PUBLIC DRAFT

Programmatic Environmental Assessment for a Grazing Management Plan at Fort Hood, Texas

November 2011

FINDING OF NO SIGNIFICANT IMPACT
FOR A GRAZING MANAGEMENT PLAN AT FORT HOOD, TEXAS

PROJECT HISTORY:

Fort Hood Military Reservation (Fort Hood) became a permanent installation in 1950, but was initially established as Camp Hood in 1942. The creation of Camp Hood and later expansion of Fort Hood was made possible by the condemnation of private lands by the Federal government, allowing the United States (U.S.) Army (Army) to prepare Soldiers for tank destroyer combat during World War II. In exchange for the condemned land, the ranchers received fair market value and a 5-year lease to allow continued grazing of the land. Every 5 years, the terms of the lease and the effects of grazing are reviewed and a lease may or may not be renewed. The most recent grazing lease was accepted by the Central Texas Cattlemen's Association (CTCA) in 2010. The CTCA was formed by these landowners to manage their cattle grazing rights on Fort Hood. Providing a lease for continued grazing on training lands is consistent with Fort Hood's "good neighbor" policy and also supports the military mission by maintaining the condition of the training landscape and providing revenue to fund natural resource management on the installation. The Army recognizes that a healthy and sustainable landscape is required to support the military mission and that properly managed grazing is compatible with the military mission.

In the 1990s, Fort Hood began conducting forage inventories using a clipping and drying method to measure biomass and implementing a Grazing Management Plan (GMP) which relied on the results of the forage inventory. Fort Hood has proposed the use of a Robel pole as a more efficient method of measuring biomass. With this change in methods of measuring biomass, Fort Hood has also proposed new GMP that is congruent with the use of a Robel pole.

PURPOSE AND NEED:

The purpose of the Proposed Action is to manage grazing activity on the installation in support of Fort Hood's mission. Fort Hood's mission includes providing and maintaining the infrastructure to support strategic power projection and to train Fort Hood units and Soldiers; maintaining a quality living and working environment for Soldiers, families, retirees, and authorized civilians; and sustaining an effective partnership with surrounding communities.

To provide effective training, Fort Hood must manage the training area landscape (i.e., the appearance and natural characteristics of the area) for sustainability, realism, and functionality. Highly eroded soils are unable to sustain vegetation, and the formation of rills and gullies on eroded soils presents a safety hazard to Soldiers and limits tactical maneuverability. Areas that are obviously degraded by previous grazing or training activity detract from the realism of the current training activity. Areas that are stripped of their vegetation no longer resemble the undisturbed lands that might be encountered during real conflicts. Optimum landscape conditions provide sufficient vegetation to provide cover and concealment opportunities.

The landscape conditions of training areas can also affect the quality of life for the Fort Hood community. Local communities are connected by the public roadways which traverse the training areas, and the training areas provide multiple recreational opportunities when not being used for military training activities. Cattle grazing was part of the local landscape prior to the establishment of Fort Hood and continues to be an important economical and cultural influence on the surrounding communities. Grazing lease proceeds are available to fund a variety of

environmental stewardship programs on the installation, ranging from maintenance of natural resources to preservation of cultural resources. Fort Hood believes that well-managed grazing is compatible with the military mission, and is in support of maintaining both the landscape and Fort Hood's "good neighbor" policy.

The need to support the Army's military mission at Fort Hood remains ever present and includes providing necessary forces and capabilities to support Combatant Commanders in support of National Security and Defense Strategies. Fort Hood is one of the Army's premier training installations, and providing optimum landscape conditions for the practice of large-scale maneuvers using large numbers of personnel and equipment is necessary to ensure that Army Soldiers are effectively prepared for a variety of potential combat scenarios. The need to support natural resource management at Fort Hood stems from the need to support the military mission.

PROPOSED ACTION:

The Proposed Action is the implementation of the Adaptive GMP. Under the Adaptive GMP, the results of an annual forage inventory would be used to determine recommended stocking rates in the Western Maneuver Area and West Fort Hood Grazing Management Units (GMU). In these GMUs, the quality and quantity of impacts related to training and land management can vary substantially from year to year, and these activities can substantially affect forage availability from year to year. The Adaptive GMP would maintain moderate stocking rates by recommending increased or decreased rates in response to annual measurement of forage availability. In the Eastern Training Area, training-related impacts are minimal and forage levels are relatively stable. Based on historical trends, a sustainable stocking rate would be established for these GMUs. In order to avoid substantial training impacts, the maximum stocking rate in the Live Fire Impact Area (LFIA) would be 750 Animal Units (AU). North Fort Hood (NFH) would not be routinely stocked, but would be used for grazing, if temporary deferrals are required in other GMUs. If grazing continues for more than 1 year in NFH, NFH would be incorporated into the Adaptive GMP.

ALTERNATIVES:

No Action Alternative
Under the No Action Alternative, a maximum stocking rate of 2,000 AU would be established. This stocking rate is based on previous forage inventories and rangeland health assessments conducted by the Natural Resources Conservation Service (NRCS). These stocking rates represent moderate, sustainable levels of grazing under current climate, training, and management conditions. Cattle would be redistributed among the GMUS or grazing would be deferred to avoid substantial impacts on the environment; however, the total stocking rate for the installation would not exceed 2,000 AU. In order to avoid substantial training impacts, the maximum stocking rate in the LFIA would be 750 AU. NFH would not be routinely stocked, but would be used for grazing if temporary deferrals are required in other GMUs.

Limited Range GMP
Under the Limited Range GMP, no grazing would occur in the Western Maneuver Area or West Fort Hood GMUs. In the Eastern Training Area, training-related impacts are minimal and forage levels are relatively stable. Based on historical trends, a sustainable stocking rate would be established for these GMUs. In order to avoid substantial training impacts, the maximum stocking rate in the LFIA would be 750 AU. NFH would not be grazed.

OTHER ALTERNATIVES CONSIDERED:

Full Rotational Grazing

In 1998, the NRCS produced a natural resources inventory of the installation and provided recommendations for improving the grazing program, including modifications of the grazing intensity, grazing system, and deferments for range recovery efforts, particularly in areas recently cleared of brush using fire or mechanical means. A substantial concern with this alternative is that the full rotational grazing system assumes that access to each of the grazing units is controlled and animals can be moved in and out of areas as necessary. Depending on the scale at which the areas are managed, fencing or natural barriers would be required to restrict cattle movement. In typical rangeland and grazing situations, these assumptions and recommendations would be feasible. However, on the installation, few natural barriers sufficiently constrain cattle. Fencing is in direct conflict with the mission; therefore, this alternative could not be considered.

ENVIRONMENTAL CONSEQUENCES:

Land Use

The Proposed Action would have less than significant impacts on land use. Cattle tend to avoid training activities in most areas. Cattle can have a direct impact on land use in the LFIA where training is delayed to avoid direct impacts on cattle. However, stocking rates in the LFIA would be maintained at the established maximum for avoiding substantial delay of training. Grazing can have an indirect impact on land use in the Western Maneuver Area and West Fort Hood where training has a greater impact on the landscape. Degradation of the training landscape would be avoided by increasing or decreasing stocking rates based on an annual measurement of forage availability.

Physiography and Soils

The Proposed Action would have less than significant impacts on physiography and soils. Grazing by cattle can lead to increased erosion and can ultimately impact physiography where grazing results in substantial soil compaction and reduced vegetative cover. These conditions would be avoided under the Proposed Action by increasing or decreasing stocking rates relative to an annual measurement of forage availability. By maintaining the maximum stocking rate in the LFIA and the sustainable stocking rates in the Eastern Training Area, rates of soil erosion would be less than significant. Results of the biomass inventory were used to estimate soil erosion rates using the Revised Universal Soil Loss Equation. This evaluation indicated that recommended stocking rates would not result in significant erosion.

Water Quality and Wetlands

Under the Proposed Action, impacts on water quality would be less than significant. Grazing by cattle can have direct and indirect impacts on water quality. Cattle can increase concentrations of harmful bacteria by defecating directly into surface waters. Cattle feces on the landscape can also contribute to harmful bacteria concentrations during storm events especially where erosion is substantial. Trampling of shorelines and streambanks by cattle can reduce water clarity. Where grazing results in substantial erosion, it can also contribute to reduced water clarity. Direct impacts to water quality would continue, but are not likely to increase substantially relative to the total area of the impacted watersheds. The annual adjustment of stocking rates would avoid substantial erosion caused by grazing and, thereby, minimize indirect impacts on water quality. Grazing would have no impact on the extent of jurisdictional wetlands.

Air Quality
Under the Proposed Action, impacts on air quality would be minimal. Cattle can emit greenhouse gases; however, the relatively small number of cattle stocked at Fort Hood would have a less than significant impact. Grazing by cattle can result in reduced vegetative cover. Reduced vegetative cover can lead to increased suspension of particulate matter. Stocking rates would be decreased before reduced vegetative cover results in substantial wind erosion.

Biological Resources
Grazing would continue to have less than significant impacts on the composition and structure of vegetation communities and the suitability of terrestrial and aquatic habitats for wildlife. Adjusting stocking rates in response to annual forage inventories would minimize the impacts of grazing on biological resources. Grazing would continue to impact sensitive habitats where cattle tend to be concentrated, such as wetlands, riparian zones, and aquatic habitats. However, grazing would not result in the threatened persistence of common plants or wildlife and would have a less than significant impact on biological resources.

Special Status Species
Implementation of the Adaptive GMP would not increase the adverse effects of grazing on Federally listed species or migratory birds. Rates of cowbird parasitism would continue to be controlled by the trapping program regardless of any increase in stocking rates. Minimal adverse effects on other special status species would continue.

Cultural Resources
Adverse effects of cattle grazing on historic and cultural resources, including the direct effects of trampling and the indirect effects of erosion, would be minimal. Grazing, by itself, is not considered to have significant impacts on surface artifacts. Adjusting stocking rates in response to annual forage inventories would minimize the potential for erosion to adversely affect surface artifacts.

Socioeconomics
Adjusting stocking rates in response to annual forage inventories would result in short- and long-term benefits to CTCA and associated economies by maintaining a sustainable rangeland that is resistant to drought, wildfires, and training impacts. The Adaptive GMP would optimize stocking rates during the short-term while maintaining sufficient residual biomass to promote increased forage production during good years and sustainable forage production during poor years.

Aesthetics and Recreation
Adjusting stocking rates in response to annual forage inventories would minimize the adverse effects of cattle grazing on aesthetics and recreation. The landscape would continue to provide forage and cover for terrestrial game species and hunting conditions would not be substantially impacted. Impacts on water quality would be minimized, and the impacts of grazing on water quality would not substantially limit the suitability of aquatic habitats for game fish. Swimming and other recreation which involves contact with surface waters would continue to be adversely affected by the presence of harmful bacteria. Swimming is allowed in Belton Lake, where the large volume of water is likely to reduce concentrations of harmful bacteria to less than significant levels.

Utilities and Transportation
There would be no effect on utilities, including potable water quality and quantity, energy consumption, and demand for waste disposal or wastewater treatment. Impacts on transportation would be similar to the No Action Alternative, but collisions with cattle would increase or decrease relative to stocking rates.

Noise
Noise levels would not be adversely affected.

Hazardous Materials and Waste
Maintaining moderate stocking rates would not affect or be affected by hazardous materials and waste.

FINDING:

Based on the information and analyses presented in the Environmental Assessment, which is attached to and incorporated in this FONSI, the Proposed Action is not anticipated to have significant adverse impacts on the quality or integrity of the human or natural environments. Therefore, an Environmental Impact Statement (EIS) will not be prepared for the Fort Hood Grazing Management Plan.

Signed: _____ _____

MARK A. FREITAG
COL., AR
Commanding

Date

Public Draft

Programmatic Environmental Assessment for a Grazing Management Plan at Fort Hood, Texas

Contract No. W9126G-09-D-0067
Task Order: 0010

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November 2011

EXECUTIVE SUMMARY

Public Draft Programmatic Environmental Assessment
for a Grazing Management Plan
at Fort Hood, Texas

Background:
Fort Hood Military Reservation (Fort Hood) became a permanent Installation in 1950, but was initially established as Camp Hood in 1942. The creation of Camp Hood and later expansion of Fort Hood was made possible by the condemnation of private lands by the Federal government, allowing the United States (U.S.) Army (Army) to prepare Soldiers for tank destroyer combat during World War II. In exchange for the condemned land, the ranchers received fair market value and a 5-year lease to allow continued grazing of the land. Every 5 years, the terms of the lease and the effects of grazing are reviewed and a lease may or may not be renewed. The most recent grazing lease was accepted by the Central Texas Cattlemen's Association (CTCA) in 2010. Gulf South Research Corporation (GSRC) was tasked by the U.S. Army Corps of Engineers (USACE), Fort Worth District (Contract No. W9126G-09-D-0067; Task Order: 0010) to prepare an Environmental Assessment (EA) of the implementation of alternative Grazing Management Plans (GMP).

The intent of this EA is to assess and disclose the known and potential environmental consequences, both beneficial and adverse, of alternative GMPs. Key issues to be addressed in the EA are the potential effects of alternative GMPs on the sustainability of the landscape, soil quality, water quality, natural resource management, military training activities, and surrounding communities. The EA will help provide an independent, unbiased analysis and comparison of alternatives to the Proposed Action. The EA will assist Fort Hood in deciding how best to implement grazing activities, determine all direct and indirect environmental effects that may result from alternative GMPs, and identify any necessary mitigation measures.

Alternatives:
Three alternative GMPs are considered in this EA, including: 1) the No Action Alternative, which would allow continued grazing at long-term sustainable stocking rates in all Grazing Management Units (GMUs); 2) an Adaptive GMP, the Proposed Action, which would result in annual adjustment of stocking rates based on measurement of residual biomass; and 3) a Limited Range GMP, which would defer all grazing in the Western Maneuver Area and West Fort Hood GMUs.

No Action Alternative
Under the No Action Alternative, a maximum stocking rate of 2,000 AU would be established (Table 1). This stocking rate is based on previous forage inventories and rangeland health assessments conducted by the Natural Resources Conservation Service (NRCS). These stocking rates represent moderate, sustainable levels of grazing under current climate, training, and management conditions. Cattle would be redistributed among the GMUS or grazing would be deferred to avoid substantial impacts on the environment; however, the total stocking rate for the Installation would not exceed 2,000 AU. In order to avoid substantial training impacts, the maximum stocking rate in the Live Fire Impact Area (LFIA) would be 750 AU. North Fort Hood (NFH) would not be routinely stocked, but would be used for grazing if temporary deferrals are required in other GMUs.

Table ES-1. Stocking Rates Under the No Action Alternative (2010 to 2015)

GMU	Abbreviation	Stocking Rate (animal units)					
		2010	2011	2012	2013	2014	2015
Western Maneuver Area – North	WMAN	320	320	TBD	TBD	TBD	TBD
Western Maneuver Area – South	WMAS	394	394	TBD	TBD	TBD	TBD
West Fort Hood – North	WFHN	73	73	TBD	TBD	TBD	TBD
West Fort Hood – South	WFHS	109	109	TBD	TBD	TBD	TBD
Subtotal		*896*	*896*	*TBD*	*TBD*	*TBD*	*TBD*
Eastern Training Area – North	ETAN	207	207	207	207	207	207
Eastern Training Area – South	ETAS	147	147	147	147	147	147
North Fort Hood	NFH	0	0	TBD	TBD	TBD	TBD
Live Fire and Impact Area	LFIA	750	750	750	750	750	750
Subtotal		*1,104*	*1,104*	*TBD*	*TBD*	*TBD*	*TBD*
Total		***2,000***	***2,000***	***2,000***	***2,000***	***2,000***	***2,000***

TBD = to be determined

Adaptive GMP (Proposed Action)

The Proposed Action is the implementation of the Adaptive GMP. Under the Adaptive GMP, the results of an annual forage inventory would be used to determine recommended stocking rates in the Western Maneuver Area and West Fort Hood GMUs (Table 2). In these GMUs, the quality and quantity of impacts related to training and land management can vary substantially from year to year, and these activities can substantially affect forage availability from year to year. The Adaptive GMP would maintain moderate stocking rates by recommending increased or decreased rates in response to annual measurement of forage availability. In the Eastern Training Area GMUs, training-related impacts are minimal and forage levels are relatively stable. Based on historical trends, a sustainable stocking rate would be established for these GMUs. In order to avoid substantial training impacts, the maximum stocking rate in the LFIA would be 750 AU. NFH would not be routinely stocked, but would be used for grazing if temporary deferrals are required in other GMUs. If grazing continues for more than 1 year in NFH, NFH would be incorporated into the Adaptive GMP.

Table ES-2. Stocking Rates Under the Proposed Action (2010 to 2015)

GMU	Abbreviation	Stocking Rate (animal units)					
		2010	2011	2012	2013	2014	2015
Western Maneuver Area - North	WMAN	320	371	TBD	TBD	TBD	TBD
Western Maneuver Area - South	WMAS	394	524	TBD	TBD	TBD	TBD
West Fort Hood – North	WFHN	73	0	TBD	TBD	TBD	TBD
West Fort Hood – South	WFHS	109	86	TBD	TBD	TBD	TBD
subtotal		*896*	*981*	*TBD*	*TBD*	*TBD*	*TBD*
Eastern Training Area – North	ETAN	207	207	207	207	207	207
Eastern Training Area - South	ETAS	147	147	147	147	147	147
North Fort Hood	NFH	0	0	TBD	TBD	TBD	TBD
Live Fire and Impact Area	LFIA	750	750	750	750	750	750
subtotal		*1,104*	*1,104*	*TBD*	*TBD*	*TBD*	*TBD*
Total		***2,000***	***2,085***	***TBD***	***TBD***	***TBD***	***TBD***

TBD = to be determined

Limited Range GMP

Under the Limited Range GMP, no grazing would occur in the Western Maneuver Area or West Fort Hood GMUs (Table 3). In the Eastern Training Area, training related impacts are minimal and forage levels are relatively stable. Based on historical trends, a sustainable stocking rate would be established for these GMUs. In order to avoid substantial training impacts, the maximum stocking rate in the LFIA would be 750 AU. NFH would not be grazed.

Table ES-3. Stocking Rates Under the Limited Range Alternative (2010 to 2015)

GMU	Abbreviation	Stocking Rate (animal units)					
		2010	2011	2012	2013	2014	2015
Western Maneuver Area - North	WMAN	320	0	0	0	0	0
Western Maneuver Area - South	WMAS	394	0	0	0	0	0
West Fort Hood – North	WFHN	73	0	0	0	0	0
West Fort Hood – South	WFHS	109	0	0	0	0	0
subtotal		*896*	*0*	*0*	*0*	*0*	*0*
Eastern Training Area – North	ETAN	207	207	207	207	207	207
Eastern Training Area - South	ETAS	147	147	147	147	147	147
North Fort Hood	NFH	0	0	0	0	0	0
Live Fire and Impact Area	LFIA	750	750	750	750	750	750
subtotal		*1,104*	*1,104*	*1,104*	*1,104*	*1,104*	*1,104*
Total		***2,000***	***1,104***	***1,104***	***1,104***	***1,104***	***1,104***

TBD = to be determined

Environmental Effects of Proposed Action:

Land Use

The Proposed Action would have less than significant impacts on land use. Cattle tend to avoid training activities in most areas. Cattle can have a direct impact on land use in the LFIA where training is delayed to avoid direct impacts on cattle. However, stocking rates in the LFIA would be maintained at the established maximum for avoiding substantial delay of training. Grazing can have an indirect impact on land use in the Western Maneuver Area and West Fort Hood where training has a greater impact on the landscape. Degradation of the training landscape would be avoided by increasing or decreasing stocking rates based on an annual measurement of forage availability.

Physiography and Soils

The Proposed Action would have less than significant impacts on physiography and soils. Grazing by cattle can lead to increased erosion and can ultimately impact physiography where grazing results in substantial soil compaction and reduced vegetative cover. These conditions would be avoided under the Proposed Action by increasing or decreasing stocking rates relative to an annual measurement of forage availability. By maintaining the maximum stocking rate in the LFIA and the sustainable stocking rates in the Eastern Training Area, rates of soil erosion would be less than significant. Results of the biomass inventory were used to estimate soil erosion rates using the Revised Universal Soil Loss Equation. This evaluation indicated that recommended stocking rates would not result in significant erosion.

Water Quality and Jurisdictional Wetlands

Under the Proposed Action, impacts on water quality would be less than significant. Grazing by cattle can have direct and indirect impacts on water quality. Cattle can increase concentrations of harmful bacteria by defecating directly into surface waters. Cattle feces on the landscape can also contribute to bacterial concentrations during storm events, especially where erosion is substantial. Trampling of shorelines and streambanks by cattle can reduce water clarity. Where grazing results in substantial erosion, it can also contribute to reduced water clarity. Direct impacts on water quality would continue, but are not likely to increase substantially relative to the total area of the impacted watersheds. The annual adjustment of stocking rates would avoid substantial erosion caused by grazing and, thereby, minimize indirect impacts on water quality. Grazing would have no impact on the extent of jurisdictional wetlands.

Air Quality

Under the Proposed Action, impacts on air quality would be minimal. Cattle can emit greenhouse gases; however, the relatively small number of cattle stocked at Fort Hood would have a less than significant impact. Grazing by cattle can result in reduced vegetative cover. Reduced vegetative cover can lead to increased suspension of particulate matter. Stocking rates would be decreased before reduced vegetative cover results in substantial wind erosion.

Biological Resources

Grazing would continue to have less than significant impacts on the composition and structure of vegetation communities and the suitability of terrestrial and aquatic habitats for wildlife. Adjusting stocking rates in response to annual forage inventories would minimize the impacts of grazing on biological resources. Grazing would continue to impact sensitive habitats where cattle tend to be concentrated, such as wetlands, riparian zones, and aquatic habitats. However, grazing would not result in the threatened persistence of common plants or wildlife and would have a less than significant impact on biological resources.

Special Status Species

Implementation of the Adaptive GMP would not increase the adverse effects of grazing on Federally listed species or migratory birds. Rates of cowbird parasitism would continue to be controlled by the trapping program, regardless of any increase in stocking rates. Minimal adverse effects on other special status species would continue.

Cultural Resources

Adverse effects of cattle grazing on historic and cultural resources, including the direct effects of trampling and the indirect effects of erosion, would be minimal. Grazing, by itself, is not considered to have significant impacts on surface artifacts. Adjusting stocking rates in response to annual forage inventories would minimize the potential for erosion to adversely affect surface artifacts.

Aesthetics and Recreation	Adjusting stocking rates in response to annual forage inventories would minimize the adverse effects of cattle grazing on aesthetics and recreation. The landscape would continue to provide forage and cover for terrestrial game species, and hunting conditions would not be substantially impacted. Impacts on water quality would be minimized, and the impacts of grazing on water quality would not substantially limit the suitability of aquatic habitats for game fish. Swimming and other recreation which involves contact with surface waters would continue to be adversely affected by the presence of harmful bacteria. Swimming is allowed in Belton Lake, where the large volume of water is likely to reduce concentrations of harmful bacteria to less than significant levels.
Socioeconomics	Adjusting stocking rates in response to annual forage inventories would result in short- and long-term benefits to CTCA and associated economies by maintaining a sustainable rangeland that is resistant to drought, wildfires, and training impacts. The Adaptive GMP would optimize stocking rates during the short-term while maintaining sufficient residual biomass to promote increased forage production during good years and sustainable forage production during poor years.
Utilities and Transportation	There would be no effect on utilities, including potable water quality and quantity, energy consumption, and demand for waste disposal or wastewater treatment. Impacts on transportation would be similar to the No Action Alternative, but collisions with cattle would potentially increase or decrease relative to stocking rates.
Noise	Noise levels would not be adversely affected.
Hazardous Materials and Waste	Maintaining moderate stocking rates would not affect or be affected by hazardous materials and waste.

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SECTION 1.0
PURPOSE AND NEED FOR ACTION

1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

Fort Hood Military Reservation (Fort Hood) became a permanent Installation in 1950, but was initially established as Camp Hood in 1942. The creation of Camp Hood and later expansion to Fort Hood was made possible by the condemnation of private lands by the Federal government, allowing the United States (U.S.) Army (Army) to prepare Soldiers for tank destroyer combat during World War II. In exchange for the condemned land, the ranchers received fair market value and a 5-year lease to allow continued grazing of the land. Every 5 years, the terms of the lease and the effects of grazing are reviewed and a lease may or may not be renewed. The most recent grazing lease was accepted by the Central Texas Cattlemen's Association (CTCA) in 2010. Gulf South Research Corporation (GSRC) was tasked by the U.S. Army Corps of Engineers (USACE), Fort Worth District (Contract No. W9126G-09-D-0067, Task Order: 0010) to prepare an Environmental Assessment (EA) of the implementation of alternative Grazing Management Plans (GMP).

The intent of this EA is to assess and disclose the known and potential environmental consequences, both beneficial and adverse, of alternative GMPs. Key issues to be addressed in the EA are the potential effects of alternative GMPs on the sustainability of the landscape, soil quality, water quality, natural resource management, military training activities, and surrounding communities. The EA will help provide an independent, unbiased analysis and comparison of alternatives to the Proposed Action. The EA will assist Fort Hood in deciding how best to implement grazing activities and to assess the direct and indirect environmental effects that may result from alternative GMPs.

This EA is divided into seven sections. Section 1.0 provides an introduction to the EA and supporting background material, a description of the Proposed Action and the purpose and need for the Proposed Action, the regulatory framework guiding preparation of the EA, and a record of the public involvement and agency coordination conducted during preparation. Section 2.0 describes the alternatives considered for evaluation, including the No Action Alternative, the Adaptive GMP (i.e., the Proposed Action), and the Limited Range GMP. Section 3.0 describes the existing natural and human environment in the affected area and identifies operational and environmental criteria that will be used to evaluate and compare the

alternatives. Section 4.0 discusses the potential environmental consequences of implementing each alternative, and Section 5.0 discusses the cumulative effects of other past, present, and proposed actions and the Proposed Action for this project. Section 6.0 provides a list of preparers, and Section 7.0 provides a list of references cited.

1.2 BACKGROUND

Fort Hood occupies approximately 335 square miles of Central Texas in Bell and Coryell counties (Figure 1-1) (Fort Hood 2009a). The Installation is 60 miles north of Austin and 50 miles south of Waco. Fort Hood's infrastructure, power projection capabilities, and state-of-the-art training facilities support upwards of 50,000 active and Reserve Army personnel.

Since 1942, Fort Hood has continuously renewed a grazing lease allowing previous land owners to graze cattle on training lands (Fort Hood 2009b). The CTCA was formed by these landowners to manage their cattle grazing rights on Fort Hood. Providing a lease for continued grazing on training lands is consistent with Fort Hood's "good neighbor" policy and also supports the military mission by maintaining the condition of the training landscape and providing revenue to fund natural resource management on the Installation. The Army recognizes that a healthy and sustainable landscape is required to support the military mission and that properly managed grazing is compatible with the military mission.

Historically, the stocking rates on Fort Hood were determined using the 25 percent Harvest Efficiency method (USACE 2003, Fort Hood 2009b). The 25 percent Harvest Efficiency method assumes that stocking rates should be set at a rate that results in consumption of 25 percent of available forage (White 1997, Hanselka et al. 2001b). Stocking rates are calculated in terms of Animal Units (AU). One AU consumes 9,490 pounds of dry-weight forage per year or 26 pounds per day. Furthermore, it is assumed that 25 percent of available forage will be dropped or trampled in the process of grazing and that 50 percent of the available forage should be left ungrazed. Stocking rates determined using this method are considered to be moderate, and it is assumed that leaving 50 percent of forage ungrazed (i.e., residual forage) will improve plant health and species composition, reduce soil loss, and prevent the need for deferrals during drought conditions.

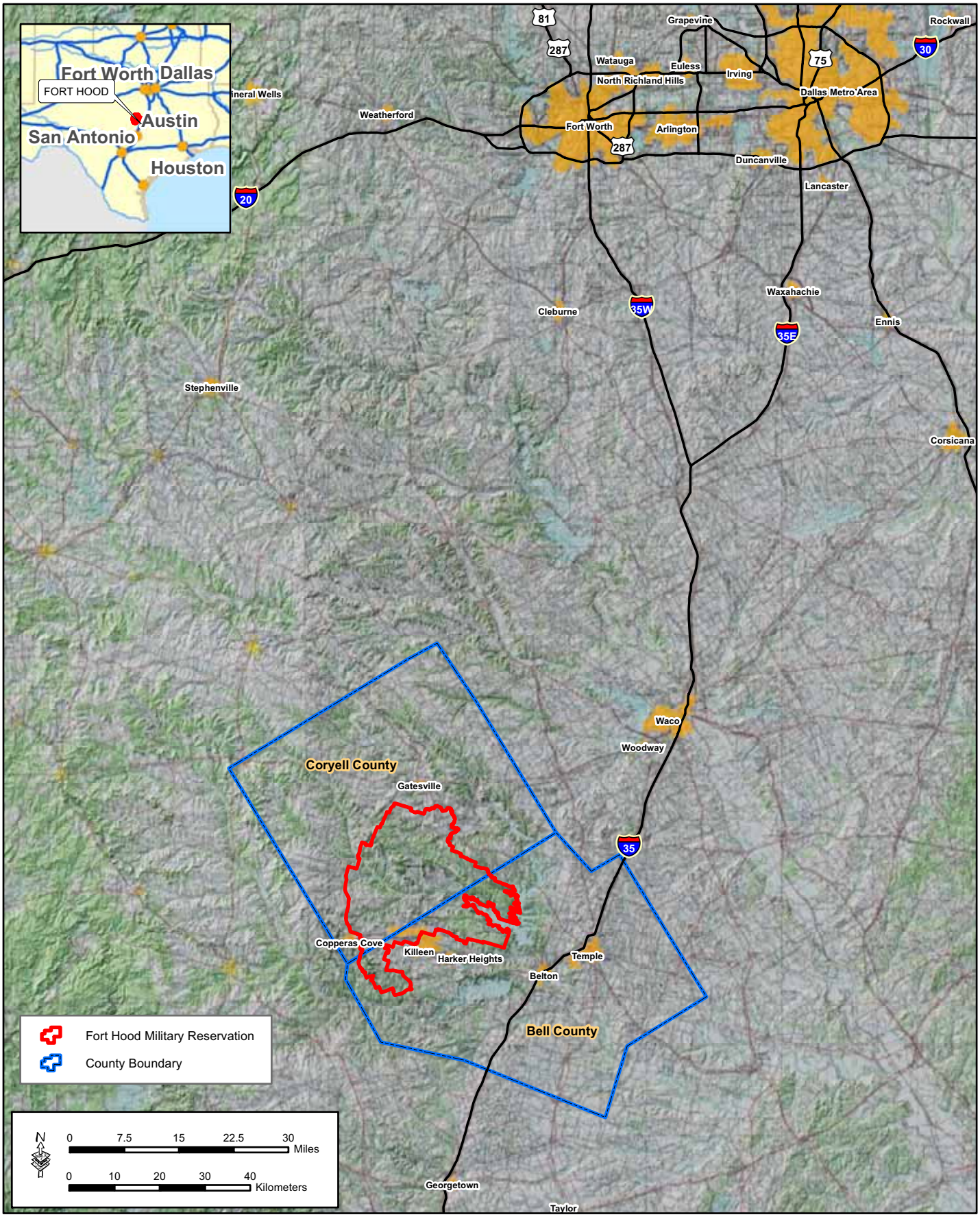

Figure 1-1: Location Map
Fort Hood Military Reservation (Fort Hood)

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Crider (1955) found that root growth was reduced as aboveground plant biomass was removed. Root growth was virtually stopped when 50 percent of the current growth was removed, and root growth of most plants was dramatically reduced when removal of aboveground biomass exceeded 50 percent. If root growth is inhibited, the ability of the plant to compete with adjacent plants will be reduced; therefore, over a period of time, levels of use relate to changes in the plant community. This supports the widely accepted generality that range managers should allow only 50 percent use of current-year growth on key species to maintain them in the plant community.

In 1996, the Installation-wide stocking rate was set at 3,500 AU using the 25 percent Harvest Efficiency method. In 1997, the Natural Resource Conservation Service (NRCS) conducted a vegetation inventory and rangeland condition analysis (i.e., forage inventory) for the Installation (NRCS 1998). The NRCS inventory and analysis noted extensive rill and gully erosion, poor ecological conditions, and a lack of similarity between existing rangeland conditions and the historical climax plant communities (NRCS 1998). NRCS attributed these problems to excessive military training and excessive livestock grazing on open, flat topography.

In 2000, the Army began preparing an EA for the proposed GMP through 2005. In that EA, the Army proposed continued grazing at a reduced stocking rate and deferral of grazing in areas showing poor ecological conditions and trending away from climax plant communities. The EA determined that ecological conditions at Fort Hood had deteriorated since issuance of the original grazing lease in the 1940s due to a variety of factors including livestock overgrazing, drought, and military training activities. Upon review of the EA, agencies commented that Fort Hood proposed overly complicated grazing management strategies and that stocking rate calculations performed at that time employed inadequate data. As a result, the Army agreed to prepare a Supplemental EA (SEA) to include the results from a forage inventory conducted on the Installation by the NRCS.

In 2001, the NRCS conducted a second forage inventory at Fort Hood, which indicated that productivity of palatable perennial species had declined substantially since 1996 (NRCS 2002a). The observed decline in productivity was attributed to multiyear drought conditions, continuous and heavy grazing, and concentrated military training. In 2002, the NRCS conducted a third forage inventory of the Installation (NRCS 2002b), and the results were incorporated into an SEA prepared by the USACE (2003). The 2003 SEA evaluated several alternative GMPs used

to calculate stocking rates based on the observed availability of forage and an evaluation of scheduled military training activities. The SEA identified a preferred alternative that maximized grazing opportunities while minimizing potential impacts on environmental resources and military training activities. The preferred alternative was implemented from 2003 to 2010. During this time, recommended stocking rates have generally been less than 2,000 total AU on an Installation-wide basis.

In 2010, the CTCA requested a renewed assessment of vegetation conditions. Fort Hood proposed the use of a modified Robel pole as a more efficient method than previous forage inventories for evaluating range conditions (Appendix B). A modified Robel pole is used to estimate total biomass, or the dry weight of organic matter (i.e., vegetation) per unit of area (Ackerman et al. 2001, Vermeire et al. 2002).

1.3 PROPOSED ACTION

The Proposed Action is the implementation of the Adaptive GMP. Under the Adaptive GMP, the results of an annual forage inventory would be used to determine recommended stocking rates in the Western Maneuver Area and West Fort Hood Grazing Management Units (GMU). In these GMUs, the quality and quantity of impacts related to training and land management can vary substantially from year to year, and these activities can substantially affect forage availability from year to year. The Adaptive GMP would maintain moderate stocking rates by recommending increased or decreased rates in response to annual measurement of forage availability (Appendix B). In the Eastern Training Area, training-related impacts are minimal and forage levels are relatively stable. Based on historical trends, a sustainable stocking rate would be established for these GMUs. In order to avoid substantial training impacts, the maximum stocking rate in the Live Fire and Impact Area (LFIA) would be 750 AU. North Fort Hood (NFH) would not be routinely stocked, but would be used for grazing if temporary deferrals are required in other GMUs. If grazing continues for more than one year in NFH, NFH would be incorporated into the Adaptive GMP.

The Adaptive GMP would maintain moderate grazing levels in the Western Maneuver Area and West Fort Hood by adjusting stocking rates on the basis of data provided by annual forage inventories (Appendix B). Inventories would be conducted annually at the end of the growing season and would measure biomass of vegetation. Residual biomass, or the biomass still

available at the end of the growing season, is a good indicator of a wide range of environmental conditions occurring throughout the year (i.e., climate, training, land management, wild fire, and grazing). Stocking rates would be increased or decreased based on the proportion of sample plots within a GMU in which measured biomass levels are above or below management thresholds. The management thresholds represent points at which changing levels of biomass begin to affect other processes on the landscape. The methods of the forage inventory and the steps used to determine the stocking rate adjustments for each GMU are discussed in detail in Section 2.2 of this EA and in the Biomass Survey Report provided as Appendix B of this EA.

1.4 PURPOSE AND NEED

The purpose of the Proposed Action is to identify sustainable grazing activity on the Installation in support of Fort Hood's mission. Fort Hood's mission includes providing and maintaining the infrastructure to support strategic power projection and to train Fort Hood units and Soldiers; maintaining a quality living and working environment for Soldiers, families, retirees, and authorized civilians; and sustaining an effective partnership with surrounding communities (Fort Hood 2009a).

To provide effective training, Fort Hood must manage the training area landscape (i.e., the appearance and natural characteristics of the area) for sustainability, realism, and functionality. Highly eroded soils are unable to sustain vegetation, and the formation of rills and gullies on eroded soils presents a safety hazard to Soldiers and limits tactical maneuverability. Areas that are obviously degraded by previous grazing or training activity detract from the realism of the current training activity. Areas that are stripped of their vegetation no longer resemble the undisturbed lands that might be encountered during real conflicts. Optimum landscape conditions provide sufficient vegetation to provide cover and concealment opportunities.

The landscape condition of training areas can also affect the quality of life for the Fort Hood community. Local communities are connected by the public roadways which traverse the training areas, and the training areas provide multiple recreational opportunities when not being used for military activities. Cattle grazing was part of the local landscape prior to the establishment of Fort Hood and continues to be an important economic and cultural influence on the surrounding communities. Grazing lease proceeds are available to fund a variety of environmental stewardship programs on the Installation, ranging from maintenance of natural

resources to preservation of cultural resources. Fort Hood believes that well-managed grazing is compatible with the military mission, and is in support of maintaining both the landscape and Fort Hood's "good neighbor" policy.

The need to support the Army's military mission at Fort Hood remains ever present and includes providing necessary forces and capabilities to support Combatant Commanders in support of National Security and Defense Strategies. Fort Hood is one of the Army's premier training Installations, and providing optimum landscape conditions for the practice of large-scale maneuvers using large numbers of personnel and equipment is necessary to ensure that Army Soldiers are effectively prepared for a variety of potential combat scenarios. The need to support natural resource management at Fort Hood stems from the need to support the military mission.

1.5 COMPLIANCE WITH REGULATORY REQUIREMENTS

The National Environmental Policy Act (NEPA) (Public Law [PL] 91-190, 1969) requires Federal agencies to consider the environmental consequences of all proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through a well-informed decision-making process. The Council on Environmental Quality (CEQ) was established under NEPA to implement and oversee Federal policy in this process. The CEQ issued the Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508, 1993). Army Regulation (AR) 200-2 implements CEQ regulations relating to the Army. These CEQ regulations and AR 200-2 provide for the periodic review of continuing activities to ensure that setting, actions, and effects which may have been previously assessed remain substantially accurate, particularly if changes in operation have occurred or are planned. This document assesses the environmental impacts associated with the implementation of revisions to the grazing program at Fort Hood.

Department of Defense (DoD) Instruction Number 4715.03 "establishes policy and assigns responsibility for compliance with applicable Federal statutory and regulatory requirements, Executive Orders (EO), and Presidential Memorandums for the integrated management of natural resources including lands, airs, waters, coastal, and near-shore areas managed and/or controlled by the DoD." DoD Instruction 4715.03 incorporates the requirements of the Sikes Act of 1960 and the Sikes Act Improvement Act of 1997 (16 United States Code 670) , which

include the preparation of an Integrated Natural Resources Management Plan (INRMP) in cooperation with the U.S. Fish and Wildlife Service (USFWS) and State fish and wildlife management agencies. The most recent INRMP for Fort Hood was prepared in 2009 and has been approved by the resource agencies.

AR 405-80, 10 October 1997, Section 4-8, Management of Title and Granting Use of Real Property states: "The Department of the Army will not authorize the use of real property, water, or other natural resources when the use conflicts with the goals and intent of overall Federal policy on environmental quality and historical preservation. All actions will comply with applicable Federal and state environmental, historical, and cultural protection requirements as well as any applicable coastal zone management plans, floodplain, and wetland management (see AR 200-2)."

In addition, Army (1999a) Department-Wide guidance on Reimbursable Agricultural/Grazing and Forestry Programs provides general criteria for Installation managers to determine whether such programs can be implemented on the Installation. The guidance states that outleasing and harvesting activities shall be conducted in such a manner as to support mission operations, support conservation compliance, and execute natural resources stewardship (e.g. maintain healthy ecosystems). Below are relevant excerpts from the guidance and the transmittal letter from the Assistant Chief of Staff for Installation Management.

- Reimbursable agricultural/grazing and forestry activities are opportunities for planning and managing the landscape (i.e., the appearance and natural characteristics of the area) to fit the needs of the mission. Outleasing and harvest of forest products shall be conducted in such a manner to support mission operations, support conservation compliance, and execute natural resources stewardship, e.g. maintain healthy ecosystems, sustain biodiversity. (Section 2.a.)
- Installation mission operations personnel (e.g., Installation G-3, Directorate of Plans, Training, Mobilization, and Security staff or equivalent and testing counterparts) shall determine optimum mission landscape requirements (i.e., ecosystem characteristics) in consultation with Installation conservation personnel. (Section 2.b.)
- Sustained reimbursable activities "must support the mission" of the Installation. The activity "must not encumber land that is needed for conducting mission operations." The Natural Resource Managers "must coordinate with mission operators to identify opportunities to improve long-term mission access to land, increase training realism, and improve training flexibility." [Section 3.a(5)(a)]
- Installations that conduct these activities must identify how specific reimbursable program activities directly support mission landscape requirements and environmental stewardship in the INRMP or other appropriate planning documents where INRMPs are

not required. Reimbursable program activities that obstruct these requirements are not eligible for automatic reimbursement authority. (Section 2.c.)

- Agricultural and forest products shall not be given away, abandoned, carelessly destroyed, used to offset contract costs or traded for services, supplies, or products, or otherwise be improperly removed (except as authorized in 3b(9) and 3c(2)). (Section 3.a(1))

Other laws, regulations, EOs, and guidance documents reviewed in the development of this EA are summarized within Section 3.0, and significance thresholds are provided in Section 4.0 in association with the resources to which they apply.

1.6 PUBLIC INVOLVEMENT/AGENCY COORDINATION

A Public Draft EA and Draft Finding of No Significant Impact (FNSI), if appropriate, will be delivered to government and tribal agencies and made available to the public for review and comment for a period of 30 days. All comments received will be incorporated, as appropriate, into a Final EA and FONSI and included as Appendix A in the Final EA.

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SECTION 2.0
DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

The Army is proposing to implement a GMP that would be used to identify sustainable stocking rates for four GMUs: the Western Maneuver Area - North (WMAN), Western Maneuver Area - South (WMAS), West Fort Hood - North (WFHN), and West Fort Hood - South (WFHS) (Figure 2-1). Under each of the alternative GMPs, stocking rates for Eastern Training Area - North (ETAN), Eastern Training Area - South (ETAS), North Fort Hood (NFH), and the LFIA GMUs would remain unchanged. The stocking rate in these GMUs would be based on previous forage inventories and rangeland health assessments conducted by the NRCS. These stocking rates represent moderate, sustainable levels of grazing under current climate, training, and management conditions. In order to avoid substantial training impacts, the maximum stocking rate in the LFIA would be 750 AU. NFH would not be routinely stocked, but would be used for grazing if temporary deferrals are required in other GMUs. If grazing continues for more than 1 year in NFH, NFH would be incorporated into the Adaptive GMP.

Three alternative GMPs are considered in this EA, including: 1) the No Action Alternative, which would allow continued grazing at 2010 stocking rates in all GMUs; 2) an Adaptive GMP (Proposed Action), which would result in maintenance of moderate grazing levels through annual adjustment of stocking rates based on measurement of residual biomass (Appendix B); and 3) a Limited Range GMP, which would defer all grazing in the Western Maneuver Area and West Fort Hood GMUs. It is estimated that 9,490 pounds of forage is necessary to support one AU for 1 year (Hanselka et al. 2001a). Forage is measured in terms of biomass, which is the dry weight of organic material per unit of area.

2.2 PROPOSED ACTION (ADAPTIVE GMP)

The Proposed Action is the implementation of the Adaptive GMP. Under the Adaptive GMP, the results of an annual forage inventory would be used to determine recommended stocking rates in the two Western Maneuver Area and two West Fort Hood GMUs (Table 2-1). In these four GMUs, the quality and quantity of training and land management can vary substantially from year to year, and these activities can substantially affect forage availability from year to year.

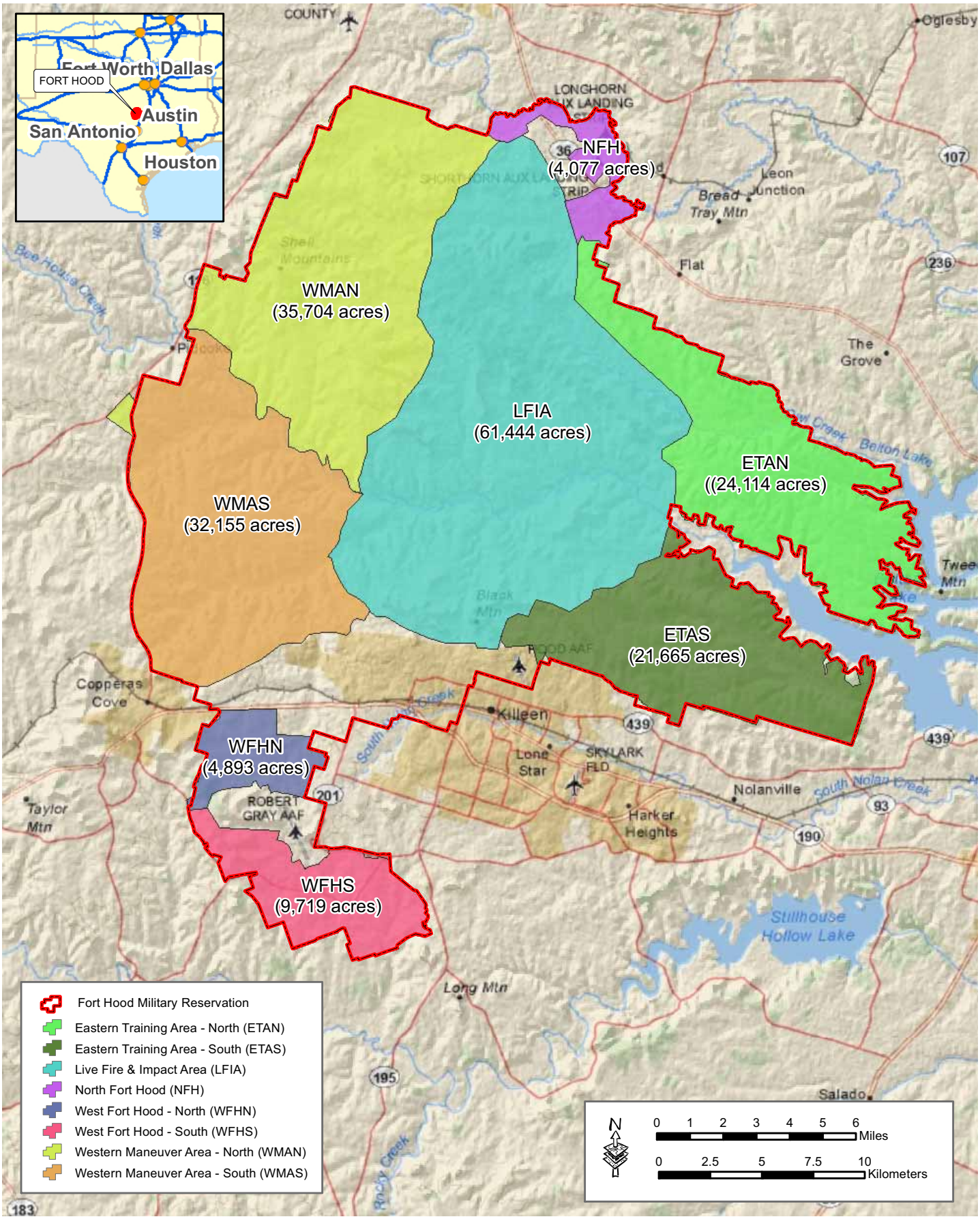

Figure 2-1: Fort Hood Grazing Management Units (GMUs)

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Table 2-1. Stocking Rates under the Proposed Action (2010 to 2015)

GMU	Abbreviation	Stocking Rate (animal units)					
		2010	2011	2012	2013	2014	2015
Western Maneuver Area - North	WMAN	320	371	TBD	TBD	TBD	TBD
Western Maneuver Area - South	WMAS	394	524	TBD	TBD	TBD	TBD
West Fort Hood - North	WFHN	73	0	TBD	TBD	TBD	TBD
West Fort Hood - South	WFHS	109	86	TBD	TBD	TBD	TBD
subtotal		*896*	*981*	*TBD*	*TBD*	*TBD*	*TBD*
Eastern Training Area - North	ETAN	207	207	207	207	207	207
Eastern Training Area - South	ETAS	147	147	147	147	147	147
North Fort Hood	NFH	0	0	TBD	TBD	TBD	TBD
Live Fire and Impact Area	LFIA	750	750	750	750	750	750
subtotal		*1,104*	*1,104*	*TBD*	*TBD*	*TBD*	*TBD*
Total		***2,000***	***2,085***	***TBD***	***TBD***	***TBD***	***TBD***

TBD = to be determined

The Adaptive GMP would maintain moderate stocking rates by recommending an increase or decrease of AU in response to annual measurement of forage availability (Appendix B). The inventory would be conducted by the Army or a third party contracted by the Army. A detailed description of the methods of the annual forage inventory, the management thresholds, and steps taken to determine stocking rates are provided in the Forage Inventory Summary Report attached to this EA as Appendix B. In the Eastern Training Area, training-related impacts are minimal and forage levels are relatively stable. Based on historical trends, a sustainable stocking rate would be established for these GMUs. In order to avoid substantial training impacts, the maximum stocking rate in the LFIA would be 750 AU. NFH would not be routinely stocked, but would be used for grazing if temporary deferrals are required in other GMUs. If grazing continues for more than 1 year in NFH, NFH would be incorporated into the Adaptive GMP.

2.2.1 ETA

Stocking rates in the ETA would remain unchanged. The current stocking rates were determined using the previous methods of forage analysis and stocking rate determination. These methods were applied over several years and both training intensity and stocking rates in the ETA did not vary substantially from year to year. Thus, these rates represent long-term sustainable rates for the ETA.

2.2.2 LFIA

The LFIA is particularly sensitive to training interruptions due to the presence of cattle. Soldiers participating in gunnery practice must stop activities when cattle cross into their line of fire. Either personnel must be dispatched to move cattle out of the way or units must wait until cattle leave their line of fire voluntarily. Based on historical trends, interruptions in the LFIA occur at an approximate rate of 1.8 annual shutdowns per AU (Appendix E). The maximum number of annual shutdowns, as determined by Fort Hood range managers, is 419. Thus, 750 is the allowable number of AU that can be stocked on the LFIA and avoid shutdowns in excess of 419. If training interruptions occur in excess of acceptable rates, the Installation will implement reduced stocking rates prior to substantial impacts to the military mission. Based on historical trends, forage production in the LFIA tends to be high relative to other GMUs. The750 AU stocking rate represents a light to moderate grazing in this GMU and is sustainable over the long-term (Appendix E).

2.2.3 NFH

If temporary deferrals are in response to mission needs or unanticipated and substantial disturbance (e.g., wildfire), the duration would be relative to the mission need or restoration of disturbed areas. The annual carrying capacity for North Fort Hood will be set at long-term, sustainable rates, of 40 AU. If use of NFH lasts more than one grazing season, the Adaptive GMP would be implemented on this GMU.

2.3 LIMITED RANGE GMP ALTERNATIVE

Under the Limited Range GMP, no grazing would occur in the Western Maneuver Area or West Fort Hood GMUs (Table 2-2). In the Eastern Training Area, training-related impacts are minimal and forage levels are relatively stable. Based on historical trends, a sustainable stocking rate would continue to be implemented in these GMUs. In order to avoid substantial training impacts, the maximum stocking rate in the LFIA would be 750 AU. NFH would not be grazed.

Table 2-2. Stocking Rates under the Limited Range Alternative (2010 to 2015)

GMU	Abbreviation	Stocking Rate (animal units)					
		2010	2011	2012	2013	2014	2015
Western Maneuver Area - North	WMAN	320	0	0	0	0	0
Western Maneuver Area - South	WMAS	394	0	0	0	0	0
West Fort Hood – North	WFHN	73	0	0	0	0	0
West Fort Hood – South	WFHS	109	0	0	0	0	0
subtotal		*896*	*0*	*0*	*0*	*0*	*0*
Eastern Training Area – North	ETAN	207	207	207	207	207	207
Eastern Training Area - South	ETAS	147	147	147	147	147	147
North Fort Hood	NFH	0	0	0	0	0	0
Live Fire and Impact Area	LFIA	750	750	750	750	750	750
subtotal		*1,104*	*1,104*	*1,104*	*1,104*	*1,104*	*1,104*
Total		***2,000***	***1,104***	***1,104***	***1,104***	***1,104***	***1,104***

TBD = to be determined

2.4 NO ACTION ALTERNATIVE

Under the No Action Alternative, a maximum stocking rate of 2,000 AU would be established (Table 2-3). This stocking rate is based on previous forage inventories and rangeland health assessments conducted by the NRCS. These stocking rates represent moderate, sustainable levels of grazing under current climate, training, and management conditions. Cattle would be redistributed among the GMUS or grazing would be deferred to avoid substantial impacts on the environment; however, the total stocking rate for the Installation would not exceed 2,000 AU. In order to avoid substantial training impacts, the maximum stocking rate in the LFIA would be 750 AU. NFH would not be routinely stocked, but would be used for grazing if temporary deferrals are required in other GMUs.

Table 2-3. Stocking Rates under the No Action Alternative (2010 to 2015)

GMU	Abbreviation	Stocking Rate (animal units)					
		2010	2011	2012	2013	2014	2015
Western Maneuver Area – North	WMAN	320	320	TBD	TBD	TBD	TBD
Western Maneuver Area – South	WMAS	394	394	TBD	TBD	TBD	TBD
West Fort Hood – North	WFHN	73	73	TBD	TBD	TBD	TBD
West Fort Hood – South	WFHS	109	109	TBD	TBD	TBD	TBD
Subtotal		*896*	*896*	*TBD*	*TBD*	*TBD*	*TBD*
Eastern Training Area – North	ETAN	207	207	207	207	207	207
Eastern Training Area – South	ETAS	147	147	147	147	147	147
North Fort Hood	NFH	0	0	TBD	TBD	TBD	TBD
Live Fire and Impact Area	LFIA	750	750	750	750	750	750
Subtotal		*1,104*	*1,104*	*TBD*	*TBD*	*TBD*	*TBD*
Total		***2,000***	***2,000***	***2,000***	***2,000***	***2,000***	***2,000***

TBD = to be determined

2.5 MEASURES COMMON TO EACH ALTERNATIVE ASSESSED IN THIS EA

The Installation is divided into eight GMUs based on geographic configuration, potential barriers to cattle movement between areas, training uses, and associated management restrictions. The lessee would be responsible for implementing the necessary livestock inventory and herd management practices to ensure that the number of cattle present in each GMU does not exceed the stocking rates as determined using the GMP assessed in this EA. Grazing would be continuous year-round. Methods to be used for herd management require Fort Hood's approval to ensure that they neither conflict with the training mission of the Installation nor are unsafe. Real Property would ensure that the CTCA adheres to agreed stocking rates. Fort Hood retains the right to defer grazing at any time, and grazing would be deferred if impacts on the landscape threaten the military mission.

The government would charge back to the lessee any costs associated with implementing or managing the lease. These costs may include, but are not limited to, repairs to fences and cattle guards and costs associated with conducting any biomass inventories.

2.6 ALTERNATIVES ELIMINATED FROM FURTHER ANALYSIS

In 1998, the NRCS produced a Natural Resources Inventory of the Installation and provided recommendations for improving the grazing program, including modifications of the grazing intensity, grazing system, and deferments for range recovery efforts, particularly in areas recently cleared of brush using fire or mechanical means (NRCS 1998). A substantial concern with this alternative is that the full rotational grazing system assumes that access to each of the grazing units is controlled and animals can be moved in and out of areas as necessary. Depending on the scale at which the areas are managed, fencing or natural barriers would be required to restrict cattle movement. In typical rangeland and grazing situations, these assumptions and recommendations would be feasible. However, on the Installation, few natural barriers sufficiently constrain cattle. Fencing is in direct conflict with the mission; therefore, this alternative could not be considered.

2.7 COMPARISON OF ALTERNATIVES

Potential effects associated with the implementation of the alternatives described above are summarized in Table 2-4.

Table 2-4. Impacts Summary Table

Resource	No Action	Adaptive GMP	Limited Range GMP
Land Use	The predominant land use on rangelands is military training. Training can be adversely affected by the presence of cattle and indirectly by the effects of grazing on the landscape. The presence of cattle typically causes training interruptions in the LFIA where a maximum stocking rate has been established to limit cattle-related training interruptions. Cattle typically avoid training activities in all other GMUs. Cattle grazing would continue to affect the physical and biological processes which shape the landscape and ultimately affect the value and sustainability of military training.	Under the Adaptive GMP, stocking rates would not increase in the LFIA. Maintaining light to moderate stocking rates is compatible with maintaining the value and sustainability of the landscape for military training.	Cattle-related training interruptions would be avoided in areas where grazing is deferred. The value and sustainability of the landscape in these areas would continue to be maintained through brush removal, controlled burns, and other land management practices. In areas where cattle are not removed, the effects of grazing on land use would be the same as those occurring under the No Action Alternative.
Physiography and Soils	Grazing, training, and land management practices would continue to affect soil erosion rates and sustainability of the landscape. Estimates of soil erosion indicate that the combined effects of land use and land management on soil erosion rates would be less than significant.	Adverse effects of grazing and other land management practices would be minimized by moderating stocking rates in response to biomass production of desirable grasses. If the combined effects of grazing, training, climate, wildfire and land management practices result in reduced plant biomass, stocking rates would be reduced and, if necessary, grazing would be deferred to allow rangelands to recover.	Grazing would not contribute to soil erosion in areas of heavy training. In areas where cattle are not removed, the effects of grazing on soil erosion would be the same as those occurring under the No Action Alternative.
Water Quality	Water quality would continue to be adversely affected by the presence of cattle on the landscape and by soil erosion. Bacteria present in the feces of cattle and wildlife is carried into streams, ponds, and lakes during storms or deposited directly into waters. High levels of these bacteria can limit the suitability of water in streams, ponds, and lakes for aquatic habitats, drinking, and recreation.	The adverse effects of grazing on water quality would be moderated by adjusting the stocking rate in response to biomass production of desirable grass species. By maintaining residual biomass levels within the established conservation thresholds, soil erosion and the consequent effects on water quality would be minimized. The direct deposition of feces into waters would continue and could increase or decrease, but would remain less than significant.	The adverse effects of grazing on water quality would be avoided in areas of heavy training. In areas where cattle are not removed, the effects of grazing on water quality would be the same as those occurring under the No Action Alternative.

Table 2-4, continued

Resource	No Action	Adaptive GMP	Limited Range GMP
Air Quality	Air quality would continue to be affected by grazing. Air quality is adversely affected by the suspension of particulate matter, which occurs in areas where fine soils are exposed to wind erosion for prolonged periods. Cattle grazing and training with heavy equipment disturbs and compacts soils, which can result in reduced plant cover and exposure of soils to wind erosion. Impacts on air quality would be less than significant.	The Adaptive GMP would moderate the adverse effects of grazing on air quality by adjusting stocking rates in response to biomass production of desirable species. Under the Proposed Action, reduced biomass production and increased exposure of soils would result in reduced stocking rates, which would avoid or minimize potential adverse effects on air quality.	The effects of grazing on air quality would be avoided in areas of heavy training. In areas where cattle are not removed, the effects of grazing on air quality would be the same as those occurring under the No Action Alternative.
Biological Resources	Grazing would continue to have adverse effects on biological resources but would not result in permanent changes in floral or faunal composition. Measures to minimize and mitigate the effects of training and improve the sustainability of the landscape would continue to minimize the adverse effects of grazing on biological resources.	Moderating stocking rates in response to the biomass production of desirable grasses would minimize adverse effects of grazing on grassland habitats. Because cattle tend to favor areas of high productivity and primarily drink from natural sources of water, the nature and magnitude of the adverse impacts of grazing and cattle on wetland, riparian, and aquatic habitats would be similar to those described under the No Action Alternative. Although these impacts could increase relative to stocking rates, they would remain less than significant.	The effects of grazing on biological resources would be avoided in areas of heavy training. In areas where cattle are not removed, the effects of grazing on biological resources would be the same as those occurring under the No Action Alternative.
Special Status Species	Grazing has no effect or minimal adverse effects on most special status species occurring on Fort Hood. However, two Federally listed birds and migratory birds are adversely affected by brown-headed cowbirds (*Molothrus atar*), which are attracted by cattle and parasitize the nests of other birds. The rate of parasitism is maintained at low levels through a trapping program implemented under Fort Hood's Endangered Species Management Plan and would not increase. Other special status species occurring on Fort Hood are transient or depend on habitats that are relatively unaffected by grazing, and potential adverse effects would be less than significant.	Implementation of the Adaptive GMP would not increase the adverse effects of grazing on Federally listed species or migratory birds. Rates of cowbird parasitism would continue to be controlled by the trapping program regardless of any increase in stocking rates. The potential effects of grazing and cattle on other special status species would be moderated through adjustment of stocking rates and any adverse effects would be less than significant.	The deferral of grazing in areas of heavy training activity could result in a reduction of cowbird trapping activities on lands adjacent to Fort Hood. This could increase parasitism rates near the perimeter of the Installation, but could also reduce parasitism in central areas. In areas where cattle are not removed, the effects of grazing on special status species would be the same as those occurring under the No Action Alternative.

Table 2-4, continued

Resource	No Action	Adaptive GMP	Limited Range GMP
Cultural Resources	The effects of grazing on cultural resources would be minimal. Trampling by cattle has a minimal adverse effect on the cultural value of surface artifacts, and cattle are excluded from areas containing sensitive artifacts or structures. Cultural resources can also be adversely affected by erosion; however, if erosion rates increased substantially, land management practices would be altered to avoid significant adverse effects.	The effects of grazing on soil erosion rates, and consequent effects on cultural resources, would be moderated by the Adaptive GMP, and significant adverse effects would be avoided.	Adverse effects of grazing on historic and cultural resources would be avoided in areas of heavy military training. In areas where cattle are not removed, the effects of grazing on cultural resources would be the same as those occurring under the No Action Alternative.
Aesthetics and Recreation	Grazing and the maintenance of open rangelands have minimal effects on the aesthetic environment of Fort Hood. The effects of grazing on the availability of forage and cover for terrestrial game species does not significantly affect hunting, and the effect of grazing on water quality does not significantly affect fishing or contact recreation.	Maintenance of light to moderate stocking rates would contribute to maintaining the aesthetic environment. The effects of grazing on wildlife habitats and water quality, and consequent effects on recreation, would be moderated by implementation of the Adaptive GMP, and significant adverse effects would be avoided.	Open rangelands would be maintained through other land management practices; thus, the aesthetic environment would remain largely unchanged. Deferral of grazing from areas of heaviest military training could improve the suitability of wildlife habitats and improve water quality resulting in beneficial effects on recreation. The effects of grazing on recreation in other areas would remain less than significant.
Socioeconomics	The grazing outlease would continue to provide economic benefits to the CTCA and associated economies.	The Adaptive GMP would promote the maintenance of a sustainable landscape by sustaining sufficient residual biomass to promote increased production during good years and sustainable production during poor years. Moderating stocking rates can improve profitability over the long term by allowing a greater flexibility in response to market demands.	This alternative would result in adverse effects as a result of lost profitability of the grazing outlease for CTCA members and a consequent reduction of incomes for associated economies.
Utilities and Transportation	There would be no effect on utilities, including potable water quality and quantity, energy consumption, and demand for waste disposal or wastewater treatment. Collisions with cattle would continue at current rates resulting in minimal adverse effects on transportation.	There would be no effect on utilities, including potable water quality and quantity, energy consumption, and demand for waste disposal or wastewater treatment. Impacts on transportation would be similar to the No Action Alternative, but collisions with cattle would increase or decrease relative to stocking rates.	There would be no effect on utilities, including potable water quality and quantity, energy consumption, and demand for waste disposal or wastewater treatment. Deferral of grazing in areas of heavy military training would result in beneficial effects on traffic by reducing collisions with cattle.

Table 2-4, continued

Resource	No Action	Adaptive GMP	Limited Range GMP
Noise	Noise levels would not be adversely affected.	Noise levels would not be adversely affected.	Noise levels would not be adversely affected.
Hazardous Materials and Waste	The alternative would not affect or be affected by hazardous materials and waste.	This alternative would not affect or be affected by hazardous materials and waste.	This alternative would not affect or be affected by hazardous materials and waste.

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SECTION 3.0
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This section describes the existing environment that may be affected by the alternative actions considered in this EA. The potentially affected environment generally includes the land area within Fort Hood; however, many resources occurring outside of this geographic boundary could also be affected. For example, water quality could be affected in waterways downstream of Fort Hood. The existing conditions within the area of potential effects are described for each resource. Regional climatic conditions are discussed below; however, an assessment of how alternative actions would affect climate is limited to the assessment of impacts on air quality.

Fort Hood lies along the edge of two subtropical climate zones (Nielsen-Gammon 2011). Subtropical climates experience cold winters and hot summers and typically experience the greatest rainfall during the summer months. The subtropical, maritime climate of Texas is predominantly influenced by onshore flow of tropical maritime air from the Gulf of Mexico. The onshore flow is influenced by a decrease in moisture content from east to west and by intermittent seasonal intrusion of continental air from the north. The two subtropical climate zones are classified based on this east-to-west moisture gradient. The climate of Fort Hood exhibits characteristics of both the subtropical sub-humid zone to the west and the subtropical humid zone to the east. Winters are typically cold and summers are typically hot. While precipitation generally occurs in the summer, it can be absent for long periods of time.

Maximum, minimum, and mean daily temperatures at Waco, Texas were above normal from 2005 through 2009 (Table 3-1) (Office of the Texas State Climatologist 2011a, 2011b). From January 2005 through July 2009, the three coldest months were December, January, and February with a mean daily temperature of 48.2, 48.1, and 51.5 degrees Fahrenheit (°F), respectively. The three hottest months were June, July, and August with a mean daily temperature of 82.3, 85.3, and 86.3 °F, respectively. Average daily temperatures tended to rise and fall by approximately 8 °F each month through the spring and fall.

Table 3-1. Deviation of 2005 through 2009 Maximum, Minimum, and Mean Daily Temperature from Normal

Time Period	Average Maximum (°F)	Average Minimum (°F)	Mean (°F)
Normal*	77.9	55.3	66.6
Deviation from Normal			
2009	+1.6	+0.4	+1.0
2008	+1.5	-0.1	+0.4
2007	-0.6	+0.8	+0.1
2006	+3.8	+1.6	+3.0
2005	+1.7	+1.0	+1.4

* based on record from 1971 to 2000

The average annual rainfall from 1971 to 2000 was 33.3 inches at Waco, Texas (Table 3-2) (Office of the Texas State Climatologist 2011a, 2011b). Rainfall is typically greatest in April, May, and June when warm air masses begin to move northward, with normal rainfall during these months being 3.0, 4.5, and 3.1 inches, respectively. A second period of relatively high rainfall occurs in September and October when cool air masses begin to move southward, with normal rainfall during these months being 2.9 and 3.7, respectively. Rainfall typically occurs during isolated, large thunderstorms; thus, amounts of rainfall are primarily singular events and tend to vary substantially among months and years. From 2005 to 2010, rainfall ranged from 0.89 to 13.99 inches during May and from 0.73 to 8.76 during June. Average monthly rainfall has been at or above normal for most months over the last 5 years. Annual rainfall totals were approximately 30 percent below normal in 2005 and 2006, 44 percent above normal in 2007, near normal in 2008 and 2009, and 40 percent above normal for the first 6 months of 2010.

Table 3-2. Monthly and Annual Total Rainfall from 2005 through 2009

Month	Rainfall (inches)						Average	Normal*	Percent of Normal
	2005	2006	2007	2008	2009	2010			
January	3.30	2.02	3.98	0.67	0.64	5.29	2.7	1.9	139
February	3.34	1.84	0.55	1.22	1.35	3.47	2.0	2.4	81
March	1.26	3.27	9.76	5.00	4.91	4.63	4.8	2.5	194
April	2.04	2.46	1.16	5.20	4.54	4.03	3.2	3.0	108
May	3.64	2.20	13.99	4.66	1.37	0.89	4.5	4.5	100
June	1.37	2.52	8.76	0.18	0.73	5.72	3.2	3.1	104
July	1.07	0.33	2.24	0.66	2.80	na	1.4	2.2	64

Table 3-2, continued

Month	Rainfall (inches)						Average	Normal*	Percent of Normal
	2005	2006	2007	2008	2009	2010			
August	4.83	0.06	0.48	10.33	0.01	na	3.1	1.9	170
September	0.57	1.24	3.79	0.61	4.09	na	2.1	2.9	72
October	0.89	4.04	0.76	3.90	9.71	na	3.9	3.7	105
November	0.51	1.07	1.78	0.43	1.69	na	1.1	2.6	42
December	0.43	2.82	0.79	0.68	1.54	na	1.3	2.8	45
Annual	23.3	23.9	48.0	33.5	33.4	24.0			
Normal*	33.3	33.3	33.3	33.3	33.3	17.3			
Percent of Normal	70	72	144	101	100	139			

* based on record from 1971 to 2000, na = not avaiable

3.2 LAND USE

3.2.1 Military Training and Support

Military training and support are the primary land uses on Fort Hood (Fort Hood 2009b). The Installation encompasses approximately 215,000 acres of land area, including nearly 200,000 acres used for military training and more than 15,000 acres used as the Installation's three cantonment areas. There are five main land areas, including NFH, the Eastern Training Area, West Fort Hood, the Western Maneuver Area, and the centrally located LFIA (see Figure 2-1).

The three cantonment areas are located centrally within North Fort Hood and West Fort Hood and south-centrally within the Installation. Cantonment areas are essentially urban and contain all facilities related to administrative, command, industrial, maintenance, warehousing, housing, logistical, billeting, and other Installation support land uses.

The Army's only Mission Command Training Center is located at Fort Hood and this facility allows training of brigade, division, and corps formations (Fort Hood 2009b). Coordinated exercises place command and control elements in the field while fire and maneuver actions are replicated using a combination of deployed tactical units and computer-supported war gaming or constructive and virtual reality battlefield simulations. Training lands on Fort Hood easily accommodate a full-scale, modern, digitally equipped heavy battalion task force exercising in multiple scenarios over several weeks at a time.

NFH is the primary site for reserve component training and mobilization and is capable of supporting 12,000 troops in permanent and tent facilities. Land use activities are similar to those of the Main Cantonment Area but are more limited, with most activity occurring during summer training. NFH also includes two auxiliary airfields. When NFH is not being used for training, fewer than 100 personnel reside there.

The Eastern Training Area is divided into a northern unit (ETAN) comprised of Land Groups 1 and 2 and a southern unit (ETAS) designated as Land Group 3. Belton Lake Reservoir divides the two units. ETAN is heavily vegetated and cross-compartmentalized, providing limited value as a mechanized maneuver area. ETAS provides more favorable terrain for mechanized units, but it is only 2.5 to 4 miles wide north to south and 9.5 miles long from east to west. Limited area dictates that ETAN and ETAS are best suited for unit assembly and logistical areas, artillery firing points, and company- and platoon-level mounted and dismounted training. In addition, these areas support engineer, combat support, and combat service support training, while providing locations for amphibious and river-crossing operations.

Land Group 1 is used year-round primarily for tracked vehicle maneuvering. It hosts tanks and Bradley fighting vehicles approximately 28 days per month and additional artillery vehicles approximately 14 days per month. Digging of trenches and fighting positions, construction of obstacles, and use of smoke and pyrotechnics also occur in this land group.

Land Group 2 is used year-round approximately 21 days per month, primarily for wheeled and dismounted military police training. It includes core endangered species habitat and has restrictive terrain and vegetation, so training is normally conducted on roads and trails. Only minor digging is conducted in this land group.

Land Group 3 is used year-round for some tracked-vehicle maneuver and dismounted training. Tracked-vehicle training is normally restricted to about 15 vehicles. This land group has most of the Installation's artillery firing points. Artillery units fire cannon and Multiple Launch Rocket System rockets from this land group weekly, which accounts for additional tracked-vehicle traffic. Some excavation and use of smoke occurs in this area.

West Fort Hood is not used for maneuver training because of its small size and its isolation from the main cantonment area by U.S. Highway 190. This training area includes many restricted

areas, including Robert Gray Army Airfield and the Ammunition Supply Point. Designated as Land Group 7, West Fort Hood is used primarily for small mechanized unit and dismounted infantry training and for logistical sites.

The Western Maneuver Area is comprised of Land Groups 4, 5, and 6, and provides training opportunities for large armored and mechanized infantry forces. The training area averages 4 to 6 miles wide from east to west and 19 miles long from north to south. The area features a wide variety of terrain and vegetation characteristics that greatly enhance cross-country, combined arms maneuver. Due to its large, contiguous size, this is the only maneuver area on Fort Hood capable of supporting brigade-level operations.

Land Groups 4, 5, and 6 are heavy, tracked-vehicle maneuver areas. Training with up to 3,000 vehicles is conducted year-round approximately 21 days per month. Digging of vehicle fighting positions, construction of obstacles, and use of smoke and pyrotechnics also occur in these land groups (USACE 2003).

The LFIA, in the central portion of the Installation, does not host maneuver training. Individual, crew-served, and major weapons systems up to battalion strength are fired into the area. The area contains more than 80 firing range complexes, all oriented to direct firing at the large impact area in the center of the LFIA. Traffic in the live-fire and impact area consists of vehicles moving to and from the ranges.

3.2.2 Grazing

Fort Hood training lands have been divided into eight GMUs based on geographic configuration, potential barriers to cattle movement between areas, and training uses (see Figure 2-1). The Eastern Training Area, West Fort Hood, and the Western Maneuver Area are each divided into north and south GMUs including ETAN, ETAS, WMAN, WMAS, WFHN, and WFHS, respectively, while NFH and the LFIA are each managed as whole GMUs. Due to the lack of fencing or other barriers within GMUs, stocking rates are managed on a GMU basis.

3.2.3 Natural Resources Management

Fort Hood's (2009b) INRMP integrates training land requirements for the military mission and the requirements for maintaining the ecological health of the training areas. Fort Hood's primary purpose is the military mission, and the Installation must provide a quality training facility to

serve that purpose. This goal is achieved through implementation of the INRMP and various other plans and programs that support the military mission. Through consultation with the USFWS, the USACE prepared an Endangered Species Management Plan (ESMP) for Fort Hood (Cornelius et al. 2007). Fort Hood's ESMP identifies conservation measures to avoid adverse effects of ongoing military activities and other actions, including grazing, occurring on Fort Hood. These measures include limiting the Installation-wide rate of brown-headed cowbird parasitism on Federally listed species to 10 percent, as described in the USFWS's (20010) Biological Opinion of Fort Hood's ESMP. Management actions and other measures implemented under the INRMP and ESMP are discussed specifically in this EA in Section 5.0 as they pertain to the cumulative effects of past, present, and proposed actions in the affected area. However, military training and other land management practices interact with grazing and influence the productivity, composition, and sustainability of the landscape. Thus, each alternative is assessed within the context of these ongoing efforts to minimize the adverse effects of training while managing the landscape for multiple uses, including grazing, maintenance of floral and faunal diversity, and the military mission.

3.3 PHYSIOGRAPHY AND SOILS

3.3.1 Physiography

Physiographic regions are broad-scale subdivisions based on terrain texture, rock type, and geologic structure and history. Based on the USGS's three-tiered classification of the physiographic regions of the U.S. (Fenneman and Johnson 1946), Fort Hood is situated west of the Atlantic Plain division along the southeastern margin of the Interior Plain division. The Atlantic Plain extends inland from the broad continental shelf along the Atlantic and Gulf of Mexico coastlines. The Atlantic Plain is characterized by a series of terraces sloping gently seaward consisting of unconsolidated layers of sand and clay. The Interior Plain spreads across the stable core (i.e., craton) of the North American continent between the Rocky Mountains and the Appalachian Mountains. The craton was formed by the fusion of several smaller continents over 500 million years ago, and tectonic activity on the craton has been limited to areas of uplift along the margins. The Interior Plain was inundated by shallow seas twice during its geologic history, and the relative flatness of the area is a reflection of the deposition and compaction of marine sediments during these periods. The accumulation of marine deposits and subsequent erosion has resulted in layered deposits of limestone,

sandstone, and shale, with the residuum of these materials overlying metamorphic and igneous rocks of the craton.

Fort Hood lies within the Great Plains province and Edwards Plateau section of the Interior Plains division (Fenneman and Johnson 1946). The southern and eastern boundary of the Edwards Plateau is defined by the Balcones Escarpment, which is an area of normal faults that rises abruptly from the Gulf Coast Plains forming a plateau to the west. Erosion of the escarpment by eastward-flowing streams has created areas of high relief along the southeast margin of the plateau commonly referred to as "Texas Hill Country". The bedrock of the Edwards Plateau consists primarily of limestone. Subsequent to periods of uplift, stream erosion has resulted in steep-sided hills, outcrops, and mesas of the underlying bedrock surrounded by broad and relatively flat depositional areas (Figure 3-1).

3.3.2 Soils

There are approximately 40 unique soil series on Fort Hood (NRCS 2009a, 2009b). In general, these soils are well-drained and moderately permeable, but they can vary widely in other characteristics such as depth, parent material, and slope. Approximately 45 percent of the land area on Fort Hood is comprised of shallow or very shallow (i.e., less than 20 inches) soils developed over limestone bedrock. The most common of these shallow soils are the Doss-Real complex, Eckrant-Rock outcrop complex, and Real-Rock outcrop complex (Figure 3-2). Most of these shallow soils are situated on ridge tops, hilltops, and backslopes. Shallow soils that do not include rock outcrops are the only soils on Fort Hood classified as highly erodible. These highly erodible soils occur on the backslopes of hilltops, ridges, and outcrops or on the footslopes just above deep floodplain soils (Figure 3-3).

Approximately 40 percent of the land area on Fort Hood is comprised of moderately deep (i.e., 20 to 40 inches) soils developed over limestone bedrock. The most common of these moderately deep soils is Topsey clay loam, which comprises nearly 20 percent of the Fort Hood land area and is situated on backslopes and footslopes. Other moderately deep soils include Nuff very stony silty clay loam, which is also situated on backslopes, and Evant silty clay, which is situated on summits of broad ridges. Soils in this group are generally well-drained and potentially highly erodible. Soils that are deep to very deep (i.e., over 40 inches) occur over approximately 15 percent of the land area on Fort Hood. These deep soils occur on three major landforms: uplands, terrace deposits, and floodplain sediments. Deep soils formed in uplands

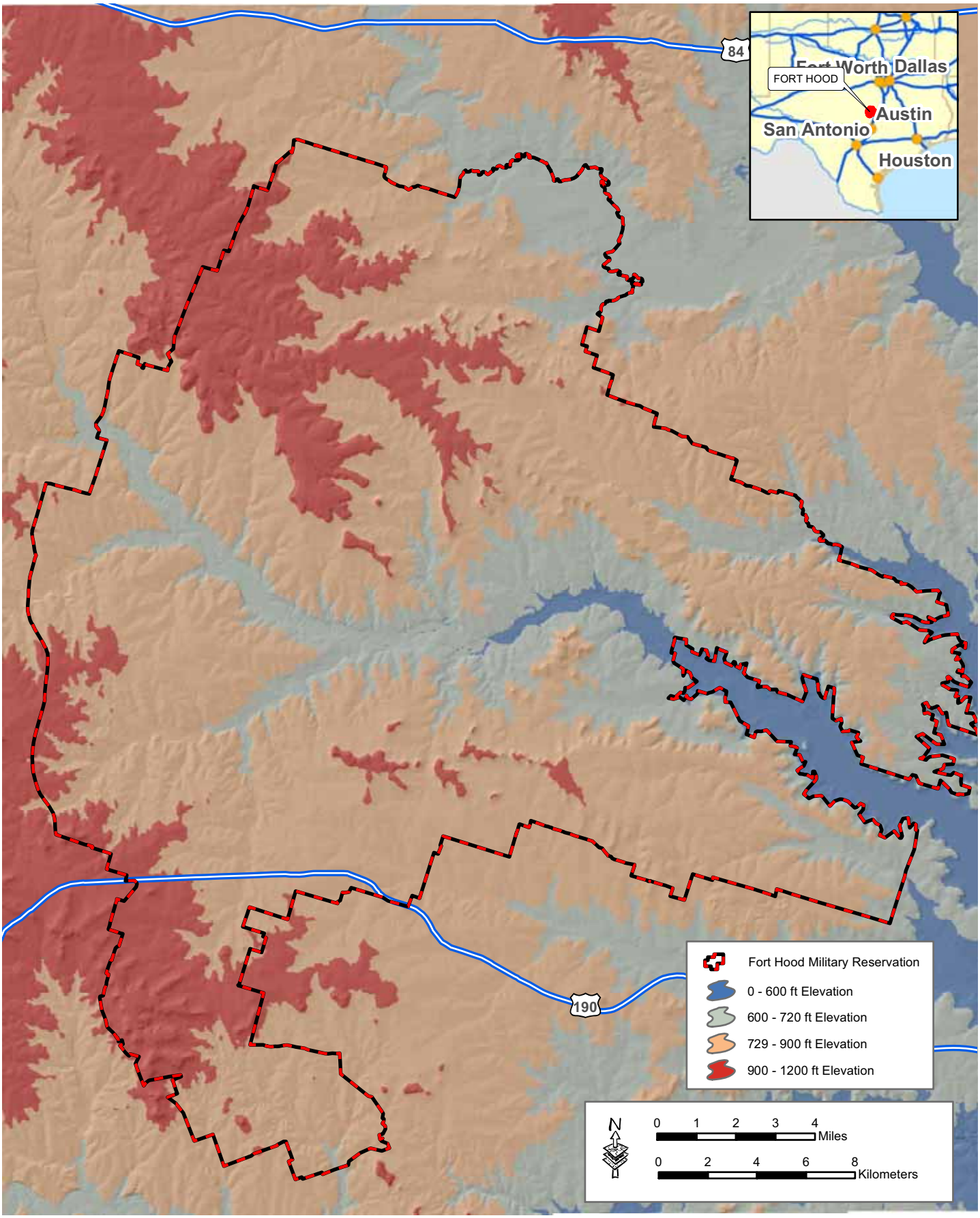

Figure 3-1: Fort Hood Topography

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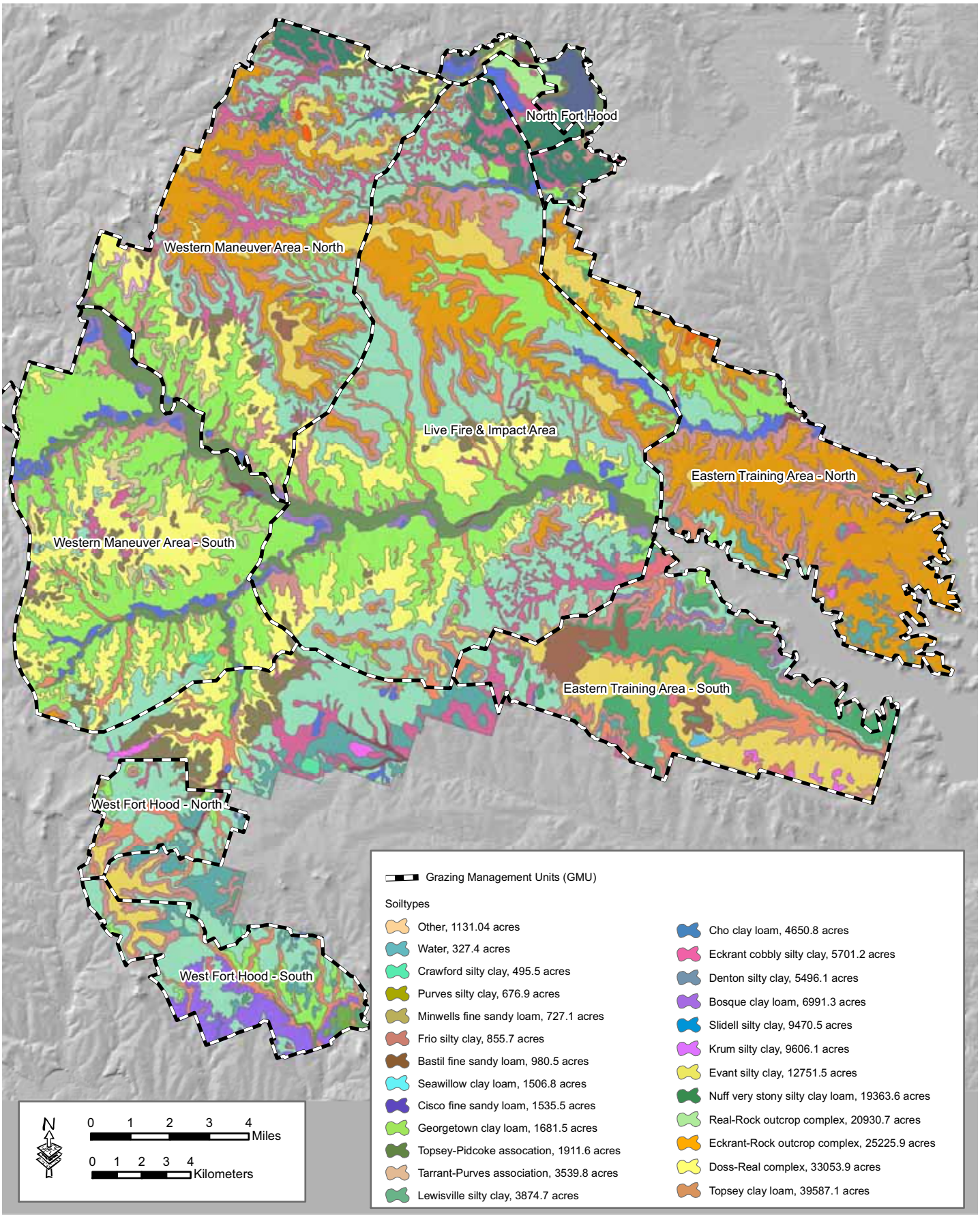

Figure 3-2: Fort Hood Soil Map Units

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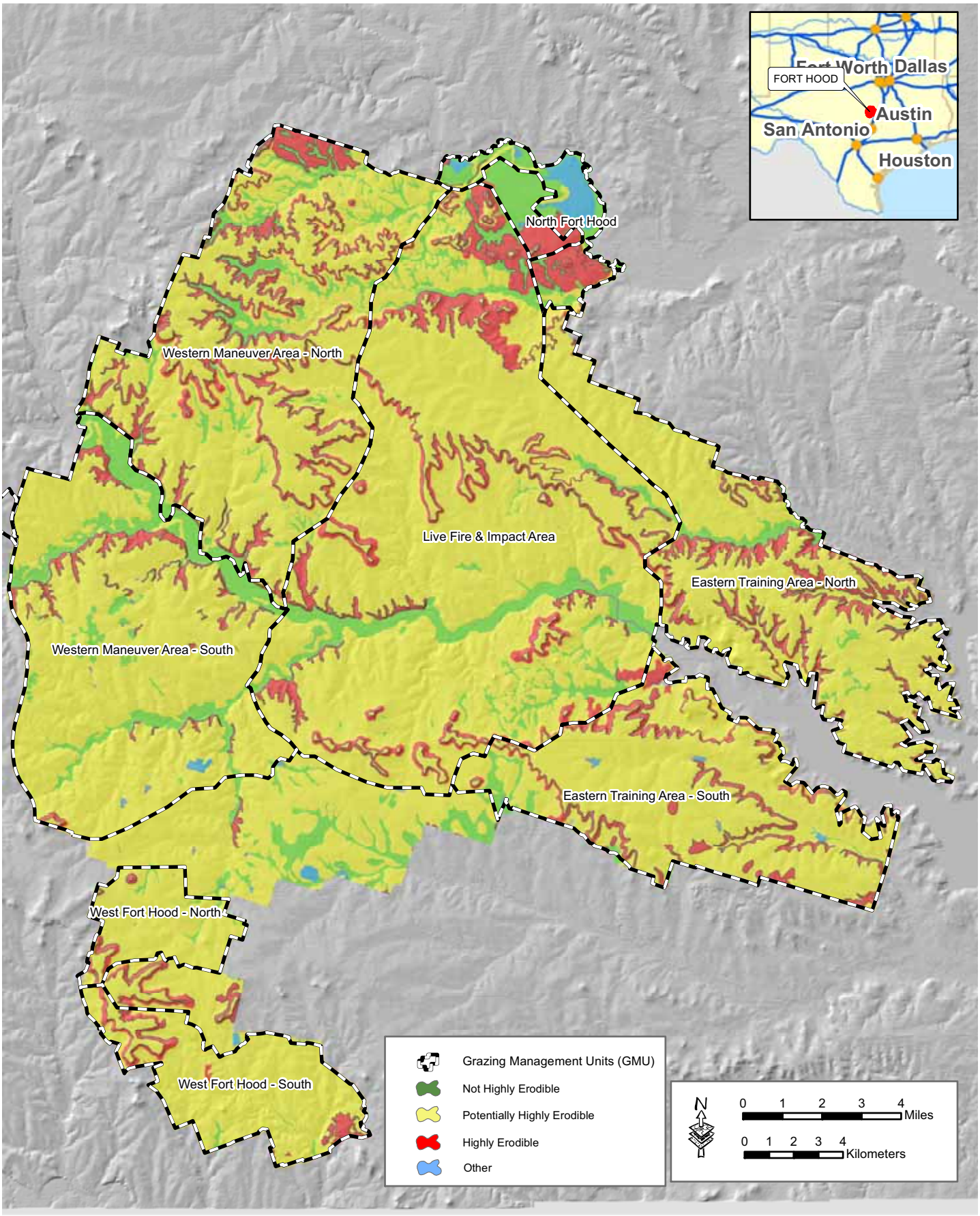

Figure 3-3: Fort Hood Soil Erodibility

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include the Slidell silty clay and Cisco fine sandy loam. Deep soils developed in stream terraces include Krum silty clay and Lewisville silty clay. Deep soils developed in loamy and clayey alluvium on floodplains of major streams include the Bosque and Frio soil series. These deep soils are generally not highly erodible, are well-drained, and have moderate to slow permeability.

Although not regulated on military Installations, Prime Farmland, as defined by the U.S. Department of Agriculture (USDA) (Federal Register [FR], Vol. 6, Parts 400-699, January 1, 2001, Section 657.5(a)), is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest, or other land, but it is not urban or built-up land or water areas. The NRCS maintains and monitors a list of Prime and Unique Farmland soils, which produce high value or unique crops, and each state office of the NRCS maintains a list of soils which support Farmlands of Statewide Importance. Approximately 39,000 acres of soils classified as Prime Farmland Soils occur on Fort Hood and include the following soil series: Bastsil fine sandy loam, Bosque clay loam, Crawford silty clay, Frio silty clay, Krum silty clay, Lewisville silty clay, Minwells fine sandy loam, San Saba clay, and Slidel silty clay (NRCS 2009a, 2009b). All of these soils are deep or moderately deep and occur primarily on terraces and floodplains (see Figure 3-2).

3.4 WATER QUALITY AND WETLANDS

3.4.1 Surface Water

As defined by the U.S. Geologic Survey (USGS) (Seaber et al. 1994), Fort Hood lies within three major watersheds trending from northwest to southeast: Leon (#12070201), Cowhouse (#12070202), and Lampasas (#12070203) (Figure 3-4). Cowhouse Creek and the Lampasas River are both tributaries of the Leon River. The Leon River begins approximately 60 miles northwest of Fort Hood and roughly parallels the Installation's northern boundary. Tributaries of the Leon River, including Shoal and Henson creeks, drain northern portions of NFH, the Western Maneuver Area, the LFIA, and the Eastern Training Area. Owl Creek drains northern portions of the LFIA and the Eastern Training Area and merges with the Leon River to form the northern arm of Belton Lake. Nolan Creek, which drains the southern portion of the Eastern Training Area and the main cantonment area, is also part of the Leon River Watershed and merges with this river downstream of Belton Lake. The western arm of Belton Lake is formed

Figure 3-4: Fort Hood Surface Waters

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by Cowhouse Creek. The Cowhouse Creek watershed includes several tributaries within Fort Hood and drains most of the Western Maneuver Area and LFIA and the northern portion of West Fort Hood. Most of West Fort Hood is within the Lampasas River watershed and this land area is drained by Reese Creek and its tributaries.

The Federal Water Pollution Control Act of 1977 (33 U.S. Code [USC] 1251, as amended), popularly known as the Clean Water Act (CWA), is a comprehensive statute aimed at restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters, including surface water and groundwater. The U.S. Environmental Protection Agency (USEPA) administers the CWA in cooperation with other Federal agencies, states, municipalities, and industries. The Texas Commission on Environmental Quality (TCEQ) is responsible for developing state water quality programs and standards, and maintaining a list of impaired waters. For impaired waters, TCEQ is required to develop a pollutant load reduction plan to correct any cause of impairment. These plans, known as Total Maximum Daily Loads (TMDLs), document the nature of the impairment, determine the maximum amount of a pollutant which can be discharged and still meet standards, and identify allowable loads from the contributing sources.

The Leon, Cowhouse, and Lampasas watershed areas are part of the larger Brazos River Basin, which drains much of northern and central Texas. Water quality concerns in the Brazos River Basin have focused on fecal coliform (e.g., *Escherichia coli*) contamination believed to be contributed to by municipal runoff, point source discharge, on-site treatment systems (e.g., septic systems), and non-point source agriculture (TCEQ 2010a).

Portions of the Leon and Lampasas rivers and Nolan and Cowhouse creeks downstream of or within Fort Hood have been identified as exceeding the acceptable contaminant loads for fecal coliform (Table 3-3, see Figure 3-4) (TCEQ 2010b). High nutrient concentrations also impair the use of Nolan Creek and the Leon River downstream of Fort Hood.

A TMDL was approved for the Leon River, but is currently on hold while stakeholders (including Fort Hood) develope a Watershed Protection Plan. The Leon River watershed includes urban areas, as well as military training areas where maneuver and live fire occur. The Leon River's designated uses include contact recreation, high aquatic life use support, and use as a public water supply.

Table 3-3. Impaired Waters Downstream of or within Fort Hood

Waterbody	Segment	Cause of Impairment	Impaired Use	Potential Sources	Year Listed and Category*
Nolan Creek	Confluence w/ North Nolan to Liberty Ditch Confluence	*Escherichia coli* Nitrate Phosphorous Orthophosphorous	Contact Recreation	Non-Point Source** (NPS) and NPS Agriculture	1996 5c
Cowhouse Creek	Upstream Portion	*E. coli*	Contact Recreation	NPS** and NPS Agriculture	2006 5c
Lampasas River	Confluence w/ Simms Creek to Bennet Creek Confluence	*E. coli*	Contact Recreation	Source Unknown (UNK)	2002 5c
Leon River	Lake Belton Confluence to Unnamed Tributary in Coryell County	*E. coli* Dissolved Oxygen Grab Chlorophyll-a	Contact Recreation	NPS**, NPS-Agriculture, NPS-Permitted Runoff from Confined Animal Feeding Operations, NPS-Natural Sources, NPS-Internal Nutrient Cycling (CAFO)'s	1996 5a

**Category 5a* - A TMDL is underway, scheduled, or will be scheduled. *Category 5b* - A review of the water quality standards for this water body will be conducted before a TMDL is scheduled. *Category 5c* - Additional data and information will be collected before a TMDL is scheduled
**NPS listed by itself in this case generally refers to municipal runoff.

3.4.2 Groundwater

The Trinity Aquifer, which extends through parts of 55 counties of north and central Texas, is the only major aquifer beneath Fort Hood (Ashworth and Hopkins 1995). The three major rock formations comprising the Trinity Aquifer, from youngest to oldest, are Paluxy, Glen Rose, and Twin Mountains. The Paluxy formation is a shallow, water-bearing formation consisting of up to 400 feet of predominantly fine- to coarse-grained sand interbedded with clay and shale. The Paluxy formation outcrops on Fort Hood on the rolling lowlands above major creeks. Beneath the Paluxy formation, the Glen Rose formation forms a gulfward-thickening wedge of impermeable marine carbonates consisting primarily of limestone. The Glen Rose formation is exposed within Fort Hood along the bottom of major creeks. The basal unit of the Trinity Group beneath Fort Hood is the Twin Mountains formation, which consists mainly of medium- to coarse-grained sands, silty clays, and conglomerates. The Twin Mountain formation is not exposed on Fort Hood. No major groundwater resources outside the Installation are affected by recharge from within Fort Hood. Recharge that occurs within the Installation affects only the small, shallow groundwater supplies that are confined within the Installation.

3.4.3 Wetlands

Two soil associations occurring on Fort Hood contain soil types that are included on the state and Federal hydric soils lists: Bosque clay loam and Frio silty clays (NRCS 2010). These associations occur over approximately 7,900 acres or 3.7 percent of the Installation; however, hydric components generally comprise 1 to 3 percent of the soil association. Bosque and Frio soils are generally located along the stream banks of the Leon River, Cowhouse Creek, Nolan Creek, and their larger tributaries. Other soils can become hydric, exhibiting anaerobic conditions, as a result of periodic or permanent saturation or inundation.

Wetlands in Central Texas and at Fort Hood are most common on floodplains along rivers and streams (e.g., riparian wetlands), along the margins of lakes and ponds, and in other low-lying areas where the groundwater intercepts the soil (i.e., springs). There are numerous natural springs and seeps occurring on Fort Hood, but most of their locations have not been mapped. Wetland features are currently being delineated to determine jurisdictional status under Section 404 of the CWA (33 U.S. Code [U.S.C.] 1251, as amended)(Fort Hood 2009b).

3.5 AIR QUALITY

The Clean Air Act of 1963 (16 USC 470, as amended) provides protection and enhancement of the Nation's air resources. The Federal Conformity Final Rule (40 Code of Federal Register [CFR] Parts 51 and 93) specifies criteria or requirements for conformity determinations for Federal projects, and the USEPA established National Ambient Air Quality Standards (NAAQS) for specific pollutants determined to be of concern with respect to the health and welfare of the general public (USEPA 2010a). NAAQS are classified as either "primary" or "secondary", and represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect the public health and welfare. The major pollutants of concern, or criteria pollutants, are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns (PM-10), particulate matter less than 2.5 microns (PM-2.5) and lead (Pb) (Table 3-4).

Table 3-4. National Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Times
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour [1]	None	
	35 ppm (40 mg/m^3)	1-hour [1]		
Lead	0.15 µg/m^3 [2]	Rolling 3-Month Average	Same as Primary	
	1.5 µg/m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	53 ppb [3]	Annual (Arithmetic Average)	Same as Primary	
	100 ppb	1-hour [4]	None	
Particulate Matter (PM-10)	150 µg/m^3	24-hour [5]	Same as Primary	
Particulate Matter (PM-2.5)	15.0 µg/m^3	Annual [6] (Arithmetic Average)	Same as Primary	
	35 µg/m^3	24-hour [7]	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour [8]	Same as Primary	
	0.08 ppm (1997 std)	8-hour [9]	Same as Primary	
	0.12 ppm	1-hour [10]	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Average)	0.5 ppm	3-hour [1]
	0.14 ppm	24-hour [1]		
	75 ppb [11]	1-hour	None	

Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb - 1 part in 1,000,000,000) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air (µg/m^3).
[1] Not to be exceeded more than once per year.
[2] Final rule signed October 15, 2008.
[3] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard
[4] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).
[5] Not to be exceeded more than once per year on average over 3 years.
[6] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.
[7] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).
[8] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
[9] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(c) EPA is in the process of reconsidering these standards (set in March 2008).
[10] (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.
[11] (a) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Areas that do not meet these NAAQS standards are called non-attainment areas; areas that meet both primary and secondary standards are known as attainment areas. The Federal Conformity Final Rule specifies requirements for conformity determinations for Federal projects. The Federal Conformity Rule was first promulgated in 1993 by the USEPA, following the passage of Amendments to the Clean Air Act in 1990 (42 U.S.C. 7401, as amended). The rule

mandates that a conformity analysis must be performed when a Federal action generates air pollutants in a region that has been designated a non-attainment or maintenance area for one or more NAAQS.

A conformity analysis is the process used to determine whether a Federal action meets the requirements of the General Conformity Rule. It requires the responsible Federal agency to evaluate the nature of a proposed action and associated air pollutant emissions and calculate emissions as a result of the proposed action. If the emissions exceed established limits, known as *de minimis* thresholds, the proponent is required to implement appropriate mitigation measures. TCEQ has adopted USEPA's NAAQS as Texas' criteria pollutants. Areas that fail to meet federal standards for ambient air quality are considered non-attainment by the State of Texas. Both TCEQ and USEPA consider Bell and Coryell counties as in attainment for all NAAQS (USEPA 2010b).

Global climate change refers to a change in the average weather on the earth. Greenhouse Gases (GHGs) are gases that trap heat in the atmosphere. They include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases including chlorofluorocarbons (CFC) and hydrochlorofluorocarbons (HFC), and halons, as well as ground-level O_3 (California Energy Commission 2007). The GHGs covered by EO 13514 are CO_2, CH_4, N_2O, HFC, perfluorocarbons, and sulfur hexafluoride. These GHGs have varying heat-trapping abilities and atmospheric lifetimes. CO_2 equivalency (CO_2e) is a measuring methodology used to compare the heat-trapping impact from various greenhouse gases relative to CO_2. Some gases have a greater global warming potential than others. Nitrous oxides (NOx), for instance, have a global warming potential that is 310 times greater than an equivalent amount of CO_2, and CH_4 is 21 times greater than an equivalent amount of CO_2.

The CEQ provided draft guidelines for determining meaningful GHG decision-making analysis. The CEQ GHG guidance is currently undergoing public comment at this time; however, the draft guidance states that if the project would be reasonably anticipated to cause direct emissions of 27,557 U.S. tons or more of CO_2 GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. For long-term actions that have annual direct emissions of less than 27,557 U.S. tons of CO_2, CEQ encourages Federal agencies to consider whether the action's long-term emissions should receive similar analysis. CEQ does not propose this as an indicator

of a threshold of significant effects, but rather as an indicator of a minimum level of GHG emissions that may warrant some description in the appropriate NEPA analysis for agency actions involving direct emissions of GHGs (CEQ 2010).

A single adult cow emits 175 to 245 pounds of CH_4 per year. At 2010 stocking rates (i.e., 2,000 AU), the total emissions from cattle on Fort Hood would amount to less than 490,000 pounds, or just 245 tons of CH_4 per year.

3.6 BIOLOGICAL RESOURCES

3.6.1 Flora

The three physiographic regions associated with Fort Hood's geology and climate are the Edwards Plateau, the Great Plains, and the Balcones Escarpment as discussed in Section 3.2.2. Several authors have delineated regions of Texas giving varying importance to geology, climate, flora, and fauna. Although the boundaries of these regions vary somewhat depending upon the specific delineation criteria, the three physiographic regions are more or less associated with three ecological regions: Edwards Plateau, Cross Timbers and Prairies, and Blackland Prairie, respectively (Texas Parks and Wildlife Department [TPWD] 2009a). The classification system used here is based on a physiognomic classification conducted by NRCS in 2008. A physiognomic classification distinguishes between vegetation communities based on the general appearance of both the landscape and plant growth forms (e.g., Deciduous Woodland). The species composition and, to some extent, the physiognomic classification of Fort Hood's vegetation communities is the result of regional geology and climate, as well as more local patterns of topography and soil. However, the predominant factor influencing the distribution and composition of vegetation communities on Fort Hood is the history of disturbance related to fire, grazing, and military training.

Fort Hood is situated in the northeastern reaches of the Edwards Plateau, the southernmost extension of the Cross Timbers and Prairies, and just west of the Blackland Prairie ecological regions. Woody and shrub-dominant communities which typify much of the land area on Fort Hood are most closely representative of Edwards Plateau vegetative associations. The grasslands are representative primarily of the mid-grass associations of the Cross Timbers and Prairies areas, with inclusions of species more commonly associated with tall-grass associations of the Blackland Prairie. Historically, frequent natural and man-made fires confined

woody vegetation to riparian areas and rocky slopes and hills. As a result of human activities including grazing, reduction and suppression of fires, and training activities, the current vegetation structure and mix of species differ from those historically associated with the region (Fort Hood 2009b).

Three distinct vegetation communities dominated by woody vegetation occur on Fort Hood: Coniferous Forest and Shrub, Deciduous Forest and Shrub, and Mixed Forest and Shrub communities. These communities are found on the rocky slopes and hillsides or mesas and along streams and rivers (Figure 3-5). Small pockets of Coniferous Forest and Shrub are found throughout the Installation and are primarily composed of Ashe juniper (*Juniperus ashei*). Other species found in this community include flameleaf sumac (*Rhus lanceolata*), Texas ash (*Fraxinus texensis*), plateau live oak (*Quercus fusiformis*), a variety of grasses, and broomweeds (*Amphiachyris s*pp.).

Deciduous Forest and Shrub was historically more abundant throughout the Installation. This community is composed of broad-leaf trees and shrubs and is found in lowlands and on protected slopes. Tree species representative of this community include plateau live oak, post oak (*Quercus stellata*), pecan (*Carya illinoiensis*), and sycamore (*Platanus occidentalis*). Understory species include Alabama supplejack (*Berchemia scandens*), Texas persimmon (*Diospyrus texana*), saw greenbriar (*Smilax bona-nox*), hairy grama (*Bouteloua hirsuta*), Texas grama (*B. rigidiseta*), prairie-tea (*Croton monanthogynus*), broomweed, silver bluestem (*Bothriochloa saccharoides*), prairie three-awn (*Aristida oligantha*), and mist-flower (*Eupatorium coelestinum*).

The most common vegetation community on the Installation is the Mixed Forest and Shrub Community. In some areas Ashe juniper dominates over either plateau live oak or Texas red oak (*Quercus texana*), and in others the oaks dominate the Ashe juniper. Understory species are a mixture of the previously mentioned communities.

Grasslands are found throughout the Installation, but are most common on rolling uplands between the floodplains and hills or mesas in the LFIA and Western Maneuver Area. Wildfires caused by various training activities, controlled burns, and other forms of brush removal can increase the area of grasslands and limit the establishment and expansion of woody vegetation.

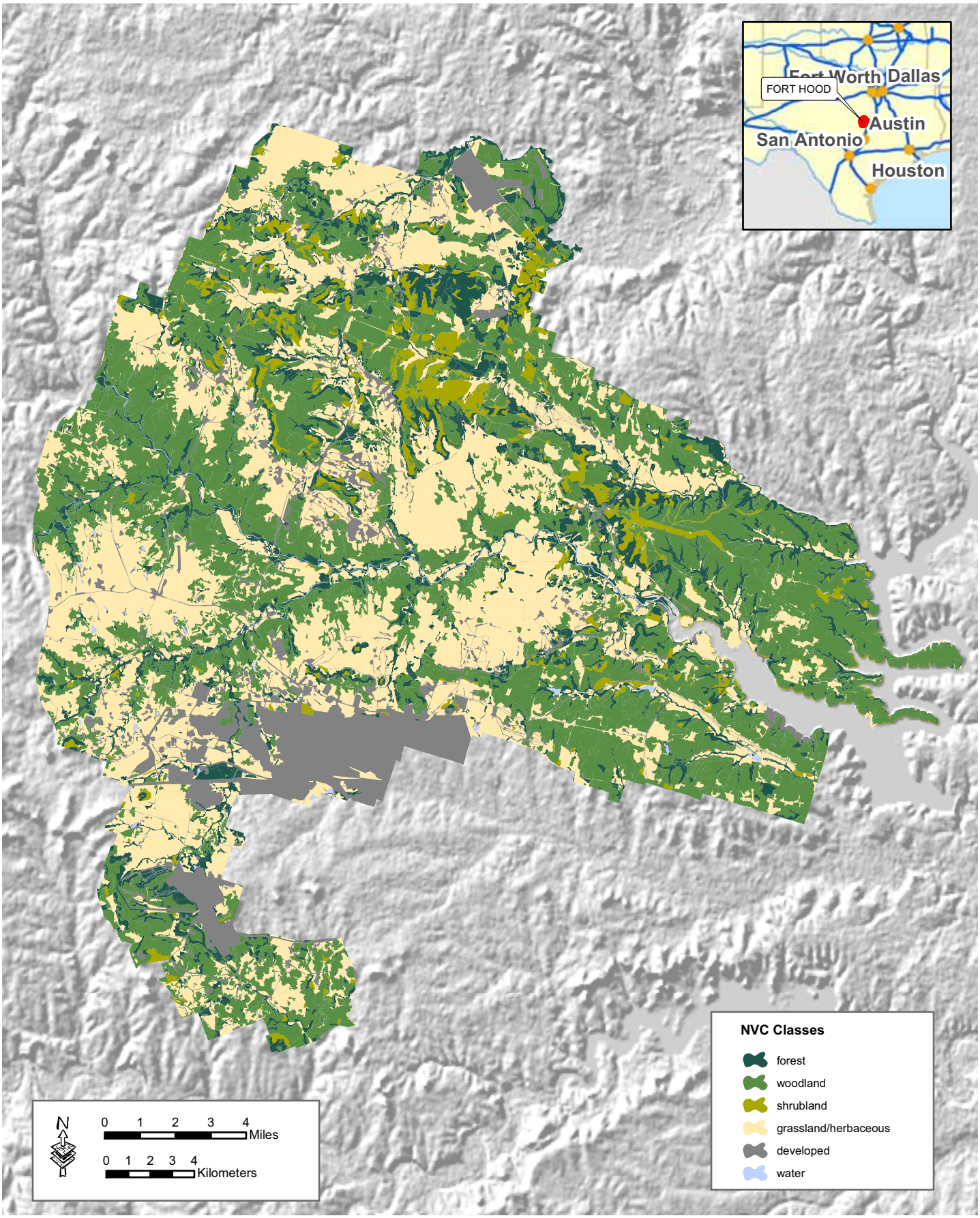

Figure 3-5: Fort Hood Vegetation Cover Types

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Grassland areas are composed primarily of perennial herbaceous species, and may include little bluestem (*Schizachyrium scoparium*), hairy grama, sideoats grama (*Bouteloua curtipendula*), blue grama (*B. gracilis*), Texas wintergrass (*Nassella leucotricha*), seep muhly (*Muhlenbergia reverchonii*), silver bluestem, prairie-tea, broomweeds, ragweed (*Ambrosia artemisiifolia*), three-awns (*Aristida* spp.), and snow-on-the-prairie (*Euphorbia bicolor*). Small, isolated areas have a species composition that is more representative of the tall-grass prairies, which are dominated by little bluestem, yellow Indiangrass (*Sorghastrum nutans*), and big bluestem (*Andropogon gerardii*).

Several vegetation resource inventories have been conducted to assess the effects of a variety of actions occurring on Fort Hood on grasslands, including military training and grazing. Conditions observed during the 2010 biomass survey (Appendix B) were similar to previous surveys; however, areas with extremely low forage biomass (i.e., less than 500 pounds per acre) were less frequent than in previous surveys. In the Western Maneuver Area and Eastern Training Area, sites that had moderate to high residual biomass (i.e., 1,000 to 3,000 pounds per acre) were generally dominated by King Ranch bluestem (*Bothriochloa ischaemum*), a non-native perennial grass that has high productivity but has only fair grazing value. King Ranch bluestem is considered to have fair grazing value due to lesser volume production, lower palatability, and lower quality when compared to plants with good value, such as little bluestem. In NFH, Texas wintergrass and Virginia wildrye (*Elymus virginicus*), both native cool season species, comprised approximately 60 percent of the grazeable forage. In the West Fort Hood management units, sites were typically dominated by little bluestem.

3.6.2 Fauna

Terrestrial wildlife habitats are closely associated with the vegetation communities described above, but are also influenced by moisture and elevation clines from upland to riparian habitats (USACE 1999, Fort Hood 2009b). Wooded habitats in riparian areas contain the greatest densities of passerine birds, followed by juniper woodland and mixed woodland. The least dense bird populations are found in the grassland habitat. The most widespread and abundant passerine species located on the area is the cardinal (*Cardinalis cardinalis*), which thrives in disturbed areas. Other common species are the mourning dove (*Zenaida macroura*), Carolina chickadee (*Parus carolinensis*), mockingbird (*Mimus polyglottos*), and turkey vulture (*Cathartes aura*).

Common mammal species in the area are the raccoon (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), and black-tailed jackrabbit (*Lepus californicus*). Common small mammals include the deer mouse (*Peromyscus maniculatus*), hispid cotton rat (*Sigmodon hispidus*), and eastern wood rat (*Neotoma floridana*).

Reptiles and amphibians at Fort Hood are representative of the eastern, western, and southern U.S. communities. Eastern species present on the Installation include Blanchard's cricket frog (*Acris crepitans blanchardi*), gray treefrog (*Hyla versicolor*), and bullfrog (*Rana catesbeiana*). Western species include the Texas greater earless lizard (*Cophosaurus texanus*), collared lizard (*Crotaphytus collaris*), western diamondback rattlesnake (*Crotalus atrox*), and the western narrow-mouthed toad (*Gastrophryne olivacea*). Southern species include the Texas spiny lizard (*Sceloporus olivaceus*), short-lined skink (*Eumeces tetragrammus brevilineatus*), Rio Grande leopard frog (*Rana berlandieri*), and Texas patchnose snake (*Salvadora grahamiae lineata*).

Thirty-two species of fish have been documented from the lakes, ponds, and streams on the Installation. The common species are red shiner (*Cyprinella lutrensis*), blacktailed shiner (*Notropis venustus*), and bullhead minnow (*Pimephales vigilax*), with remaining species being members of the minnow (Cyprinidae) or sunfish (Centrarchidae) families. The only genus expected to occur but not found on the Installation is *Percina*, the darters. The absence of darters could be the result of sedimentation of the gravel habitat required by these species.

3.7 SPECIAL STATUS SPECIES

3.7.1 Listed Species

Special status species include those species for which some protection is afforded under state or Federal regulations or which is not formally protected but monitored due to rarity or sensitivity to anthropogenic activities. The Endangered Species Act (ESA) of 1973 requires that a discretionary Federal action not put into jeopardy the continued existence of a listed species or cause the destruction or adverse modification of their critical habitat. The USFWS maintains and monitors a list of non-marine species considered to be threatened with extinction or in danger of becoming extinct. The USFWS (2011) and TPWD (2010a, 2010b) each maintain a database of special status species and the counties in which they could potentially occur (Appendix C). The status, preferred habitats, and potential for each of these species to be within the range of potential effects resulting from grazing activities on Fort Hood are presented

in Table 3-5. Species listed as threatened or endangered by the USFWS are protected from harm or harassment by the Endangered Species Act (16 U.S.C. 1531). Migratory birds are afforded special status under the Migratory Bird Treaty Act (MBTA). The Bald and Golden Eagle Protection Act affords additional protection to both bald (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*). Potentially affected special status species are described below.

Table 3-5. Sensitive Species, Status, Preferred Habitats and Potential to occur within the Action Area

Species	Status*	Preferred Habitat	Potential to be Present in the Action Area
INSECTS			
Leon River winter stonefly *Taeniopteryx starki*	None	Not described in detail, breeds in rivers	None – known to occur locally on the Leon River upstream of Fort Hood (NatureServe 2010)
MOLLUSKS			
False spike mussel *Quadrula mitchelli*	ST	Medium to large rivers over variety of substrates	Low – known populations believed to be extirpated (Zara 2010); but could occur on Fort Hood (Hammer 2011)
Smooth pimpleback *Q. houstonensis*	ST	Small to moderate rivers and moderate sized reservoirs over a variety of substrates	Low – known to occur in the Leon River in Blanco County (Zara 2010); could occur in rivers on Fort Hood (Hammer 2011)
Texas fawnsfoot *Truncilla macrodon*	ST	Rivers and larger streams	Low – remaining populations are believed to be restricted to the Brazos River (Zara 2010); but could occur on Fort Hood (Hamer 2011)
FISHES			
Guadalupe bass *Micropterus treculii*	None	Perennial streams of the Brazos River, Colorado River, San Antonio Bay, and Nueces River basins	None – Fort Hood is not part of the Brazos River basin (Hassan-Williams and Bonner 2011)
Smalleye shiner *Notropis buccula*	FC	Medium to large prairie streams with sandy substrate and turbid to clear warm water in the upper Brazos River system	None – Fort Hood is not part of the Brazos River basin (Hassan-Williams and Bonner 2011)
AMPHIBIANS			
Salado Springs salamander *Eurycea chisholmensis*	FC	Surface springs and subterranean waters of the Salado Springs system	None – known populations occur approximately 5 miles south of Stillhouse Hollow Lake (TPWD 2010a)
REPTILES			
Texas garter snake *Thamnophis sirtalis annectens*	None	Generally found in dry, lightly wooded areas often in association with wet or moist microhabitats	Moderate – although not reported, this uncommon species is likely to occur on Fort Hood (TPWD 2010a)
Texas horned lizard *Phyrnosoma cornutum*	ST	Open, arid and semi-arid regions with sparse vegetation on friable soils	Confirmed – known to occur on Fort Hood (Webb and Henke 2008)

Table 3-5, continued

Species	Status*	Preferred Habitat	Potential to be Present in the Action Area
Timber/canebrake rattlesnake *Crotalus horridus*	ST	Woods and forests with dense ground cover near permanent water	Moderate – although not reported, this uncommon species is likely to occur on Fort Hood (TPWD 2009b)
BIRDS			
American peregrine falcon *Falco peregrinus anatum*	ST	Migratory habitat includes urban areas and leading landscape edges such as lake shores, coastlines, and barrier islands	Confirmed – observed on Fort Hood and likely migrates through the area (Fort Hood 2009b)
Bald eagle *Haliaeetus leucocephalus*	ST	Larger rivers and lakes with adequate perching opportunities	Confirmed – known to nest around Belton Lake (Fort Hood 2009b)
Black-capped vireo *Vireo atricapilla*	FE	Patchy, island habitat of wooded areas with shrubs up to 6 feet tall surrounded by grasslands	Confirmed – suitable nesting and foraging areas known to occur on the Installation (Fort Hood 2009b)
Golden-cheeked warbler *Dendroica chrysoparia*	FE	Mixed, closed-canopy woodlands with mature Ashe juniper and oaks	Confirmed – suitable nesting and foraging areas known to occur on the Installation (Fort Hood 2009b)
Mountain plover *Charadrius montanus*	None	Heavily grazed pastures, burned fields, fallow fields, and tilled fields	Low – species prefers large areas of bare ground often associated with agricultural production, but may occur on Fort Hood (Andres 2009)
Sprague's pipit *Anthus spragueii*	FC	Grasslands with minimal disturbance such as grazing, haying or other human presence	Confirmed – known to winter on Fort Hood (Hammer 2011)
Western burrowing owl *Athene cunicularia hypugaea*	None	Open grasslands, especially prairie, plains, and savanna	Confirmed – nesting occurs in west Texas and the panhandle; species may migrate through or overwinter on the Installation (Klute et al. 2003); and have been recorded on Fort Hood (Hammer 2011)
Whooping crane *Grus americana*	FE, SE	Frequents coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields	Confirmed – Fort Hood used in transit to Belton Lake or other migratory destinations (Fort Hood 2009b)
MAMMALS			
Cave myotis bat *Myotis velifer*	None	Forages over deserts, grasslands, and watercourses; roosts in caves and crevices	Confirmed – a known roost occurs in the Western Maneuver Area (Fort Hood 2009b)
Plains spotted skunk *Spilogale putorius interrupta*	None	Generalist; prefers wooded, brushy areas and tallgrass prairie	Moderate – although not reported, this uncommon species is likely to occur on Fort Hood (Loomis 2010)
Red wolf *Canis rufus*	FE, SE	Brushy and forested areas	None – known to be extirpated from Texas (TPWD 2010a)
PLANTS			
Texabama croton *Croton alabamensis* var *texensis*	None	In duff-covered loamy clay soils on rocky slopes in forested, mesic limestone canyons	Confirmed – known populations occur on Fort Hood (Fort Hood 2009b)

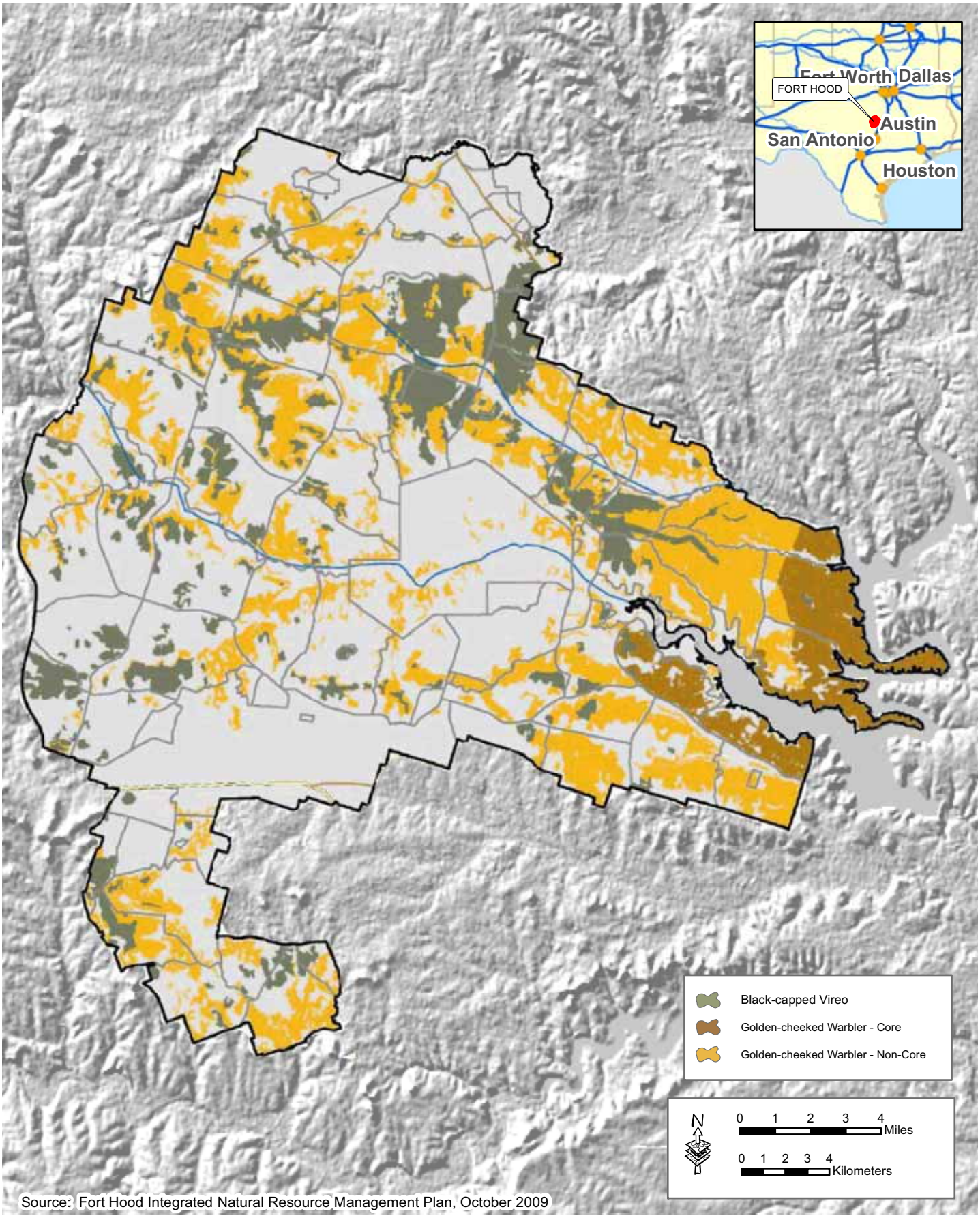
* FC – Federal Species of Concern, FE - Federally Endangered, SE – State Endangered, ST – State Threatened; none – species monitored by resource agencies

3.7.2 Federally Listed Species

Migratory black-capped vireos (*Vireo atricapilla*) historically nested along a grassland/forest ecotone from central Kansas to eastern Mexico during the summer months (USFWS 2007). Breeding has not been recently documented in the northern portions of the historic breeding range. Black-capped vireos nest in early-succession deciduous scrub communities that are typically generated as the result of various disturbances, including wildfire or mechanical removal of woody top growth. Preferred nesting habitat for black-capped vireos includes a wide diversity of hardwoods in patchy, low-growing configuration separated by open, grassy spaces. As high quality habitat ages, it will decrease in quality until it is no longer used; therefore, maintaining habitat for black-capped vireos requires active management. Throughout the range of the species, the black-capped vireo is threatened by cowbird parasitism and by habitat loss from browsing animals, fire suppression, and urban development. Wildfire suppression threatens the black-capped vireo because this species utilizes relatively young deciduous shrub communities that replace the older, single-species juniper stands after a wildfire.

Golden-cheeked warblers (*Dendroica chrysoparia*) are migratory and breed exclusively in mixed Ashe juniper/deciduous woodlands of Central Texas (USFWS 2011b). Suitable nesting habitat is provided by tall, closed canopy, dense, mature stands of Ashe juniper mixed with deciduous trees and is typically found in relatively moist areas such as steep-sided canyons, slopes, and adjacent uplands or in drier areas of flat topography. The species is dependent upon Ashe juniper bark for nest material and forages on insects gleaned from a variety of tree species. Primary threats to the species throughout its range include habitat destruction by urban development, brush clearing, oak wilt, range wildfires, and nest parasitism from brown-headed cowbirds.

Suitable habitat for black-capped vireos and golden-cheeked warblers occurs throughout much of Fort Hood (Figure 3-6) (Cornelius et al. 2007, Fort Hood 2009b). In 2011, it was estimated that approximately 52,000 acres of suitable golden-cheeked warbler habitat occur on Fort Hood (Hammer 2011). The Fort Hood ESMP designates approximately 8,900 acres of golden-cheeked warbler habitat in the Eastern Training Area as core habitat for the species (Hammer 2011). Activities in the core habitat area are restricted to minimize impacts on the species. In 2011, it was estimated that approximately 22,450 acres of suitable black-capped vireo habitat occurs on Fort Hood (Hammer 2011). Surveys conducted from 1992 to 2005 indicated a



Source: Fort Hood Integrated Natural Resource Management Plan, October 2009

Figure 3-6: Fort Hood Black-capped Vireo & Golden-cheeked Warbler Habitats

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steadily increasing trend in the number of golden-cheeked warblers nesting on Fort Hood, but did not indicate a trend in the number of black-capped vireos (Anders and Dearborn 2001).

Oak wilt has been observed on the Installation and its impacts are unknown, but studies are underway to assess the extent and the impacts of this disease. Wildfires on the Installation result from military training activities, primarily in the LFIA, during hot and dry periods when fuel is readily available in the form of dry brush and grass. Such fires have affected both golden-cheeked warbler habitat and that of the black-capped vireo over the past decade.

Brown-headed cowbirds are most abundant near grazing cattle where they feed on insects disturbed by the cattle; however, cowbirds are known to travel up to 5 miles to parasitize nests. Brown-headed cowbirds parasitize nests by removing eggs of the occupant and laying their own eggs in the nest. Occupants of the nest then brood over the brown-headed cowbird's egg. Most species parasitized by the cowbird are unable to differentiate between their hatchling and the cowbird hatchling, and expend energy and other resources raising only the cowbird. However, the golden-cheeked warbler is one of the few species that may either abandon parasitized nests, or successfully raise the cowbird hatchling with a reduced number of its own, reducing but not eliminating the impacts of cowbirds on the species. Cowbird parasitism on the black-capped vireo is a greater concern than on the golden-cheeked warbler because the vireo does not have a natural defense mechanism such as nest abandonment.

Whooping cranes are rare migrants through the Fort Hood area (Cornelius et al. 2007, Fort Hood 2009b). Whooping cranes migrate through Central Texas during spring and fall and have been observed along the shoreline of Belton Lake. Whooping cranes were observed foraging in a borrow pit on Fort Hood in March 2010 (Hammer 2011).

3.7.3 State-Listed Species

The Texas garter snake and canebrake rattlesnake are each uncommon, but not rare, species that are known to occupy wooded areas of Central Texas (TPWD 2009b, TPWD 2010a). Although no records of these species occurring on Fort Hood were identified, it is likely that these species occupy the wooded habitats on the Installation in low numbers. The greatest threats to these species are loss and fragmentation of habitat due to development and collection for the skins (rattlesnake only).

The Texas horned lizard has been documented throughout Fort Hood in low numbers (Webb and Henke 2008, Fort Hood 2009b). The species prefers arid to semi-arid habitats with minimal vegetation cover over friable soils. Threats to the species include fragmentation of habitats; disturbance of habitats, including compaction of soils; predation of prey (i.e., red harvester ants [*Pogonomyrmex barbatus*]) by imported red fire ants (*Solenopsis invicta*) and direct predation by fire ants.

The American peregrine falcon is a resident of southwest Texas, where it occupies a variety of arid and semi-arid habitats (Cornelius et al. 2007, Fort Hood 2009b). The species was heavily impacted by pesticide use in the late 20th century and was previously listed as Federally endangered; however, bans on pesticide use and reintroduction efforts have led to recovery of the species over most of its range and delisting of the species by the USFWS. The species remains listed as threatened by the TWPD. The species has been anecdotally recorded on Fort Hood, and it is presumed that the species is a transitory migrant in the area.

Bald eagles winter regularly on Belton Lake and the shoreline along the eastern boundary of Fort Hood (Cornelius et al. 2007, Fort Hood 2009b). Wintering populations vary from two to as many as seven, including adults, subadults, and juveniles. Historically, threats to bald eagles included hunting, habitat destruction, and widespread pesticide use. Laws preventing hunting of the species and outlawing the use of certain pesticides have resulted in a significant recovery of this species, and delisting by the USFWS. The only substantial threat to this species on the Installation is the aerial support for training activities. However, activities near roost sites are heavily restricted when bald eagles are known to be in the area.

3.7.4 Other Special Status Species

While the mountain plover has not been documented on Fort Hood, the western burrowing owl has (Cornelius et al. 2007, Fort Hood 2009b). The mountain plover typically prefers barren areas associated with intense agriculture use, but may also use heavily grazed pastures (Andres and Stone 2009). While the burrowing owl uses open grasslands, in Central Texas, the species is more commonly associated with agricultural lands where man-made features provide highly suitable burrowing opportunities (Klute et al. 2003). Due to the presence of more suitable habitat outside of the Installation, these species are not likely to occur in substantial numbers on Fort Hood, but could occur as transitory migrants through the area.

The cave myotis bat and plains spotted skunk are relatively uncommon, but not rare, species and utilize a wide variety of habitats throughout much of Texas (Loomis 2010). A known cave myotis bat roost occurs in the Western Maneuver Area and other bat roosts are known to occur in the LFIA (Fort Hood 2009b). Threats to bat species typically include disturbance of roost sites and development of foraging habitats. The plains spotted skunk has not been reported on Fort Hood, but is likely to occur on the Installation in low numbers.

The Texabama croton is a variety of the Alabama croton, which was previously designated as a candidate for Federal listing (Cornelius et al. 2007). The Texabama croton forms dense, local thickets as understory shrubs in deep soils found on toe slopes and fluvial deposits of canyon bottoms. The species is known from a few populations in Bell, Coryell, and Travis counties. Fort Hood populations are known to occur along the Owl Creek drainage in the Eastern Training Area.

Troglobite faunal communities (i.e., cave-adapted organisms) of Texas are often represented by rare endemics due to the narrow ecological niche and natural isolation of the cave systems they inhabit (Cornelius et al. 2007). Several endemic and currently undescribed cave invertebrate species and one probable new subspecies of salamander (*Plethodon albagula* spp.) occur on Fort Hood. A series of cave and karst investigations at Fort Hood have found at least 18 species of troglobite or possible troglobite endemic to Fort Hood; of these, four species are probably new. These species include six spiders, one pseudoscorpion, one centipede, one millipede, one silverfish, one ground beetle, six ant-like litter beetles, and one salamander. Threats to cave fauna include construction, soil erosion, water quality, training activity, and predation by imported red fire ants.

3.8 CULTURAL RESOURCES

3.8.1 Historical Context

The Central Texas region has been inhabited since about 12,000 years ago when groups hunted large game and collected the plant resources of the region at the end of the last Ice Age (Army 1995). As the climate gradually warmed, small bands of people used a wider range of plant foods. Burned rock deposits provide archaeological evidence of specialized food processing techniques. Later, hunting activities increased and the bow and arrow came into

use. Pottery-making techniques were developed and subsequent regional trade networks were established in the area.

Europeans reported encountering Tonkawa Indians in Central Texas in the late 1600s (Army 1995). Little else is known about the Tonkawa people, who may have been displaced by tribes from the plains who had adopted horseback riding. Wild horse herds are likely to have attracted both Anglo-Americans and Comanches to the area. The Wichita Indians, who had a large village at Waco by the early 1800s, hunted in the hill country around Fort Hood, along with the Comanches. In the early 1800s, Phillip Nolan operated in the area rounding up horses for resale in Louisiana. Nolan Creek runs through the Main Cantonment Area of Fort Hood.

The Brazos River area, including Bell and Coryell counties, was colonized in the 1830s by Sterling Robertson and was known as "Robertson's Colony" (Army 1995). After Texas became part of the U.S. in 1846, the Army built Fort Gates on the Leon River. The following year, Bell County was established and the region grew as ranchers grazed cattle and hogs on the open rangeland. In the 1880s, railroad access to the area increased settlement along the railroad route and provided access to regional markets for cash crops such as cotton, which increased in importance through World War I, until its value dropped during the economic decline of the 1920s.

In 1942, Camp Hood was established as a tank destroyer center with 5,630 buildings and 35 firing ranges (Army 1995). Camp Hood was renamed Fort Hood when it became a permanent Installation in 1951. Since its establishment, Fort Hood has been used as a training location for Army armored units.

3.8.2 Archaeological Resources

Intensive professional archaeological investigations began at Fort Hood in 1949 with the National Park Service (NPS) River Basin Surveys (Army 1999b). Since then, more than 2,200 archaeological sites, approximately evenly divided between prehistoric and historic sites, have been recorded at the Installation. A total of 1,098 prehistoric sites range in age from 12,000 years old to less than 150 years old and include flaked rock scatters, campsites, burned rock features, rock quarries, caves and rock shelters, and rock art. According to the Fort Hood archaeological database, 167 of these sites are eligible for the National Register of Historic Places (NRHP), and 325 are potentially eligible. A total of 1,120 historic archaeological sites

include the remains of farms, homes, churches, and cemeteries reflecting Euroamerican occupation of the area. According to the Fort Hood archaeological database, 13 sites are eligible for the NRHP, and 641 sites are potentially eligible (USACE 2003). None of the Fort Hood sites are presently listed on the NRHP (NPS 2011).

3.8.3 Architectural Resources

Historic architectural resources at Fort Hood include buildings that predate Army ownership of the property and more than 600 primarily temporary buildings constructed during the World War II era (Army 1995). An evaluation of historic buildings at the Installation in 1990 and 1991 identified structures that were eligible for the NRHP, including several that predate the military Installation and one from the World War II era. None of the Fort Hood buildings are presently listed on the NRHP (NPS 2011).

3.8.4 Traditional Cultural Resources

At Fort Hood, one traditional cultural place has been evaluated as eligible for the NRHP (U.S. Army 1999b). Fort Hood maintains an informal agreement with the Tonkawa and Comanche tribes regarding the treatment of human remains under the Native American Graves Protection and Repatriation Act (NAGPRA).

3.9 SOCIOECONOMICS

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires an assessment of environmental effects, including human health, economic, and social effects on minority communities and low-income communities.

Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks) requires an assessment of environmental health and safety risks that may disproportionately affect children.

Seven surrounding cities are partnered with and provide substantial quality of life support to Fort Hood: Killeen, Temple, Belton, Salado, Copperas Cove, Gatesville, and Lampasas (Fort Hood 2009a). Fort Hood's homepage directs personnel and their families to these areas for various

activities which economically drive local service and retail industries, bolster development, and support community growth.

3.9.1 Demographics

The estimated 2009 population of the seven incorporated places partnered with Fort Hood was approximately 253,237 people (U.S. Census Bureau [USCB] 2011a). Bell County includes four incorporated places near Fort Hood: Belton, Temple, Killeen, and the village of Salado. The estimated 2009 population of these four incorporated places was 17,799; 60,120; 119,512; and 2,042, respectively. Coryell County includes two incorporated places near Fort Hood: Gatesville and Copperas Cove. The estimated 2009 population of these places was 15,136 and 30,808, respectively. Lampasas County includes one incorporated place near Fort Hood, Lampasas, which had an estimated population of 7,821 in 2009. The 2010 census data for all incorporated places in Texas is not yet available.

The Bell County population from 2000 to 2010 was nearly three times larger than the average of all Texas counties and experienced an average annual growth rate over this period that was greater than average (Table 3-6) (USCB 2011b). While the Coryell County population was nearly as large as the average for Texas in 2000, a negative average annual growth rate from 2000 to 2009 resulted in an estimated population loss of almost 2,500 people. However, population growth in Coryell County from 2009 to 2010 resulted in a flat average annual growth rate over the 11 year period from 2000 to 2010. The Lampasas County population increased from 2000 to 2004 and remained relatively constant 2004 to 2010. The average annual growth rate of Lampasas County from 2000 to 2010 was near the state average.

Table 3-6. Bell, Coryell, and Lampasas County Population Estimates and Average Annual Growth: 2000 to 2009

County	Population Estimate (1,000 people)											Average Annual Growth (percent)
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
Bell	238.0	242.6	248.0	253.9	255.5	261.7	266.5	278.3	285.6	285.8	310.2	2.64
Coryell	75.0	73.8	73.3	73.6	72.7	73.1	71.7	72.6	73.1	72.5	75.4	0.03
Lampasas	17.8	18.1	18.7	19.0	20.2	19.6	20.3	20.7	20.9	20.9	19.7	1.14
Average*	82.5	84.0	85.5	86.8	88.3	89.8	92.0	93.8	95.7	97.6	98.9	1.84

*for all Texas counties

The populations of Bell and Coryell County have higher diversity levels than the State of Texas, while Lampasas County is less diverse (Table 3-7) (USCB 2011c). Bell and Coryell counties have a proportionally larger population of blacks when compared to Texas as a whole; however, the composition of other races is proportionally near or less than the State of Texas average. The population of people of Hispanic origin is relatively low in all three counties when compared to Texas as a whole.

Table 3-7. Bell, Coryell, and Lampasas County Estimated Percent Composition by Race 2010

Race	Percent of Total Population			
	Bell	Coryell	Lampasas	Texas
White	61.4	70.3	85.3	70.4
Black	21.5	15.8	3.2	11.8
American Indians and Alaskan Natives	0.8	0.8	0.9	0.7
Asian	2.8	1.9	1.0	3.8
Native Hawaiian or other Pacific Islanders	0.8	0.9	0.2	0.1
Persons reporting two or more races	5.0	5.0	3.2	2.7
Persons of Hispanic or Latino origin	21.6	15.9	17.5	37.6
White persons not Hispanic	50.7	62.0	75.4	45.3

USCB 2011c

3.9.2 Employment and Income

Income levels in Bell, Coryell, and Lampasas counties are lower than the national average (USCB 2011d) for 2005 to 2009 (Table 3-8). Economic data for 2010 are not yet available. Bell County had the greatest income by household, family, and per capita, while Coryell had the least income by family and per capita and Lampasas had the least household income. In all three counties, the number of families and individuals living below the poverty level was greater than the national average.

Table 3-8. Bell, Coryell, and Lampasas County Estimated Economic Characteristics for 2005-2009

Characteristic	Bell	Coryell	Lampasas	U.S.
Median Household Income (dollars)	46,473	45,678	44,301	51,425
Median Family Income (dollars)	53,914	50,503	51,531	62,363
Per Capita Income (dollars)	22,002	18,688	20,562	27,041
Families Below Poverty Level (percent)	11.1	13.7	11.5	9.9
Individuals Below Poverty Level (percent)	14.2	14.9	17.3	13.5

Almost 98 percent of the 52,200 Soldiers and their family members live within 10 miles of the main Fort Hood Cantonment (Fort Hood USA 2010). These Soldiers are complemented by more than 11,900 civilian employees at the Central Texas post, making Fort Hood the largest single site employer in the state and directly inserting nearly $6 billion annually into the Texas economy. In 2007, the direct economic impact of Fort Hood on the Texas economy was $4.4 billion dollars, with a total statewide impact of $10.8 billion dollars.

The vast majority of employers are located in Bell County, with the least number of employers located in Lampasas County (Table 3-9) (USCB 2011e). Excluding educational services, sectors not reported, and farm-related income, the services sectors are the largest employers and payroll providers in the Bell, Coryell, and Lampasas counties. The largest segments of the services sector were Health Care and Social Assistance, with 18,504 employees and a payroll of more than 800 million dollars, and Professional, Scientific, and Technical Services, with 4,688 employees and a payroll of more than 125 million dollars. Other important sectors included manufacturing, retail trade, and accommodation and food services.

Table 3-9. Bell, Coryell, and Lampasas County Non-Farm Employment and Payroll by Sector for 2007

Sector	Bell		Coryell		Lampasas	
	Employees	Payroll ($1,000)	Employees	Payroll ($1,000)	Employees	Payroll ($1,000)
Manufacturing	7,028	246,589	*	*	*	*
Wholesale Trade	2,933	125,274	3,515	34,335	882	11,547
Retail Trade	12,506	282,957	1,752	36,709	644	14,389
Information	2,576	128,261	80	2,100	47	2,311
Real Estate and Rental Leasing	1,501	40,258	153	2,683	50	1,957
Professional, Scientific, and Technical Services	4,688	593,591	*	*	*	*
Administrative and Support and Waste Management and Remediation Services	5,047	126,834	*	*	*	*
Educational Services	*	*	*	*	*	*
Health Care and Social Assistance	18,504	802,103	*	*	*	*
Arts, Entertainment, and Recreation	*	*	*	*	*	*
Accommodation and Food Services	9,329	104,934	1,231	11,340	380	3,975
Other Services (Except Public Administration)	2,418	50,871	516	13,164	149	2,906
Totals	**66,530**	**2,501,672**	**7,247**	**100,331**	**2,152**	**37,085**

* data not disclosed by USCB to protect private information

The net value of farm-related income for Bell, Coryell, and Lampasas counties was approximately 3.7 billion dollars in 2007 (Table 3-10) (USDA 2009), which is approximately 10 percent of the non-farm related payroll for these three counties in 2007 (see Table 3-9). The area of land in farm production is greater than 400,000 acres in each county; however, Bell County has the greatest number of farms. This indicates that Bell County has a disproportionate number of small farms. In each county, farms producing cattle and calves account for approximately 60 percent of all farms. Livestock and crops are of nearly equal value in Bell County; however, crops account for a significantly larger proportion of market value in Coryell County and livestock account for a significantly larger proportion of market value in Lampasas County.

Table 3-10. Bell, Coryell, and Lampasas County Farms and Income from Farm-Related Sources for 2007 ($1,000)

Source	Bell	Coryell	Lampasas
Market Value of Livestock and Poultry	31,955	33,386	11,850
Market Value of Crops	29,792	87,628	2,122
Net Cash Farm Income	9,453	-698	-5,052

USDA 2009

According to the Texas Agricultural Census of 2007 (USDA 2009), five types of livestock farms occur within Bell, Coryell, and Lampasas counties. These include: cattle and calves, beef cow, milk cow, hogs and pigs, and lamb and sheep farms. The dominant livestock operation is cattle and calves totaling over 150,000 animals with more than 2,500 farms accounting for these operations within the three counties. Table 3-11 describes the various livestock operations and provides the number of farms and animals within those operations per county. When compared to the State of Texas, the three counties combined account for 0.02 percent of cattle and calf farms, 0.05 percent of beef cow farms, 0.00001 percent of milk cow farms, 0.02 percent of hog and pig farms, and 0.04 percent of lamb and sheep farms The operators of farms in Bell, Coryell, and Lampasas County were predominantly white in 2007 (Table 3-11) (USDA 2009). The proportion of each race operating farms is lower than the proportion of the total population for each county and each race. The largest minority race operating farms is black or African American, who operate 2.2, 0.4, and 1.1 percent of farms in Bell, Coryell, and Lampasas counties, respectively.

Table 3-11. Number of Farms and Animals by Livestock Operation and County (2007)

	Cattle and Calves	Beef Cow	Milk Cow	Hogs and Pigs	Lamb and Sheep
Bell County					
Farms	1,320	1,117	1	71	108
Animals	52,118	D	D	1,102	3,430
Coryell County					
Farms	876	777	0	22	109
Animals	66,483	32,289	0	738	10,571
Lampasas County					
Farms	606	527	1	452	142
Animals	32,942	D	D	18,694	8,133
Texas County					
Farms	152,102	131,769	1,293	4,053	8,750
Animals	13,709,543	5,259,843	404,399	2,794,334	945,164

D = information was withheld to avoid disclosing data for individual farms USDA 2009

Table 3-12. Bell, Coryell, and Lampasas County Number of Farms Operated by Race and County for 2007

Race*	Farms Operated by County**					
	Bell		Coryell		Lampasas	
	total	percent	total	percent	total	percent
Spanish, Hispanic, or Latino	99	4.2	55	4.1	62	6.4
Indian or Alaskan Native	17	0.7	9	0.7	10	1
Asian	10	0.4	5	0.4	3	0.3
Black or African American	53	2.2	6	0.4	11	1.1
Native Hawaiian or Other Pacific Islander	7	0.3	2	0.1	0	0
White	2,306	96.7	1,330	99.3	943	97.6

*operators can claim more than one race; thus, totals do not match those presented in Table 3-9
** total number of farms operated by each race and percent of total farms presented in Table 3-9

3.10 AESTHETICS AND RECREATION

Aesthetics is essentially based on an individual or group of individuals' judgment as to whether or not an object is visually pleasing or would influence the quality of life. The rural character of the Texas Hill Country is largely defined by the vast open vistas created by undeveloped rangelands and agricultural development. The local landforms, including flat-topped steep-sided plateaus, ridges and isolated hills, sloping valley sides, floodplains, and stream courses, are varied and visually interesting. Rocky outcrops are visible at the tops of some of the steeper slopes and add visual interest. Vegetation is visually varied with dense shrub forest, areas of scattered trees and brush, and areas with low grassy or forb ground cover. Moving or standing water along stream channels or in the form of constructed ponds and small lakes is common

and also adds visual interest. There are no scenic highways or visually sensitive, Federally protected areas that have views to Fort Hood.

Fort Hood has offered to establish an entirely voluntary program with cooperating nearby landowners known as the Army Compatible Use Buffer. Under this program, landowners would be compensated in exchange for their agreement to maintain the current rural nature of their land near Fort Hood's boundaries (Army 2009).

3.11 UTILITIES AND TRANSPORTATION

The Bell County Water Control and Improvement District (BCWCID) #1 provides potable water and wastewater treatment for most of the communities surrounding Fort Hood, including Fort Hood (BCWID 2011). The BCWCID #1 currently serves a population of 250,000 people and can treat and deliver over 90 million gallons of potable water daily. The district's three wastewater treatment facilities serve the City of Killeen and Fort Hood and have a total capacity to treat 30 million gallons of water per day. The NFH cantonment area relies on wastewater sedimentation ponds that are designed to be expanded to meet the requirements of the additional National Guard troops that are stationed at NFH every summer (USACE 1999). The treatment facilities were constructed in anticipation of heavy use for a few months in the summer, and very low use for the remainder of the year. Electric power and natural gas are each provided to Fort Hood through the Texas Utilities and Electric Company and Lone Star Gas Company, respectively (USACE 1999).

The Installation's principal cantonment area and the adjacent West Fort Hood are bisected by U.S. Highway 190, which is a four-lane controlled access road that flows directly into U.S. Interstate Highway 35 (I-35). I-35 is the main north-south route through Texas and Mid-America from Laredo, Texas to Duluth, Minnesota. Roadways through the Western Maneuver Area and West Fort Hood training areas are open to the public and connect many of the surrounding communities. West Range Road travels the length of the Western Maneuver Area and connects the main cantonment area of Fort Hood to Gatesville and other communities north of Fort Hood. Elijah Road and Antelope Road provide access from West Range Road to the western boundary of the Installation and residential areas associated with Copperas Cove. Two roads bisect the training areas around the West Fort Hood cantonment, Oakalla Road and

Maxdale Road; however, there are no major residential or commercial areas south of the Installation.

Cattle are free ranging within the Installation and accidents involving cattle occur on average every 3 weeks (USACE 2003). Over a 39-month period beginning in January of 1997, 54 vehicle accidents were reported, of which 53 involved cattle. All of these accidents involved property damage and seven involved injury. The Installation-wide stocking rate during this period was 3,500 AU.

3.12 NOISE

The primary source of noise exceeding ambient levels is attributed to aircraft use (Fort Hood 2009). Existing airspace agreements allow Fort Hood aircraft a 500-foot floor. The historical use of the study area by approximately 36,000 flight operations monthly has created approximately 30 noise complaints per year. Residential areas and isolated residences, along with farms and ranches, around Fort Hood are the primary sensitive land uses of concern with respect to noise. Most public complaints about Fort Hood activities are caused by aircraft (Fort Hood 2009b). The cause of the complaints is not always a direct effect of the noise heard by the people, but due to the damage done to facilities or structures when livestock are startled by sudden noise. Operation of military vehicles and use of munitions during training activities also produces noise levels greater than ambient conditions; however, noise from these sources is typically attenuated before reaching sensitive receptors.

3.13 HAZARDOUS MATERIALS AND WASTE

The management and use of compounds regulated under the Federal Insecticide, Fungicide, and Rodenticide Act (7 USC 136, as amended) are performed by the Environmental Management Division (Fort Hood 2009b). The Installation has an Installation Pest Management Coordinator who oversees all activities and maintains an application record. All applicators are certified prior to using pesticides at Fort Hood.

The largest quantities of bulk transported materials are vehicle fuels (i.e., gasoline and diesel fuel) and aviation fuels (Fort Hood 2009b). Additional transported items include other ignitable

or flammable materials, corrosives, toxics, and reactive materials such as munitions. These materials are mostly transported in small non-bulk packed quantities.

Hazardous materials are widely distributed throughout the Installation (Fort Hood 2009b). Hazardous materials of interest would depend upon the training activities and the specific locations in which they are planned to occur. Information on Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. 9601, as amended) locations within the Installation are available through the USEPA's CERCLA and RCRA databases and registration reports. Additional USEPA-identified sites are listed in the Emergency Response Notifications System Locations database. These and other potentially hazardous materials and hazardous material locations can be identified though the Texas Natural Resource Conservation Commission (TNRCC) Waste Management Section (800-832-8244) databases, including the leaking tanks report and solid waste registration report.

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SECTION 4.0
ENVIRONMENTAL EFFECTS

4.0 ENVIRONMENTAL EFFECTS

This section of the EA addresses potential impacts associated with the implementation of the alternatives described in Section 2.0. Impacts on the human and natural environment can be characterized as beneficial or adverse, and can be direct or indirect, based upon the result of the action. Direct impacts are those effects that are caused by the action and occur at the same time and place (40 CFR 1508.8[a]). Indirect impacts are those effects that are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable (40 CFR 1508.8[b]).

The impact analysis presented in this EA is based upon existing regulatory standards, scientific and environmental knowledge and best professional opinions. Impacts can vary in degree or magnitude from a slightly noticeable change to a total change in the environment. Minimal impacts are impacts that would result in a slightly noticeable or quantifiable change in a resource, but which would not substantially change the value of that resource. A moderate impact is an impact that would result in easily recognized changes in a resource and potentially affect the value of that resource, but would remain less than significant. Significant impacts are those effects that would result in substantial changes to the environment (as defined by 40 CFR 1508.27) and should receive the greatest attention in the decision-making process. The alternatives may create temporary (lasting less than a single grazing season), short-term (up to 3 years), long-term (3 to 10 years), or permanent impacts or effects. Whether an impact is significant depends on the context in which the impact occurs and the intensity of the impact.

The following discussions describe and, where possible, quantify the potential effects of each alternative on each resource. All impacts described below are considered to be adverse unless stated otherwise. Additionally, a quantitative impact analysis was used to describe potential impacts when data were available for the given resource (i.e., soils). Many impacts are qualitative in nature (i.e., impact on cultural resources) and are not quantified.

4.1 LAND USE

Significant effects on land use include substantial interruptions or delays of military training. Any short-term or longer delay of training activities due to direct interaction with cattle or the indirect effect of cattle on the landscape would be considered significant. Support of military

training is part of the primary mission at Fort Hood and part of the purpose and need for the Proposed Action. Actions which improve the realism of training activities or result in the long-term stability and sustainability of the landscape are considered beneficial to land use and support the purpose and need of the Proposed Action.

4.1.1 No Action Alternative

The No Action Alternative would not result in significant impacts on land use. Historically, grazing in the LFIA has been the primary source of interaction between cattle and training activities. When cattle move within the line of fire, training activities cease until the cattle are removed, even though not required. Due to the proximity of various ranges, it is sometimes necessary to shut down more than one range when cattle wander into the line of fire. In addition to the direct loss of training time, the tempo of range operations is disrupted, forcing combat vehicle crews to stop, attempt to restart systems, and resume the intended rhythm of the training scenario.

Though training and grazing can be compatible land uses in most areas at Fort Hood, the intensive and critical training activities that occur in the LFIA require additional restrictions on cattle densities in these areas. Temporary training delays must be minimized in order that Soldiers may fulfill the semi-annual requirement to meet Army-mandated qualification standards. Fort Hood range managers have set a limit of 750 AUs in the LFIA. This represents the maximum number that can reasonably be controlled without incurring significant impacts on training. Grazing cattle have less adverse impacts on training in other areas. Where live rounds are not used, damage to cattle is avoided and the need to disrupt training is reduced. In these areas, cattle tend to avoid interaction with most training activities. Historically, there has not been a need to cap stocking rates in these areas, even when stocking rates have exceeded current levels.

Historically, deferral of training activities in response to environmental degradation has occurred as a result of heavy training in combination with relatively high stocking rates, other land management practices, and climate. Stocking rates have been reduced by more than 40 percent compared to historic rates, and improved land management practices have been implemented, including increased use of fire management, brush control and removal, improved stormwater management, and other efforts to mitigate training impacts. Without substantial changes in training intensity, climate, or occurrence of wildfires, the current stocking rate would

not result in significant adverse effects on the environment. If these conditions change substantially in the future, it may be necessary to defer grazing or even military training activities to avoid potentially significant impacts.

4.1.2 Proposed Action (Adaptive GMP)

The Proposed Action would not result in significant adverse impacts on land use. The Adaptive GMP could result in a reduction, increase, or no change in stocking rates on an annual basis. Stocking rates would remain at 750 AU in the LFIA to avoid significant impacts on land use as a result of training interruptions. The minimal adverse impacts of grazing cattle on training activity outside the LFIA would continue. Interruptions outside the LFIA have historically been limited by the skittish nature of the cattle, and increased stocking rates would not likely increase the number of interruptions.

Implementing the Adaptive GMP would support the maintenance and sustainability of the landscape. Grazing at light to moderate levels (i.e., increasing grazing when grazing pressure falls below management thresholds and decreasing grazing when grazing pressure rises above management thresholds) can promote increased biomass production of desirable grasses and improve composition of desirable grasses (Hanselka et al. 2001b, Thurow et al. 1988), can prevent the accumulation of excessive fuels (Menke 1992, Stevens 2004), can limit or control woody encroachment (Predick and Archer 2009, Reinecke et al. 2011, Sankey 2007, Smiens and Fuhlendorph 2011), and promote long-term sustainability of the grassland and resistance to disturbance and climate (Hanselka et al. 2001b, Heitschmidt et al. 1998, White and McGinty 1999). The Adaptive GMP would minimize long-term adverse effects on the stability of the landscape by reducing stocking rates or, if necessary, deferring grazing in response to years of poor forage production. The Adaptive GMP would also promote increased forage production when training and climate conditions are favorable.

4.1.3 Limited Range Alternative

The Limited Range Alternative would not result in significant adverse impacts on land use. Training interruptions would be avoided in areas where grazing is deferred, and interruptions in the LFIA would continue to be minimized by limits on stocking rates. The use of controlled burns, brush removal and control, and other land management practices would continue to maintain the value and sustainability of the landscape for military training.

4.2 PHYSIOGRAPHY AND SOILS

The Farmland Protection Policy Act of 1981 requires Federal agencies to avoid the unnecessary and irreversible conversion of farmland to nonagricultural uses. As discussed in Section 3.2, approximately 39,000 acres of Prime Farmland Soils occur on Forth Hood; however, conversion of Prime Farmland Soils for national defense is not regulated and none would be converted to nonagricultural uses as a result of any alternative.

Erosion results in soil loss and occurs naturally across the landscape. Soil loss is typically not a significant impact; however, the indirect effects of soil loss on the sustainability of the landscape and pollution of downstream waterways can be significant. The tolerable soil loss threshold (T) as established by the NRCS (1999) is used in this EA as a significance threshold, such that soil erosion rates greater than T are considered significant. T is defined as the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. This includes maintaining the surface soil as a seedbed for plants, maintaining the interface between the air and the soil that allows the entry of air and water into the soil and still protects the underlying soil from wind and water erosion, and maintaining the total soil volume as a reservoir for water and plant nutrients.

Erosion losses are estimated by the Universal Soil Loss Equation and the Revised Universal Soil Loss Equation (RUSLE). The T factor is assigned to soils without respect to land use or cover, is used to compare erodibility of soils, and does not directly relate to vegetation response. T factors commonly serve as objectives for conservation farm planning to assist in the identification of cropping sequences and management systems that will maximize production and sustain long-term productivity. Thus, T factors represent the goal for maximum annual soil loss in the context of maintaining the long-term sustainability goal.

Estimated sediment yields were compared to the T listed in the soil survey for each soil type. An erosion index was calculated as the ratio of estimated sediment yield to sustainable sediment yield. An erosion index greater than 1.0 indicates unsustainable conditions and is assumed to result in significant adverse effects. A detailed description of the methods used to estimate soil erosion rates using RUSLE is provided in Appendix D.

4.2.1 No Action Alternative

Under the No Action Alternative, soil erosion would continue to occur as a result of both military training activities and cattle grazing. Because the potentially affected soils are not Prime Farmland soils, or otherwise unique and valuable, the direct loss of soil would have a minimal adverse effect on this resource. However, soil erosion rates have indirect impacts on land use, water quality, air quality, biological resources and special status species, cultural resources, socioeconomics, aesthetics, and recreation as discussed in the sections associated with these resources.

Vegetative cover is critical for maintaining natural rates of erosion (Davenport et al. 1998). As the cover of perennial bunch grasses is reduced, the space between plants increases, resulting in reduced retention of organic matter in the soils, reduced infiltration of precipitation, increased evaporation, increased soil temperatures and increased erosion (Hanselka et al. 2001). As vegetative cover is reduced to critical levels, soil erosion begins to increase substantially in response to small decreases in vegetative cover. Erosion rates beyond this threshold increase rapidly and are irreversible, and the landscape becomes unsustainable without implementation of remedial actions.

As discussed in Fort Hood's (2009b) INRMP, military training on Fort Hood is one of the primary causes of soil erosion on the Installation. Tracked and wheeled vehicles crush vegetation and disturb soils, which results in reduced vegetative cover and increased erosion. Tracking on wet soils significantly increases these effects. Recovery of the vegetation and the reduction in soil erosion rate depends on the amount of time before the site is disturbed again. Grazing by livestock can slow the recovery of these sites because new growth on the vegetation is grazed before it can produce sufficient root systems to hold the soil and provide sufficient plant cover to reduce erosion. Although levels of vegetative cover return to pre-disturbance levels after a few years without disturbance, several years of recovery and remedial actions may be necessary before climax grass species return to their pre-disturbance abundance.

Using RUSLE, estimated sediment yield (i.e., soil erosion rates) occurring as a result of the No Action Alternative would be less than significant (Table 4-1). This analysis assumes that climate conditions, training intensity, and other factors influencing productivity (e.g., fire, brush control, or other management actions) would remain relatively stable over the long-term. Stocking rates

would not be adjusted; thus, reduced productivity over a sustained period could result in substantial increases in the erosion rate.

Table 4-1. Maximum and Average Sediment Yield and Erosion Index by GMU under the No Action Alternative

GMU	Maximum Sediment Yield (tons/acre/year)	Average Sediment Yield (tons/acre/year)	Maximum Erosion Index	Average Erosion Index by GMU
WMAN	0.57	0.11	0.13	0.04
WMAS	0.58	0.13	0.29	0.04
WFHN	0.62	0.24	0.14	0.07
WFHS	0.35	0.18	0.35	0.08

Assuming that productivity in the LFIA and Eastern Training Area has not changed substantially, erosion rates in these areas would remain less than significant. Stocking rates in the LFIA would remain at 750 AU, which has been shown to be a light level of grazing for this highly productive area. Furthermore, the LFIA does not host maneuver training, and vehicle traffic in this area is limited. As discussed in Section 3.1, tracked and wheeled vehicle maneuvering is limited by terrain, training restrictions to avoid impacts on special status species, and the small size of the Eastern Training Area GMUs when compared to other areas outside the LFIA. Due to the relatively low frequency, extent, and intensity of training-related soil disturbance in the Eastern Training Area GMUs, cattle grazing and climate are the primary factors contributing to productivity. Previous RUSLE analyses have suggested that soil erosion rates in the LFIA and Eastern Training Area GMUs are less than significant. Drought would result in periodic reductions of productivity in these areas and heavy grazing could occur during these periods. However, the relatively low levels of erosion occurring under current conditions suggest that sufficient residual biomass is retained in these areas to prevent significant increases in erosion rates during periods of heavy grazing.

4.2.2 Proposed Action (Adaptive GMP)

The effects of the Proposed Action on soil erosion rates would be similar to the No Action Alternative and would be less than significant (Table 4-2). Implementation of the Adaptive GMP would promote production of desirable grass species and reduce soil erosion rates over the long-term. If the combined effects of grazing, training, climate, or wildfires result in reduced forage, stocking rates would be reduced and, if necessary, grazing would be deferred to allow rangelands to recover before erosion rates become significant. Although training levels,

drought, and wildfire are unpredictable to some degree and would occur before stocking rates are adjusted, maintenance of residual forage biomass at 1,000 pounds per acre would increase the tolerance of rangelands to these disturbances. Stocking rates would be reduced following years of low productivity and would not be increased again until rangelands have recovered.

Table 4-2. Maximum and Average Sediment Yield and Erosion Index by GMU under the Proposed Action

GMU	Maximum Sediment Yield (tons/acre/year)	Average Sediment Yield (tons/acre/year)	Maximum Erosion Index	Average Erosion Index
WMAN	0.65	0.15	0.14	0.05
WMAS	0.65	0.20	0.33	0.06
WFHN	<0.62	<0.24	<0.14	<0.07
WFHS	0.33	0.17	0.33	0.07

The minimal adverse effects of the Proposed Action on soil erosion rates occurring in the LFIA and Eastern Training Area GMUs would be the same as those occurring under the No Action Alternative.

4.2.3 Limited Range Alternative

Under the Limited Range Alternative, soil erosion rates would not exceed tolerable limits (i.e., the T value established by NRCS) for the sustainability of grasslands and would not result in significant indirect effects on other resources. Grazing would not contribute to soil erosion rates outside the LFIA or Eastern Training Area. The adverse effects of the Limited Range Alternative on soil erosion rates occurring in the LFIA and Eastern Training Area GMUs would be the same as those occurring under the No Action Alternative and would be less than significant.

4.3 WATER QUALITY AND JURISDICTIONAL WETLANDS

Significant impacts on water quality occur when waterbodies are polluted to the extent that they are listed as impaired for designated uses under the CWA, or when an action conflicts with local or regional plans to maintain or achieve TMDLs.

The CWA and Executive Order 11990 (Protection of Wetlands) regulate developments affecting waters of the U.S. and wetlands. Significant effects occur as a result of lost wetland area. No

development would occur as a result of grazing; thus, the connectivity of waters of the U.S. and extent of jurisdictional wetlands would not be affected by any alternative.

4.3.1 No Action Alternative

As discussed in Section 3.3, water quality has been significantly affected in the waterbodies surrounding Fort Hood, including Nolan Creek, Cowhouse Creek, Lampasas River, and the Leon River. Contact recreation in these water bodies has been significantly affected by high levels of harmful (i.e., fecal coliform) bacteria. Although the most substantial contributors to these adverse effects have been attributed to runoff from municipal areas and concentrated animal feeding operations, the presence of cattle in any number contributes to harmful bacteria and nutrient concentrations in downstream waterbodies (USEPA 2003). Release of microbes from manure deposited on grazing land is influenced by time, temperature, moisture, and other variables. Runoff from grazed land can contain high numbers of indicator microorganisms. However, microorganism counts in runoff from grazed lands are typically several orders of magnitude lower than numbers from land where manure is deliberately applied or cattle are concentrated in high densities. Nutrient inputs from grazed lands to surface water come mainly in the form of nitrogen and phosphorus from manure and decaying vegetation. Nutrient impacts on water quality vary considerably in study results, and are dependent on specific site conditions such as precipitation, runoff, vegetation cover, grazing density, proximity of grazing to waterbodies, and period of use. The risk of nutrient enrichment is low in arid rangelands where animal wastes are widely distributed and stormwater runoff volume is comparatively light.

The impaired portion of the Leon River would not be affected because cattle would not be stocked in NFH and because Owl Creek, which flows through ETAN, converges with the Leon River in Belton Lake, which is downstream of the impaired segment. However, aquatic habitats and contact recreation would continue to be adversely affected in the Nolan Creek, Cowhouse Creek, and Lampasas River watersheds. Impacts on these resources would be less than significant and are described in detail in Sections 4.5 and 4.9, respectively.

Cattle grazing on Fort Hood is a relatively minor source of harmful bacteria (i.e., 2,000 AU distributed over 250,000 acres of the Installation) when compared to listed sources of pollution resulting in impairments to downstream waterbodies. As discussed later in Section 5.0, other ongoing or approved actions (e.g., establishment of TMDLs and implementing Watershed Protection Plans) within the affected watersheds would result in moderate beneficial effects on

water quality in these waterbodies and would result in removal of the waterbodies from the list of impaired waters.

4.3.2 Proposed Action (Adaptive GMP)

The adverse effects of cattle grazing on water quality would be moderated by adjusting stocking rates in response to forage production. Cattle would continue to deposit harmful bacteria directly into waters when drinking; however, by maintaining residual biomass levels within the established conservation thresholds, soil erosion and the consequent effects on water quality would be minimized over the long-term. Stocking rates would only increase in response to increased forage availability; therefore, the consequent increase in feces production on the landscape would not result in substantial increases in fecal coliform bacteria levels in waters.

4.3.3 Limited Range Alternative

Under the Limited Range Alternative, the adverse effects of grazing would be substantially reduced. Although training in the Western Maneuver Area and West Fort Hood GMUs would continue to contribute to soil erosion and consequent water pollution, the concentration of harmful bacteria and nutrients in stormwater runoff would be reduced over the long-term. Deferral of grazing from the Western Maneuver Area and West Fort Hood GMUs would reduce the total number of AU on Fort Hood from 2,000 to 1,104 and would remove all cattle from the Lampasas watershed.

4.4 AIR QUALITY

Effects on air quality would be significant if an action results in levels of criteria pollutants greater than NAAQS. The Federal Conformity Final Rule mandates that a conformity analysis must be performed when a Federal action generates air pollutants in a region that has been designated a non-attainment or maintenance area for one or more NAAQS. Bell and Coryell counties have been in compliance with NAAQS for the period of record (1992 to 2008); thus, a conformity analysis is not required. Methane produced by cattle on Fort Hood does not reach levels warranting further analysis and would not substantially contribute to GHG emissions. The alternatives considered do not include any development or additional sources of pollutant emissions.

4.4.1 No Action Alternative

The No Action Alternative would have minimal effects on air quality. Air quality is adversely affected by the suspension of particulate matter, which occurs in areas where fine soils are exposed to wind erosion for prolonged periods. Cattle grazing and training with wheeled and tracked vehicles disturbs and compacts soils and can result in reduced plant cover and consequent exposure of soils to wind erosion. Bell and Coryell counties have been in compliance with the NAAQS for the period of record (1992 to 2008). During this period stocking rates were as much as 75 percent greater than current levels. Grazing, in combination with other land management practices, is not likely to result in an increased area of exposed soils relative to historic conditions; thus, impacts on air quality would be less than significant.

4.4.2 Proposed Action (Adaptive GMP)

The Adaptive GMP would moderate the adverse effects of grazing on air quality by adjusting stocking rates in response to residual forage availability. Under the Proposed Action, reduced forage availability and consequent increased exposure of soils would result in reduced stocking rates and avoidance or minimizing of potential adverse effects on air quality over the long-term. Stocking rates would not be increased without an observed increase in forage availability, which would consequently reduce sources of PM-10 (i.e., exposed soils). Although grazing, training, and other factors would continue to influence soil exposure and wind erosion, the Adaptive GMP would promote long-term sustainability of the landscape and adverse effects on air quality would be less than significant.

4.4.3 Limited Range Alternative

The potential adverse effects of grazing on air quality would be avoided in areas of greatest military training activity. In other areas, where soil exposure is not substantially affected by other land uses and grazing pressure is low, grazing would continue to have minimal effects on air quality.

4.5 BIOLOGICAL RESOURCES

Effects on biological resources would be considered significant if the alternative results in loss of diversity (i.e., extirpation of a species from the area) or substantial, long-term changes in ecological processes such that remedial actions are required. Ecological processes occur at the scale of the landscape and affect the cycling of energy, nutrients, and water on the

landscape, which substantially affect the abundance and diversity of flora and fauna. Healthy rangeland is land on which all ecological processes can be sustained indefinitely. Sustainability for long periods can be expected as long as the conditions of the soil, soil moisture, and vegetation remain within a certain range.

4.5.1 No Action Alternative

Grazing would continue to have adverse effects on biological resources but would not result in reduced floral or faunal diversity or substantial, long-term changes in ecological processes. A landscape that is in support of the military mission at Fort Hood includes a balance of grassland, shrubland, and woodland communities that are suitable for military training; tolerant of disturbances related to training, grazing, fire, and climate (i.e., sustainable); and provides suitable habitats for the greatest diversity of plants and animals. Maintaining this mixture of habitats types will have beneficial effects on some wildlife and adverse effects on others, but will insure a long-term maintenance of overall diversity (Brown 1978, bock et al 1984).

The current stocking rate is the result of past monitoring of rangeland trends and forage productivity and represents a light to moderate level (i.e., within management thresholds) of grazing given current rangeland conditions. The composition and abundance of desirable grasses has not changed substantially since stocking rates were reduced from historic highs to the current levels (Appendix B). Grazing at light to moderate levels (i.e., increasing grazing when grazing pressure falls below management thresholds and decreasing grazing when grazing pressure rises above management thresholds) can help to sustain this mixture of habitats by promoting increased biomass production and improved composition of desirable grasses (Hanselka et al. 2001b, Thurow et al. 1988), by preventing the accumulation of excessive fuels (Menke 1992, Stevens 2004), by limiting or controlling woody encroachment (Predick and Archer 2009, Reinecke et al. 2011, Sankey 2007, Smiens and Fuhlendorph 2011), and by promoting long-term sustainability of the grassland and resistance to disturbance and climate (Hanselka et al 2001b, Heitschmidt et al. 1998, White and McGinty 1999).

The presence of cattle and the impact of grazing on forage availability and vegetation structure has varied effects on habitat suitability in grasslands, riparian zones, and aquatic habitats. In grasslands, cattle can trample nests of ground-nesting birds, affect cover opportunities for birds, mammals, and reptiles, and can reduce forage availability for other herbivores. In riparian habitats, cattle grazing can reduce structural diversity of vegetation resulting in reduced

suitability for riparian dependent birds. Grazing affects aquatic habitats indirectly through its effects on soil erosion from upland habitats and through its affects on the filtration and water storage capacity of riparian zones. The presence of cattle can also result in direct effects on aquatic habitats by destabilizing streambanks, disturbing substrates, and suspending sediments in the water. Although grazing has multiple adverse effects on wildlife and their habitats, grazing on Fort Hood at current levels has not resulted in a loss of floral or faunal diversity and has not resulted in substantial, long-term changes in ecological processes.

4.5.2 Proposed Action (Adaptive GMP)

The Adaptive GMP would have various effects on wildlife and their habitats that would be similar to those occurring under the No Action Alternative. Maintenance of residual forage would promote increased productivity and improved composition of desirable grasses over the long-term and consequently improve the suitability grassland habitats for wildlife. Maintaining residual forage availability provides direct benefits to forage plants by protecting the plant crown from cold, heat, and insect damage and improves vegetative cover and productivity by improving soil moisture retention and reducing erosion (Hanselka et al. 2001b, Heitschmidt et al. 1998, Thurow et al. 1988, White and McGinty 1999). Maintenance of residual forage also helps to conserve a metabolic reserve of leaf and stem tissue that allows plants to recover from grazing and is the primary factor influencing rangeland recovery from and tolerance of disturbance and drought. Maintenance of minimum levels of residual forage also improves the effectiveness of controlled burns by producing high enough temperatures to kill small shrubs and tree saplings (i.e., less than 2 feet in height) (Menke 1992, Stevens 2010).

Removal of excess residual forage biomass improves productivity, helps to control the encroachment of woody species, including Ashe juniper, and prevents the accumulation of excessive fuels (Menke 1992, Predlick and Archer 2009, Reinecke 2011, Sankey 2007, Smiens and Fuhlendorph 2011, Stevens 2010). Accumulation of dead stem bases due to lack of grazing can cause self-shading of newly emerging tillers on bunchgrass and the formation of decadent plants over time. Livestock ‘hoof action’ or trampling can help to place dead plant material in contact with decomposer bacteria and invertebrates in the soil which speeds nutrient recycling and litter turnover. Light to moderate levels of grazing can reduce or control the growth of woody plants, which can compete with perennial bunch grasses for light and water and can restrict cattle’s access to forage materials. Removal of excess forage to prevent the

accumulation of fuels can also minimize or avoid destruction of desired grass species resulting from high temperature wildfires.

Because cattle tend to concentrate near water, grazing would continue to have adverse effects on riparian and aquatic habitats. Although maintenance of residual forage in grasslands would have long-term beneficial effects on aquatic habitats as a result of reduced soil erosion and water pollution, the direct effects of grazing on riparian and aquatic habitats would continue. Grazing in riparian areas would continue to affect vegetation structure and composition, destabilize stream banks, and disturb substrates. These direct impacts can reduce the suitability of riparian and aquatic habitats by reducing the availability of forage and cover and by reducing water quality. Although many of the adverse effects of grazing on riparian and aquatic habitats would continue, they would not result in a loss of floral or faunal diversity or result in substantial, long-term changes in ecological processes.

4.5.3 Limited Range Alternative

The Limited Range Alternative would have minimal adverse effects on biological resources. The productivity, sustainability, and mixture of grasslands, shrublands, and woodlands in areas of heavy military training would be maintained through use of controlled burns, removal and control of woody species, and other land management practices. The adverse effects of grazing on riparian and aquatic habitats would be avoided where grazing is deferred. The use of wheeled and tracked vehicles is minimal or absent in areas where grazing would continue and stocking rates are relatively low. The effects of grazing on terrestrial habitats would be minimal and the effects of grazing on riparian and aquatic habitats would be less than significant.

4.6 SPECIAL STATUS SPECIES

Actions that adversely affect Federally listed species are considered significant if the effects cannot be minimized to a level that avoids jeopardy. TPWD regulations prohibit the taking, possession, transportation, or sale of any of the animal species designated by state law as endangered or threatened without the issuance of a permit. Actions that result in substantial adverse effects on state-listed species, such that local populations become unsustainable or extirpated, would be considered significant.

The MBTA made it illegal for people to "take" migratory birds, their eggs, feathers, or nests. Take is defined in the MBTA to include, by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof. Actions which result in substantial take of migratory birds, their eggs, or nests; such that local populations become unsustainable or extirpated, would be considered significant.

4.6.1 No Action Alternative

Under the No Action Alternative, adverse effects on special status species would be less than significant. Grazing at any stocking rate is not likely to adversely affect special status species that are suspected to be transient at Fort Hood, including, whooping cranes, peregrine falcons, mountain plover, and western burrowing owl. Stocking rate is also not likely to affect the Texabama croton populations, which are stable and tolerant of both heavy grazing and fire. The canebrake rattlesnake and Texas garter snake, which prefer wooded habitats, are also not likely to be affected by stocking rates, but could be adversely affected if damaging fires occur in woodland areas as a result of excessive accumulation of fuels. Continued grazing is not likely to impair aquatic life use of Belton Lake and is consequently not likely to affect the suitability of habitats for bald eagles. The Texas horned lizard, which prefers low vegetative cover, could benefit from the effects of continued grazing on vegetative cover.

The troglobite fauna of Fort Hood and the cave myotis bat would not be affected by current stocking rates. The primary threat to these species is disturbances which occur within caves or other karst features. Caves and karst features (i.e., landscape formed by layers of soluble bedrock) on Fort Hood have been identified and are protected from human disturbance. Substantial increases in erosion rates that result in deposition of sediments within karst features or substantial increases in woody cover that result in increased evapotranspiration and reduce water flows could adversely affect these species. These impacts are not likely to be substantial with the continued stocking at current levels.

Migratory birds would continue to be adversely affected by the No Action Alternative. Migratory birds utilize grassland, shrubland, and woodland communities depending on the species and resource use (i.e., nesting or foraging). The effects of cattle grazing and other land management practices would sustain a mixture of these habitat types across the Installation. Grazing and other land management practices would continue to affect the cover conditions of grassland habitats; however, these habitats are not likely to be substantially degraded such that

it affects the status of any migratory bird. Cattle can also affect migratory bird populations by attracting brown-headed cowbirds, which parasitize the nests of other species. Adverse impacts on migratory birds would not result in take such that population levels become unsustainable and would not be significant.

Two Federally listed species are affected by grazing at any stocking rate because the presence of cattle attracts brown-headed cowbirds. The golden-cheeked warbler and black-capped vireo are both adversely affected by cowbird brood parasitism. As discussed below in Section 5.0, the cumulative effects of past and present actions have affected these Federally listed species. The effects of grazing on the Installation, including the effects of brown-headed cowbird parasitism, are assessed in the Fort Hood ESMP (Cornelius et al. 2007). Fort Hood implements the reasonable and prudent measures to promote the recovery of the two species on the Installation, which include limiting cowbird parasitism to 10 percent, as described in the USFWS's (2010) Biological Opinion of Fort Hood's ESMP. The adverse effects of grazing on golden-cheeked warblers and black-capped vireos would continue at current levels, would not affect the status of the species, and would be less than significant.

4.6.2 Proposed Action (Adaptive GMP)

As described under the No Action Alternative, light to moderate stocking rates are not likely to substantially affect the suitability of habitats utilized by special status species on Fort Hood, and the Proposed Action is not likely to adversely affect most special status species. As discussed in Section 4.5, the Adaptive GMP could improve the suitability of grassland habitats over the long-term and result indirect benefits to aquatic habitats. Thus, the Adaptive GMP could result in some beneficial effects on special status species using these habitats. Grazing would continue to attract brown-headed cowbirds and result in parasitism of migratory and Federally listed birds, specifically golden-cheeked warblers and black-capped vireos. However, the rate of parasitism would continue to be monitored and controlled in compliance with the 2010 BO which authorizes grazing under the Endangered Species Management Program. Therefore, the Adaptive GMP is not likely to adversely affect Federally listed species.

4.6.3 Limited Range Alternative

The deferral of grazing from the Western Training Area and West Fort Hood GMUs is not likely to affect most special status species, but could have adverse effects on migratory birds, including the Federally listed golden-cheeked warbler and black-capped vireo. As discussed in

Section 5.0, deferral of grazing in the Western Maneuver Area and West Fort Hood GMUs could result in the cessation of cowbird trapping conducted by ranchers on properties adjacent to Fort Hood. This could increase parasitism rates near the perimeter of the Installation, but could also reduce parasitism from central areas. Cowbird trapping would continue on Fort Hood and prevent rates of parasitism from increasing above 10 percent; however, cowbird parasitism could increase on adjacent lands. The productivity, sustainability, and mixture of grasslands, shrublands, and woodlands in areas of heavy military training would be maintained through use of controlled burns, removal and control of woody species, and other land management practices.

4.7 CULTURAL RESOURCES

Cultural resources are subject to review under both Federal and state laws and regulations. The National Historic Preservation Act (NHPA) of 1966 (16 USC 470, as amended) requires the assessment of effects through consultation with the Advisory Council on Historic Preservation. Under Section 106 of the NHPA, consultation with the State Historic Preservation Officer (SHPO) is required for all Federal actions. The Archaeological Resources Protection Act of 1979 prohibits the excavation, removal, damage, or other alteration or defacing of archaeological resources located on public lands. Fort Hood maintains an informal agreement with the Tonkawa and Comanche tribes regarding the treatment of human remains under the NAGPRA. A significant impact on cultural resources would occur if resources that are eligible for listing on the NRHP are substantially degraded such that they would no longer be eligible for listing.

4.7.1 No Action Alternative

The adverse effects on cultural resources from continued grazing would be less than significant. Livestock grazing and erosion would potentially impact cultural resources under certain circumstances (Osburn et al. 1987, Nickens 1990, Trimble 1995). Trampling by cattle has a minimal adverse effect on the cultural value of surface artifacts, and cattle are excluded from areas containing sensitive artifacts or structures. Cultural resources can also be adversely affected by erosion. Previous investigations have found that cattle grazing on Fort Hood has minimal adverse effects on archaeological resources (e.g., trampling or scattering of typically fractured stone implements and pottery that are common on the landscape), and previous

consultations with the SHPO have determined that rangeland grazing alone has no effect on historic properties.

4.7.2 Proposed Action (Adaptive GMP)

The effects of grazing on cultural resources would be similar to those described under the No Action Alternative. The effects of grazing on soil erosion rates, and consequent effects on cultural resources, would be moderated by the Adaptive GMP, and significant adverse effects would be avoided.

4.7.3 Limited Range Alternative

Adverse effects of grazing on historic and cultural resources would be avoided in areas of heavy military training. In other areas, training activities result in limited erosion and stocking rates are relatively low; thus, the adverse effects of grazing and soil erosion on cultural resources would remain less than significant.

4.8 SOCIOECONOMICS

An action would result in significant impact if it causes a permanent population increase beyond the capacity of existing and projected infrastructure and public services, causes the vacancy rate for housing to fall, requiring relocation of existing people, construction of replacement housing elsewhere, or relocation of housing or businesses, or causes a reduction in local income that would affect the surrounding city or county budgets through loss of tax revenue.

The alternatives assessed in this EA would primarily affect the members of the CTCA and economies associated with ranching. There would be no adverse or beneficial effects on minority or low-income populations.

Grazing would not have disproportionate effects on children and as such does not meet any criteria which would require an assessment of environmental health or safety risks that may affect them.

As discussed in Section 3.8, the number of cattle grazed on Fort Hood represents a small fraction of the agricultural economy in the region. Although substantial changes in stocking rates on the Installation would affect income and profit for members of the CTCA, these adverse

effects would not extend to the agricultural sector of the economy as a whole and would not be significant.

4.8.1 No Action Alternative

The No Action Alternative would have minimal adverse effects on socioeconomics; however, substantial changes in rangeland productivity could result in adverse effects. Although unlikely to occur, substantial long-term increases in productivity without subsequent increases in stocking rates would result in a lost potential income for CTCA members and associated economies over the short term. Furthermore, as discussed in Section 4.5, reduced grazing intensity (i.e., increased productivity without an adjustment of stocking rates) could result in woody encroachment and long-term loss of rangeland productivity (Predlick and Archer 2009, Reinecke 2011, Sankey 2007, Smiens and Fuhlendorph 2011). Although also unlikely to occur, substantial long-term decreases in productivity would potentially result in deferral of grazing from one or more GMUs to avoid significant impacts on military training or natural resources. If deferral occurs when other rangelands in the region are also experiencing the need to reduce stocking rates, flooded market conditions would result in lost profit for CTCA members attempting to sell cattle (White and McGinty 1999). CTCA members would continue to lose potential income, potentially for several years, while rangelands are allowed to recover. Current stocking rates are the result of rangeland health and forage monitoring conducted by the NRCS and represent long-term sustainable rates.

4.8.2 Proposed Action (Adaptive GMP)

Socioeconomic impacts would be less than significant under the Proposed Action. The Adaptive GMP would promote the maintenance of a sustainable landscape by sustaining adequate residual forage to provide for increased production during good years and sustainable production during poor years. Moderating stocking rates can improve profitability over the long term by allowing a greater flexibility in response to market demands.

4.8.3 Limited Range Alternative

The Limited Range Alternative would have significant adverse impacts on the expected income of the CTCA. Deferral of grazing from the Western Maneuver Area and West Fort Hood would reduce the Installation-wide stocking rate by nearly 45 percent. This would result in lost profitability of grazing for CTCA members and a consequent reduction of incomes for associated local economies.

4.9 AESTHETICS AND RECREATION

Significant effects on aesthetics occur when an action results in substantial loss or degradation of the visual qualities of the landscape that are valued by the local culture. Significant effects on aesthetics of rangelands on Fort Hood would include large areas of denuded and eroding soil or substantial encroachment of woody species and loss of grassland vistas.

Significant effects on recreation occur when recreational opportunities are lost or their value is substantially degraded. As discussed in Section 3.9, recreational opportunities on Fort Hood generally consist of hunting, fishing, and water sports on Lake Belton.

4.9.1 No Action Alternative

The No Action Alternative would have minimal beneficial and adverse effects on aesthetics and recreation. Light to moderate grazing under the No Action Alternative, as discussed in Sections 4.2 and 4.5, can help to maintain grassland communities, suppress the encroachment of woody species, and limit soil erosion. These effects on vegetation and soils would maintain the visual qualities of the landscape and have beneficial effects on rangeland aesthetics (Reinecke et al. 2011).

The No Action Alternative would have varied effects on recreation. As discussed in Section 4.5, current stocking rates are light to moderate and have minimal adverse effects on the availability of forage and cover for game animals and minimal adverse effects on the suitability of aquatic habitats for game fish. As discussed in Section 4.3, the impact of grazing and the presence of cattle on water quality can adversely affect contact recreation. Due to the large volume of water in Belton Lake, it is likely that levels of harmful bacteria are diluted to less than significant levels in this waterbody and water sports are not likely to be significantly affected.

4.9.2 Proposed Action (Adaptive GMP)

The effects of the Proposed Action on aesthetics and recreation would be similar to those occurring under the No Action Alternative. As discussed in Sections 4.2 and 4.5, the Adaptive GMP could improve the suitability of grasslands and aquatic habitats over the long-term and result in corresponding improvements to aesthetics and hunting and fishing opportunities. As discussed in Section 4.3, the Adaptive GMP is also likely to reduce the impact of cattle and

grazing on water quality over the long-term and result in corresponding improvements to contact recreation in Lake Belton.

4.9.3 Limited Range Alternative

The Limited Range Alternative would have minimal adverse and beneficial effects on aesthetics and recreation. Under the Limited Range Alternative, the mixture of grassland, shrubland, and forested communities in the Western Maneuver Area and West Fort Hood GMUs would be maintained through controlled burns, brush removal and control, and other management activities. In the absence of grazing, the productivity and composition of forage species could be affected; however, these impacts would likely be minimal and would not substantially affect forage availability for game species. Reduced pollution of downstream waterways would also have beneficial effects on aquatic habitats for game fish. Grazing would continue on the LFIA, the GMU closest to Belton Lake; therefore, beneficial effects on contact recreation in Belton Lake would be minimal.

4.10 UTILITIES AND TRANSPORTATION

Significant impacts on utilities would occur when an action results in increased use beyond existing or planned capacity or when an action results in reduced access to or availability of utilities. Utilities-based effects would also occur as a result of extending utilities into previously undeveloped areas. Grazing would not increase use or availability of utilities.

Significant impacts on transportation would occur when an action results in substantial delays or substantially affects safety.

4.10.1 No Action Alternative

Under the No Action Alternative, delays and collisions related to cattle on roadways would be minimal. Accidents involving cattle would continue. Signs indicating the presence of cattle on the range and signs indicating locations of frequent crossings minimize the frequency of cattle-related incidents.

4.10.2 Proposed Action (Adaptive GMP)

Delays and accidents involving cattle as a result of implementing the Proposed Action would be minimal. Under the Proposed Action, the Installation-wide stocking rate would potentially

increase or decrease depending on productivity of the rangelands. However, it is not anticipated that stocking rates would exceed historical rates, and cattle-related traffic accidents would not likely increase above historic levels.

4.10.3 Limited Range Alternative

The deferral of grazing from the Western Maneuver Area and West Fort Hood GMUs would have minimal beneficial effects on transportation. Vehicle accidents involving cattle on roads connecting the communities surrounding Fort Hood (i.e., West Range, Elijah, and Antelope Roads) would be avoided. Vehicle accidents involving cattle would continue to have minimal adverse effects on transportation in the LFIA and the Eastern Training Area.

4.11 NOISE

Noise would result in significant adverse effects when the level of noise damages hearing or creates a substantial nuisance or hazard to other activities. Suitable noise levels for the workplace, residential areas, and other designated places have been developed by the Office of Safety and Health Administration and the USEPA; however, noise levels outside the workplace are typically regulated by local government agencies. Although grazing occurs near residential areas and other noise sensitive locations on and around the Installation, grazing does not contribute to noise levels above ambient conditions; thus, there would be no effect of any alternative on noise levels.

4.12 HAZARDOUS MATERIALS AND WASTE

Through the RCRA and the CERCLA, the USEPA has developed guidelines for the safe treatment, storage, and disposal of hazardous materials and wastes. Grazing would not result in the treatment, storage, or disposal of hazardous materials or wastes; thus, there would be no adverse effects from these substances occurring as a result of any alternative.

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SECTION 5.0
CUMULATIVE EFFECTS

5.0 CUMULATIVE EFFECTS

5.1 IDENTIFICATION OF CUMULATIVE EFFECTS ISSUES

The CEQ defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). This section continues, "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

In Section 4.0, this EA identified several resources which would not be affected by the Proposed Action: utilities, noise, and hazardous materials and waste. Although other actions would affect these resources, the Proposed Action would not affect these resources; therefore, there would be no cumulative effects. For the remaining resources addressed in Section 4, adverse effects were assessed as minimal and some resources would be beneficially impacted.

5.1.1 Land Use

Land use on Fort Hood has changed to meet the requirements of an evolving military training Installation. As training activities have changed, so have cattle management strategies. These two components have interactively and cumulatively affected land use. As training methods evolve, action areas experience change, and stocking rates must then be adjusted to avoid substantial adverse impacts. The most recent training development plan involves the construction and modification of Installation ranges and is summarized below:

- The 10-year range development plan began in 2010 and includes the construction and modification of 24 ranges within the LFIA and their associated facilities to support changing military training standards. Each project has a specific year associated with its construction. Best Management Practices (BMP) will be followed which utilize stormwater runoff mitigation and low-impact development techniques (Hoganwood 2011).

Stocking rates in the LFIA would not change under any of the GMPs assessed in this EA, including the No Action Alternative, and the range development plan would have a limited effect on forage availability. The use of controlled burns, brush removal and control, and other BMPs

would continue to have beneficial effects on the value and sustainability of the landscape for military training.

5.1.2 Water, Soils, and Air

The Hill Country of Central Texas has experienced significant declines in water quality, stream and river geomorphology, and soil stability. On Fort Hood training areas, this combined and cumulative degradation affects the predominantly clayey soils, causing sedimentation in adjacent streams (Cowhouse Creek, Nolan Creek, etc.), consequently affecting Belton Lake and Leon River. These large downstream bodies of water also draw runoff and associated pollutant loads from the adjacent Cities of Killeen, Harker Heights, Belton, and Temple. These declines adversely affect riparian and aquatic environments, and consequently human communities. This degradation can be historically attributed to early cattle management practices, invasive species introduction, and inadequate wastewater treatment facilities. These historic effects have experienced remediation/monitoring from several government-funded programs including, but not limited to, the following:

- The Installation Restoration Program (IRP), established in 1975 to provide guidance and funding for the investigation and remediation of hazardous waste sites caused by historic disposal activities at military Installations.
- The Soil Erosion Inventory compiled in 1998 by Fort Hood and the NRCS to determine erosion tolerance levels on the Installation.
- The Soil Erosion Survey and Rangeland Health study conducted in 2001 through 2002 and 2004 to determine rangeland health and soil stability.
- The TCEQ conducts ongoing water quality surveys producing impairment data which can be used to produce mitigation and quality improvement protocols.

Proposed, present, and future projects which include mitigation efforts and water quality improvement projects are summarized below:

- The Tank Trail Maintenance project improves over 400 miles of tank trails present on Fort Hood. These trails experience significant degradation due to intensive use. Maintenance is required to prevent erosion, sedimentation, and runoff that can impair Cowhouse Creek and consequently Belton Lake or Leon River (Hoganwood 2011).
- The Maneuver Access Structure Program proposal would initiate the Installation of maneuver structures commonly referred to as “gully plugging”. These Installations fall under Integrated Training Area Management (ITAM) and reduce sediment influx to Lake Belton which is attributed to constant tank maneuvering. These Installations consist of the placement of rock structures over seasonal water drainages. This slows runoff

during heavy precipitation and reduces erosion and consequently sedimentation (Hoganwood 2011).

- Wastewater treatment infrastructure developments at Fort Hood and surrounding cities are in progress or in planning and will meet the demands of a growing population.

All future projects occurring on the Fort Hood Installation have associated contamination risks involving the handling of fuels, oils, volatile organic compounds, and hazardous materials and will be avoided or minimized by use of BMPs. Compliance with wastewater treatment regulations and integration into the current wastewater treatment system will likely be required; thus, any future cumulative effects would be minimized. Current wastewater treatment projects would markedly reduce municipal runoff levels, effectively allowing for natural vegetative filtration to resolve impairments over time.

A large portion of Fort Hood training acreage is considered highly susceptible to erosion (see Figure 3-3). In erosion areas already bare from previous soil activities such as the Western Maneuver Area, overgrazing effects are exacerbated by military vehicle maneuvering. Loss of perennial vegetative cover as a result of heavy training maneuvers has resulted in annual woody encroachment and high erosion rates. These degraded soil communities would stabilize given the combined effects of a residual biomass maintenance program and ongoing revegetation measures to prevent grassland and streamside erosion. A project has been proposed to remove woody plants and brush so that healthy grassland communities which support training operations will return. This project is summarized below:

- The U.S. Army, Headquarters III Corps and Fort Hood propose to perform woody species management throughout the western maneuver training areas. The area encompasses the entire west side of the Installation. It is located in both Bell and Coryell counties, although the majority of the area lies within Coryell County. The project footprint is approximately 67,000 acres. The estimated amount of Ashe juniper and mesquite to be removed is approximately 3,000 acres (Hoganwood 2011).

Prior to any vegetation removal, coordination between Directorate of Public Works Natural Resources staff, Range Control, Integrated Training Area Maintenance, and the contractor's staff who would perform the maintenance would occur. The addition of riparian buffer zones in current and future project BMPs will also promote the restructuring of deep and complex root systems which prevent soil loss and stream sedimentation. When combined with the Proposed

Action, the woody species management plan would minimize any cumulative erosion issues through the moderation of grazing activity throughout the Installation.

5.1.3 Vegetation

Central Texas Hill Country grasslands and cross-timbers have historically been altered by several additive and cumulative factors, including poor cattle management during European settlement, an overpopulation of white-tailed deer, and Ashe juniper expansion. In many places, continuous overgrazing and fire suppression has reverted the cross-timber and mid-grass dominant ecosystem to patches of mid-grass separated by large areas of bare soil and short-grass. White-tailed deer over-browsing has affected plant diversity while hoof trails have eroded soil and diverted overland water flow. The expansion of Ashe juniper has substantially lowered the floral species diversity.

During the early decades of the Installation's history, extensive sodding and seeding of large areas for training purposes added to these stress factors, causing further alteration of vegetation structure. Soil compaction and erosion from both training exercises and cattle movement have been primary factors contributing to these alterations. In recent history, monitoring projects have been initiated in an effort to understand the scope of change in the interest of mitigation. These projects are noted below:

- The Fort Hood Vegetative Resource Inventory (1998)
- The Fort Hood Vegetation Survey Project (2002)
- The study involving tolerance of switchgrass to tracked vehicle disturbance (ongoing)

As a result of these monitoring efforts, Fort Hood has proposed a project to perform maintenance in the form of woody species management (small tree and brush removal) from the entire Western Maneuver Area, which encompasses 67,000 acres on the west side of the Installation, over 10 years.

The Proposed Action, when combined with BMPs involved in the aforementioned project, would give grass time to grow, and reduce the overall impacts on the environment. Therefore, the cumulative effects on the environment under the GMPs assessed in this EA would be less than significant.

5.1.4 Special Status Species

Cumulative impacts on fauna are determined to be significant using standards similar to those used for assessing traditional impacts (See Section 4.2). However, the temporal aspect holds greater weight during cumulative impact analysis due to both a larger time scale (past, present, and future projects), and a capacity for rapid change within native wildlife populations in any given season. In order to preserve current population levels and establish buffers against large-scale and unpredictable events (wildfire, drought, flooding, etc.), the health of any individual species population must be directly tied to range health (i.e, soil, vegetation, water) and its ability to sustain at least current levels of abundance and species richness.

The two species of concern present on Fort Hood are the Federally endangered golden-cheeked warbler and the endangered black-capped vireo. The largest threats to these species which can be mitigated by Fort Hood activities are habitat alteration and removal and nest parasitism by brown-headed cowbirds. Projects buffering and preserving the riparian habitats which are frequented by these species have been outlined in previous sections; however, historic and ongoing projects involving parasitic species control have proven effective and can cumulatively interact with proposed action alternatives to avoid or minimize adverse effects:

- A cowbird trapping and shooting program began in 1988 and has since lowered rates of parasitism and consequently raised abundance levels of both endangered passiforms (Hayden et al. 2001).
- To further reduce parasitism rates on the warblers and vireos in the core habitat areas, the Natural Resource Management Board considered restricting cattle grazing in those areas during the nesting season. A memorandum of understanding was developed that allowed grazing in these areas to continue if the CTCA supported an off-site cowbird trapping program (USFWS 1999). Under the MOU, the CTCA provides financial support for a government employee to trap cowbirds during the breeding season, maintain traps, and work with TPWD to gain voluntary legal access to the private lands adjacent to the Installation in the targeted areas (USFWS 1999).
- The Maneuver Access Structure Program proposal outlined in Section 5.1.2 preserves riparian ecosystems through the prevention of erosion and sedimentation which affects local riparian ecosystems as it is transported to larger permanent water bodies.

Rates of cowbird parasitism would be maintained at rates less than 10 percent under each alternative assessed in this EA; therefore, adjustment of stocking rates would not result in a change in the effects of grazing on warblers or vireos. Improved riparian ecosystem management would improve habitat for these species, thereby, further minimizing or avoiding adverse effects on these species.

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SECTION 6.0
LIST OF PREPARERS

6.0 LIST OF PREPARERS

Name	Years of Experience	Agency or Organization	Area of Responsibility
Michael Hodson	10 years natural resources and NEPA studies	GSRC	Project Manager, Data Analysis, Soils, and Biological Resources
Ben Tomson	1 year natural resource studies	GSRC	Land Use, Water Quality, Cumulative Effects
Steve Kolian	10 years natural resources and NEPA studies	GSRC	Noise, Air Quality
Steve Oivanki	21 years environmental planning studies	GSRC	Socioeconomics, Aesthetics and Recreation, Utilities and Transportation, Hazardous Materials and Wastes
John Lindemuth	12 years cultural resources studies	GSRC	Historic and Cultural resources
Maria Bernard-Reid	10 years natural resources and NEPA studies	GSRC	Technical Review
Chris Ingram	31 years EA/EIS analysis	GSRC	Quality Control

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SECTION 7.0
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7.0 REFERENCES

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APPENDIX A
COORDINATION AND CORRESPONDENCE

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT HOOD
FORT HOOD, TEXAS 76544-5002

REPLY TO
ATTENTION OF

NOV 0 8 2011

Directorate of Public Works

Mr. Stratford Williams, President
Wichita and Affiliated Tribes
PO Box 729
Anadarko, OK 73005

Dear Mr. Williams:

The United States Army Corps of Engineers (USACE) has prepared a draft Programmatic Environmental Assessment (PEA) for a Grazing Management Plan (GMP) at Fort Hood, Texas. The US Army, Fort Hood, is proposing to implement an Adaptive GMP that will adjust stocking rates in response to residual forage. The purpose of the proposed GMP is to manage grazing activity on the installation in support of Fort Hood's mission.

The USACE is requesting that you review the enclosed draft PEA and identify any specific information, issues, or concerns that should be included in the final PEA and would facilitate the decision-making process. Please respond within 30 days of the date of this letter to ensure that your concerns are addressed within the PEA. Written comments may be sent to:

Ms. Kimberly Musser
HQ III Corps and Fort Hood
ATTN: IMWE-HOD-PWE
4622 Engineer Drive
Fort Hood, TX 76544-5028

For further information, contact the Fort Hood NEPA Program at (254) 288-5132.

Sincerely,

Brian L. Dosa
Director of Public Works

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT HOOD
FORT HOOD, TEXAS 76544-5002

REPLY TO
ATTENTION OF

NOV 08 2011

IMWE-HOD-PWE

MEMORANDUM FOR Mr. Al Armendariz, Environmental Protection Agency (Mail Code 6MD-A), 1445 Ross Avenue, Suite 1200, Dallas, TX 75202

SUBJECT: Draft Programmatic Environmental Assessment for a Grazing Management Plan at Fort Hood, Texas

1. The United States Army Corps of Engineers (USACE) has prepared a draft Programmatic Environmental Assessment (PEA) for a Grazing Management Plan (GMP) at Fort Hood, Texas. The US Army, Fort Hood, is proposing to implement an Adaptive GMP that will adjust stocking rates in response to residual forage. The purpose of the proposed GMP is to manage grazing activity on the installation in support of Fort Hood's mission.

2. The USACE is requesting that you review the enclosed draft PEA and identify any specific information, issues, or concerns that should be included in the final PEA and would facilitate the decision-making process. Please respond within 30 days of the date of this letter to ensure that your concerns are addressed within the PEA. Written comments may be sent to:

Ms. Kimberly Musser
HQ III Corps and Fort Hood
ATTN: IMWE-HOD-PWE
4622 Engineer Drive
Fort Hood, TX 76544-5028

For further information, contact the Fort Hood NEPA Program at (254) 288-5132.

BRIAN L. DOSA
Director of Public Works

Encl
as

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT HOOD
FORT HOOD, TEXAS 76544-5002

REPLY TO
ATTENTION OF

NOV 08 2011

Directorate of Public Works

Mr. Ron Twohatchet, Chairman
Kiowa Tribe of Oklahoma
PO Box 369
Carnegie, OK 73015

Dear Mr. Twohatchet:

The United States Army Corps of Engineers (USACE) has prepared a draft Programmatic Environmental Assessment (PEA) for a Grazing Management Plan (GMP) at Fort Hood, Texas. The US Army, Fort Hood, is proposing to implement an Adaptive GMP that will adjust stocking rates in response to residual forage. The purpose of the proposed GMP is to manage grazing activity on the installation in support of Fort Hood's mission.

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Sincerely,

Brian L. Dosa
Director of Public Works

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT HOOD
FORT HOOD, TEXAS 76544-5002

REPLY TO
ATTENTION OF

NOV 08 2011

Directorate of Public Works

Mr. Mark Chino, President
Mescalero Apache Tribe
PO Box 227
Mescalero, NM 88340

Dear Mr. Chino:

The United States Army Corps of Engineers (USACE) has prepared a draft Programmatic Environmental Assessment (PEA) for a Grazing Management Plan (GMP) at Fort Hood, Texas. The US Army, Fort Hood, is proposing to implement an Adaptive GMP that will adjust stocking rates in response to residual forage. The purpose of the proposed GMP is to manage grazing activity on the installation in support of Fort Hood's mission.

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Sincerely,

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Director of Public Works

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FORT HOOD, TEXAS 76544-5002

REPLY TO
ATTENTION OF

NOV 08 2011

Directorate of Public Works

Mr. Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
PO Box 12276
Austin, TX 78711

Dear Mr. Wolf:

The United States Army Corps of Engineers (USACE) has prepared a draft Programmatic Environmental Assessment (PEA) for a Grazing Management Plan (GMP) at Fort Hood, Texas. The US Army, Fort Hood, is proposing to implement an Adaptive GMP that will adjust stocking rates in response to residual forage. The purpose of the proposed GMP is to manage grazing activity on the installation in support of Fort Hood's mission.

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Director of Public Works

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US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT HOOD
FORT HOOD, TEXAS 76544-5002

REPLY TO
ATTENTION OF

NOV 08 2011

Directorate of Public Works

Ms. Carolyn Runyon
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Dear Ms. Runyon:

The United States Army Corps of Engineers (USACE) has prepared a draft Programmatic Environmental Assessment (PEA) for a Grazing Management Plan (GMP) at Fort Hood, Texas. The US Army, Fort Hood, is proposing to implement an Adaptive GMP that will adjust stocking rates in response to residual forage. The purpose of the proposed GMP is to manage grazing activity on the installation in support of Fort Hood's mission

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Sincerely,

Brian L. Dosa
Director of Public Works

Enclosure

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT HOOD
FORT HOOD, TEXAS 76544-5002

REPLY TO
ATTENTION OF

NOV 0 8 2011

Directorate of Public Works

Tonkawa Tribe of Indians of Oklahoma
1 Rush Buffalo Road
Tonkawa, OK 74653-4449

To whom it may concern:

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Director of Public Works

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US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT HOOD
FORT HOOD, TEXAS 76544-5002

REPLY TO
ATTENTION OF

NOV 08 2011

Directorate of Public Works

Mr. Tom Heyger
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, TX 78744

Dear Mr. Tom Heyger:

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FORT HOOD, TEXAS 76544-5002

REPLY TO
ATTENTION OF

NOV 08 2011

Directorate of Public Works

Mr. Adam Zerrenner
Field Supervisor
U.S. Fish and Wildlife Service
10711 Burnet Road, Suite 200
Austin, Texas 78758

Dear Mr. Zerrenner:

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