontological resource. As this would affect areas with high data potential, these actions would result in moderate, long-term, beneficial impacts.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the *in situ* specimens and the geological context of the discovery site are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term, beneficial cumulative impacts to the *in situ* specimens and geologic context of the discovery site. The contribution of alternative C relative to these cumulative impacts would be appreciably beneficial.

Conclusion. Under alternative C, impacts would be moderate, long-term beneficial to the *in situ* specimens and geologic context of the discovery site. The cumulative effect of this alternative on the *in situ* specimens and geologic context of the discovery site would provide an appreciable benefit.

Paleontological Collections (Museum Collections)

Analysis. Under this alternative, the paleontological collections management would be divided between the National Park Service and Baylor University with the initiation of a program of specimen preparation and cataloging called for, as in alternative B, but with the National Park Service taking the lead. It is assumed that a specimen preparation laboratory could be incorporated into the city’s proposed environmental education center at the site with the National Park Service operating the lab. The collection would continue to be housed within Baylor University’s Mayborn Museum Complex, except that select portions of the collection may be housed on site within the education center for the purposes of exhibiting prepared specimens and/or exhibiting the specimen preparation process to the public. Research reports, documentation of the site and excavation activities would be maintained onsite by the National Park Service. Similar to alternative B, this would benefit future researchers, as access to prepared specimens would be made possible for the first time. It would also provide a benefit for the public, as select fossils could be cast for exhibit purposes. However, under this alternative, it would provide an added benefit of integrating the specimen preparation activities into the interpretive experience at the site. These changes would result in a moderate, long-term, beneficial impact on paleontological collections of the Waco Mammoth Site under this alternative.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the Mayborn Museum’s museum collections are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major,

long-term, beneficial cumulative impacts on the Mayborn Museum's central Texas museum collections. The incremental effect of alternative C relative to these cumulative impacts would be appreciably beneficial.

The effects of other past, present, and foreseeable future actions affecting the museum collections of the National Park Service's Intermountain Region are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, beneficial cumulative impacts on the museum collections of the National Park Service's Intermountain Region. Alternative C would expand the NPS collection although it deviates from the trend to centralize museum collections in the NPS Intermountain Region. The intent of this alternative is to keep the entire paleontological collection intact and in close association with the discovery site. The incremental effect of alternative C to these cumulative impacts would be a very small component.

Conclusion. Under alternative C, impacts would be moderate, long-term, and beneficial on the paleontological collections of the Waco Mammoth Site. The cumulative effect of this alternative on the Mayborn Museum's central Texas collection would be an appreciable benefit. The cumulative effect of this alternative on the museum collections of the National Park Service's Intermountain Region would be very small.

Impacts on Other Resources

Soils including Prime Farmlands

Analysis. Under this alternative, the city envisions additional park development to provide for an environmental education center and connecting trails to the Bosque River to compliment the paleontological features of the site. It is assumed under this alternative that space for NPS management staff would also be accommodated in the center. To accommodate additional park infrastructure, some localized loss of soil is

anticipated, resulting in potentially minor, long-term adverse impacts to soils and potentially minor, long-term adverse impacts to some of the prime farmland contained within the study area. It is anticipated that these changes would occur over a relatively small percentage of the study area (less than 5-10%) and that the majority of the site would remain undeveloped and managed as a nature preserve.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the soils and prime farmland of McLennan County are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, adverse cumulative impacts on the soils and prime farmland of McLennan County as these changes are readily apparent and occur throughout the county. The incremental effect of alternative C relative to these cumulative impacts would be a very small component.

Conclusion. Under alternative C, impacts would be minor, long-term, and adverse on soils and potentially minor, long-term, and adverse on the prime farmland in the study area. The cumulative effect of this alternative on the soils and prime farmland of McLennan County would be very small.

Floodplains and Wetland

Analysis. Under alternative C, there are no federal actions contemplated that would affect floodplains or wetlands. However, the city's long-range vision for accommodating water taxi service along the Bosque River and connecting to regional trailways along the Brazos River Corridor would entail a minor level of development on a portion of the study area that fronts the Bosque River. Features such as a boat dock and trails may be constructed within the floodplain and wetlands areas and would adversely impact relatively small, localized areas of these resources. This would result in negligible to minor, long-term, adverse impacts. The city

would be required to consult and coordinate with the Army Corp of Engineers to obtain permits for these activities.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the floodplains and wetlands of the Bosque River watershed within McLennan County are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, adverse cumulative impacts as these changes are readily apparent and have occurred throughout watershed. The incremental effect of alternative C relative to these cumulative impacts would be a very small component.

Conclusion. Impacts from the actions under alternative C would be negligible to minor, long-term, and adverse to the floodplains and potential wetlands found within the study area. The cumulative effect of this alternative on the floodplains and wetlands of the Bosque River watershed within McLennan County would be very small.

Vegetation, Wildlife, Habitat, and Special Status Species

Analysis Under this alternative, the city envisions additional park development to provide for an environmental education center and connecting trails to the Bosque River to compliment the paleontological features of the site. There would be minor, long-term, adverse impacts on vegetation, wildlife, and wildlife habitat over a localized area of the site to accommodate park development. It is anticipated that these changes would occur over a relatively small percentage of the study area (less than 5-10%) and that the majority of the site would remain undeveloped and managed as a nature preserve.

There also could be on-going minor, adverse impacts on vegetation and wildlife from the increase in human activities at the site that

may result in the dispersal of wildlife and the degradation of habitat.

When more detailed site planning is initiated, consultation with US Fish and Wildlife Service and the state of Texas would be needed to assess the potential for impacting special status species.

As part of the environmental education focus of this alternative, it is anticipated that resource management plans could be initiated by the city, Baylor University, and the National Park Service for the undeveloped portions of the site such as conducting inventories to determine the composition of native, non-native, and/or special status species inhabiting the study area; and developing management strategies for restoring native vegetation patterns and enhancing wildlife habitat. This would result in moderate, long-term, beneficial impacts for these resources.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the vegetation, wildlife, habitat, and special status species of McLennan County are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term, adverse cumulative impacts as substantial changes to vegetation communities and wildlife habitat over a large area of the county have resulted in a number of extirpated species and the designation of a number of special status species. The incremental effect of alternative C relative to these cumulative impacts would provide a small beneficial offset to the countywide loss of native vegetation and wildlife habitat by providing restoration and enhancement of these resources over a majority of the 109-acre study area.

Conclusion. Impacts would be minor to moderate, long-term, and adverse or beneficial, depending on the particular action

being taken under alternative C. There could be minor, long-term, adverse impacts on vegetation, wildlife, and wildlife habitat over a localized area of the study area to accommodate park development and increased human activity. Moderate, long-term, beneficial impacts are anticipated when resource management strategies are implemented to restore native vegetation and enhance wildlife habitat throughout the study area. The cumulative effect of this alternative on the vegetation, wildlife, habitat, and special status species of McLennan County would provide a small beneficial offset.

Impacts on Visitor Experience

Analysis. Similar to alternative B, under alternative C the visitor experience opportunities at the Waco Mammoth Site would expand markedly. Instead of the limited operational schedule (12 scheduled events) described under alternative A, visitors to the site would be accommodated on a daily basis.

Under this alternative, the tripartite division of labor and responsibility for interpretation among the city of Waco, Baylor University, and the National Park Service, would mean that the National Park Service would take the lead interpreting the core paleontological site to visitors. It would own and control that portion of the study area, which would likely mean NPS designed interpretative exhibits at the core paleontological site; NPS designed interpretive and educational outreach programs and media, and trained NPS personnel to speak with visitors.

It is projected there would be moderate, long-term, beneficial impacts to the communities within the central Texas region and within the scientific community. This would be realized by enhancing onsite access and interpretation of the Waco Mammoth Site, encouraging research activities to help broaden the understanding of what occurred there, and enhancing educational opportunities for local and regional school groups.

For the area surrounding the core paleontological site, the National Park Service would look to partners to help initiate additional visitor experience opportunities there. Under the city of Waco's management lead, they would have the freedom to pursue ideas involving environmental education and recreation. Visitors would benefit from this expanded range of visitor opportunities. Change from the no-action alternative under this alternative involves the potential of increased interpretation mechanisms, educational outreach programs, and environmental educational and recreational facilities. This would provide on-going benefits to the visitor experience.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting visitor experience opportunities within the Waco area are described in the "Impact Topics and Cumulative Effects Scenario" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term, beneficial cumulative impacts since a number of projects have greatly enhanced the range of visitor experience opportunities found within the city. Alternative C adds a unique component to this mix, available daily to the visiting public and represents a noticeable increment to the vast array of engaging visitor experience opportunities found in the Waco area.

Conclusion. Under alternative C, the impact to the visitor experience would be moderate, long-term, and beneficial. The cumulative effect of this alternative on the visitor experience opportunities within the Waco area would be an appreciable benefit.

Impacts on Management and Operations

Analysis. Under this alternative, the Waco Mammoth Site would be managed as a new unit of the national park system, in partnership with the city of Waco, Baylor University, and others.

The National Park Service would take the lead responsibility for ensuring the protection, scientific study, and visitor enjoyment of paleontological resources, enlisting the help of partners to accomplish this mission. Impacts to the National Park Service's operations would be moderate, long-term, and adverse resulting from the expanded range of management responsibilities for the National Park Service requiring congressional allocation of park funding and the assignment of additional National Park Service personnel to manage a new unit of the national park system.

The city of Waco would take the lead for initiating additional recreational, interpretive, and environmental educational opportunities on the site. This would result in an expanded range of management responsibilities for the city of Waco Parks and Recreation Department. The impacts on the city of Waco operations would be moderate, long-term, and adverse with the need to hire additional staff and allocate additional operational funding for managing new park facilities.

Similar to alternative A, Baylor University would continue to accommodate the curatorial storage of the paleontological collections within their Mayborn Museum Complex. However, under this alternative, management of the fundamental resources would be transferred to the National Park Service. Baylor University primary role under this alternative would be to collaborate with the National Park Service and the city of Waco for expanding the interpretive and educational programs highlighting the special resource. The impacts on Baylor University's Mayborn Museum Complex operations would be negligible to minor, long-term, and adverse with the transfer of their management responsibility for the fundamental resources to the National Park Service. It is anticipated that there would be a minimal change from their current investment in operations and management support for the resource as the emphasis of their effort is redirected into interpretive and educational programs.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting management and operations of the city of Waco, Baylor University's Mayborn Museum Complex, and the National Park Service are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in minor to moderate, long-term, adverse cumulative impacts on the city of Waco; Baylor University's Mayborn Museum Complex; and National Park Service's operations. The contribution of alternative C relative to these cumulative impacts would be a small component.

Conclusion. Under alternative C, impacts would range from negligible to moderately adverse and would vary depending on the managing entity. The impacts on the city of Waco's operations would be moderate, long-term, and adverse. The impacts on Baylor University's Mayborn Museum Complex operations would be negligible to minor, long-term, and adverse. The impacts to the National Park Service's operations would be moderate, long-term, and adverse. The cumulative effect of this alternative on the management and operations of the city of Waco, the Mayborn Museum, and the National Park Service would be relatively small.

Impacts on Socioeconomic Environment

Analysis. Similar to alternative B, under alternative C visitor access to the Waco Mammoth Site would be expanded. Instead of the limited operational schedule (12 scheduled events) described under alternative A, the site would be open 7 days a week. Depending on the level of marketing employed to promote the site, the park would have the potential to attract large numbers of long-distance travelers—the types of visitors who patronize hotels, restaurants, and other commercial establishments. Designation as a new unit of the national park system would enhance awareness of the site and could

potentially attract visitors from outside of the state. This would provide an economic benefit for area businesses. It is projected that the construction phase (\$8.7 million) would add \$20.23 million to the central Texas region. Staff and operation budgets (\$645,000) would have an on-going economic impact of \$1.82 million. The economic impact of visitor spending would be \$0.68 million. The total economic impact of this alternative would amount to a one-time impact of \$22.73 million with a continuing annual impact of \$2.5 million to the central Texas region. This would result in a moderate, long-term, beneficial impact on the Waco economic environment resulting from enhanced tourism and increased spending in the area generated by the daily influx of visitors to the site and the addition of new employment opportunities for managing and maintaining a new park.

It is expected that this enhanced level of visitor access to the site would noticeably expand the range of tourism opportunities within the city and thereby beneficially impact local community life.

There would be additional long-term, beneficial impacts resulting from the intangible value of collective community pride for the citizens of Waco who have supported the notion of establishing the Waco Mammoth Site as a new unit of the national park system for the entire Nation to enjoy.

Residents living in the surrounding area may experience increased traffic congestion on a daily basis. However, impacts would be minimal since access to the site would be by New Steinbeck Bend Road, a local arterial connector road that currently experiences low volume traffic as the surrounding areas are mostly undeveloped.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the socioeconomic environment of the Waco MSA and central Texas region are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, beneficial cumulative impacts on the Waco MSA socioeconomic environment and minor, long-term, beneficial cumulative impacts on the central Texas region. The incremental effect of alternative C relative to these cumulative impacts would be a small component when compared to the vast array of other economic activity and community initiatives previously completed or underway.

Conclusion. Under alternative C, there would be moderate, long-term, beneficial impacts on the Waco economic environment and the communities within the central Texas region and within the scientific community. There would be minor, long-term, adverse impacts on the residents of adjacent neighborhoods and businesses resulting from increased traffic congestion generated daily along New Steinbeck Bend Road. The cumulative effect of this alternative on the economic environment of the Waco MSA and the communities of the central Texas region would be small.

ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE D

Managed as a Focused Unit of the National Park System

Impacts on the Fundamental Resources of the Waco Mammoth Site

In Situ Specimens and Geologic Context of the Discovery Site

Analysis. Under this alternative, management of the entire study area would be transferred to the National Park Service. This would include monitoring the conditions of the *in situ* specimens and perhaps exploring other areas within the excavation shelter to acquire additional information about the circumstances of the site. These changes would enhance resource conditions and promote a greater understanding of the paleontological resource. As this would affect areas with high data potential, these actions would result in moderate, long-term, beneficial impacts.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the *in situ* specimens and the geological context of the discovery site are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term, beneficial cumulative impacts to the *in situ* specimens and geologic context of the discovery site. The contribution of alternative D relative to these cumulative impacts would be appreciably beneficial.

Conclusion. Under alternative D, impacts would be moderate, long-term, and beneficial to the *in situ* specimens and geologic context of the discovery site. The cumulative effect of this alternative on the *in situ* specimens and geologic context of the discovery site would provide an appreciable benefit.

Paleontological Collections (Museum Collections)

Analysis. Under this alternative, management of the entire paleontological collections and

archives would be transferred to the National Park Service. The storage of collected specimens and archives would continue to be housed within Baylor University’s Mayborn Museum Complex, until the collection could be accommodated in a new collection storage facility with a specimen preparation laboratory provided onsite. The National Park Service would develop protocols and methodologies for initiating preparation and cataloging of the specimens currently housed in plaster jackets and the smaller fragments and soil samples in cardboard boxes. This would benefit future researchers as access to prepared specimens would be made possible for the first time. It would also benefit the public as select fossils could be cast for exhibit purposes and specimen preparation activities could be integrated into the interpretive experience at the site. These changes would result in a moderate, long-term, beneficial impact on paleontological collections of the Waco Mammoth Site under this alternative.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the Mayborn Museum’s museum collections are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term, beneficial cumulative impacts for the Mayborn Museum’s central Texas collection. The incremental effect of alternative D would contribute a very noticeable benefit to the Mayborn Museum collections as the transfer of the Waco Mammoth Site collections to an onsite facility operated by the National Park Service would free up significant collections space within the geology/paleontological collections storage room of the Mayborn Museum.

The effects of other past, present, and foreseeable future actions affecting the museum collections of the National Park

Service's Intermountain Region are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, beneficial cumulative impacts on the museum collections of the National Park Service's Intermountain Region. Alternative D would expand the NPS collection although it deviates from the trend to centralize museum collections in the NPS Intermountain Region. The intent of this alternative is to keep the entire paleontological collection intact and in close association with the discovery site. The incremental effect of alternative D to these cumulative impacts would be a very small component.

Conclusion. Under alternative D, impacts would be moderate, long-term, and beneficial on the paleontological collections of the Waco Mammoth Site. The cumulative effect of this alternative on the Mayborn Museum's central Texas collection would be an appreciable benefit. The cumulative effect of this alternative on the museum collections of the National Park Service's Intermountain Region would be very small.

Impacts on Other Resources

Soils including Prime Farmlands

Analysis. Under this alternative, it is anticipated that a minimum level of additional onsite development would be required to allow the National Park Service to effectively manage for resource protection and visitor enjoyment such as space to accommodate enhanced interpretive and educational programs, staff offices, maintenance support, paleontological collections storage, and specimen preparation. To accommodate additional park infrastructure, some localized loss of soil is anticipated, resulting in potentially minor, long-term, adverse impacts to soils and potentially minor, long-term, adverse impacts to some of the prime farmland contained within the study area. It is anticipated that these changes would occur

over a relatively small percentage of the study area (less than 5%) and that the majority of the site would remain undeveloped and managed as a nature preserve.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the soils and prime farmland of McLennan County are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, adverse cumulative impacts on the soils and prime farmland of McLennan County as these changes are readily apparent and occur throughout the county. The incremental effect of alternative D to these cumulative impacts would be a very small component.

Conclusion. Under alternative D, impacts would be minor, long-term, and adverse on soils, and potentially minor, long-term, and adverse on the prime farmland in the study area. The cumulative effect of this alternative on the soils and prime farmland of McLennan County would be very small.

Floodplains and Wetlands

Analysis Under alternative D, there are no federal actions contemplated that would affect the floodplains or potential wetland areas along the Bosque River section within the study area. Consequently, there would be no impacts to the current condition of these resources.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the floodplains and wetlands of the Bosque River watershed are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. Alternative D would have no impacts on these resources and therefore would not contribute to the effects of these other actions. Consequently, there would be no cumulative impacts to floodplains and wetlands of the Bosque River

watershed within McLennan County under alternative this alternative.

Conclusion. There would be no impact to the floodplains and potential wetlands found within the study area from the actions under this alternative. Correspondingly, there would be no cumulative effect.

Vegetation, Wildlife, Habitat, and Special Status Species

Analysis. The National Park Service would require a minimum level of additional onsite development to effectively manage for resource protection and visitor enjoyment. There would be minor, long-term, adverse impacts on vegetation, wildlife, and wildlife habitat over a localized area of the site to accommodate park development. It is anticipated that these changes would occur over a relatively small percentage of the study area (less than 5%) and that the majority of the site would remain undeveloped and managed as a nature preserve.

As development plans are prepared, consultation with US Fish and Wildlife Service and the state of Texas would be needed to assess the potential for impacting special status species.

It is also anticipated that the National Park Service would initiate resource management activities for the undeveloped portions of the site such as conducting resource inventories to determine the composition of native, nonnative, and/or special status species inhabiting the study area; and developing management strategies for restoring native vegetation patterns and enhancing wildlife habitat. This would result in moderate, long-term, beneficial impacts for these resources.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting the vegetation, wildlife, habitat, and special status species of McLennan County are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in

combination with the actions under this alternative would result in major, long-term, adverse cumulative impacts as substantial changes to vegetation communities and wildlife habitat over a large area of the county have resulted in a number of extirpated species and the designation of a number of special status species. The incremental effect of alternative D relative to these cumulative impacts could potentially provide a relatively small beneficial offset to the countywide loss of native vegetation and wildlife habitat by providing restoration and enhancement of these resources over a majority of the 109-acre study area.

Conclusion. Impacts would be minor to moderate, long-term, and adverse or beneficial, depending on the particular action being taken under this alternative. There would be minor, long-term, adverse impacts on vegetation, wildlife, and wildlife habitat over a localized area of the study area to accommodate park development. Moderate, long-term, beneficial impacts are anticipated when resource management strategies are implemented to restore native vegetation and enhance wildlife habitat throughout the study area. The cumulative effect of this alternative on the vegetation, wildlife, habitat, and special status species of McLennan County would be a small beneficial offset.

Impacts on Visitor Experience

Analysis. Similar to alternative B, visitor experience opportunities at the Waco Mammoth Site would expand markedly. Instead of the limited operational schedule (12 scheduled events) described under alternative A, visitors to the site would be accommodated on a daily basis.

Under this alternative, the tripartite division of labor and responsibility for interpretation among the city of Waco, Baylor University, and the National Park Service, would mean that the National Park Service would take the lead for visitor understanding and enjoyment. This would likely mean NPS designed interpretative exhibits and interpretive and

educational outreach programs and media, and trained NPS personnel to interact with visitors. Additional opportunities for visitors to observe the work of paleontologists and technicians within the specimen preparation laboratory could be provided. Such readily apparent visitor access would emphasize the core values of the paleontological resources at the site and enable visitors to realize, appreciate, and enjoy new interpretative mechanisms.

School groups of the central Texas region would benefit from the opportunity to engage in onsite educational opportunities.

Under this alternative, visitor experience opportunities within the surrounding lands would not be accommodated, as this area would be managed as a natural buffer for the protection and preservation of the core paleontological site. Consequently, there would be no impacts to the visitor experience in this area.

Change from the no-action alternative under this alternative involves the potential of increased interpretation mechanisms, educational outreach programs, and environmental educational and recreational facilities. This would provide on-going benefits to the visitor experience.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting visitor experience opportunities within the Waco area are described in the “Impact Topics and Cumulative Effects Scenario” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in major, long-term, beneficial cumulative impacts to the overall visitor experience opportunities found within the Waco area. Alternative D adds unique component to the mix, available daily to the visiting public and represents a noticeable increment to an already vast array of engaging visitor experience opportunities found in the Waco area.

Conclusion. Under alternative D, the impact to the visitor experience would be moderate, long-term, and beneficial. The cumulative effect of this alternative on the visitor experience opportunities within the Waco area would be an appreciable benefit.

Impacts on Management and Operations

Analysis. Under this alternative, the Waco Mammoth Site would be managed as a new unit of the national park system, with the entire paleontological resource (*in situ* fossils and the collection of fossils currently housed at Baylor University) managed onsite by the National Park Service. The National Park Service would focus on a core mission of protection, scientific study, and interpretation of the fundamental paleontological resources. Impacts to the National Park Service’s operations would be moderate, long-term, and adverse resulting from the expanded range of management responsibilities for the National Park Service requiring congressional allocation of park funding and the assignment of additional National Park Service personnel to manage a new unit of the national park system.

The city of Waco would transfer ownership of their land to the federal government as well as the primary responsibilities for managing and operating the Waco Mammoth Site to the National Park Service. This would reduce the need to dedicate staff and funding to operate and maintain the excavation pavilion. The city would still retain an affiliation with the site by participating in a collaborative effort with the National Park Service for developing interpretive and educational outreach programs on the special resource. It is assumed that city services such as fire, police, and emergency medical response would still be provided for the site.

Baylor University would transfer the ownership of the paleontological collection to the National Park Service, and when a collection storage facility is constructed on

site, the collection would be moved into this new facility. This change in management responsibilities would free up space in the Mayborn Museum collection room and reduce the need to dedicate museum staff for the curatorial care of the paleontological collection. Similar to the city's wishes to still retain some form of affiliation with the site, Baylor University would participate in a collaborative effort with the National Park Service for developing interpretive and educational outreach programs on the special resource.

The impacts to the operations of the city of Waco and Baylor University's Mayborn Museum Complex would be moderate, long-term, and beneficial with the transfer of management responsibilities to the National Park Service. This would free up the staff and operational expenses previously dedicated to the Waco Mammoth Site for other needs within each of their respective organizations.

Cumulative Effect. The effects of other past, present, and foreseeable future actions affecting management and operations of the city of Waco, Baylor University's Mayborn Museum Complex, and the National Park Service are described in the "Impact Topics and Cumulative Effects Scenarios" section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in minor, long-term, adverse cumulative impacts on the city of Waco; Baylor's Mayborn Museum Complex; and National Park Service operations. The contributions of alternative D relative to the cumulative impacts on the city of Waco and Baylor University's Mayborn Museum Complex would provide a modest beneficial offset to the cumulative effects on their operations by reducing their overall management responsibilities at the Waco Mammoth Site. The contributions of alternative D relative to the cumulative impacts on the National Park Service would add a small increment.

Conclusion. Impacts would vary depending on the management entity. The impacts to the

city of Waco's and Baylor University's Mayborn Museum Complex would be moderate, long-term, and beneficial while the impacts to the National Park Service operations would be moderate, long-term, and adverse. The cumulative effect of this alternative on the management and operations of the city of Waco and the Mayborn Museum would provide a small beneficial offset. The cumulative effect of this alternative on the National Park Service would be small.

Impacts on Socioeconomic Environment

Analysis. Similar to alternative B, under alternative D visitor access to the Waco Mammoth Site would be expanded. Instead of the limited operational schedule (12 scheduled events) described under alternative A, the site would be open 7 days a week. Depending on the level of marketing employed to promote the site, the park would have the potential to attract large numbers of long-distance travelers – the types of visitors who patronize hotels, restaurants, and other commercial establishments. As a new unit of the national park system, this would enhance nationwide awareness of the site and potentially attract visitors from outside of the state. This would provide an economic benefit for area businesses. It is projected that the construction phase (\$2.6 million) would add \$6.05 million to the central Texas region. Staff and operation budgets (\$768,500) would have an on-going economic impact of \$2.17 million. The economic impact of visitor spending would be \$0.68 million. The total economic impact of this alternative would amount to a one-time impact of \$8.9 million with a continuing annual impact of \$2.85 million to the central Texas region. This would result in a moderate, long-term, beneficial impact on the Waco economic environment resulting from enhanced tourism and increased spending in the area generated by the daily influx of visitors to the site and the addition of new employment opportunities for managing and maintaining a new city park.

Communities in the central Texas region would benefit from enhanced educational outreach programs.

It is expected that this enhanced level of visitor access to the site would noticeably expand the range of tourism opportunities within the city and thereby beneficially impact local community life.

There would be additional long-term, beneficial impacts resulting from the intangible value of collective community pride for the citizens of Waco who have supported the notion of establishing the Waco Mammoth Site as a new unit of the national park system for the entire Nation to enjoy.

Residents living in the surrounding area may experience increased traffic congestion on a daily basis. However, impacts would be minimal since access to the site would be by New Steinbeck Bend Road, a local arterial connector road that currently experiences low volume traffic as the surrounding areas are mostly undeveloped.

Cumulative Effect. The effects of other past, present, and foreseeable future actions

affecting the socioeconomic environment of the Waco MSA and central Texas region are described in the “Impact Topics and Cumulative Effects Scenarios” section of this chapter. The impact of these other actions in combination with the actions under this alternative would result in moderate, long-term, beneficial cumulative impacts on the Waco MSA socioeconomic environment. The incremental effect of alternative D to these cumulative impacts would be a small component when compared to the vast array of other economic activity and community initiatives previously completed or underway.

Conclusion. Under alternative D, there would be moderate, long-term, beneficial impacts on the Waco economic environment and communities within the central Texas region. There would be minor, long-term, adverse impacts on the residents of adjacent neighborhoods and businesses resulting from increased traffic congestion generated daily along New Steinbeck Bend Road. The cumulative effect of this alternative on the economic environment of the Waco MSA and the communities of the central Texas region would be small.