CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

3.1.1 Organization

Chapter 3 of this Environmental Impact Statement (EIS) describes the existing conditions at Donnelly Training Area (DTA) East and provides a basis for identifying and evaluating the environmental effects of the proposed action. This EIS focuses primarily on those issues that were identified as major concerns during the scoping processes, both during the development of the preceding Environmental Assessment (EA) and this EIS (see Section 1.9, *Issues Identified During the Scoping Process* and Table 3.1.1.a), as well as the community's concerns expressed in litigation prompting this EIS. The division between "primary" and "secondary" resources is based on public input and not ecological importance.

Issue 1: Site criteria or selection of the site is discussed in Chapter 2, Section 2.2, *Detailed Description of Location Alternatives*. Issue 10: Army commitments to mitigations, is discussed in the appendix.

While this document will primarily focus on the major issues identified through public participation, the remainder of the potential issues and resource categories (Table 3.1.1.b) will also be addressed in this EIS. As initial and subsequent scoping indicated that none of the alternatives would have any effect on geologic resources, such analyses are not included in this document. The conditions at each alternative site (Eddy Drop Zone, Donnelly Drop Zone, North Texas Range and North Texas Range/Eddy Drop Zone Combination) are described within subsections of each resource category.

Table 3.1.1.a Primary Issues of Concern.

Section	Resource Category	Page Number
3.2.1	Soil Resources (**Issue 2:** Permafrost impacts resulting from vegetation removal)	3-3
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Section	Resource Category	Page Number
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Table 3.1.1.b Secondary Issues of Concern.

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3.3.1	Air Quality	3-80
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3.3.5	Threatened or Endangered Species and Species of Concern	3-97
3.3.6	Socioeconomics	3-100
3.3.7	Subsistence	3-105
3.3.8	Public Access and Recreation	3-111
3.3.9	Environmental Justice	3-119

For detailed discussion of the existing environment and the effects of the proposed action on the human environment, the analysis is divided into three activity areas for each location alternative: construction footprint, maneuver area, and surface danger zone. Soldier training functions described in previous sections within Chapter 2, *Description of Proposed Action and Alternatives* (e.g., construction, training, and live fire) would remain constant at each alternative location. Section 2.4.2, *Activity Areas* describes the general activities occurring within each activity area which are applicable to all four location alternatives. In certain instances, the effects of the proposed action would not have an impact within all three activity areas (construction footprint, maneuver area, and surface danger zone) under some resource issues. Thus, those activity areas that were not impacted were not included within the analysis of that particular resource.

Previous EISs, studies and management plans that address ongoing actions, issues, or baseline data are used as background information or incorporated by reference into this EIS. This major documentation is listed in Section 1.11, *Other Environmental Analyses Relevant to the Action*.

3.1.2 Description of USARAK Lands

A majority of U.S. Army Alaska (USARAK) lands, which include DTA, are on long-term withdrawal from the public domain, originally assigned to the Bureau of Land Management (BLM). Ultimate responsibility for these withdrawn lands remains with the BLM, which retains interest in the stewardship of the parcels, even though the land is under long-term Department of Defense (DOD) management. Withdrawal documents and executive orders indicate that

withdrawn lands are not available for disposal actions, such as state or native selection, sales under the Federal Land Planning and Management Act or the Recreation and Public Purposes Act, or other exchanges.

3.1.2.1 Donnelly Training Area East

DTA is located approximately 100 miles southeast of Fairbanks and lies within the Tanana River Valley (Appendix, Figure 3.a), encompassing approximately 631,000 acres. DTA is comprised of two training areas: DTA East and DTA West. This analysis concerns activities proposed at DTA East.

The Delta River and its floodplain form the west side of DTA East, and Granite Creek forms the eastern border. The northern boundary roughly parallels the Alaska Highway, and the southern boundary lies at the base of the Alaska Range's foothills. The Main Post is managed with DTA East and it lies south of Delta Junction.

3.1.2.2 Climate Regime at Donnelly Training Area East

DTA has the northern continental climate of interior Alaska, which is characterized by short, moderate summers; long, cold winters; and low precipitation and humidity. Average monthly temperatures range from -6 degrees Fahrenheit (°F) in January to 60 °F in July, with an average annual temperature of 28 °F. Prevailing winds are from the east-southeast between September and March and from the west, southwest, or south between April and August. The average annual wind speed is approximately 8 miles per hour (mph). The greatest wind speeds occur during winter. Thunderstorms are infrequent and occur only during summer. Average annual precipitation is less than 12 inches, which falls over 90 days, mostly during summer and early fall. Average monthly precipitation ranges from a low of 0.25 inches in April to a high of 2.4 inches in June. Average annual snowfall is approximately 41 inches, with a record 99.7 inches in 1945. Heavy fog is relatively common during December and January. Ice fog can form at temperatures below -30 °F. Ordinarily, ice fog will occur in areas near human settlements where there is a water vapor source, including vehicles and heat sources (Egeland 2003).

3.2 PRIMARY ISSUES OF CONCERN

3.2.1 Soil Resources

Issue 2: Permafrost impacts resulting from vegetation removal. The impact of construction and operation of the Battle Area Complex (BAX) and Combined Arms Collective Training Facility (CACTF) to permafrost was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

3.2.1.1 Soil Characteristics

The Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service, initiated a soil survey of DTA in 1999 and completed fieldwork in 2004. The following discussion of soils is based on that survey (USDA 2005).

Soils in DTA are primarily derived from glacial activities modified by streams and discontinuous permafrost, and overlain by loess in many places. The loess cap ranges from a few centimeters to several meters thick. Strong winds in the area pick up silt from major drainages and redeposit them throughout the landscape. Many of the soils in the area are classified as inceptisols (weakly developed soils). Additionally, extensive areas of permafrost and gelisols (previously frozen soils) occur in the area.

Moraine deposits are characterized by rolling hills and kettle lakes, and the soils in these areas have a thin to moderately thick loess cap underlain by gravelly silts and sands. Soils in outwash plain areas have a moderately thick to very thick loess mantle underlain by sands and gravels. Alluvial materials, similar in appearance to outwash, occur in both major and minor drainages. All of the major drainages in the area are glacially fed and carry a heavy sediment load of silt, sand, and gravel. This sediment is deposited in braided stream channels and floodplains. Silty soils in level areas hold moisture and develop thick organic mats, which lower the soil temperature and favor permafrost formation.

3.2.1.1.1 Soil Trafficability

Trafficability is defined as the ability of soils to physically support military vehicle maneuvers. Soil trafficability is the primary factor used to evaluate potential damage from off-road military vehicle maneuvers in this analysis (primarily the Stryker). Off-road military maneuvers would be expected for the Battle Area Complex (BAX), while vehicles would mostly remain on roads and trails within the Combined Arms Collective Training Facility (CACTF). By determining the trafficability of soils at each alternative BAX site, an evaluation of the site's relative capacity (or ability) to support off-road vehicle maneuver can be made. Wetlands (which typically have saturated soil) and slopes over 30 percent are considered not trafficable. USARAK used the presence of wetlands as the primary factor for determining trafficability at DTA East, since slopes rarely exceed 30 percent in the study areas. Trafficability also varies by season. During the winter season (November to April), the trafficability of soils does not limit off-road vehicle maneuver since frozen soils can support more than the required maneuver capacity, regardless of soil type. However, in the summer season when soils are saturated, the ability of wet soils to support military vehicle maneuvers is very low.

Maneuver capacity was assessed by estimating the number of vehicle passes each alternative site could sustain over the summer season without becoming impassable. A higher percentage of trafficable soils in an area would allow for increased maneuver capacity. In addition, erosion rates would be expected to be lower. Soil trafficability can also be manipulated to provide increased levels of capacity. For example, wet soils in certain areas can be filled and hardened to increase the ability of an area to physically support military vehicle maneuvers.

The trafficability and maneuver capacity of soils for each alternative area is detailed in USAG-AK 2006 and is described below in Section 3.2.1.1.2.

3.2.1.1.2 Soil Characteristics by Alternative

Table 3.2.1.a lists descriptions of dominant soil types for each alternative area based on the NRCS soil survey. Appendix, Figure 3.b shows the locations of these soil associations by alternative.

Table 3.2.1.a Description of Primary Soil Associations by Alternative.

Location	Soil Association or Complex	Description
Alternative 2: Eddy Drop Zone BAX	Salchaket very fine sandy loam	Very fine sandy loam over stratified silt loam to fine sand and very gravelly sand; found on floodplains; parent material is alluvium; slightly erodable by water and moderately erodable by wind; well drained soil with low runoff; not hydric.
Alternative 2 and 5: Eddy Drop Zone CACTF	Butchlake-Southpaw complex, 0 to 12 percent slopes	Mucky silt loam over extremely gravelly coarse sandy loam and very cobbly sandy loam; found on hills on moraines; parent material is loess over till; slightly erodable by water and severely erodable by wind; Well drained soil with low runoff; not hydric.
Alternative 3: Donnelly Drop Zone BAX	Donnelly silt loam, 0 to 3 percent slopes	Gravelly silt loam over variegated gravelly silt loam and very gravelly sand; soils are found on stream terraces; parent material is loess over sandy and gravelly alluvium; slightly erodable by water and moderately erodable by wind; somewhat excessively drained soil with low runoff; not hydric.
Alternative 3: Donnelly Drop Zone CACTF	Butchlake-Southpaw complex, 0 to 12 percent slopes	Mucky silt loam over extremely gravelly coarse sandy loam and very cobbly sandy loam; found on hilly moraines; parent material is loess over till; slightly erodable by water and severely erodable by wind; well drained soil with low runoff; not hydric.
Alternative 4: North Texas Range BAX	Typic Aquiturbels, subalpine, 0 to 7 percent slopes	Very fine sandy loam over permanently frozen very fine sandy loam and permanently frozen gravelly very fine sandy loam; found on hills and depressions on moraines; parent material is loess over till; slightly erodable by water and wind; poorly drained soil with high runoff potential; hydric.
Alternative 4: North Texas Range CACTF	Nenana-Donnelly complex, hilly	Gravelly silt loam over very gravelly sand; found on stream terraces; parent material is loess over sandy and gravelly alluvium; severely erodable by water and moderately erodable by wind; somewhat excessively drained soil with medium runoff potential; not hydric.
Alternative 5: North Texas Range BAX	Nenana-Donnelly complex, hilly	Gravelly silt loam over very gravelly sand; found on stream terraces; parent material is loess over sandy and gravelly alluvium; severely erodable by water and moderately erodable by wind; somewhat excessively drained soil with medium runoff potential; not hydric.

Source: USDA 2005

Eddy Drop Zone – The Eddy Drop Zone alternative lies within an extensive, fairly flat glacial outwash terrace characterized by gravelly soils with a thin eolian and alluvial silt layer. Soils in the area are well drained with low runoff potential and typically result in relatively rapid infiltration of floodwaters through the soil (during times when soil is unfrozen) and into the underlying aquifer. A few low bog areas contain thicker silt and peat deposits. Permafrost is confined to these few low bog areas. Several relic stream channels of Jarvis Creek cross the area. Hydric soils make up approximately 16 percent of the proposed BAX maneuver footprint and 9 percent of the CACTF maneuver footprints.

The majority of soils on Eddy Drop Zone are considered trafficable and can support year-round training with military vehicles. Due to the distribution of trafficable soils within the site, the BAX maneuver area can support 10,001 Stryker vehicle passes in the summer season without becoming impassable. Winter season training is not affected by trafficability.

Donnelly Drop Zone – The western third of the Donnelly Drop Zone alternative lies within a fairly flat glacial outwash terrace characterized by gravelly soils. The central third of the alternative lies within the floodplains of Ober and Jarvis Creeks. Vegetated eolian (wind-formed) and alluvial (water-formed) silts covering gravelly soils at depth characterize the Ober Creek floodplain. Soils in the area are also well drained with low runoff potential and typically result in relatively rapid infiltration of floodwaters through the soil and into the underlying aquifer. It has extensive permafrost. The eastern third of the alternative is within the Delta glacial moraine with rolling hills and hummocky features. Low areas in moraine contain thick silt and peat deposits and extensive permafrost. Hydric soils make up approximately 31 percent of the proposed BAX maneuver footprint and 29 percent of the CACTF maneuver footprint.

There are not enough trafficable soils on Donnelly Drop Zone to support year-round training with military vehicles without site modification. Due to the distribution of trafficable soils within the site, the BAX maneuver area can only support 988 Stryker vehicle passes in the summer season without becoming impassable. Winter season training is not affected by trafficability.

North Texas Range – The western two thirds of the North Texas Range alternative lie within the Donnelly glaciofluvial outwash terrace. This terrace is 150 feet or more above the adjacent floodplain of the Delta River and consists of thick deposits of coarse gravel and sand with some silt. Within the outwash terrace are extensive areas that contain thicker silt and peat deposits with permafrost. The southeastern portion of the site lies within the Donnelly moraine. This steep, hummocky area consists of sandy till with rock fragments. Soils in the area are poorly to somewhat excessively drained with high to medium runoff potential. Numerous kettle depressions contain lakes and some bogs with silt and peat. Depressions are underlain by permafrost. Hydric soils make up approximately 60 percent of the proposed BAX maneuver footprint and 66 percent of the CACTF maneuver footprint.

The soils on North Texas Range are considered not trafficable enough to support year-round training with military vehicles without site modification. Due to the distribution of trafficable soils within the site, the BAX maneuver area can only support 517 Stryker vehicle passes in the summer season without becoming impassable. Winter season training is not affected by trafficability.

North Texas Range/Eddy Drop Zone Combination – The soils found at Eddy Drop Zone and North Texas Range are essentially a combination of those listed for each respective alternative. The CACTF at Eddy Drop Zone lies within the moraines and footslopes to the east of Jarvis Creek. The BAX at North Texas Range lies within the Donnelly glaciofluvial outwash terrace and contains thicker silt and peat deposits with permafrost. Hydric soils make up approximately 52 percent of the proposed BAX maneuver footprint on North Texas Range and approximately 9 percent of the CACTF maneuver footprint at Eddy Drop Zone.

The soils on North Texas Range are considered not trafficable enough to support year-round training with military vehicles without site modification. Due to the distribution of trafficable soils within the site, the BAX maneuver area can only support 648 Stryker vehicle passes in

the summer season without becoming impassable. Winter season training is not affected by trafficability.

3.2.1.2 Permafrost

Permafrost is a major factor influencing the distribution of vegetation and human activities in Alaska. Permafrost is defined as soil, silt, and rock that remain frozen year-round. Though a thin layer may thaw during summer months, the majority of permafrost remains frozen until the local climate changes due to natural climatic fluctuations, or it melts due to disturbance of the insulating peat and vegetation above it.

Permafrost typically exists in multiple layers of varying thickness, ranging from less than one foot to more than 150 feet. In most undisturbed areas, the depth to permafrost varies from two to three feet (Williams 1970). The deepest point at which ground temperatures remain below 32°F throughout the year defines the base of the permafrost layer. The upper surface of the perennially frozen ground is called the permafrost table, and the active layer is the zone above the permafrost table that thaws in summer and freezes again in winter (Williams 1970).

Permafrost creates important effects on such soil processes as cryoturbation, runoff, subsidence and drainage. Cryoturbation is the mixing of soil due to freezing and thawing, which results in contorted and broken soil horizons. More runoff occurs on sloping soils with permafrost, as the permafrost prevents the infiltration of water into the ground. Subsidence of the ground surface can occur if permafrost melts (Swanson and Mungoven 2001). The impermeable surface of the permafrost table can create a barrier to water flow and often causes permafrost areas to remain very wet or even saturated during the summer months.

Any activity that removes the insulating vegetation mat or destroys the active layer above the permafrost table allows the ice-rich soil to melt and irregular surface subsidence can occur. The tendency for settling and frost action is directly proportional to the silt content of the soil. “Thermokarst” is the term given to describe this process and the range of features formed from irregular subsidence. These features may include hummocks and mounds, water-filled depressions, flooded forests, mudflows on sloping ground, or other resultant landforms. The thawing process is difficult to control and, once formed, thermokarst features are likely to persist (Berger and Iams 1996). The amount of subsidence and collapse of the ground surface is dependent on the ice content of the ground.

Once started, the thawing process is difficult to control. Maneuver or construction activities could result in this type of damage if conducted in areas of high ice content. Selected sites should have the lowest possible ice content, and steps should be taken to ensure adequate ground insulation (Nakata Planning Group 1987).

Each of the alternative sites lies within a zone of discontinuous permafrost (Ferrains 1965), occurring in some areas beneath the ground surface throughout a geographic zone where other areas are free of permafrost. Permafrost is highly patchy and irregular on DTA, particularly in morainal areas where abrupt changes in slope and aspect occur (Jorgenson 2001). The highly variable sediment types, complicated topography, and micro-climatic variability make prediction of permafrost difficult. Isolated patches of permafrost are found in areas under DTA’s sandy gravel, from 2 to 40 feet below ground level. Thickness of permafrost varies widely from 10 to 118 feet.

Only a small proportion of DTA is presently affected by permafrost degradation, indicated by the presence of thaw ponds. Permafrost degradation at DTA appears to be less than in other areas in interior Alaska due to the cooler climate and higher elevations, and the prevalence of "thaw-stable," gravelly soils. However, areas dominated by loess or other silty sediments may be more vulnerable to permafrost degradation. Continued climatic warming or ground disturbance may increase the amount of thermokarst at DTA.

3.2.1.2.1 Permafrost by Alternative

Eddy Drop Zone – The Eddy Drop Zone alternative has less permafrost compared to the Donnelly Drop Zone and North Texas Range study areas as indicated by the 2005 USDA soil survey of Fort Greely and Donnelly Training Area, Alaska. According to the survey, permafrost soils exist in approximately 16 percent of the proposed BAX maneuver footprint and 9 percent of the proposed CACTF maneuver footprint.

The NRCS soil survey information is supported by detailed geotechnical exploration programs conducted during the summer and late fall of 2002 (R&M Consultants 2002, 2004 and USACE 2004). Very limited areas of permafrost were encountered at the Eddy Drop Zone alternative. Two isolated areas of permafrost were encountered at the proposed BAX site. Borings located in a small depression in the glacial moraine, along the east side of the site, encountered permafrost. At the proposed building site, permafrost was also encountered in fine-grained material near the surface. In general, the proposed BAX site was found to have a low occurrence of permafrost (R&M Consultants 2002, 2004 and USACE 2004). At the proposed CACTF site, isolated areas of perennially frozen, fine-grained soils were encountered. If this site is selected as the location for a BAX and CACTF, additional drilling at these locations is planned prior to any construction or use of the site in order to confirm the initial interpretation.

Donnelly Drop Zone – The Donnelly Drop Zone alternative has a higher amount of permafrost than the Eddy Drop Zone alternative and less permafrost than the North Texas Range alternative based on the soil survey of Fort Greely and Donnelly Training Area, Alaska (USDA 2005). According to the survey, permafrost soils exist in approximately 31 percent of the proposed BAX maneuver footprint and 29 percent of the proposed CACTF maneuver footprint.

Although geotechnical surveys have not been conducted at this site, several factors other than the soil survey were used to determine the relative probability of permafrost occurring at each area. A larger portion of Eddy Drop Zone has been cleared of vegetation as compared to Donnelly Drop Zone. In addition, the Eddy Drop Zone area has been cleared for over 50 years. The lack of insulating vegetation causes permafrost to degrade over time. Thus, permafrost amounts can be expected to be lower at the Eddy Drop Zone site and higher at the Donnelly Drop Zone site.

Previous investigations of this area also indicate greater amounts of permafrost in the Donnelly Drop Zone. The Donnelly Drop Zone alternative lies to the east of Donnelly Dome and the Richardson Highway, on both sides of Jarvis Creek. The Donnelly Drop Zone alternative lies in areas that exhibit isolated masses of permafrost and discontinuous permafrost (Ferrains 1965). The area lying on the west side of Jarvis Creek is mapped as glaciofluvial deposits (Pewe and Holmes 1964). Data presented by Pewe and Holmes indicates isolated pockets of permafrost.

Interpretation of vegetation patterns indicates that some of these pockets may be extensive (up to 0.5 mile in diameter). On the eastern side of Jarvis Creek, the Donnelly Drop Zone alternative lies on a glacial moraine of the Delta Glaciation. This area is underlain by discontinuous permafrost (Ferrians 1965). Holmes and Benninghoff (1957) noted that permafrost was observed in the areas of Muskeg Hill and Butch Lake within the northern portion of Donnelly Drop Zone alternative. They also mention permafrost under hummock bogs (bogs in the depressions on glacial till). Geologic mapping shows extensive areas of bogs on the Delta Moraine (Pewe and Holmes 1964) along the east side of the Donnelly Drop Zone alternative. Extensive permafrost can be expected in these areas. In August 1955, Holmes and Benninghoff reported that an earth flow was observed on a tank trail on Muskeg Hill. They further reported that the disturbed surface layer moved downslope in late July or early August, sliding on frozen Delta till.

If the Donnelly Drop Zone alternative is selected as the location for a BAX and CACTF, drilling will be conducted prior to any construction or use of the site in order to identify areas of higher permafrost potential and to confirm the initial interpretation at specific construction sites.

North Texas Range – The soil survey of Fort Greely and Donnelly Training Area, Alaska indicates the North Texas Range alternative has a higher amount of permafrost than the Eddy Drop Zone and Donnelly Drop Zone alternatives (USDA 2005). According to the survey, permafrost soils exist in approximately 59 percent of the proposed BAX maneuver footprint and 66 percent of the proposed CACTF maneuver footprint.

Permafrost was encountered in 15 of the 20 test borings drilled during site investigations at North Texas Range in 2005 (R&M Consultants 2005), with massive ice encountered in two of the 15 test borings. Permafrost was not encountered along the eastern edge or central portion of the North Texas site. If the North Texas Range alternative is selected, additional drilling at these locations is planned to confirm the initial interpretation prior to construction or use of this site.

The North Texas Range alternative is located to the northwest of Donnelly Dome and lies on glacial moraines and glacial outwash terraces of the Donnelly Glaciation (Pewe and Holmes 1964). Pewe and Holmes note that permafrost occurs within 10 to 25 feet of the surface in the area. Holmes and Benninghoff (1957) indicate that permafrost was encountered under hummock bogs. Bogs are located on the Donnelly Moraine along the east side of the North Texas Range alternative (Pewe and Holmes 1964). The Trans-Alaska Pipeline, located approximately two miles east of the North Texas Range alternative, is elevated in response to the non-thaw-stable permafrost in the area.

North Texas Range/Eddy Drop Zone Combination – Permafrost found at Eddy Drop Zone and North Texas Range are essentially a combination of those listed for each respective alternative. Permafrost soils exist in approximately 51 percent of the proposed BAX maneuver footprint at North Texas Range and 9 percent of the proposed CACTF maneuver footprint at Eddy Drop Zone (USDA 2005). At the proposed Eddy Drop Zone CACTF site, isolated areas of perennially frozen, fine-grained soils were encountered during drilling activities. Permafrost investigations within the North Texas Range area note that permafrost is prevalent (R&M Consultants 2005). Drilling would be conducted prior to any construction or use of these sites in order to identify areas of higher permafrost potential and to confirm the initial interpretation at specific construction sites.

3.2.2 Surface Water

Issue 3: Flooding and hydrology, particularly with respect to winter ice overflow (aufeis) at Jarvis Creek. The impact of construction and operation of the BAX and CACTF on local hydrology was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

3.2.2.1 Waterways

Most surface water within DTA East either drains directly into the Delta River or into its major tributary, Jarvis Creek. The Delta River drains directly into the Tanana River north of DTA East. Ober Creek, a tributary of Jarvis Creek, drains a southern portion of DTA East. On the eastern boundary of DTA, Granite Creek drains north directly to the Tanana River. The primary waterways potentially affected by the proposed action include the Delta River and Jarvis and Ober creeks. This section describes both the waterway characteristics and potential flood events at each of the alternatives.

DTA's surface waters are diverse, including numerous rivers, streams, ponds, and lakes. Appendix, Figure 3.c illustrates the general hydrology of the area. DTA lies entirely within the Tanana River drainage basin. A majority of the larger streams flowing through DTA, such as the Delta River and Jarvis Creek, are glacial-fed. Principal glaciers lying along or south of DTA's southern boundary include Canwell, Castner, and Black Rapids, which drain into the Delta River. Jarvis Creek is fed by meltwater from glaciers on Mt. Silvertip (USARAK 1979). The Delta River and Jarvis Creek have broad braided channels flowing over permeable alluvial fan deposits. Large quantities of stream flow infiltrate through the sediments into the groundwater table, resulting in decreasing stream flow in a downstream direction.

The volume of stream flow fluctuates dramatically by season. From October to May, flow is limited to groundwater seepage from aquifers into streams, and many small streams freeze solid (zero discharge). In particular, Jarvis Creek ceases to flow at the Richardson Highway during the winter. Stream flow further upstream is converted to winter river icing or "aufeis." Aufeis is an ice sheet that forms on a floodplain in winter (as the normal channels freeze solid or are otherwise dammed so that water spreads out over the surface and also freezes). Aufeis can accumulate to several meters in thickness over a winter and cover large areas of the active floodplain in braided streams such as the Delta River and Jarvis Creek. Snowmelt typically begins in May and reaches its peak in June, followed by the peak melting of glaciers in July. After July, most of the snow has melted at higher elevations, and rainfall sustains a steady flow during August and September.

The estimated peak discharge for various return periods for the Delta River, Jarvis Creek , and Ober Creek are presented in Table 3.2.2.a. These figures are for values of cubic feet of water discharge per second at the river mouth.

Table 3.2.2.a Expected Flood Discharge for Delta River, Jarvis Creek and Ober Creek.

Stream	Drainage Area (square miles)	Expected flood discharge (cfs)						
		2 years	5 years	10 years	25 years	50 years	100 years	500 years
Delta River [1]	1,638	na	na	17,100	na	33,000	42,000	67,000
Jarvis Creek [2]	248	1,342	2,094	2,640	3,368	3,928	4,504	5,902
Ober Creek [2, 3]	30	291	500	665	898	1,087	1,288	1,802

[1] Federal Emergency Management Agency 1982, Dingman et al. 1971.
[2] Curran et al. 2003.
[3] Ober Creek flood discharge estimate is included as part of Jarvis Creek flood discharge estimate.
na = Data not available.

3.2.2.1.1 Waterways by Alternative

Eddy Drop Zone – Appendix, Figure 3.c illustrates the surface waters potentially affected by the proposed location of the BAX and CACTF within the Eddy Drop Zone alternative. Jarvis Creek, the main waterway within the Eddy Drop Zone alternative, originates at the terminus of Jarvis Glacier on the north side of the Alaska Range and flows northward for 40 miles through a narrow valley before passing through DTA East. The creek drains an area of 248 square miles and receives glacial meltwater from Riley and Little Gold creeks. McCumber Creek and Morningstar Creek are non-glacial streams that enter Jarvis Creek from Granite Mountain. As it passes through DTA, Jarvis Creek flows across a large alluvial fan before it joins the Delta River.

The proposed locations of the BAX and CACTF within the Eddy Drop Zone alternative are on a large glacial outwash fan, formed where Jarvis Creek flows out of the Delta Glaciation end moraine features. The apex of this outwash fan is about seven miles south of the main Fort Greely cantonment area. The outwash fan is generally a broad, gently sloping landform, steeper at the proposed BAX site than at the proposed CACTF site. The active channel of Jarvis Creek flows down the center of the outwash fan near the BAX site and then turns west just before reaching the CACTF site, where it flows down the western edge of the fan to the existing Richardson Highway bridge (Appendix, Figure 3.c).

The proposed location of the BAX is within the mapped 100-year floodplain of Jarvis Creek (Appendix, Figure 3.d). The floodplain is subject to overbank flooding mainly due to aufeis-caused overflows (see additional discussion of floodplains in Section 3.2.2.2).

Aufeis or river icing is likely to occur in areas of a river channel where the river transitions from a more confined stretch with a deeper channel or channels to a broader stretch with shallower channels. These transitions are usually associated with a decrease in channel bed slope. Shallow channels tend to freeze to the bottom during the winter, forcing underlying flow onto the ice surface. Low air temperatures and little snow cover during first half of winter, or snow cover removed by wind, allows deeper freezing of shallow channels, thus forcing underlying flow onto the ice surface. Conversely, early heavy snow and lack of wind to remove snow cover tends to minimize icing incidence (Carey 1973).

The formation of aufeis occurs in Jarvis Creek at approximately the same spot each winter (Appendix, Figure 3.d). Approximately two miles upstream from the proposed BAX site, Jarvis

Creek narrows and a "pinch point" is created. At the "pinch point," flow becomes concentrated, traveling through a narrow channel. The stream then widens out onto an open area with multiple shallow channels and with little to no side banks on the east side. Aufeis typically forms at this location and continues downstream for approximately one mile. The gradient also flattens out at this point.

The presence of aufeis at this location has historically caused the water in Jarvis Creek to overflow its natural streambank during the spring. Exiting water typically flows out of the braided channels over the low side banks and along alternate high water or preferential flow channels east of Jarvis Creek, which continue northward towards the Alaska Highway and the community of Delta Junction. Flooding of areas adjacent to the aufeis formation commonly occurs annually, and during high snowmelt years or large rainstorms, some flooding can occur within Delta Junction (Darby and Associates 1980). Measurements indicate that during the summer period, Jarvis Creek loses water to its bed (groundwater) as it flows downstream over a widening floodplain (Holmes and Benninghoff 1957). This indicates that potential spring flooding is more probable than summer flooding, especially when the creek bed is frozen and aufeis remains in portions of the creek.

During the spring, as air temperatures begin to rise and snow starts to melt, the flow within Jarvis Creek increases. At this point, air temperatures are not yet warm enough to melt the aufeis blocking the channel, and the increased flow due to snowmelt is forced to travel over the aufeis onto the adjacent floodplain. The height of the right bank of Jarvis Creek is very low in this area, and spring snowmelt leaves the channel at several locations within this 200-300 feet wide exit point. Water flows northward along several high water or preferential flow channels. These preferential flow channels or drainage ways cross (south to north) the proposed BAX site. Typically, not all of the Jarvis Creek flow leaves the channel. Flowing water was observed across certain areas of the proposed BAX location during site visits in the spring of 2002, 2004 and 2005.

In the spring of 2004, the combination of aufeis, melt-induced surface runoff, and high rainfall led to considerable flooding of the proposed BAX site and downstream flooding within Delta Junction. Aufeis remained in Jarvis Creek about two miles south of the proposed BAX site. Starting in late April, it diverted meltwater out of the ice-blocked channel, over the low bank, and into preferential flow channels which trend to the northeast along the east side of Eddy Drop Zone (Appendix, Figure 3.d). On the 8th and 9th of May 2004, heavy rains (over one inch) and warm temperatures resulted in a significant rain-on-snow event in the central Alaska Range and the remnant aufeis forced water out of Jarvis Creek and into the preferential channels. Water flowed northeast through the proposed BAX site and along and across 33-Mile Loop Road. The flow continued northeast, crossing under the Alaska Highway about six miles southeast of Delta Junction. Flow then continued northwest, crossing Nistler and Jack Warren roads (NOAA 2004). Based on estimates of flow width, velocity, and depth, a flow of 500 cfs was estimated at a low water crossing of 33-Mile Loop Road east of the existing Eddy Drop Zone. Flows at the Alaska Highway culvert crossing were estimated at 1,200 to 1,500 cfs (USAERDC 2006).

One of the preferential overflow channels is a ditch along the west side of the existing Eddy Drop Zone that drains water away from the area. During a spring 2002 site visit, the ditch was flowing full to a depth of five to seven feet. This same site visit verified a naturally occurring high water flow area to the east of the Eddy Drop Zone. This is further verified by aerial photos as a dendritic-shaped band of deciduous trees and open spruce forest, as opposed to the dense spruce

covering the remainder of the outwash fan. Water drains as "sheet flow" through this area and not in defined, active channels. These areas are covered by moss and brush, indicating only low velocity flows in the recent past. The high water channels (crossing the proposed BAX site) flow into a large flat area, with scattered bogs to the east of the proposed CACTF site (between the site and the glacial moraines). Water leaving the BAX site is likely stored in this area until it evaporates or drains down through the underlying gravels. This boggy area continues north, across the Alaska Highway and east of Delta Junction, as shown on U.S. Geological Survey topographic maps (U.S. Geological Survey 1988a,b) and the Delta Flood Hazard Study (USDA 1978).

There is no evidence of preferential flow channels or recent flooding from Jarvis Creek at the proposed CACTF site. The CACTF site is not within the 100-year floodplain (Appendix, Figure 3.d). The previously discussed preferential flow channels lie on either side (east and west) of the CACTF site. A ditch along the west edge of the site has been excavated (with berms along the sides) to accommodate possible flows during periods of high water.

Donnelly Drop Zone – Appendix, Figure 3.c illustrates the surface waters potentially affected by proposed location of the BAX and CACTF within the Donnelly Drop Zone alternative. Jarvis Creek and its tributary, Ober Creek, bisect the area (see description of Jarvis Creek in Section 3.2.2.1.1). The proposed range facilities would be located along both the east and west banks of Jarvis Creek and Ober Creek. The Donnelly Drop Zone alternative is located upstream from the Eddy Drop Zone alternative. Other unnamed seasonal watercourses also traverse the area. Ober Creek and these smaller waterways are non-glacial. Portions of the proposed location of the BAX and CACTF are within the floodplains of Jarvis Creek and Ober Creek (see additional discussion of floodplains in Section 3.2.2.2).

No aufeis conditions exist within Donnelly Drop Zone (Figure 3.d). Aerial photography shows the potential for flooding to the east, continuing north through Butch Drop Zone. Evidence of old, alternate streambeds for Ober Creek and others across the area are also visible. Hydraulic modeling indicated that some flooding of the left bank near the mouth and upstream of Ober Creek can occur (USAERDC 2006).

North Texas Range – Surface water from the North Texas Range alternative drains into the Delta River (Appendix, Figure 3.c). The BAX and CACTF would not be constructed in an area that would directly be affected by or create impacts to the Delta River, as it would be situated on a bluff approximately 150 ft above the Delta River. However, the Delta River passes through a portion of the proposed surface danger zone at this location. There are small streams flowing through the area that drain into the Delta River. The Delta River is confined to a wide braided floodplain incised 150 ft or more into the Donnelly glaciofluvial outwash deposits and the Donnelly glacial moraine, forming high bluffs on either side of the river.

The Delta River flows northward 80 miles from its headwaters to its confluence with the Tanana River, and runs through DTA for approximately 30 miles. The Delta River serves as the dividing line between DTA East and West. It drains an area of approximately 1,638 square miles. The river originates as a non-glacial waterway at Tangle Lakes, approximately 50 miles south of the southern boundary of DTA. As the river flows through the Alaska Range, it receives significant meltwater from Canwell, Castner, Gulkana, College, Eel, Jarvis, McGinnis, Augustana, Eureka, and Black Rapids glaciers, and several smaller glaciers.

Downstream from Black Rapids Creek, the Delta River broadens and the gradient is reduced. Upon entering DTA, the river flows across a north-sloping alluvial fan where the channel becomes

braided and complex. With the exception of Jarvis Creek, the Delta River has no major tributaries once it leaves the Alaska Range (Ferrick et al. 2001).

Low flow for the Delta River usually occurs between October and April. Extensive aufeis forms in the braided channel during the winter months but does not alter the floodplain boundary. Flow increases dramatically during May, with high flows occurring between June and August. The mean annual flow of the Delta River is estimated to be 13,000 cfs, with the 100-year flood frequency estimated to be 42,000 cfs (Dingman et al. 1971; USDA 1987).

The construction footprint and maneuver area of the BAX and CACTF are not located within the floodplain of the Delta River, but the BAX surface danger zone falls within the 100-year floodplain of the Delta River (Appendix, Figure 3.d) (see additional information on floodplains in Section 3.2.2.2).

North Texas Range/Eddy Drop Zone Combination – The waterways found at Eddy Drop Zone and North Texas Range are essentially a combination of those listed for each respective alternative. The active channel of Jarvis Creek turns west just before reaching the Eddy Drop Zone CACTF site, where it flows down the western edge of the outwash fan to the existing Richardson Highway bridge (Appendix, Figure 3.c). The proposed location of the CACTF at Eddy Drop Zone is outside of the mapped 100-year floodplain (Appendix, Figure 3.d). The BAX at North Texas Range would not be constructed in an area that would directly be affected by or create impacts to the Delta River, as it would be situated on a bluff approximately 150 ft above the Delta River. The BAX surface danger zone falls within the 100-year floodplain of the Delta River.

3.2.2.2 Floodplains

Executive Order (EO) 11988, *Floodplain Management* [42 FR 26971, May 24, 1977], was issued in order to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplain development wherever there is a practicable alternative. Every federal agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain, to ensure that its planning programs reflect consideration of flood hazards and floodplain management, and to prescribe procedures to implement the policies and requirements of EO 11988. EO 11988 defines the term “floodplain” to mean the lowland and relatively flat areas adjoining inland and coastal waters including floodprone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year (i.e., the 100-year floodplain). The following section describes the floodplains within the proposed alternatives.

3.2.2.2.1 Floodplains by Alternative

Eddy Drop Zone – The Eddy Drop Zone floodplain is subject to overbank flooding due to aufeis overflows. The extent of such flooding, up to the 100-year recurrence interval, was estimated and mapped in 1978 using high altitude aerial photography, satellite imagery, and observations (USDA 1978). It was updated in 1982 as part of a Flood Insurance Study and a Flood Insurance Rate Map prepared by the Federal Emergency Management Agency (FEMA 1982). In 1987, a more extensive analysis of flooding and erosion potential was undertaken, and suggested flood protection measures were proposed (USDA 1987). However, the 1978, 1982, and 1987 floodplain analyses only covered a small portion of Fort Greely and just the northern portion of the Jarvis Creek watershed.

Floodplains were delineated for Jarvis Creek by combining the flooding conditions occurring under two different scenarios: with and without the effects of aufeis (river ice). Modeling was conducted using the U.S. Army Corps of Engineers River Analysis System computer program (HEC-RAS) and topographic data obtained through Light Detection and Ranging (LIDAR) surveys. LIDAR is a survey system that utilizes electromagnetic radiation at optical frequencies to take measurements of objects (in this case, topographic landforms). Areas of aufeis formation were determined from aerial photographs taken during the spring 2004 flooding event. As can be see from Figure 3.e, the floodwaters during ice-free events are generally contained within the banks of Jarvis Creek. Aufeis deposits and river ice cover significantly increase water levels in Jarvis Creek such that floodwaters flow away from Jarvis Creek in an established floodplain in the vicinity of Eddy Drop Zone (Appendix, Figure 3.d). Portions of both the construction footprint and maneuver area of the BAX are within the Jarvis Creek floodplain due to these ice-affected flooding events. Table 3.2.2.b indicates which portions of the proposed alternatives would be located within a floodplain.

Table 3.2.2.b 100-Year Floodplains at DTA East.

Alternative/Footprint	Jarvis Creek Floodplain (acres)	Delta River Floodplain (acres)
Eddy Drop Zone – BAX		
Construction Footprint	97	0
Maneuver Area	948	0
Eddy Drop Zone – CACTF		
Construction Footprint	0	0
Maneuver Area	0	0
Donnelly Drop Zone – BAX		
Construction Footprint	33	0
Maneuver Area	171	0
Donnelly Drop Zone – CACTF [1]		
Construction Footprint	0	0
Maneuver Area	16	0
North Texas Range – BAX		
Construction Footprint	0	0
Maneuver Area	0	0
North Texas Range – CACTF		
Construction Footprint	0	0
Maneuver Area	0	0
Combined North Texas Range and Eddy Drop Zone		
Construction Footprint – NTR BAX	0	0
Construction Footprint – EDZ CACTF	0	0
Maneuver Area – NTR BAX	0	0
Maneuver Area – EDZ CACTF	0	0

[1] The CACTF at Donnelly Drop Zone is not within Jarvis Creek floodplain. However, it is within the Ober Creek floodplain, but acres are not available.

An abandoned channel of Jarvis Creek, located along the western side of the proposed CACTF site, crosses the Buffalo Drop Zone (located just north of Eddy Drop Zone) and runs through the community of Delta Junction. The Delta Junction school (on Tanana Street) and the community airstrip are located on this abandoned channel, lying within the 100-year floodplain (FEMA 1982). USARAK built an earthen barrier where this channel leaves Jarvis Creek in 1967 (in the vicinity of 33-Mile Loop Road) and this channel has not flooded since then (USDA 1987).

Donnelly Drop Zone – The floodplain analysis of a portion of Jarvis Creek, conducted by the U.S. Department of Agriculture, Soil Conservation Service (1978), does not extend as far south as the Donnelly Drop Zone alternative. However, the 2005 hydraulic investigation included the portions of Jarvis Creek and Ober Creek that are within the proposed BAX and CACTF alternative. The Donnelly Drop Zone BAX construction footprint and maneuver area would be within the Jarvis Creek floodplain, and the CACTF construction footprint and maneuver area would be within the Ober Creek floodplain. Delineated floodplains within the Donnelly Drop Zone alternative are illustrated in the Appendix, Figure 3.d. Table 3.2.2.b indicates which portions of the proposed alternative would be located within a floodplain.

North Texas Range – The surface danger zone is the only portion of this alternative that falls within the Delta River floodplain. The U.S. Department of Agriculture (USDA) floodplain analysis of a portion of Jarvis Creek and the Delta River (USDA 1978) does not extend as far south as the North Texas Range alternative. A map of the Delta River floodplain in this area (Appendix, Figure 3.d) was developed using aerial photography and existing geology and landform maps (Pewe and Holmes 1964). Although no ground measurements were made to determine the exact extent of the 100-year floodplain as part of this mapping effort, the steep topography and the restricted nature of the floodplain in this area ensure that the mapped floodplain will closely correspond with a 100-year floodplain. Delineated floodplains adjacent to the North Texas Range construction footprint and maneuver area are illustrated in Appendix, Figure 3.d.

North Texas Range/Eddy Drop Zone Combination – The proposed CACTF at Eddy Drop Zone and the BAX at North Texas Range alternative would not be located within the 100-year floodplain (Appendix, Figure 3.d and Table 3.2.2.b).

3.2.2.3 Lakes and Ponds

Lakes and ponds are an important component of the surface water resources at DTA. These resources provide various benefits such as water storage, flood control, water supply sources, and recreation. They also provide important habitat for numerous fish and wildlife species.

3.2.2.3.1 Lakes and Ponds by Alternative

Eddy Drop Zone – A total of 23 shallow lakes and ponds lie within the eastern and southern edges of the Eddy Drop Zone alternative and are associated with the moraine topography (Appendix, Figure 3.c). None of these are managed for recreational fishing (or stocked with fish) due to their susceptibility to freezing. In addition, 10 dry lakebeds are present within the Eddy Drop Zone alternative. Overall, lake levels appear to be dropping (drying up) within this area (Clark 2004).

Donnelly Drop Zone – Butch Lake is the only large lake or pond on the Donnelly Drop Zone alternative (Appendix, Figure 3.c). It is a large shallow lake in the northeast corner of the area,

accessible by 33-Mile Loop Road. It is not suitable for stocking by the Alaska Department of Fish and Game (ADF&G). Two small lakes (less than two acres) lie on the far eastern edge of the alternative.

North Texas Range – There are numerous lakes and ponds within the glacial moraine in the eastern portion of North Texas Range alternative (Appendix, Figure 3.c). The Meadows Road/ Windy Ridge Road/Old Richardson Highway loop has 14 lakes that are stocked by the ADF&G. Big Lake is too shallow for stocking, but is a popular non-fishing recreation destination. The stocked lakes most likely affected by the proposed BAX and CACTF at North Texas Range are North and South Twin, Rockhound, No Mercy, Doc, and Mark, in addition to 35-40 other non-stocked lakes and ponds.

North Texas Range/Eddy Drop Zone Combination – The stocked lakes most likely affected by the proposed BAX at North Texas Range are North and South Twin, Rockhound, No Mercy, Doc, and Mark lakes, in addition to 35-40 other non-stocked lakes and ponds. No stocked lakes are located within the proposed CACTF footprint.

3.2.2.4 Surface Water Quality

Surface water quality is a measurement of chemical parameters of the creeks and rivers, which are used to determine the cleanliness and safety of the water. Common parameters include pH, dissolved gases, temperature, hardness, and dissolved solids. The water quality measurements help to identify the appropriate water quality classification for each waterway. The State of Alaska considers all freshwaters in Alaska to be in their original and natural conditions; therefore, they are also considered suitable to serve all the uses established under each of the three different water quality classes:

(A) Water Supply
  (i) drinking, culinary, and food processing
  (ii) agriculture, including irrigation and stock watering
  (iii) aquaculture
  (iv) industrial
(B) Water Recreation
  (i) contact recreation
  (ii) secondary recreation
(C) Growth and propagation of fish, shellfish, other aquatic life and wildlife

The water quality criteria listed in 18 AAC 70 and in the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (dated 15 May 2003), in combination with the above mentioned classes and subclasses of water use, constitute the water quality standards for a particular water body. The water quality standards regulate human activities that could result in alterations to waters with the State of Alaska's jurisdiction.

All waters within DTA East are protected by use classes (A), (B), and (C) as assigned by the State of Alaska (USARAK 2004a).

The pH levels in the Delta River and Jarvis Creek are slightly alkaline, but they are within limits established by the state. Dissolved oxygen levels generally vary with water flow – they are highest in June, July, and August and may approach zero during periods of prolonged ice cover (USARAK 1980; USARAK 1979).

While lakes are abundant on DTA, their water quality has not been scientifically determined. Water samples from Bolio Lake indicate a pH of 8.8 to 9.2, an alkalinity beyond acceptable limits defined by the state. Nitrogen in Bolio Lake is in organic forms (0.98 milligrams per liter (mg/l)), with low concentrations of nitrates and nitrogen (0.02 mg/l). Samples collected from Bolio Lake in August 1975 had dissolved oxygen concentrations of 9.8 mg/l near the surface and 10.0 mg/l at a depth of 15 feet.

3.2.2.4.1 Surface Water Quality by Alternative

In a site-specific study of water quality in streams flowing through DTA (United States Army Environmental Hygiene Agency 1990), water and sediment samples were collected upstream and downstream. Upstream values indicate the background or natural water quality of DTA. The *Transformation of U.S. Army Alaska Final Environmental Impact Statement Vol. 2*, Appendix E lists water quality and characteristics for the Delta and Tanana rivers.

Surface water quality values on DTA meet the primary standards set by the Alaska Drinking Water Standards (18 AAC 80). However, aluminum, iron, and manganese concentrations were higher than the state's secondary standards. DTA water contains calcium carbonate and is slightly basic. The pH measurements from DTA ranged from 7.9 to 8.4, within the limits established by the state's standards (6.5-8.5) (USARAK 2004a).

Iron may occasionally exceed the secondary drinking water standard of 0.3 mg/l for potable water sources. High iron concentrations are typical in streams that drain wetland areas high in organic matter (Anderson 1970). Dissolved oxygen values measured at DTA were above the state's minimum level of 4.0 mg/l. Dissolved oxygen values ranged from 9.7 mg/l at the Delta River to 12.1 mg/l at Jarvis Creek (USARAK 2004a).

The U.S. Army Corps of Engineers (USACE) recently completed a study of Jarvis Creek (Bristol Environmental and Engineering Service 2003). Arsenic levels ranged from 2.1 to 35.8 micrograms per liter, within State of Alaska and Environmental Protection Agency (EPA) surface water quality standards. The pH levels ranged consistently between the state standards of 6.5 to 8.5. Dissolved oxygen ranged from 1.15 to 19.90 mg/l, while the state standard is between 4 and 17 mg/l. Temperature ranged from 5 to 16° C, with higher temperatures dominating the shallow, braided parts of the creek. Alaska state standards are less than 15° C for drinking water or 20° C for general supply. All other measured parameters were within or below the state's criteria. Streams from the Alaska Range tend to have a higher sulfate and magnesium content than other streams in the Tanana Basin, although the levels are below the state's standards.

The average annual suspended sediment yield for the Delta River is 1,200 tons per square mile (Dingman et al. 1971), and the sediment load ranges from 100 to 1,000 mg/l during the open-water season. In-stream sediment samples from the Delta River and other similar streams yielded the following particle size distribution:

- clay size – 10-25 percent of suspended material
- silt size – 40-50 percent of suspended material
- sand size – remainder (25-50 percent) of suspended material

Most of the clay and silt-sized material at glacial endpoints is rock silt, which is found in layers at the bottom part of most glaciers. Rock silt forms in the glacial bed as rock and is ground into fine particles by glacial movement. These particles are transported to receiving waters by melting and freezing cycles at the bed-glacier interface.

High stream flows tend to have lower concentrations of dissolved solids. Typical of the Alaska Range, the streams that contain the highest dissolved solids (during low flow periods) are those that drain areas of mineralized bedrock (Dingman et al. 1971). Sediment load concentrations also change rapidly with changes in stream discharge. Thus, more than 99 percent of the annual sediment load is transported during the summer, and it is evenly distributed during this time period (Anderson 1970).

Delta River bedload carries mostly particles larger than sand size, which move by rolling, bouncing, and drifting just above the streambed. Thus, the bedload contains channel and floodplain material with a mixture of gravel particles (averaging about 1.6 inches in diameter), sand, and silt. Total bedload yield for the Delta River cannot be estimated (Dingman et al. 1971).

3.2.3 Fire Management

Issue 4: Risk of wildfires. The impact of construction and operation of the BAX and CACTF to wildfire risk was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

Northern boreal ecosystems evolved with natural fire events (Shugart et al. 1992), and future disturbance by wildland fires is assured, regardless of which management alternative is chosen. Species-specific fire effects on northern vegetation, including that in Alaska, have been compiled and summarized into an electronic Northern Rockies Interagency Fire and Aviation Management Fire Effects Information System. Information on Alaskan fire effects by vegetation types has been summarized in *Wildland Fire in Ecosystems: Effects of Fire on Flora* (USFS 2000) and reviewed in *Effects of Fire in Alaska and Adjacent Canada: A Literature Review* (Viereck and Schandelmeier 1980). This information summarizes the effect on individual species and is incorporated by reference into this analysis. The information below is a brief summary of fire effects on black spruce, white spruce, and tussock tundra.

The vegetation (fuels) on the floor of Alaskan forests is composed almost entirely of small, fast drying fuels. When relative humidity decreases, the moisture content of these fuels also drops quickly. Surface fuels in Alaska become almost involatile above 15 percent moisture content. They burn readily at 8 to 10 percent, and at 5 to 7 percent, these fuels burn with fierce intensity and can carry fire into tree crowns (Norum 1980).

Black spruce is found throughout south-central and interior Alaska. Depending on the individual site, black spruce morphology can vary greatly. However, the trees will almost always have a continuous ladder of fuels reaching from the surface of the forest floor into the crowns. Regardless of moisture content, black spruce needles are always prone to vigorous burning, primarily due to the heavy content of volatile waxes and resins. Black spruce forests have an almost mattress-like layer of moss, lichens, and dead material on the forest floor. Dead tree branches typically extend to the ground. The ground fuels are either dead or contain enough flammable substance to carry a fire when they dry out. While a fire that stays on the ground is relatively easy to suppress, one that “kicks up” into the trees has an intensity comparable to California brush fires. These trees are always moisture-starved, with needle fuel moisture levels at approximately 10 percent coming out of winter. As this rises only slightly during the growing season, canopies readily burn when they get enough heat underneath.

In general, when the relative humidity drops into the 40 percent range, trees become susceptible to fire and, if wind speed is over 10 mph, such a fire will become a slow moving crown fire with a surface fire ahead of the crown fire. If relative humidity falls into the 30 percent range, potential fire intensity increases. While well-established fire lines can hold a fire if wind is below 5 mph, wind speeds of 10 mph (or greater) will create a full-blown, running crown fire that "spots" ahead and is too hot for fire crews to handle. Relative humidity of 30 percent (or lower) can be dangerous since crown fires are nearly certain and the fire is too intense to approach. Any wind will cause spotting across all but the widest fuel breaks. Winds above 10 mph spell a catastrophic evacuation situation (Norum 1980).

White spruce is also found in interior Alaska. It typically occurs in riparian areas and offers an opportunity to slow, if not stop, fire spread. White spruce stands often meet black spruce stands near lakes or streams. They form a very different fuel situation than black spruce, usually with a higher moisture content that fire often cannot pass through. While white spruce stands offer an opportunity to slow the progress of a fire during most burning conditions, a large load of dead and down fuels can produce a smoldering surface fire which may be difficult to extinguish. Under dry conditions, especially with steep slopes or strong winds, extremely intense fires can occur. In years of extended drought conditions, white spruce stands should not be considered a fuel break. White spruce burn at similar intensities to black spruce fires, and as white spruce are generally taller, the spotting potential is even higher. Due to the nature of their shallow root systems, trees can also fall after the duff layer has been consumed, a safety concern for firefighters.

Tussock tundra occupies large portions of Alaska. It is usually found on flat to gently rolling terrain in western Alaska, and the lower one-third of gentle slopes in the Alaskan Interior. The proportion of cured or dead material in tussock tundra has a pronounced effect on fire spread and must be carefully estimated. Knowledge of relative humidity thresholds is key to estimating fire behavior in tussock tundra.

3.2.3.1 Fire Hazard Assessment

Along with the broader Delta Junction area, DTA East has a long history of wildfires. The fire management strategy for this area is addressed through a three-phase program: (1) prevention, (2) hazard fuel reduction, and (3) stationing of an Initial Attack Response Team during training events. Ignition sources for the DTA area, associated with both military training and other non-military actions (lightning and recreational use), will continue to cause fires in DTA East, as they have in the past. In general, large fires happen during hot, dry, and windy conditions.

3.2.3.1.1 Canadian Forest Fire Danger Rating System

The wildfire history of the Delta Junction area, including DTA East, originates from various causes including human activities and lightning. Weather patterns in this area occasionally stimulate extreme fire risk and behavior. USARAK's use of the Canadian Forest Fire Danger Rating System (CFFDRS) reduces the likelihood of military-caused fires, primarily by restricting certain training activities based upon fire risk.

Certain military activities are restricted when thresholds of wildfire risk are reached, as required by USARAK Range Regulation, 350-2 (i.e., use of pyrotechnics, smoke pots, and grenades may be restricted when fire danger is high and extreme, and smoke grenades and star-cluster flares will be used only for emergency operations during high and extreme fire danger times) (USARAK 2004b). Weather readings are collected by the USARAK Fire Department and used to calculate

the fire danger rating according to the CFFDRS. The USARAK Fire Department provides the rating to Range Control at DTA, which restricts the use of munitions and pyrotechnics as the fire danger increases. The four fire index rating categories used by USARAK are extreme, high, moderate, and low (Table 3.2.3.a). This rating provides general information about potential fire behavior at selected sites.

Table 3.2.3.a USARAK Fire Index Rating Categories.

Fire Index Rating	Definition
Extreme	During dry and warm weather conditions, wildfires ignite very easily, may burn with very high intensity, and may have a very high potential for rapid fire spread. Typical fire behavior generally includes continuous crown fires, an active flaming front, fire whirls, massive convection columns, and spotting beyond ½ mile ahead of the flaming front. These fires are dangerous to personnel and equipment. Control efforts at the head of the fire are ineffective. Fires present serious control problems as they are virtually impossible to contain until burning conditions improve.
High	During dry and warm weather conditions, wildfires ignite easily, may burn with high intensity, and may have a high potential for rapid fire spread. Typical fire behavior may include crown fires, an active flaming front, and spotting as far as ½ mile ahead of the flaming front.
Moderate	Under dry and warm weather conditions, fires burn with moderate intensity and have a moderate potential for fire spread. Typical fire behavior may include creeping, short runs of active fire in fuel jackpots, and occasional torching.
Low	During dry and warm weather conditions, fires burn with low intensity and have low potential for fire spread. Fire behavior may include smoldering and intermittent creeping.

The fire index, as determined by the USARAK Fire Department, is based on the CFFDRS, which is the fire danger rating system used by BLM, Alaska Fire Service (AFS) and the State of Alaska, Division of Forestry. Of the various fire danger indicators within the CFFDRS, USARAK uses the fire weather index (FWI) as an indicator of fire intensity and spread potential. The FWI tracks the effects of weather on forest fuels, producing an estimate of potential fire danger and fire behavior in an area adjacent to a weather station where weather data are recorded. The FWI is based on the moisture content of three classes of surface forest fuels, plus the effect of wind on fire behavior.

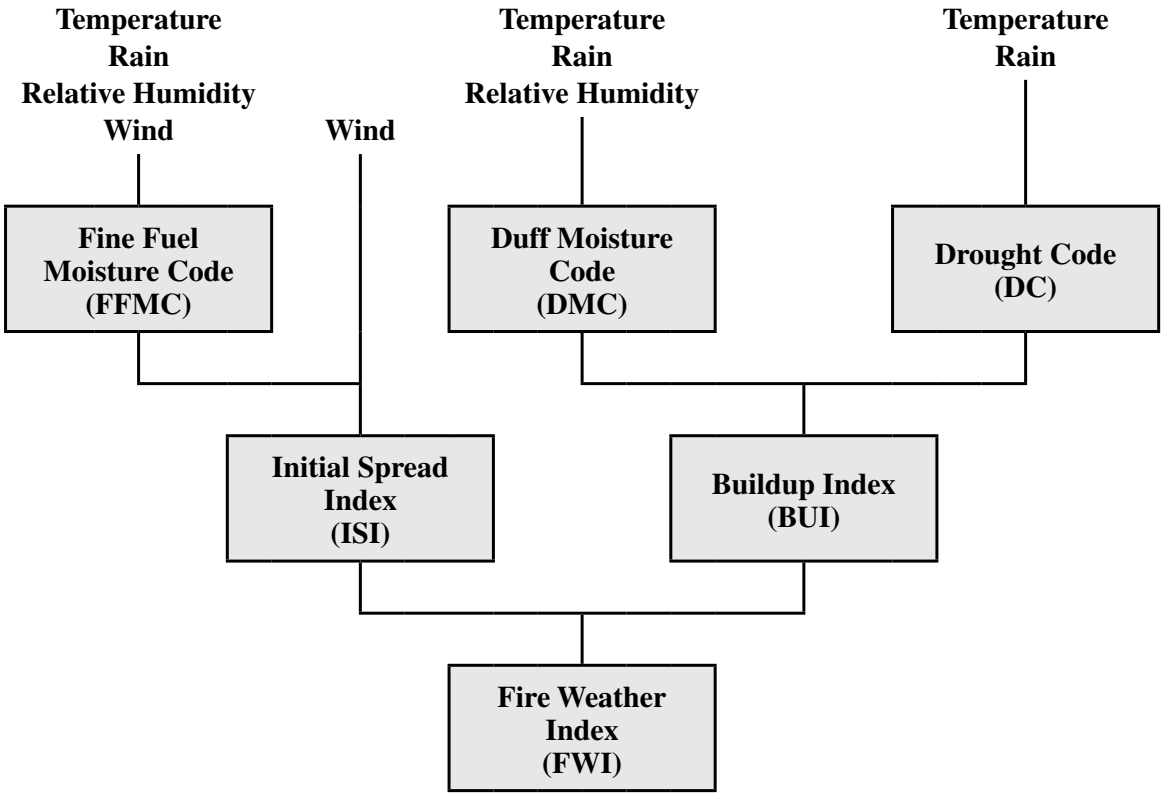
Using the FWI system for a particular weather station (in the case of DTA East, the weather station is located at Allen Army Airfield), fuel moisture is added in the form of precipitation and subtracted in the form of drying. Precipitation is the only input component that will add fuel moisture while the other inputs of temperature, relative humidity, wind speed, and time of year control the rate of drying. The FWI system consists of six components: three primary indexes, or codes (the Fine Fuel Moisture Code, the Duff Moisture Code and the Drought Code), representing fuel moisture for each of the three fuel layers; two intermediate indexes (the Initial Spread Index and the Buildup Index), representing rate of spread and fuel consumption; and a final index representing fire intensity as energy output per unit length of fire front (the FWI). The

FWI system is depicted in Figure 3.f. The FWI is used by USARAK to establish daily range use restrictions.

Currently, the USARAK Fire Chief is responsible for computing and disseminating the FWI on a daily basis during fire season (typically from early April to late August). Information on weather obtained from an AFS website provides the fire department with the information used for computation of the FWI. Typically, AFS relies more upon the Fine Fuel Moisture Code in analyzing fire ignition potential in the spring, due to its emphasis on ignition. As the summer season progresses, the Duff Moisture Code and the Drought Code, along with Fine Fuel Moisture Code, are assessed for fire potential due to the progressive drying of the organic layers. Prior to 1999, the USARAK Fire Department primarily used the Fine Fuel Moisture Code to determine fire index ratings. In 1999, USARAK replaced the Fine Fuel Moisture Code with the FWI in computing fire index ratings. The specific methodology for FWI computation by the USARAK Fire Department and other technical aspects of this program are coordinated annually in a Memorandum of Understanding between USARAK G-3, AFS, the USARAK Fire Chief, and the U.S. Air Force (USAF).

The fire index rating (as determined by the USARAK Fire Chief, and based on the FWI) is disseminated to each Range Control office daily, is applicable to that particular area, and is valid for 24 hours. This information is provided by a series of remote sensors located at Allen Army Airfield and provides timely, accurate information regarding the FWI conditions. The sensors are part of the statewide fire weather system and are maintained by AFS and State of Alaska, Division of Forestry. The Range Control office is responsible for obtaining the daily fire index rating and

Figure 3.f Definition of the Fire Weather Index (FWI).



disseminating that information to units using the range. Table 3.2.3.b shows a history of fire index ratings assigned at DTA.

Table 3.2.3.b Fire Index Ratings at DTA from 1995 to 2005.

Year [1,2]	Number of Days			
	Low	Moderate	High	Extreme
1995	10	10	59	0
1996	4	11	13	21
1997	19	9	66	7
1998	25	22	49	0
1999	33	13	20	25
2000	61	38	34	24
2001	38	53	54	22
2002	65	51	24	21
2003	36	41	49	52
2004	38	45	47	39
2005	30	37	40	30
Total	**359**	**330**	**455**	**241**

[1] Prior to 1999, the FFMC was the primary index used to determine the fire index rating. Use of the FWI began in 1999 and is currently used to determine the fire index rating.
[2] Fire index ratings are only assigned during the fire season, which varies annually. It is typically from early April to late August.

3.2.3.1.2 Fire Hazard Assessment of USARAK Lands

In fire-prone areas, climate, human activity, and types of vegetation (or fuels) determine the level of wildland fire potential. USARAK compiled fuel type maps for DTA East (Appendix, Figure 3.g). Common fuels found on DTA East include the following (Musitano et al. 2002):

Black spruce – These trees are highly flammable and are generally located in areas with wet soils and cooler, north-facing aspects. Crown fires are common and typically result in extensive mortality.

White spruce – White spruce is less flammable and generally located in lowland riparian areas. Crown fires may occur during drought conditions.

Mixed spruce/hardwood – The conifers are generally white spruce with black spruce sometimes present. Black spruce is highly flammable and susceptible to crown fire, while white spruce is both less flammable and less conducive to crown fire. The associated hardwoods are generally less flammable and may include birch, aspen, and/or cottonwood. Surface fuels include mosses, lichens, leaf litter, grasses, and shrubs. Fires in these mixed tree stands generally exhibit moderate intensity.

Bluejoint reedgrass – This species occurs in patches on DTA East, and may occur in association with hardwoods and mixed forest stands, or may dominate clearings. Fires within this grass start easily, spread quickly, and may burn intensely.

Tundra – In these areas, very flammable grasses dominate. Dwarf birch and willow may be present and are generally highly flammable, especially if they have a high lichen content. In alpine tundra, short shrubs, mosses, and lichens dominate. Vegetation in these areas ranges from moderately to highly flammable.

To compile fuel maps, the vegetation described above was grouped into four fuel type categories based on the Canadian Forest Service fuel type designations (Table 3.2.3.c).

Table 3.2.3.c Canadian Forest Service Fuel Types Used for USARAK Fuel Maps.

Fuel Type	Composition	Fuel Status
C-2 Boreal Spruce	Moderately well-stocked black spruce stands on both upland and lowland sites.	Most likely fuel to burn.
O-1B Grass/ Herb	Continuous standing grass and accumulated litter.	Most likely to burn during spring and fall.
M-2 Boreal Mixed wood	Boreal conifers and northern hardwoods.	Least likely fuel to burn. Fuel types are differentiated by season and percent conifer composition.
Barren Land	Low to no vegetation. Usually river bars and human modified features.	No fuel present to burn.

Fire hazard assessments were conducted on USARAK lands in 2002 by AFS fuels management specialists, with the assistance of USARAK forestry personnel, to evaluate the potential implications of siting military ranges in certain areas. An increase in overall military range construction on Army lands created the need to identify and prioritize fuel reduction efforts. These assessments provided a high, moderate, or low potential fire behavior rating based on existing vegetation, topography, and general area weather characteristics. These assessments were based on established AFS fire hazard assessment methods.

3.2.3.1.2.1 Fire Hazard Assessment by Alternative

Eddy Drop Zone – The Eddy Drop Zone alternative has a high hazard assessment. The fuels are continuous stringers of black spruce, dwarf black spruce, and mixed hardwood with black spruce. Understory vegetation includes bluejoint reedgrass, mosses, and lichens. Localized weather patterns may create extremely hazardous fire situations. Typically, wind-driven fires in black spruce are high in intensity and they pose potential threats to state lands and private homesteads along the northern boundary (Musitano et al. 2002).

Donnelly Drop Zone – The Donnelly Drop Zone alternative has a moderate hazard assessment. Fuels within this area are continuous black spruce with pockets of hardwoods. Understory generally consists of mosses and lichens. Based on the fire history and historical weather patterns, the area is very susceptible to high winds and fire starts. Typical fires in this area exhibit high rates of spread and intensities. However, local fire scars (including the 1999 Donnelly Flats fire

and the 1987 Granite Creek fire), the presence of hardwoods, and an established road system all serve as natural fire breaks that reduce the risk of fire spread and prevent this area from being given a hazard assessment of high (Musitano et al. 2002).

North Texas Range – The North Texas Range alternative has a low to moderate hazard assessment. Within this area, the fuel type is alpine tundra and consists mainly of grasses/sedge willow, alder, short shrubs, and mosses with a few pockets of black spruce. The risk of fire spread may be moderate to high depending on fuel and weather conditions. Old fire scars to the east and northeast, and the Delta River to the west, may serve as fuel breaks to slow the spread of fire, giving this area a lower hazard assessment (Musitano et al. 2002).

North Texas Range/Eddy Drop Zone Combination – Although a separate hazard assessment was not conducted for this alternative location, conditions are inferred from the surveys completed at Eddy Drop Zone and North Texas Range. The BAX site proposed at North Texas Range has a low to moderate hazard assessment rating. The CACTF site proposed at Eddy Drop Zone has a high hazard assessment.

3.2.3.2 Fire Policy

Fire management on USARAK installations is required by the Sikes Act and by Army Regulation (AR) 200-3, as well as the Resource Management Plan mandated under Public Law 106-65, *Military Lands Withdrawal Act*. Specific fire management requirements are stated in a 1995 Memorandum of Understanding between the BLM, AFS and USARAK, as well as the Army Wildland Fire Policy Guidance (Department of the Army 2002a).

Effective wildland fire management in Alaska requires multi-agency cooperation and coordination. Fire management on USARAK lands is a joint effort between USARAK and AFS. The agencies have developed two inter-service support agreements, which establish AFS responsibility for all fire detection and suppression on military lands (AFS and USARAK 1995a,b). In exchange, the Army provides AFS (a federal agency) with buildings, utilities, land, training services, air support, and other support services.

AFS also has a Reciprocal Fire Management Agreement with the State of Alaska, Division of Forestry (AFS and State of Alaska 1998). Under this agreement, the agencies have implemented a coordinated fire suppression effort and have identified areas where each agency has agreed to provide wildland fire suppression, regardless of land (state or federal) ownership.

Fire management planning in Alaska has been conducted by agreements executed on an interagency, landscape-scale basis since the early 1980s. These efforts standardized policies and procedures among land managing agencies. All federal (including military), state, and Alaska Native land managers utilize four statewide wildland fire suppression management options (Critical, Full, Modified, and Limited). Each management option is defined by objectives, management constraints, and values to be protected. Options are assigned on a landscape scale across agency boundaries. Management option categories are designed to be ecologically and fiscally sound, operationally feasible, and sufficiently flexible to respond to changes in objectives, fire conditions, land use patterns, resource information, new technologies, and new scientific findings. The designation of a management option establishes the strategies (appropriate management responses) assigned to meet land use and resource objectives. Site-specific designations (Critical, Full, Avoid, and Non-sensitive) are used for small sites within the

landscape scale classification. Management option designations are based upon an evaluation of USARAK legal mandates, policies, regulations, resource management objectives, and local conditions.

Critical Management Option – The critical management option is assigned to populated areas, USARAK-managed lands adjacent to populated areas, and the wildland/urban interface. National Historic Landmarks are designated critical, in compliance with state and federal regulations. Wildland fires that occur on critical management option lands are given the highest priority for suppression action. Protection of life or occupied property has priority over National Historic Landmarks. The appropriate management response to wildland fires is aggressive and continuous without compromising firefighter safety.

Full Management Option – This option provides for protection of cultural and paleontological sites, USARAK-developed recreational facilities, physical developments, administrative sites and cabins, uninhabited structures, high value natural resources, and other high value areas that do not involve the protection of human life and inhabited property. The appropriate management response to a wildland fire is aggressive action to minimize resource damage and suppress the fires within the smallest reasonably possible acreage. Wildland fires within (or near) a critical management area receive a higher priority for suppression than a fire in a full management area.

Modified Management Option – This option provides an appropriate management response to account for seasonal variations in risk, allowing the full management option when risks of large wildland fires are high and the limited management option when such risks are low. The conversion (transition) date is based on the input of land managers, weather trends, and statewide fire occurrence, and is set each year by the Alaska Wildland Fire Coordinating Group. This date is traditionally July 10. The appropriate management responses for fires occurring within this designation are:

- Before the conversion date, fires would be contained with initial attack forces. If a deviation from the appropriate management response is necessary, wildland fire use "for natural resource benefit" may be considered as a management alternative. These natural resource benefits result from vegetation management, as wildland fires produce a mixture of seral stages that maintain watershed condition, ecosystem health, and habitat conditions for fish and wildlife.
- After the conversion date, a fire may be allowed to function in its natural ecological role, maintaining routine surveillance to ensure that identified site-specific values and adjacent higher priority management areas are protected. Direct or indirect suppression actions may be initiated to keep a fire within the boundary of the management option or to protect identified sites. The use of wildland fire as a natural resource benefit is an approved response.

Limited Management Option – This designation focuses on firefighter safety and natural resource benefit, and is assigned to restricted areas or hot zones where no "on the ground" fire fighting can be accomplished due to danger of unexploded ordnance (UXO). The natural resource benefits result from vegetation management, as wildland fires produce a mixture of seral stages that maintain watershed condition, ecosystem health, and habitat conditions for fish and wildlife. The natural mosaic of habitats and plant diversity for all wildlife species, and for subsistence activities, is sustained and enhanced. Wildland fires occurring within this designation are allowed to burn under the influence of natural forces. Suppression actions may be initiated to keep a fire within the boundary of the management option or to protect identified higher value areas/sites. Site-specific areas that warrant higher levels of protection may occur within limited management

areas. Appropriate suppression actions to protect these sites will be taken when warranted, without compromising the intent of the limited management area.

The most appropriate management response is to allow fire to function in its natural ecological role while conducting routine surveillance to observe fire activity and to protect site-specific values or adjacent higher priority management areas. Direct or indirect suppression actions may be initiated to keep a fire within the boundary of limited management to protect identified sites or to restrict fire size when extensive statewide activity has overtaxed suppression resources.

Site-Specific Option – In order to prioritize assignment of suppression forces and determine the appropriate actions to be taken within the landscape-scale management option classifications, site designations of critical, full, avoid, and non-sensitive have been established. These designations provide fire suppression agencies more specific guidance for small sites and apply to structures, cultural and paleontological sites, small areas of high resource value, and threatened and endangered species habitat:

- Sites designated as Critical and Full are to be protected from fire.
- Sites designated Avoid are areas where fire suppression efforts should be avoided and effects from suppression efforts minimized. All aircraft should be restricted from these areas.
- Sites designated as Non-sensitive are acknowledged by the field office staff but require no additional suppression efforts or restrictions.

3.2.3.2.1 Fire Policy by Alternative

Currently, DTA East is designated as a full management option area due to the close proximity of the Delta Junction community and the cantonment area of DTA (Fort Greely) (Appendix, Figure 3.h). This area is subject to high winds and extreme fire behavior. The northern portion of the Fort Greely Main Post is a critical management option area. The Army also has structures at risk throughout DTA East. These resources have been identified and mapped. DTA East surrounds a portion of private and state land known as the “Key Hole” (USARAK 2002b). The BAX and CACTF construction footprint and maneuver area at Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range fall within the full management option area. The surface danger zones associated with the Eddy Drop Zone and Donnelly Drop Zone alternatives are within the full management option, and the surface danger zones associated with both North Texas Range alternatives are within a limited management option area.

3.2.3.3 Fire History

Fires are common at DTA. According to Jorgenson et al. (2001), 59 percent of DTA has burned since 1950 and a considerable portion has burned more than once. Based on fires recorded on the installation since 1950, 1.2 percent of DTA has burned annually. Approximately 70 percent of DTA East has burned within the past 25 years.

Between 1950 and 2002, 53 known fires burned over 93,000 acres on and around DTA East (Table 3.2.3.d). The USDA and the U.S. Department of the Interior classify a large fire as 100 acres or larger in timber fuel types, and as 300 acres or larger in grass fuel types (USDA 2004). Eleven large fires (greater than 100 acres) have burned on or around DTA East since 1950.

In 1999, the Donnelly Flats fire burned approximately 18,720 acres of DTA East and Fort Greely Main Post. This fire was reported near Donnelly Dome, an area with predominantly black spruce located just north of the Alaska Range on DTA, to Delta Area Forestry at 10:00 a.m. on June 11. This area is influenced by topographically and glacially induced winds. The local weather was clear, 76° F, variable winds were at 10 mph with a relative humidity of 19 percent, and the vegetation was very dry. The fire spread steadily to the south. At 5:10 p.m., the size of the fire was estimated at 150 acres. At 9:00 p.m., the fire had grown to one half mile wide and four miles long. On June 12, the fire grew to 400 acres. On June 13, east winds were blowing at 10 mph, it was 80° F, and the relative humidity was in the low 30s. These conditions caused a large increase in fire behavior, pushing it westward. At 3:00 p.m., the fire began to threaten residences along the Richardson Highway and Alyeska Pump Station Nine. At 9:30 p.m., the fire crossed the southernmost fuel break, which was the pre-established trigger point for initiating the Fort Greely evacuation plan. At 10:00 p.m., Delta Area Forestry initiated the evacuation of southern areas of Delta Junction. By June 14, certain areas were secured, and by June 16, weather conditions (higher relative humidity and rain) caused the fire to diminish. A total of 15,226 acres of military land within a full management option area was burned and 305 acres of military land within a critical management option area were burned. Approximately 2,329 acres of BLM-managed land within a full management option area were burned and 860 acres of privately-owned land within a full management option area were burned. The fire was declared out at 18,720 acres on September 23, 1999.

The AFS maintains incident reports for fires reported on the lands used by USARAK. Record keeping has varied over the years and some fires have more information available than others. All reported fires that have occurred on DTA East are listed in Table 3.2.3.d. Appendix, Figure 3.i illustrates the recorded large fires that have occurred on DTA East including the 1999 Donnelly Flats fire, 1987 Granite Creek fire, 1981 Bolio Lake fire, and 1954 PK fire.

Table 3.2.3.d History of All Fires That Have Occurred on DTA East [1].

Date	Name	Acres	Source	Cause	Specific
9/3/1950	Delta Flat Fire	10.0	mil. training [2]	incendiary	unknown
6/26/1951	Army Firing Range	5.0	mil. training	incendiary	artillery/bullets
4/16/1953	Black Rapids	400.0	mil. training	incendiary	artillery/bullets
6/5/1954	P.K. Fire	50.0	human	military	debris burning
1954	Granite Mountain	18,000.0	mil. training	maneuver	vehicle exhaust
5/23/1955	Sam Kelly	0.1	human	civilian	cigarette
4/23/1956	Meadows Rd	1.0	mil. training	incendiary	phosphorus shells
5/17/1956	Meadows	4.0	mil. training	incendiary	phosphorus shells
5/31/1956	Bolio Lake	0.2	human	fisherman	campfire
7/17/1958	Bolio Lake S-4	30.0	human	unknown	unknown
5/20/1960	Donnelly Dome	200.0	human	unknown	unknown
7/14/1960	Donnelly Dome N-5	1.0	mil. training	unknown	unknown
8/5/1960	Donnelly Dome E-2	3.0	human	military	construction
4/16/1970	Quartz Lake	150.0	human	campfire	cooking fire
5/31/1973	Buffalo Ctr.	0.1	unknown	unknown	unknown
4/23/1977	Donnelly	50.0	mil. training	incendiary	unknown

Date	Name	Acres	Source	Cause	Specific
5/14/1978	Big SO 16	9.0	human	unknown	unknown
5/16/1980	Bolio Lake	4.0	mil. training	incendiary	unknown
3/18/1981	Bolio	8,000.0	human	data not available	data not available
5/11/1983	Big SE 11	15.0	mil. training	incendiary	unknown
7/31/1985	Jarvis	0.1	human	civilian	cigarette
6/2/1986	FBK SE 85	0.1	human	unknown	unknown
4/9/1987	FBK E 83	0.5	unknown	unknown	unknown
4/11/1987	Texas Range	100.0	human	unknown	unknown
5/22/1987	Granite Creek	46,078.0	human	data not available	data not available
5/19/1990	A008	2.5	mil. training	incendiary	unknown
8/4/1990	12064	0.2	mil. training	incendiary	flare
6/18/1991	Mark Lake	3.0	human	incendiary	unknown
6/27/1991	Golfballs	0.1	natural	lightning	n/a
8/9/1991	B735	4.0	human	unknown	unknown
9/27/1991	B802	20.0	mil. training	incendiary	maneuvers
4/13/1993	B001	21.0	mil. training	incendiary	blasting
5/13/1993	Jarvis Ck	0.1	human	unknown	warming fire
6/5/1993	1397 Road 2	4.5	natural	lightning	n/a
6/5/1993	B265	300.0	natural	lightning	n/a
6/5/1993	B266	895.0	natural	lightning	n/a
6/30/1993	Muskeg Hill 1	1.0	mil. training	incendiary	unknown
6/30/1993	Muskeg Hill 3	0.2	mil. training	incendiary	unknown
6/30/1993	B444	5.0	mil. training	incendiary	unknown
6/30/1993	B455	0.1	mil. training	incendiary	unknown
6/30/1993	B457	2.0	mil. training	incendiary	unknown
6/30/1993	B458	0.5	mil. training	incendiary	unknown
7/18/1993	B622	2.5	mil. training	incendiary	flare
8/31/1994	B623	0.3	mil. training	incendiary	unknown
8/31/1994	A624	1.0	unknown	unknown	unknown
10/01/1994	Dry Creek	0.1	human	unknown	warming fire
5/13/1995	B164	1.5	mil. training	incendiary	unknown
5/30/1998	Surprise	0.1	human	children	matches
4/17/1999	Bolio Lake	7.0	unknown	unknown	unknown
6/11/1999	Donnelly Flats	18,720.0	human	unknown	unknown
5/9/2001	Winter Ridge	110.0	mil. training	incendiary	tracers
7/20/2001	Big Lake	0.1	mil. training	incendiary	unknown
6/9/2002	OP Lakes	0.5	mil. training	incendiary	unknown

[1] The data listed in the table is valid through the 2002 fire season.
[2] Military training.

The four potential sources of fires are (1) military training; (2) human, either military or civilian, and not associated with military training; (3) natural (lightning); or (4) unknown. If the source of the fire was military training, the "cause" category defines the activity that started fire. If known, the "specific" category lists the ignition source (e.g., debris burn, cigarette, flare, bombing, etc.). If the cause is human, the cause defines the class of the individual that was responsible (e.g., hunter, civilian, etc.).

Incendiary devices from military training are the major cause of fires on installation lands. Specific devices include artillery/bullets, phosphorous shells, blasts, and flares. Other less common causes of fire are lightning, field burning, cigarettes, recreation, trash burning, and campfires. Of the 53 recorded fires between 1950 and 2002, the source of 26 fires is attributed to military training, 19 to human activities, four to natural sources, and the source of the final four were attributed to unknown sources (Table 3.2.3.d). Only three of the 26 fires attributed to military training were greater than 100 acres (Black Rapids, Granite Mountain, and Winter Ridge).

3.2.3.3.1 Fire History by Alternative

Eddy Drop Zone – The southeastern corner of Eddy Drop Zone alternative burned in 1954, and the eastern half burned in 1987 (Appendix, Figure 3.i). At the Eddy Drop Zone alternative, a 1987 fire burned approximately 46,000 acres. Factors contributing to the fire included fuel type, extreme winds (up to 50 mph), low relative humidity (approximately 25 percent), and warm temperatures (65° F). The fire started in a scattered black spruce and grass/tundra area, and the specific cause was never determined, though it was thought to be caused by non-military human activity. Dozers, fire engines, retardant ships, and hand crews were used to control the fire. The total fire control cost was $2.6 million.

Donnelly Drop Zone – The eastern third of the Donnelly Drop Zone alternative burned in 1987, and the extreme northern edge of the area burned in 1999 (Appendix, Figure 3.i). A fire was discovered in 1990 and burned approximately 0.2 acres in the area. The fire was started by a military trip flare, which caught nearby grass on fire and spread to a berm pile and into black spruce. Weather conditions included calm winds, 43 percent relative humidity, and a temperature of 63° F. A dozer and a hand crew of five people extinguished the fire. In 1991, a small fire was started by lightning and burned approximately 0.1 acres in the area.

North Texas Range – Much of the North Texas Range alternative burned in 1981 (Appendix, Figure 3.i). The fire burned a total of 8,000 acres and was influenced by the existing fuel type, warm temperatures, and high winds. The fire burned in tundra and scattered spruce, and the cause of the fire is unknown. Dozers and hand crews were utilized to control the fire. A smaller fire in 2001 burned approximately 110 acres, starting from a .50 caliber tracer round in lowland tundra grass. A dozer and an engine crew were used to extinguish the fire.

North Texas Range/Eddy Drop Zone Combination – Information on fire history at these two sites is provided above.

3.2.3.4 Fuels Management

Three management actions are used by USARAK to prevent wildfires. First, a fire danger rating system (Table 3.2.3.a) is used to reduce the likelihood of a fire by limiting military activities. Certain military activities are restricted when thresholds of wildfire risk are reached, as required by USARAK Range Regulation, 350-2 (USARAK 2004b). Second, wildfire danger is reduced through the mechanical removal of accumulated fuels, through prescribed burning, and/or construction and maintenance of fire or fuel breaks. The third fire management action is that of an Initial Attack Response Team. This wildland fire team (including a fire engine) remains on scene during all military training activities to provide both a wildfire safety briefing to incoming training units and a rapid initial response to potential wildfires in the area.

Recent fuels management projects on DTA include the removal of dead spruce, creation of fuel breaks, and prescribed burns. These projects reduce fuels, removing highly flammable spruce, and promote regeneration of less flammable hardwoods.

3.2.3.4.1 Fuels Management by Alternative

Eddy Drop Zone – In coordination with AFS, USARAK is currently conducting a landscape-scale fire mitigation project (Appendix, Figure 3.i) as part of the USARAK fuels management plan. Multiple management techniques are being used to lessen the probability of fires moving off military lands onto private property or fires starting on private property and moving onto military lands.

The Jarvis North Fire Mitigation Project was initiated in 1999 to mitigate potential fire risks from increased military use of DTA East (Table 3.2.3.e) (USARAK 2003b). Directly after the Donnelly Flats fire in 1999, the area between Eddy Drop Zone and the Alaska Highway was identified as the last continuous patch of black spruce at DTA East. Fires burning in continuous black spruce are the most difficult fires to extinguish, especially if winds are high. Research was conducted on different possible solutions to reduce the risk of wildfires in this area, from mechanical treatments to prescribed fire. Mechanical treatments were deemed the best methods, given the cost and complexity of the project. The AFS is actively involved in planning and implementing this project (Rees 2004). The State of Alaska, Division of Forestry was consulted during the planning phase and has participated in project site visits (Rees 2004). In developing the project criteria, fuel types and prevailing climatic factors (particularly high winds) were considered. The potential increased fire risks from military lands, and possible subsequent threat to private lands and residences, was recognized and incorporated into project planning.

As part of the Jarvis North Fire Mitigation Project, a rapid stand conversion from black spruce to a pure deciduous stand began in 2003 and will continue over a period of five years. Deciduous stands of hardwoods are used to stage fire suppression activities, as typical fire intensity in hardwoods is low to moderate, which is less than that of black spruce stands. By converting spruce stands to hardwoods within the fuel break, potential fire intensity will decrease and contribute to overall fire suppression tactics. If a fire starts in DTA East, the less volatile deciduous stand will stop or slow the northward progression of a low intensity fire. The location of the fuel break begins at Buffalo Drop Zone to the west and continues to South Pat Lake to the east (Appendix, Figure 3.i). The project has been organized into three major phases of operation (Table 3.2.3.e).

Table 3.2.3.e Description of Jarvis North Fire Mitigation Project.

Phase of Operation	Description
Phase 1	In the summer field season of 2003, crews started thinning operations in areas delineated on Appendix, Figure 3.i and completed approximately 36 acres. This thinning removes the spruce component from birch and aspen stands. This fuel break would serve as an initial point of access where suppression tactics can be applied. Prior to clearing operations, access was limited north of 33-Mile Loop Road. Stand conversion began in late spring 2004. Large equipment, such as a hydro-ax and shear-blade, was used to start stand conversion. All coniferous overstory vegetation was mechanically removed and piled into windrows within the treatment area. Windrows will be burned over the next two winters. A burn plan has been developed for windrow burning, and all burn and air quality permits will be acquired prior to actual burning. The organic mat would be removed, exposing bare mineral soil after windrows have been burned. During the spring of 2006 and 2007, collected seed would be spread in areas mechanically treated. Organic material would be mulched and mixed with the soil to enhance seed establishment. Approximately 210 acres would be treated with large equipment. The swath of treated areas would be 150 to 300 feet wide. A local contractor would be used to accomplish mechanical treatments.
Phase 2	This phase would determine local values, such as community, life and property, and identify the risks associated with them. Current funding shortages have delayed this portion of the mitigation project. Housing sub-divisions would need treatment to meet defensible space specifications as outlined by the Firewise Program. All large volatile vegetation would need to be removed 100 feet from structures. Smaller, less volatile vegetation would need to be both cleared 30 feet from structures and limbed to remove ladder fuels. AFS is trying to commit funding to this phase of the project. AFS would need to work with State of Alaska agencies and private homeowners to identify what work would be accomplished and project timelines.
Phase 3	Phase 3 would expand the fuel break with selected removal of vegetation within the area of interest, including a detailed assessment of wildland fire fuels just south of the intended fuel break (Appendix, Figure 3.i). The multi-year project would entail forest clearing in a series of polygons totaling approximately 200 to 300 acres. This phase would support two objectives: (1) breaks in the homogenous black spruce stands would aid in reducing the potential of a high intensity fire, and (2) breaks would serve as wildlife habitat improvements. Similar stand conversion techniques as were used in Phase 1 would be used in this phase. The success of the project, however, is not dependant on Phase 3. The purpose of Phase 3 is only to decrease the likelihood of high intensity crown fires. This phase is currently underway and is expected to be completed by December 2006.

Under extreme fire danger conditions, the Jarvis North Fire Mitigation Project will not by itself prevent the spread of wildfire onto adjacent lands (USARAK 2003b). A more comprehensive approach will greatly reduce fire ignition potential and would encompass (1) continued adherence to USARAK range regulations, (2) continued application of range use restrictions (based on risk index ratings), (3) focused hazard fuel reduction, and (4) stationing of an Initial Attack Response Team during training events.

Specific supplemental National Environmental Policy Act (NEPA) documentation has been prepared for the fire mitigation project. All necessary wetland permits, cultural resource surveys, and burn plans have been completed (USARAK 2003b).

Donnelly Drop Zone – The Jarvis North Fire Mitigation Project also applies to the Donnelly Drop Zone area (Appendix, Figure 3.i). This creates a fuel break which allows firefighters to apply suppression tactics and to provide additional suppression to any high intensity crown fire. This project is also designed to stop or slow the northward spread of a low intensity fire originating in the Donnelly Drop Zone or Eddy Drop Zone area.

North Texas Range – A fuels assessment has been completed by USARAK for the Hayes Lake area near the North Texas Range alternative. This project addresses the fire potential in the area adjacent to the Delta River Impact Area and its potential spread onto adjacent State of Alaska lands to the north of DTA. The fuels in this area are a mosaic of different spruce types, moving northward from an upland moist needleleaf forest to a lowland wet needleleaf forest. Along the Delta River, the fuel type is a riparian white spruce stand. The riparian white spruce and the upland moist needleleaf forest have a history of low fire occurrence. Adjacent fuels include hardwood stands of paper birch with herbaceous understory. Historic weather patterns show a strong southerly wind pattern with common wind gusts of 60 to 75 miles an hour, leading to extreme fire behavior (Cold Regions Test Center 2004). This is evident from documented observations and burn patterns from the 1998 Carla Lake and the 1999 Donnelly Flats fires. It is recommended that the area south of the winter trail be sectioned into units and burned. The existing trails and dozer lines provide established areas for fuel breaks and anchor points to support fire suppression operations. A major portion of the area is located in the firing fan of the DTA small arms range.

The AFS, in cooperation with USARAK and the State of Alaska Division of Forestry, conducted two prescribed burns near the North Texas Range area in the springs of 2003 and 2004 (Appendix, Figure 3.i). Approximately 3,000 acres were burned in 2003 and another 2,000 acres were burned in 2004. The outcome of these burns was successful, with 70 percent of the light flashy fuels (grass) being consumed. The goal of such burns is to reduce flammable surface fuels, mainly the open grass thatch that dominates the area. Additional objectives of the Texas Range Burn Plan are to reduce buildup of flammable fuels in and around Texas Range, to mitigate the threat of wildfire starts, and to reduce chances of fire escape. The reintroduction of an annual or biennial spring or fall burn cycle to the area would keep fuel buildups to a minimum. An additional burn is scheduled for 2006.

The Texas Range burn units are located 10 miles southwest of Delta Junction, bordering the east side of the Delta River, and five miles west of the Richardson Highway. Since the goal of the burn is to remove the grass thatch with minimal spruce mortality, an early spring or fall burn allows for protection of the spruce. This is due to wet or frozen surface fuels and fully dried grass thatch.

USARAK is currently conducting hazard fuel reduction (dead and down tree removal) on the Collective Training Range (north of the proposed BAX and CACTF site) with a total treated area of 40 acres. The objective is to reduce potential of wildfire starts from tracers embedded in dead wood. This clearing will also enhance maneuverability at the range. Treated areas include buffers directly around targets and selected maneuver corridors.

DTA Range Control has requested that AFS and USARAK conduct a wildfire assessment of Bolio Lake Training Area (Bolio Lake to Texas Range to Windy Ridge to Delta River), including a hazard fuel reduction plan. The objective is to reduce the threat of wildfire starts, conduct a fuels assessment, look at future prescribed fires, and maintain a semi-open vegetation condition for military training.

North Texas Range/Eddy Drop Zone Combination – Information on fuels management at these two sites is provided above. The Jarvis North Fire Mitigation was developed to mitigate potential fire risks from increased military use of DTA East and would apply to the Eddy Drop Zone CACTF site. Current hazard fuel reductions have occurred near the proposed North Texas Range BAX location under this alternative.

3.2.4 Noise

Issue 5: Noise impacts. The impact of construction and operation of the BAX and CACTF to existing noise levels was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

Sound is a small-scale fluctuation of air pressure that typically follows a repetitive pattern (Olishifski and Hartford 1975). Noise is unwanted sound that can cause behavioral change, impair speech and normal activities, and damage hearing. General audible noises are those sounds heard every day.

Human response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. The military noise environment consists primarily of three types of noise: transportation noise from aircraft and vehicles (including those used for construction), impulsive noise from armor and artillery firing and demolition operations, and noise from small arms ranges.

Many studies have analyzed noise impacts upon surrounding communities. Studied noise contours include small arms, transportation, aircraft, and impulsive noise. Some studies utilize annoyance levels to quantify dose-response levels, utilizing questionnaires and interviews to reach conclusions. Other studies have analyzed actual complaints and subsequently evaluated the noise levels that generated the complaints.

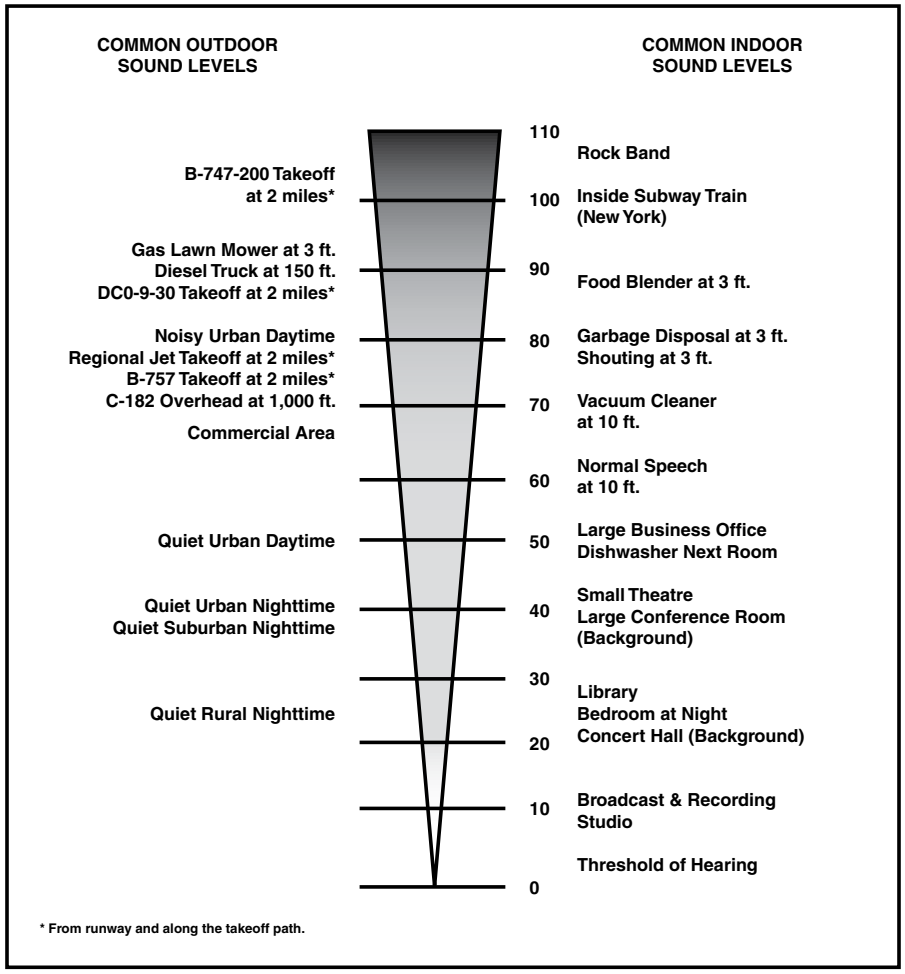
The typical response of humans to noise is annoyance, a response that is remarkably complex and, considered on an individual basis, displays wide variability for any given noise level. Annoyance is the measured outcome of a community's response to survey questions on various environmental and other factors, including noise exposure. Although individual annoyance is sometimes measured in the laboratory, field evaluations of community annoyance are most

useful for predicting the consequences of planned actions involving highways, airports, road traffic, railroads, or other noise sources. Factors directly affecting annoyance from noise include interference with communication and sleep disturbance. Other less direct effects include disruption of one's peace of mind, the enjoyment of one's property, and the enjoyment of solitude. The consequences of noise-induced annoyance are privately felt dissatisfaction, often publicly expressed as complaints to the installation or authorities. Not all those annoyed will complain, but it can be assumed that those who do complain are annoyed.

Janssen (1980) described three levels of noise impacts to wildlife. Primary effects damage hearing organs and result in temporary or permanent loss of hearing. Secondary effects result in alteration of behavior (including startle response or movement away from the noise), or inducement of the physiological stress response. Tertiary effects result in population-level changes, including increased mortality, reduced reproductive rate, or habitat abandonment. While the effects of aircraft noise have been studied on a variety of wildlife species, less is known about the effects of artillery firing.

The lower threshold of human hearing is 0 dBA. The threshold of pain for the human ear is approximately 140 dBA. Figure 3.j shows some common sound levels using the A-weighted scale.

Figure 3.j Typical Decibel Levels for A-Weighted Noise Levels.



Source: Landrum & Brown 1999

3.2.4.1 Army Noise Management

The Army's Environmental Noise Management Program, described in AR 200-1, *Environmental Protection and Enhancement*, is the primary tool the Army uses to analyze and manage noise generated by Army activities including aircraft operations, range firing, and weapons testing. The goals of the program are to protect the health and welfare of people on and off installations affected by Army-produced noise and to reduce community annoyance from environmental noise. The program seeks to achieve compliance with applicable noise regulations in a manner consistent with an installation's military mission.

The Environmental Noise Management Program requires installations to implement environmental noise policies to identify and control the effects of noise. Among these policies is the requirement to predict noise levels for long-range planning, including preparation of noise contour maps. The Army identifies and evaluates land areas with noise-sensitive land uses that are exposed to generally unacceptable noise levels. The Army uses the day-night average sound level (DNL) to quantify the noise environment at Army installations. The DNL represents sound levels measured by totaling and averaging levels during a 24-hour period. A penalty of 10 decibels (dB) is assigned to noise events occurring between 10:00 p.m. and 7:00 a.m. the following morning, which compensates for lower nighttime background noise levels as well as increased annoyance associated with events occurring at night. The DNL is a useful descriptor for noise because: (1) it averages continuous noise, such as a busy highway, and (2) it measures total sound energy over a 24-hour period. Thus, DNL effectively identifies a "noise dose" for a day.

AR 200-1 defines three noise zones (NZ): I, II, and III. The zones are developed using computer models. The models take all operations over the year and produce noise contours that represent the average DNL. Noise-sensitive land uses include, but are not limited to, residences, schools, medical facilities, and churches.

The NZ criteria used in AR 200-1 were developed based on recommendations made by the Federal Interagency Committee on Urban Noise (FICUN). C-weighting and A-weighting are two different scales that are used to assess noise impacts. The A-weighting is used to give emphasis to the frequencies that humans hear best. The C-weighting is used for sounds that have a high content of low-frequency energy. By using the C-weighting, the results reflect vibration levels that can be felt from low-frequency sounds. FICUN used existing social surveys that correlated A-weighted day-night average sound levels (ADNL) from transportation noise sources with the percentage of the population highly annoyed to develop guidelines for considering noise levels in land use planning (FICUN 1980). In addition to transportation noise sources, the ADNL is used to evaluate heavy equipment operations and small arms weapons firing (up to .50 caliber). For loud, short-duration impulsive sounds such as large caliber weapons firing (larger than 20mm) and demolitions noise, the C-weighted day-night average sound level (CDNL) is used. The NZ limits and corresponding annoyance levels are summarized in Table 3.2.4.a.

The three NZs are:

Noise Zone I. NZ I includes all areas around a noise source in which the DNL is less than 65 dBA or less than 62 dBC. This area is usually suitable for all types of land use activities. However, this does not guarantee that training noise will not be heard in these areas.

Noise Zone II. NZ II consists of an area where the DNL is between 65 and 75 dBA or between 62 and 70 dBC. Exposure to noise within this area is considered significant, and use of land within NZ II should normally be limited to activities such as industrial, manufacturing, transportation, and resource production. However, if the community determines that land in NZ II areas must be used for residential purposes, noise level reduction features should be incorporated into the design and construction of the buildings.

Noise Zone III. NZ III consists of the area around the source of the noise in which the DNL is greater than 75 dBA for aircraft, vehicle, and small arms range noise and greater than 70 dBC for noise from weapon systems larger than 20mm and demolitions. The noise level within NZ III is considered so severe that noise-sensitive land uses should be excluded.

Table 3.2.4.a Noise Limits and Zones for Land Use Planning.

Noise Zone	Percent of Population Highly Annoyed	Transportation and Small Arms (up to .50 caliber) (ADNL)	Large Caliber Weapons (larger than 20mm) and Demolition (CDNL)
I	Less than 15%	Less than 65 dBA	Less than 62 dBC
II	15%-39%	65-75 dBA	62-70 dBC
III	Greater than 39%	Greater than 75 dBA	Greater than 70 dBC

Source: 1997 AR 200-1

3.2.4.2 Small Arms Noise

Small arms (up to .50 caliber) noise contours are generated using the Small Arms Range Noise Assessment Model (SARNAM) (U.S. Army 1996). The model incorporates the latest available information on weapons noise models (including directivity and spectrum), sound propagation, effects of noise mitigation and safety structures (e.g., walls, berms, ricochet barriers, etc.), and community response protocols for small arms noise. Model inputs include range grid coordinates, number of firing lanes, distances to targets, firing azimuth, location and size of barriers, berms and baffles, number of rounds, weapon type, and time of firing.

Current DTA East small arms noise contours stay well within the installation boundary (Appendix, Figure 3.k). The land use within the contours is used for small arms training and there are no impacts upon any noise-sensitive land uses. The noise levels from existing small arms activities are compatible with Army and federal guidelines (FICUN 1980).

3.2.4.3 Large Caliber Weapons and Demolition Noise

The noise simulation program used to generate noise contours for large caliber weapons (greater than 20mm) and demolition noise is BNOISE2 (Hottman et al. 1986). The BNOISE2 program requires operational data concerning types of weapons fired from each range or firing point. The model input data include the number and type of rounds fired from each weapon, the location of targets for each range or firing point, and the amount of propellant used to reach the target. Contours are generated from range utilization data and reasonable assumptions.

Noise levels may vary significantly depending on weather conditions. There are times when infrequent loud events may generate complaints in areas that are outside of the NZs, especially during weather conditions that favor sound propagation (e.g., cold weather, low cloud cover, or a stiff wind). In these instances, it is useful to supplement the NZs shown on the maps with information on instantaneous or single event noise levels. The peak levels from the impulsive noise generated by large caliber weapons firing can be used to anticipate the risk of complaints. Peak noise levels have been determined for each alternative and are discussed in Section 4.2.4.

To evaluate the complaint potential from single impulsive sounds, a set of guidelines (Pater 1976) was developed by the Naval Surface Warfare Center. These testing guidelines are based on over 10 years of experience. These guidelines are shown in Table 3.2.4.b and represent the best compromise between cost, efficiency of range operations, and good community relations.

Table 3.2.4.b Impulse Noise Guidelines [1].

Predicted Sound Level, dBP	Risk of Complaints
Less than 115	Low risk of noise complaints.
115 – 130	Moderate risk of noise complaints.
130 – 140	High risk of noise complaints, possibility of damage.
Greater than 140	Threshold for permanent physiological damage to unprotected human ears. High risk of physiological and structural damage claims.

[1] For rapid-fire test programs and/or programs that involve many repetitions of impulse noise, reduce allowed sound levels by 15 dBP.

Source: Pater 1976

The distance and angle of firing are also important to the prediction of noise impacts to communities (Table 3.2.4.c). Noise levels are loudest in front of a discharging weapon. Thus, the peak decibel level (dBP) is higher when an observer is standing 45 degrees from a firing weapon than someone directly behind the weapon. USARAK equips the Stryker Mobile Gun System with a 105mm tank gun and it is used during training events. The following table lists the average expected peak levels and, because of varying propagation conditions, the percentage of time those levels would be expected to reach levels that have a moderate risk of generating complaints (levels greater than 115 dBP).

For example, at a distance of one mile and an angle of 45° from the direction of fire, the probability of exceeding 115 dBP, which results in a moderate risk of noise complaints, would be exceeded approximately 74 percent of the time. At a 90° angle, from the same one-mile distance, the expected dBP would be 117, and moderate risk of complaints threshold of 115 dBP would be exceeded about 67 percent of the time. If the firing was in the opposite direction (180°), the expected dBP from one mile would be 105 and the 115 dBP threshold would be exceeded only 3 percent of the time. In addition, the 115 dBP threshold attenuates rapidly with distance. At 45 degrees, noise levels exceed 115 dBP only about 2 percent of the time at a distance of three miles. Using data such as these, as well as weather factors, the Army can plan range use to minimize nearby community disturbance.

Table 3.2.4.c Expected Noise Levels From Firing Inert 105mm Tank Rounds.

Azimuth Between Direction of Fire and Receiver						
Distance (miles)	**45° (front)**		**90° (side)**		**180° (behind)**	
	dBP [1] Expected	**% of time greater than 115 dBP [1]**	**dBP [1] Expected**	**% of time greater than 115 dBP [1]**	**dBP [1] Expected**	**% of time greater than 115 dBP [1]**
1	118	74	117	67	105	3
2	107	12	106	8	94	0.1
3	101	2.3	100	1.5	87	0
4	96	0.6	95	0.4	83	0
5	93	0.2	91	0.1	79	0

[1] Levels greater than 115 dBP lead to moderate risk of noise complaints; levels less than 115 dBP lead to low risk of noise complaints.
Source: Catherine Stewart 2003, based on Pater 1976.

Current DTA East blast noise contours are contained within the boundary (Appendix, Figure 3.k). The land within the noise contours is used for range activity and military training. The noise levels are compatible with Army and federal guidelines (FICUN 1980). Also, locations of firing points and direction of fire are such that the risk of noise complaints is low.

3.2.4.4 Vehicle Noise

Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Transportation noise from vehicles is considered part of the military noise environment. Examples of noise levels for common Army vehicles are listed in Table 3.2.4.d.

As part of transformation at USARAK, the Army utilizes a new type of light armored vehicle known as the Stryker. The Stryker is an eight-wheel-drive, hard-steel vehicle designed to greatly increase ground mobility and firepower as compared to the current light infantry brigade vehicle. The noise levels generated by Stryker vehicles are less than (or equal to) the noise generated by other equipment used by the Army (Table 3.2.4.d). For example, the noise level of a Stryker moving at 50 mph is approximately 85 dBA at 60 feet away, compared to 89 dBA for a moving M1A2 tank (speed unspecified) at 50 feet away (USARAK 2004a).

Battalion-size and larger elements currently train at DTA East throughout the year. Training exercises may include deployment of troops by truck. Some vehicle testing, including tracked and wheeled vehicles, also takes place on DTA East. Though Army vehicles tend to be louder than typical passenger cars, they are still quiet enough for noise impacts to be very localized. Thus, there are minimal impacts by Army vehicles to noise-sensitive lands.

Table 3.2.4.d Noise Levels of Common Army Vehicles.

Type	Distance [1]: 50 ft		Distance [1]: 100 ft
	Moving Maximum (dBA)	Idle Maximum (dBA)	Moving Maximum (dBA)
Stryker	85 [2]	78 [3]	No data
Howitzer M109	96	76	92
D-8K Dozer	92	73	87
M548 Ammo Carrier	85	70	79
M88 Recovery Vehicle	97	70	92
M113 Personnel Carrier	87	76	82
ABLV Bridge Launcher	96	70	91
M1A1 Tank [4]	89	75	85

[1] Distance from noise source to recording device.
[2] Distance is 60 feet. (Source: Project Manager Brigade Combat Team 2002)
[3] Distance is 20 feet. (Source: Project Manager Brigade Combat Team 2002)
[4] Not used in Alaska, but included for comparative purposes.
Source: SAIC 2000

3.2.4.5 Aircraft Noise

The NOISEMAP computer model is the official DOD model for military airfield noise. Wyle Laboratories developed this program for USAF (U.S. Air Force 1990a). The required inputs to the program, obtained from airfield operational data, are the location of the flight tracks and the number of each type of aircraft using each flight track. The BASEOPS program is used to enter these data into the NOISEMAP input file. A revised Army helicopter database was added to NOISEMAP in 1993.

The NZs generated by NOISEMAP can depict areas where noise-sensitive land uses would be incompatible with aircraft operations. But the levels of operations at DTA East are not high enough to generate a NZ II or III contour that extends beyond the installation boundary. As with impulsive noise events, there still is the possibility that an infrequent helicopter overflight may cause annoyance and possibly lead to complaints.

Scandinavian studies (Rylander et al. 1974; Rylander and Bjorkman 1988) looked at the correlation between maximum overflight noise levels and annoyance levels. The subjects in the study were exposed to between 50 and 200 aircraft overflights per day. While there is no evidence that the Scandinavian studies would be applicable to the operations at airfields (flight tracks and Nap-of-the-Earth (NOE) routes with fewer than 50 operations per day), it is a tool that can provide some indication of annoyance, defined as the percent of people who might be annoyed. Rylander found that a good predictor of annoyance at airfields is the maximum level of the three noisiest events.

The maximum noise levels (USAF 1977, 1978, 1990) for various U.S. military aircraft are listed in Table 3.2.4.e. These aircraft are in the current Army and USAF aviation inventories in Alaska. These maximum levels may be compared with the levels listed in Table 3.2.4.f to determine the percent of the population that would consider itself highly annoyed from the noise levels generated by a single aircraft.

Table 3.2.4.e Maximum Noise Levels of Aircraft.

Maximum Level, dBA								
Slant Distance (ft) [1]	**Rotary Wing**			**Fixed Wing**				
	CH-47D	**OH-58D**	**UH-60**	**A-10**	**KC-135**	**C-17**	**F-16**	**C-130**
200	98	89	91	104	99	107	111	99
500	89	81	83	65	90	97	104	90
1,000	83	74	76	87	83	89	99	83
2,000	77	67	69	78	76	79	93	75
5,000	67	56	58	65	64	66	83	63

[1] Speed at 100 Knots.

Table 3.2.4.f Percentage of Population Highly Annoyed from Aircraft Noise.

Maximum Level, dBA	Percentage Highly Annoyed
70	5
75	13
80	20
85	28
90	35

Aircraft activity takes place throughout the airspace above DTA East, with the highest concentration of aircraft operations in the immediate vicinity of Allen Army Airfield. Aircraft operations include both fixed-wing and rotary-wing operations. The operational data for the airfield were modeled as part of the Environmental Noise Management Program, but because contours are based on annual average, the level of operations was not enough to generate a NZ II or III contour that extends beyond the runway.

Other existing aircraft noise is attributed to transient USAF operations. The USAF flies both fixed-wing and rotary-wing aircraft. The airspace above the western portion of DTA East and most of DTA West is Restricted Airspace R2202 (Appendix, Figure 3.l). Established Military Operation Areas (MOAs), that have fixed minimum and maximum flight altitudes, are located above the southern portion of DTA East and are adjacent to DTA West (Appendix, Figure 3.l). Both R2202 and the adjacent MOAs are frequently used by the USAF for aircraft training exercises (Appendix, Figure 3.l). The MOAs do not include the primarily developed portion of Delta Junction. When aircraft are flying out of the MOAs or restricted airspace, they must follow Federal Aviation Administration (FAA) guidelines. FAA guidelines state that aircraft must maintain a minimum flight altitude of 500 ft above ground level (AGL). Because of the large area that the flights are dispersed in, these operations do not generate a NZ II or III contour in

the vicinity of DTA East. Elmendorf Air Force Base (AFB) has information on its website that pertains to the airspace and to yearly training exercises such as Northern Edge and Cope Thunder (http://www.elmendorf.af.mil/11AF/611AOG/611AOS/webdocs/suais/suais.htm). During these joint force training exercises, there are increases in numbers of operations, especially at low altitudes.

Existing USAF operations in these areas are not enough to generate a NZ II. For routine daily training operations, the ADNL in the immediate vicinity of the existing impact areas to the west of the Delta River (those used by the USAF at DTA West) ranges from 60 to 63 dBA (below the 65 ADNL needed for NZ II). (No impact areas exist on DTA East.) Two to three miles away, the sound levels decrease to 55 dBA. During a major training exercise, the ADNL may increase from 62 to 65 dBA, but still drops to 55 dBA outside of the immediate target areas. This drop in noise levels stems from two factors: (1) when not participating directly with the impact areas, the flights are too dispersed throughout the MOAs to generate a NZ in a particular location, and (2) when not directly involved in the training exercise, aircraft loiter (fly) at higher altitudes, reducing noise levels.

Routine noise-generating operations at DTA East involve small arms training, artillery training, and rotary-wing and fixed-wing aircraft. In addition, other minor sources of noise include construction, traffic, and recreation. Some of the noise reported on and off the Army installation is due to USAF flights within R2202 and MOAs. In fulfillment of AR 200-1, USARAK developed an Environmental Noise Management Plan for each installation that assessed the noise environments and associated impacts. The current noise environment at DTA East and West is documented in the Environmental Noise Management Plan prepared for Fort Greely in 2001.

USARAK receives relatively few environmental noise complaints each year from the surrounding community. Most calls are from people with questions or requests for information. The few recently logged complaints stem from noise of large-scale training activities such as Northern Edge and Cope Thunder. USARAK provides a two-week notice to the public for noise generated during late firing training operations (between 10:00 p.m. and 7:00 a.m.) by publishing notices in the local newspapers and television. Notices are intended as an additional safety measure to keep the public informed regarding those areas to avoid during training events.

3.2.4.6 Existing Noise Conditions by Alternative

Eddy Drop Zone – The Eddy Drop Zone alternative currently falls within NZ I since no munitions with explosive projectiles are used at this location. USARAK uses Alabama, Arkansas, Georgia, and Lampkin ranges for small arms training, which are located just west of Eddy Drop Zone within DTA East. The Eddy Drop Zone area has been used for non-standard maneuver live fire in the past. Routine DTA East noise sources include rotary-wing aircraft and artillery training, as well as other minor noise sources such as construction, traffic, and recreation. Aircraft from the USAF generate noise within existing airspace.

Donnelly Drop Zone – The Donnelly Drop Zone alternative currently falls within NZ I since no munitions are currently used at this location. Routine DTA East noise sources include rotary-wing aircraft and artillery training, as well as other minor noise sources such as construction, traffic, and recreation. Aircraft from the USAF generate noise within existing airspace.

North Texas Range – The North Texas Range alternative currently includes some NZ II and III areas. Appendix, Figure 3.k shows noise levels within the North Texas alternative (Montgomery and Watson 2001). Neither NZ II nor NZ III contours leave the installation boundaries. Routine DTA East and West noise sources include rotary-wing aircraft, artillery training, and bomb detonation (west of the Delta River only within existing impact areas), as well as other minor noise sources such as construction, traffic, and recreation. Aircraft from the USAF generate noise within existing airspace.

North Texas Range and Eddy Drop Zone Combination – Existing noise conditions at these locations are similar to those previously discussed for Eddy Drop Zone and North Texas Range.

3.2.5 Human Health and Safety

Issue 6: Human health and safety impacts. The impact of construction and operation of the BAX and CACTF on human health and safety was identified as a primary issue of concern during scoping. Additional information can be found in Section 1.9, *Issues Identified During the Scoping Process*.

Human health and safety includes those facets of military activities and materials that potentially pose a risk to the health, safety, and well-being of both the public and military personnel and civilian employees/dependents. Risks involve hazardous materials and wastes, asbestos, radon, polychlorinated biphenyls (PCBs), solid wastes, pesticides, and lead-based paint. In addition, UXO, use of live munitions on firing ranges, vehicular accidents and other occupational safety hazards posed by USARAK activities are considered human health and safety impacts.

DTA East has few issues relating to human health and safety. Due to the lack of a cantonment area, housing, and potential waste-generating facilities, DTA is not considered a USARAK property having significant human health and safety issues.

Based on issues raised during scoping, topics discussed in this section include traffic concerns in and around DTA East, hazardous materials, contaminated sites, UXO, and use of live munitions at firing ranges.

3.2.5.1 Traffic

Traffic on Alaskan highways has risen steadily over the past decade. Traffic information is available from the Alaska Department of Transportation's (AKDOT) 1999-2001 statistical data (AKDOT 2002b).

Average 2001 daily traffic counts along the Richardson Highway, available only in close proximity to Fairbanks, show a sharp decline in traffic levels from Fairbanks south to Harding Lake. Average daily traffic between Fairbanks and North Pole was 15,000 vehicles while average traffic south of Eielson AFB towards Harding Lake was 2,600 vehicles per day – translating into 5,475,000 and 949,000 annual vehicles, respectively. No vehicle counts are available for segments further south along the Richardson Highway.

Accident statistics along the Richardson Highway are available from AKDOT's 2000 statistics (AKDOT 2002a). Accidents have been divided into two categories: those involving "property damage only" (PDO) or minor injuries, and accidents involving major injuries or fatalities. Between the Glenn Highway and Delta Junction, there were 22 PDO events and two major accidents. Moose were involved in seven of the accidents along this 151-mile stretch. Between Delta Junction and Eielson, there were 47 PDOs and minor accidents, and two major accidents. Moose were involved in 10 of these accidents. This stretch of the highway covers 76.9 miles. Between Eielson and Fairbanks, there were 111 PDOs and minor accidents, and five major and fatal accidents. Moose were involved in 20 of the accidents along this 17.4-mile stretch.

Overall, fewer accidents in Alaska occurred, based on vehicle miles traveled (VMT), on divided rural interstates (1.166 accidents per 100 million VMT) and undivided urban and rural interstates (1.282 accidents per 100 million VMT). These are also the roadways most likely to be impacted by "administrative road marches," involving military convoy traffic for deployment training. Currently, USARAK deployment miles are greatest between Fort Richardson (FRA) and DTA, while convoys occur most commonly between Fort Wainwright (FWA) Main Post and Yukon Training Area (YTA). Deployment miles may also include rail and air transport methods, such as airborne training flights.

AR 385-55, *Prevention of Motor Vehicle Accidents*, and USARAK Regulation 55-2, *Transportation Operations and Planning in Alaska*, provide detailed regulations for convoy preparation and implementation. Additional information can be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix H (USARAK 2004a). Army convoys are subject to an AKDOT permitting process. USARAK standard operating procedures call for large convoys to be broken into groups of no more than 20 vehicles. These groups are then separated by 30-minute gaps to alleviate traffic pressures on Alaska's highways. Highway speed for a military convoy is not expected to exceed 40 mph, with the exception of "catch-up speed," listed at 45 mph. Convoys are normally not authorized to travel during peak traffic hours (USARAK 2001).

Additional convoy traffic will result from USARAK transformation and the stationing of an SBCT. Deployment miles to DTA East will increase from 437,600 to approximately 1,042,000 from 2004 through 2009, then drop to 937,600 by 2010. Company and battalion-sized deployments to DTA East will increase from 31 to 62 times per year. Overall, convoy impacts are expected to be moderate (USARAK 2004a). Additional information on convoys can be obtained from the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a).

Rapid deployment is a key element of the USARAK mission. Although terrain, climate, and a relatively small population limit Alaska's transportation infrastructure, it is adequate to meet these needs. Deployments are capable by air, rail, road, and sea (Nakata Planning Group 2001).

The only transportation resources available to serve DTA and the Delta Junction area are the Richardson and Alaska highways and the Allen Army Airfield. Both two-lane highways are maintained year-round. In addition, a maneuver corridor, connecting the southeastern corner of Tanana Flats Training Area and the northwestern corner of DTA, has been established for training purposes (Nakata Planning Group 2001). Further discussion regarding traffic impacts can be found in Section 4.2.5, *Human Health and Safety*.

There is no rail service to DTA East or West. The nearest rail service is at FWA or Eielson AFB, about 100 miles to the north. The Alaska Railroad provides a connection to Anchorage, the nearest port with intermodal capability.

3.2.5.1.1 Traffic by Alternative

USARAK currently deploys regularly from FWA to DTA East and West for training. USARAK deploys troops 26 times per year from FWA Main Post to DTA. This includes 24 company-sized deployments (involving 30 vehicles) and two battalion-sized deployments (involving 122 vehicles). The total annual military vehicle count between FWA Main Post and DTA is 964, or 1,928 including return (roundtrip) convoy traffic. Convoys from FRA to DTA require the use of the Glenn and Richardson highways. Convoy sizes vary, based on the unit size deploying for training, but would be similar to those traveling between FWA Main Post and DTA. Large convoys are usually segmented to reduce impacts to traffic on public roads.

3.2.5.2 Hazardous Materials and Waste Management

Hazardous materials and waste management are managed through applicable regulatory procedures and programs that are designed to ensure proper handling of hazardous materials and wastes. Most activities that use hazardous materials or generate hazardous wastes are conducted within the cantonment areas. Activities at DTA East do not generate normal cantonment-like waste streams because DTA East and West are comprised of mostly maneuver and training lands.

This section provides an overview of hazardous materials management, including hazardous waste management, pollution prevention initiatives, Installation Restoration Program sites, and the use of storage tanks, asbestos, PCBs, lead-based paint, radon, and pesticides. Hazardous materials and hazardous waste management activities are governed by federal and/or state regulations. This includes substances that may present a substantial risk to human health and the environment. Solid wastes that possess specific characteristics of toxicity, ignitability, corrosivity, or reactivity are also considered hazardous. Solid and liquid waste can be defined as any discarded materials that are not specifically excluded by 40 Code of Federal Regulations (CFR) 261.4. Transportation of hazardous materials is regulated under 49 CFR, *Transportation*.

AR 200-1, *Environmental Protection and Enhancement*, governs all aspects of hazardous materials and regulated waste management by military or civilian personnel, on-post tenants, and contractors at all Army facilities. This regulation establishes the policies, responsibilities, and procedures for complying with hazardous materials/regulated waste management regulations, decision documents, and Records of Decision established by the DOD, Department of the Army, USARAK, EPA, United States Department of Transportation, and the Occupational Safety and Health Administration.

This guidance applies to all military commands and units, civilian activities, tenants, contractors, subcontractors, and consultants working at USARAK facilities, DTA. The activities covered by AR 200-1 include:

- Hazardous materials storage
- Waste minimization and pollution prevention activities
- Activities of waste generators
- Institutional controls for excavation and other land and water uses

3.2.5.2.1 Hazardous Materials and Wastes Management by Alternative

Due to the lack of a cantonment area, housing, and potential waste-generating facilities within the alternative areas, hazardous materials and wastes management issues are applicable only when units are deployed to DTA. Federal, state, and DOD regulations (summarized above) cover training activities.

3.2.5.3 Contaminated Sites

USARAK administers an Installation Restoration Program to identify, investigate, and remediate contamination from regulated substances. The primary focus of the Installation Restoration Program is remediation of contaminants, such as chlorinated solvents, regulated by the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA) (i.e., the "Superfund" Act). In addition, USARAK investigates and remediates contaminants such as PCBs, petroleum, and asbestos. Cleanup of these contaminants is not regulated under CERCLA, but are regulated by various other federal, state, and Army regulations.

Contaminant source areas are managed by interagency agreements designed to implement the Installation Restoration Program and address any stakeholder concerns. The Army, EPA, and the State of Alaska have signed Federal Facility Agreements for FWA, which includes DTA. These agreements specify the CERCLA clean-up process. In addition, environmental restoration agreements between the State of Alaska and the Army were developed to outline clean-up processes at non-Superfund sites.

3.2.5.3.1 Contaminated Sites by Alternative

There are no sites within DTA East or West listed on the EPA's National Priorities List under CERCLA.

3.2.5.4 Range Safety

Unexploded Ordnance – UXO, or duds, refers to explosive munitions that have failed to detonate properly or completely, leaving potentially explosive munitions or hazardous materials at (or near) the point of impact. Dud munitions are a potential hazard within impact area boundaries on many USARAK properties, as a variety of actions could possibly expose them to pressure. Weight, heat, or human contact could cause them to detonate.

Access to impact areas is restricted to mission-essential activities and is coordinated with the Range Control office before entry. Appropriate clearing of UXO is done before entry, except under emergency situations (i.e., aircraft mishaps or life safety). The agency gaining entrance to an impact area assumes all responsibility, liability of personnel and costs associated with access (USARAK 2002b). Impact areas are closed at all times to the public and are marked with warning signs and/or barriers. Passing any of these hazard warnings without approval is prohibited. Unauthorized entry (trespassing), as well as handling or removing UXO/munitions, are punishable offenses.

Range Safety – The Department of the Army Pamphlet 385-63, *Range Safety*, establishes and maintains a comprehensive range safety program for the Army. This publication provides implementation guidance, standards and procedures for the safe firing of ammunition,

demolitions, lasers, guided missiles, and rockets for the purposes of training, target practice, and, to the extent practicable, combat. In addition, it provides guidance on use of ranges and airspace, handling of ammunition, firing instructions, and target requirements.

On-the-ground surface danger zones are used to reduce the residual risk of projectile escape and/or other danger to the public to no greater than one in one million during live-fire training events. Department of the Army Pamphlet 385-63 defines the space requirements to safely incorporate weapons in live-fire training events. All ranges must be designed and targets placed totally within Army installation boundaries. The Army also requires the placement of targets and anticipated firing locations (by weapon type) in an area that is able to accurately contain ricochets and establish a safe impact area for all projectiles. This area is large enough to contain projectiles fired at an optimal elevation and ensure that the energy of the fired projectile is totally depleted within the surface danger zone. For example, an M2 .50 caliber round, fired at an elevation to achieve maximum range, will travel 6,400 meters along the gun target line. To either side of the gun target line, there is a 5-degree dispersion area and an additional 5-degree ricochet area. This additional combined 10-degree fan extends along the entire length of travel.

Among many other topics, Department of the Army Pamphlet 385-63 also discusses the distribution of ammunition to Soldiers, storage requirements for blank and live-fire ammunition, and procedures for handling broken and/or unserviceable munitions increments (powder bags). Actual ammunition usage is tracked and recorded using the Range Facility Maintenance Support System (RFMSS). This program allows range managers to schedule use of ranges, schedule maintenance of ranges, maintain information on the amounts and type of ammunition used on ranges, and track actual range use.

3.2.5.4.1 Range Safety by Alternative

Ongoing munitions training using high explosive (dudded) ammunition only occurs within designated USARAK impact areas. USARAK impact areas are posted with warning signs that indicate the potential risks of UXO on the impact area. There are no impact areas near the Eddy Drop Zone, Donnelly Drop Zone, or North Texas Range alternatives. Thus, the risk of encountering UXO is low. However, the Army has used DTA East for about 50 years. For this reason, there is some potential that UXO could exist within any of the alternatives, but such potential is low for all four alternative BAX and CACTF footprints.

The surface danger zone associated with the BAX at North Texas Range would extend across the Delta River and overlap an active impact area situated on the west side of the Delta River (Appendix, Figure 2.g and Figure 2.h). Although the risk of encountering UXO is higher in this impact area, it is off-limits to the public at all times, allowing no opportunity for possible encounters with UXO.

Currently, all DOD units and elements must comply with the Department of the Army Pamphlet 385-63. This includes all units assigned to USARAK, and any other visiting units that utilize USARAK training lands and ranges.

3.2.6 Wildlife and Fisheries

Issue 7: Wildlife and fisheries impacts. The impact of construction and operation of the BAX and CACTF to seasonal moose movement and migratory birds was identified as a concern during tribal consultations. Additional information can be found in Section 1.8, *Government-to-Government Consultation*.

3.2.6.1 Wildlife

Alaska's 322 million acres of public lands support a wide diversity of wildlife species (Alaska Division of Tourism 2002). Forty-three species of mammals, 173 species of birds, and one amphibian species exist on lands managed by USARAK (For a complete list, see Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2* [USARAK 2004a]). In addition, DTA is home to the largest variety of game mammals, furbearers, waterfowl, and upland game birds of any military area in the country (BLM and U.S. Army 1994).

USARAK cooperatively manages wildlife and habitats with the ADF&G and the U.S. Fish and Wildlife Service (USFWS). The Fort Greely Natural Resources Conservation Program, operated under a statewide cooperative agreement between the USARAK, USFWS and ADF&G, was originally signed in 1960 and is regularly updated. In 1980 and 1986, USARAK entered into cooperative agreements with the USFWS and ADF&G to develop fish and wildlife management programs. The current signed Integrated Natural Resources Management Plans (INRMPs) replace these agreements (USARAK 2002b) and will be renewed again in 2006.

These original cooperative agreements recognized that various species use certain areas of the DTA for calving or roosting, or as important habitat. Bison, caribou, Dall sheep, and sandhill cranes were monitored during these crucial times to ensure minimal disturbances. The DTA INRMP (2002-2006) supersedes the original cooperative agreement; however, the Army now manages these areas as special interest management areas. Range regulations (USARAK Range Regulation 350-2) state that all firing will cease when animals are present on the range, regardless of season (USARAK 2004b). USARAK monitors military training throughout the year, especially during spring bird migration and bison and caribou calving, to ensure that training follows restrictions specified for the special interest management areas.

The ADF&G is responsible for managing game populations on Alaska's Army lands and establishing population and habitat management goals. The USFWS is primarily responsible for managing nongame populations of fish and wildlife, and management of migratory bird species. USARAK works with both agencies to promote habitat management on Army lands.

The Army's specific wildlife goals include improving habitat for game and nongame species, using nesting structures to improve productivity of birds, and maintaining sustainable harvest of game populations. In addition, USARAK manages vegetation to ensure that the age class is diversified. The natural resources program encourages the watchable wildlife program, constructing viewing platforms and nest boxes, and the program strives to integrate ecosystem management into Army planning (USARAK 2002b,c).

The ADF&G divides the state into Game Management Units (GMU), which are subdivided into subunits (Appendix, Figure 3.m). All of the Army's lands in interior Alaska are located in GMU 20. DTA East, at 93,000 acres, makes up 2.5 percent of GMU 20D. The Federal Subsistence Board uses the same GMUs to regulate subsistence take of customary and traditional game species. Species that could be affected by the proposed BAX and CACTF are discussed below.

3.2.6.1.1 Mammals

Approximately 40 species of mammals inhabit or use portions of DTA (USARAK 2004a).

Large Mammals – Moose (*Alces alces*) densities are estimated to be greater than four animals per square mile in areas of DTA east of the Delta River. This area is recognized as a moose concentration area (USARAK 2004a).

Bison (*Bison bison*) were re-introduced into the Big Delta-Delta Junction area in 1928 after they were eliminated from the area 450-500 years ago. DuBois and Rogers (2000) and Ajmi and Payne (2005) have summarized the history, natural history, and management of the herd in the Delta Bison Management Plan 2000-2005. A 1980 cooperative agreement between USARAK, USFWS and ADF&G designated areas on DTA West as important bison calving and summer range, and DTA East as important late summer and early winter range (USARAK 1980). A 1986 agreement with the ADF&G (U.S. Army 1986) identified bison calving and summer range (Appendix, Figure 3.n). In 1999, as part of USARAK's Army lands withdrawal renewal, USARAK committed to ensuring that training activities do not cause significant adverse impacts to the bison herd or the State's bison herd management goals. The ADF&G has established a minimum disturbance period (mid-February to early September) for bison on that part of DTA that is west of the Richardson Highway. USARAK has agreed not to conduct activities or operations in or near bison habitat during this time period when bison are present to minimize adverse effects on bison (USARAK 1999a). Bison are now managed within the USARAK's special interest management area, as described in Section 3.2.6.1. The Delta bison herd is one of the few remaining free-ranging bison herds in the United States.

In the fall of 2003, the bison herd was estimated to have 407 animals, but numbers have declined in 2005 to about 360 animals at pre-calving (DuBois 2004, 2005). Hunting permits are allocated by drawing, and numbers of permits are based on that year's fall population. Hunting is the main mortality factor. (Additional hunting information is located in Section 3.3.8, *Public Access and Recreation*.)

The Delta bison spend the winter east and northeast of DTA, in areas around the Delta Bison Range (Bison Range) and the Delta Agricultural Project. Animals start migrating into DTA East during February and March, and by April, most of the herd is located along the Delta River floodplain, where they calve (DuBois 2005). Major bison calving areas include the Washington Impact Area and the surrounding grassland/floodplain region, near Buffalo Dome, and on the west side of the Delta River floodplain in the Minnesota Training Area. The west side of the Delta River, in the Michigan Lakes Impact Area and Buffer Zone, appears to be a springtime feeding area. The area along the Delta River, including portions of Michigan Lakes Impact Area and buffer zones, Washington Range, Washington Impact Area, Texas/North Texas Range, and Minnesota Impact Area, is considered to be important bison calving/summer habitat (DuBois 2005). Bison appear to be attracted to the area because of adequate late-winter food quality and lack of disturbance.

After calving (late April through July) the bison move from the Delta River floodplain into their summer feeding areas in surrounding uplands, including Texas and Washington Ranges. Bison usually move off DTA by late July-early August (USARAK 1979; Kiker and Fielder 1980; DuBois 2005). Initially most feed at the Bison Range, but by fall and winter many move toward the Delta Agricultural Project.

The ADF&G bison management plan includes maintenance of bison food plots on the Delta Junction Bison Range which was developed in the mid 1980s. This area is intended to provide forage in order to reduce the number of days bison spend in the Delta Agricultural Project. Prior to the completion of the Delta Junction Bison Range, ADF&G and USARAK established five 15-acre food plots east of DTA East (non-military land) along the bison's migration route (Ajmi and Payne 2005; DuBois 2005). During the time that these plots were managed, bison appeared to be deterred from grazing at the Delta Agricultural Project (DuBois 2004). Maintenance of these food plots was discontinued due to changing land use practices and bison migration patterns. USARAK then created bison food plots along Meadows Road within DTA East in 1988 in cooperation with ADF&G and the surrounding community. Seven plots, totaling approximately 52 acres, located near Big Lake were rehabilitated in 1999, 2000 and 2003 (Ajmi and Payne 2005). Prior to 1999, maintenance of food plots was sporadic. Military training continues within the bison food plot area, when bison are not present.

The Delta bison herd has been surveyed by ADF&G using radio-telemetry since the late 1980s. The past 15 years of ADF&G bison survey data are currently being compiled.

Recent aerial surveys have been also conducted by USARAK personnel (Ajmi and Payne 2005). These surveys were visual and did not include systematic radio-tracking. Thus groups of bison in forest vegetation, for example, may have been missed. These surveys should be qualified as resulting in minimum population estimates.

The surveys were summarized as follows (Ajmi and Payne 2005): Bison calving surveys located animals during a small period of annual activity ranging from 13 April – 30 May. During this time, the bison appeared to prefer the Delta River floodplain. The percent of animals counted on each survey ranged between 41 percent – 92 percent of the entire Delta bison herd (based on ADF&G herd estimate of 360 animals). The percent located varied, depending on weather and logistical problems including sightability issues. Specific bison movement patterns also seemed to vary by year. However, in general bison split into small groups in early May and move into the Delta River floodplain to calve (DuBois 2005).

During 2003, 15 groups of bison adults and calves were located as far north as the northern end of the Mississippi Impact Area, but there were no sightings in this area in 2002 and only two in 2004.

Caribou (*Rangifer tarandus*) used the southern portion of DTA west for calving (USARAK 1999a), but since 2000, the majority of the Delta herd calved south and west of DTA (USARAK 2004a). The winter concentration area lies in the foothills, on the north side of the Alaska Range above 2,500 ft. In recent years caribou also frequent the area around Donnelly Dome and other areas in the southern portion DTA East. Most of these animals appear to be part of the Macomb herd, according to ADF&G radio tracking data. However, many of the caribou that winter in this area are from the Delta herd (DuBois 2003). The Macomb herd does not calve on DTA.

DTA East is within the Unit 20D Macomb caribou registration hunt. Current population estimates (fall 2003) of the Macomb herd range between 550 and 575 animals. Information about harvest and hunting is located in Section 3.3.8, *Public Access and Recreation*.

The Delta and Macomb caribou herds have been studied extensively (Davis et al. 1985; Maier et al. 1998; Valkenburg 2002). However, prior to 2004, no surveys have concentrated on caribou use on DTA East. Starting in February 2004, USARAK personnel began a telemetry survey of DTA East and West to determine annual caribou numbers, location and habitat use. Data collected thus far are preliminary.

Grizzly bear (*Ursus arctos*) sightings are common on DTA. Bears occur throughout DTA, although concentration areas are generally at higher elevations. Bear densities in GMU 20D, including DTA east of the Delta River, average about 10 to 12 bears per 1,000 square miles (ADF&G 1998a). (Hunting information is located in Section 3.3.8, *Public Access and Recreation*.)

Furbearers – Estimates of wolf densities throughout Alaska range from approximately 5 to 24 wolves per 100 square miles (USAF 1995). DTA typically has three or four wolf packs, although the structure, distribution, and numbers of packs in a given area are highly variable. Wolves have been incidentally observed during other surveys within DTA East.

Lynx (*Lynx canadensis*), pine marten (*Martes martes*), wolverine (*Gulo gulo*), red fox (*Vulpes vulpes*) and coyotes (*Canis latrans*) are trapped for fur on DTA. Wolverines are uncommon and wide-ranging in the region, whereas the other species are reasonably common (USAF 1995).

Small Mammals – Anderson et al. (2000) conducted a small mammal survey at DTA. Eleven species of small mammals were found in this study. The masked shrew (*Sores cinereus*), tundra vole (*Microtus oeconomus*), meadow vole (*Microtus pennsylvanicus*), and northern red-backed vole (*Clethrionomys rutilus*) were captured most frequently. In addition, small mammals were surveyed by USARAK through the Range and Training Land Assessment (RTLA) program in 2002 (Mason 2003).

3.2.6.1.2 Avian Species

DTA includes a wide variety of high quality bird habitat. A recent tally identified 123 species. Another 10 to 12 species are likely because these occur in surrounding areas, but have not been confirmed at DTA. The Delta Junction area, including DTA East, is a major flyway for spring and fall migrating birds, including trumpeter and tundra swans. An estimated two million waterfowl migrate through and near DTA during spring, and nine million return during fall (USAF 1995). The birds typically follow a path that parallels the Alaska Highway, and migrants frequent the DTA region on their way to points farther north. No spring surveys have been conducted to document actual numbers of birds using DTA as a stopover point. Numbers of migrating raptors and passerines are unknown. Economically and ecologically important species that could be affected by proposed range development are discussed below.

In the spring and early summer, vegetation clearing, site preparation, or other construction activities that may result in the destruction of active bird nests or nestlings would violate the Migratory Bird Treaty Act (MBTA). Timing guidelines (current for 2005) have been developed

by the USFWS as recommendations to assist in compliance with the MBTA. Table 3.2.6.a lists guidelines for interior Alaska.

Table 3.2.6.a Timing Guidelines for Vegetation Clearing to Comply with Migratory Bird Treaty Act.

Habitat Type	Timing Guidelines for No Vegetation Clearing
Forest or woodland [1] *(*i.e., trees present*)*	May 1 - July 15 [2]
Shrub or Open *(*i.e., shrub cover or marsh, pond, tundra, gravel, or other treeless/ shrubless ground habitat*)*	May 1 - July 15 [2]
Seabird colonies *(*including cliff and burrow colonies*)*	May 1 - July 20 [3]
Raptor and raven cliffs	April 15 - August 1

[1] Owl species may begin to nest two or more months earlier than other forest birds, and are common breeders in most forested areas of Alaska. You may wish to survey for nesting owls prior to tree-cutting. It is your responsibility to protect active owl nests from destruction.
[2] Canada geese and swan habitat: begin April 20.
[3] Seabird colonies in Interior Alaska refer to terns and gulls.

Active nests encountered at any time, including before or after the vegetation clearing timing window, must be protected from destruction. “Active” is indicated by intact eggs, live chicks, or presence of an adult on the nest.

Game Birds and Waterfowl – Approximately 300,000 sandhill cranes, a large portion of the world’s population, migrate through DTA from late-April to mid-May. Peak migration occurs during early May, when more than 2,000 birds per hour have been observed over or near the DTA area (Anderson et al. 2000). The cranes’ spring migration route takes a west to slightly northwest direction. In addition, many birds use lands on DTA for roosting. Sandhill cranes typically use braided river and stream courses and expansive tussock-shrub meadows as roosting sites. Crane roosting areas exist along the gravel bars of the braided Delta River. However, meadows and farm fields are more frequently used as roosts by spring migrants than are river habitats (Anderson et al. 2000). Approximately 100 roosting cranes were observed on May 4, 1998 within the braided stream courses of the Delta River directly west of Bolio Lake, which is approximately one mile north of the proposed North Texas Range area (Anderson et al. 2000). No systematic crane surveys have been conducted by USARAK, but incidental observations in 2003 and 2005 have identified approximately 300 to 800 cranes along the Delta River due west of the Fort Greely cantonment area (Payne 2004). Sandhill crane roosting areas are managed by USARAK as special interest management areas (USARAK 2002b). Management of these areas restricts military training when migrating cranes are present along the Delta River and Delta Creek (USARAK 2004b).

Trumpeter swan (*Cygnus buccinator*) populations in Alaska have been increasing in recent years (Conant et al. 1996; Anderson et al. 2000). A 1983 survey for trumpeter swans found only eight individual swans on DTA, but a 2003 survey by USARAK personnel found 34 swans including six broods with 14 young (Mason 2003).

USARAK, in cooperation with the USFWS, conducted aerial trumpeter swan brood productivity surveys in 2001 and 2003 at DTA. Brood productivity surveys were flown from the last two weeks of August to the first two weeks of September and covered 100 percent of the useable swan habitat in each U.S. Geological Survey quadrangle map. DTA East (Mt. Hayes D-4 quadrangle) does not appear to be an important brood rearing area. Between 1980 and 1990, no swans were counted in DTA East during the brood survey. In 1995 and 2000, a single bird was observed on Big Lake (Groves 2004). In 2003 and 2004, USARAK personnel identified one pair of swans successfully nesting and raising a brood on DTA East in the Texas Range and Windy Ridge area.

DTA is not considered prime nesting and brood rearing habitat compared to other areas in interior Alaska, such as Tanana Flats Training Area in FWA. The most important nesting and brood rearing areas at DTA are the Lakes Impact Area, starting on the west bank of the Delta River and extending west and north to Delta Creek.

Sharp-tailed grouse (*Tympanuchus phasianellus*) are the most popularly sought game bird in the Delta Junction area. Sharp-tailed grouse are common in the DTA area, but very little is known about their ecology in Alaska (Connelly et al. 1998). DTA has been identified as an important area for sharp-tailed grouse and is especially important as winter range (Raymond 2001). Sharp-tailed grouse use open, brushy habitats across DTA, including recent burns and human disturbed areas.

The lakes and ponds on DTA host a large variety of nesting waterfowl, the most common being the American wigeon (*Anas Americana*) and common goldeneye (*Bucephala clangula*). Common game birds include willow ptarmigan (*Lagopus lagopus*), ruffed grouse (*Bonasa umbellus*) and spruce grouse (*Dendragapus canadensis*) in appropriate habitat.

Passerines – Fifty-five species of passerine birds have been identified on DTA by USARAK Natural Resources personnel and contracted bird survey scientists. This includes 14 species identified by federal, state and regional agencies as “species of concern.” Reasons for concern vary, but are most often due to documented population declines (see Section 3.3.5, *Threatened or Endangered Species and Species of Concern*). Bird surveys and monitoring projects are ongoing on DTA in an effort to better understand population trends and habitat requirements of passerine birds and to aid in management efforts and land use decisions.

Raptors – Estimates from migration surveys indicate that approximately 25,000 raptors migrate through DTA during spring and 48,000 during fall (USAF 1995). Sixteen species of diurnal and nocturnal raptors have been identified on DTA by USARAK Natural Resources personnel and contracted bird survey scientists. A raptor survey of DTA found several golden eagle nests in the southwest portion of the post and identified potential nesting habitat for gyrfalcons and peregrine falcons (Anderson et al. 2000). Several other common species are known to nest on post, including red-tailed hawks and great-horned owls. Northern goshawks nest on post and are most common during years when the snowshoe hare population is high. Bald eagles have been seen along Meadows Road, but nests have not been found (Reidsma 2004). The area also supports the boreal owl and the great gray owl.

3.2.6.1.3 Amphibians

Wood frogs are the only amphibians in the Alaska Interior, and they are found on DTA. Wood frogs are small to medium-sized and are mostly terrestrial, but are not usually found far from water. They inhabit marshes, riparian areas, wet meadows, moist brush, and open grassy areas,

including higher function wetlands. Wood frogs hibernate in the soil, using root channels and burrows made by other animals. These animals breed in seasonal pools, shallow ponds, marshy lake edges, flooded meadows, and quiet stretches of streams. Tadpoles usually live in the shallowest, warmest parts of the wetland.

3.2.6.1.4 Special Interest Management Areas

Donnelly Training Area has several areas with sensitive or unique wildlife species or plant communities (USARAK 2002a). These special interest management areas include the Delta bison area, the sandhill crane roosting area, the Delta caribou calving and post-calving area, and Dall sheep habitat (USARAK 1999a, 2002a). The caribou calving and post-calving areas and Dall sheep habitat are located on DTA West and are not directly affected by the proposed actions and alternatives.

Current management actions address the special management necessary for the bison and sandhill crane areas, and all future land uses are required to consider the uniqueness of these areas and ensure conservation. According to the *2002-2006 Integrated Natural Resources Management Plan*,

> "USARAK has primary responsibility for management of Special Interest Management Areas. Within USARAK, Department of Public Works (DPW), Environmental Resources Department has responsibility to identify, locate, monitor, and manage special interest areas. Range Control provides control over access to these areas."

Table 3.2.6.b lists the special interest management area categories and accompanying restrictions.

Table 3.2.6.b USARAK Special Interest Management Area Categories and Restrictions.

Special Interest Management Area Category	Restrictions
Delta Bison Area	The USAG-AK 2002-2006 DTA INRMP lists the following restrictions for this special interest management area: • USARAK has imposed restrictions to limit disturbance to bison calving areas from 15 April to 15 June, if bison are present.
Sandhill Crane Roosting Area	The USAG-AK 2002-2006 DTA INRMP lists the following restrictions for this special interest management area: • The agreement limited disturbance in designated sandhill crane areas each year from 25 April to 15 May and 1 September to 30 September, if sandhill cranes are present.

Source: USARAK 2002b

Special interest area management includes provisions stipulated by USARAK Regulation 350-2, *Range Regulation*. USAG-AK has primary responsibility for management of special interest areas. Mission-related restrictions with special interest management areas are included in the environmental limitations overlays and environmental awareness materials prepared for distribution to military units that use training areas on DTA. (See Section 2.2.1.2.3.1, *Environmental Precautions* for a description of environmental limitations overlays.)

The appendix contains a copy of a letter from the USFWS confirming that no federally listed species reside or breed on Army lands in Alaska, and that consultation under Section 7(a)(2) of the Endangered Species Act, 16 USC 1536(a)(2) is not required. Although the American peregrine falcon was delisted as an endangered species in 1999, the USFWS requests consultation on any projects that may hinder recovery. The installation is within the breeding range and a nest site was documented on DTA East in 2004 (Mason 2004). Peregrines are also known to nest within a few miles of the northwestern corner of the DTA East (Ritchie and Rose 1998). Proposed activities will have no effect on the recovery of the peregrine falcon in this area.

The USFWS updates a list of Birds of Conservation Concern by Bird Conservation Regions (BCR) every five years. Birds on this list that also occur on DTA include the peregrine falcon, American golden-plover, whimbrel, and surfbird.

Boreal Partners in Flight has identified priority bird species for conservation in Alaska (Boreal Partners in Flight Working Group 1999). The rankings are based on conservation vulnerability. This listing includes the gyrfalcon, sharp-tailed grouse, great gray owl, boreal owl, black-backed woodpecker, Hammond's flycatcher, American dipper, varied thrush, bohemian waxwing, rusty blackbird, and white-winged crossbill (Andres et al. 2001) (see Section 3.3.5, *Threatened or Endangered Species and Species of Concern*).

3.1.6.1.5 Ecosystem Management

Ecosystem Management Methodology – The USARAK Natural Resources staff has developed a system to rank priority species and to quantify availability of high value habitat (USARAK 2003c). Rankings for each mammal and bird species are based on the following factors: rarity, population trends, habitat specialization, spatial distribution, sensitivity to disturbance from military construction, training or land management practices, potential to respond to management and recovery efforts, and status as game animals (Table 3.2.6.c).

Habitat preferences for priority species were assigned based on literature reviews and knowledge from biologists familiar with the ecology at DTA (USARAK 2003c). The Ecological Land Classification delineations (Jorgensen et al. 2001) were evaluated as potential habitat for each priority species, using the following criteria: vegetation types that the species avoid were given a ranking of 1, vegetation types that species use but are not critical for life history requirements were ranked as a 2, and vegetation types that are critical for a species life history requirements were given a ranking of 3. Only the acreage of habitats was calculated. Habitats that were used by a species were given a ranking of 2, habitats critical for life history requirements were given a ranking of 3, and habitats typically avoided were ranked as 1 and were not calculated as usable habitat.

Table 3.2.6.c List of Priority Wildlife Species and Rationale for Selection [1].

Species	Rationale for Selection as a Priority Species
Mammals	
Bison	High-profile species; Delta Bison Area is managed as a special interest area (USARAK 2002b); managed as a game species
Black Bear	Requires large space; susceptible to human disturbance; DTA has large tracts of habitat; managed as a game species; responsive to management and conservation efforts

Species	Rationale for Selection as a Priority Species
Brown Bear	Requires large space; susceptible to human disturbance; DTA has large tracts of habitat; managed as a game species
Caribou	High profile species; DTA is managed as a special interest management area for caribou; susceptible to disturbance; managed as a game species
Gray Wolf	Requires large space; susceptible to human disturbance; DTA has large tracts of habitat; managed as a game species
Little Brown Bat	Relatively uncommon in Alaska; sensitive to disturbance; responsive to management and conservation efforts
Lynx	Relatively uncommon; DTA has large tracts of habitat; susceptible to disturbance; managed as a game species
Meadow Jumping Mouse	Relatively uncommon; habitat specialist; susceptible to disturbance
Moose	High profile species; managed as a game species
Wolverine	Relatively uncommon; DTA has large tracts of habitat; susceptible to disturbance; managed as a game species
Birds	
Boreal Owl	Relatively uncommon; requires large tracts of land; DTA has large tracts of habitat; susceptible to disturbance; responsive to management and conservation efforts
Great Gray Owl	Relatively uncommon; requires large tracts of land; DTA has large tracts of habitat; susceptible to disturbance; responsive to management and conservation efforts
Northern Goshawk	Relatively uncommon; requires large tracts of land; DTA has large tracts of habitat; sensitive to disturbance
Olive-sided Flycatcher	Relatively uncommon; requires large tracts of land; DTA has large tracts of habitat; susceptible to disturbance; responsive to management and conservation efforts; AKNHP Species of Concern
Rusty Blackbird	Widespread population declines throughout range; AKNHP Species of Concern
Sandhill Crane	Relatively uncommon; susceptible to disturbance; DTA includes special interest management areas
Sharp-tailed Grouse	Susceptible to disturbance; managed as a game species
Trumpeter Swan	Relatively uncommon; habitat specialists; DTA has large tracts of habitat; susceptible to disturbance

[1] USARAK 2003c

Ecosystem Management Analysis – The distribution and acreage of medium and high quality habitat for each priority species was calculated for DTA East (USAG-AK 2005b). These data are summarized in Table 3.2.6.d.

3.2.6.1.6 Wildlife by Alternative

Eddy Drop Zone

Mammals – Part of the Eddy Drop Zone alternative burned in 1987 and is considered to be high quality moose habitat. Moose move freely throughout the area because there are no structures or fences to impede movement.

Bison tend to change their migration patterns depending on habitat characteristics and food availability. The Delta herd has recently been migrating between winter areas (agricultural fields north of DTA East) and summer areas (Delta River and Texas uplands). This route is further south (near Donnelly Drop Zone) than in the past, when they used to follow a route near Allen Army Airfield. Bison are not currently using the Eddy Drop Zone alternative in large numbers.

Table 3.2.6.d Acres of Preferred Habitat [1] for Priority Wildlife Species by Alternative at DTA East.

Species	Acres			Percent of DTA East with Moderately and Highly Preferred Habitat
	Not Preferred	Moderately Preferred	Highly Preferred	
Mammals				
Bison	57,284	46,783	534	45.2
Black Bear	48,424	49,433	6,744	53.7
Brown Bear	24,721	78,750	1,130	76.4
Caribou	65,411	28,752	10,438	37.5
Gray Wolf	19,489	85,112	0	81.4
Little Brown Bat	83,680	20,232	689	20.0
Lynx	47,905	54,763	1,933	54.2
Meadow Jumping Mouse	66,204	38,397	0	36.7
Moose	38,369	61,841	14,602	66.6
Wolverine	9,162	95,439	0	91.2
Birds				
Boreal Owl	62,404	28,958	13,239	40.3
Great Gray Owl	62,245	36,594	5,762	40.5
Northern Goshawk	50,846	23,294	30,461	51.4
Olive-sided Flycatcher	76,423	9,044	19,134	26.9
Rusty Blackbird	103,781	820	0	0.8
Sandhill Crane	83,319	17,848	3,434	20.3
Sharp-tailed Grouse	75,215	538	28,848	28.1
Trumpeter Swan	103,912	0	689	0.7

[1] Habitat quality using ecotype classification (USARAK 2003c).

Caribou and wolverines are rare at the Eddy Drop Zone alternative, and it does not contain their preferred habitat. Grizzly bears, black bears, and wolves are uncommon. Only a few animals throughout the year use Eddy Drop Zone. Other furbearers are reasonably common and include lynx, fox, and coyote. Common small mammals include the northern red-backed vole and meadow vole (Mason 2003).

Habitat alteration projects in the Eddy Drop Zone area have consisted primarily of drop zone maintenance and the creation of emergency firebreaks. These provide early succession habitat. A moose habitat improvement project was undertaken in the 1980s, just to the east of the proposed BAX and CACTF area (Reidsma 2004). It consisted of 16 strips cut within the spruce forest, each measuring approximately 50 by 900 ft. In the spring of 2003, five 20-acre moose habitat clearings were created east of the site. Additional future moose habitat improvement projects are planned to create a mosaic of different-aged stands. According to Crichton (1998), 62 percent of species in the boreal forest of Canada benefit from such clearings. The proposed BAX and CACTF location would be evaluated as potential wildlife habitat, and future habitat work would be conducted within the range complex or concentrated elsewhere on DTA.

Avian Species – The actual Eddy Drop Zone (a cleared area within the alternative area) is important as a breeding area and winter range for sharp-tailed grouse. Sandhill cranes also use Eddy Drop Zone to feed on blueberries in August and September. Cranes occasionally roost in the Drop Zone, or in small open wetlands within the proposed alternative. No swans have been observed east of the Richardson Highway in the lake complex near Eddy Drop Zone during USARAK brood productivity surveys (Payne 2004). Habitats in the Eddy Drop Zone alternative also support a wide variety of passerine birds. Documented species of concern in this area include northern goshawk, blackpoll warbler, bohemian waxwing and white-winged crossbill, but densities of these species are unknown. Migrating waterfowl use the kettle lakes at the eastern and southern edges of the alternative area during migration. Population estimates and timing of migration are unknown.

Amphibians – Wood frogs are likely present at Eddy Drop Zone alternative, but distribution and densities are unknown.

Special Status Fauna – The southern half of the Eddy Drop Zone alternative is within the USARAK's bison special interest management area. This alternative does not include any other special interest management areas.

Donnelly Drop Zone

Mammals – The area is located just outside the Delta Junction Management Area (DJMA) and moose are common. Caribou and Dall sheep hunting occurs in the Granite Mountains using 12-Mile Crossing and the 33-Mile Loop Road system.

Bison sometimes migrate through the northern portion of the Donnelly Drop Zone alternative in early spring and late summer on their way to and from the Delta River (Appendix, Figure 3.n). Incidental observations have noted bison movements during March from the Jarvis Creek region across the Donnelly Drop Zone and into Texas Range (Payne 2004). ADF&G observations corroborate that bison move across Donnelly Drop Zone and into the Texas Range prior to the calving season.

The Donnelly Drop Zone alternative is within the overlapping range of the Macomb and Delta caribou herds. USARAK and ADFG survey flights have documented radio collared animals from both herds in the Donnelly Drop Zone area (Payne 2004; DuBois 2005). Caribou have only begun using this area within the last five to ten years. Caribou are commonly seen along the Richardson Highway in the vicinity of Donnelly Dome and the Donnelly Drop Zone alternative. There are no valid estimates of the number of caribou using this area, the seasonality of their use, specific habitats utilized or the relative quality of those habitats. It is considered highly unlikely that calving occurs here (DuBois 2005).

Wolves and grizzly bears have been observed or harvested within or near this site (USARAK 2004a; Mason 2005). Wolverines are wide ranging and occur in very low numbers. Coyotes are common, especially during years of high snowshoe hare (*Lepus americanus*) numbers. A recent small mammal survey found especially high numbers of northern red-backed voles (Mason 2004).

There have been no habitat management projects within the Donnelly Drop Zone alternative. Continued habitat improvement projects would be conducted elsewhere on DTA East.

Avian Species – The Donnelly Drop Zone alternative is located in an area of high quality sharp-tailed grouse habitat. Sharp-tailed grouse are found in shrub habitats and regenerating burns in this area. Other species of concern have been documented, and include the bohemian waxwing, white-winged crossbill and olive-sided flycatcher. This area is also within the territory of a golden eagle nest on Donnelly Dome that is active irregularly. Breeding bird surveys in the area have documented dozens of other bird species, with white-crowned sparrows (*Zonotrichia leucophrys*) and fox sparrows (*Passerella iliaca*) being especially abundant. Butch Lake, in the northwest corner of the alternative, is likely important for migrating waterfowl.

Amphibians – Wood frogs likely occur in the vicinity of Butch Lake and throughout shrub-scrub wetlands in the Donnelly Drop Zone alternative. Although they have not been confirmed in this area, the habitat is suitable, and wood frogs are relatively common in similar habitat in other areas of DTA, including Ober and Jarvis creeks.

Special Status Fauna – Bison and caribou are not known to calve in the Donnelly Drop Zone alternative. The Donnelly Drop Zone alternative does not include any USARAK special interest management areas.

North Texas Range

Mammals – Economically, bison are the most important big game animal in North Texas Range, and the range is located within the bison special interest management area. During late winter and spring, bison migrate from the Delta Agricultural Project to the North Texas Range/Big Lake area, where they stay until late August (Appendix, Figure 3.n). The Delta River floodplain is also important summer range. Recent surveys have documented that most calving occurs on the Delta River floodplain (Mason 2004). Major bison calving areas include the Washington Impact Area and the grassland/floodplain region east and northeast of Buffalo Dome, on the west side of the Delta River floodplain in the Minnesota Training Area.

Texas Range is an important feeding area for the bison herd after May, and more than 100 bison have been observed there during June (DuBois 2004). The Texas Range is also on the bison migration path prior to the calving season. Incidental observations during March caribou surveys

have noted bison movements from the Jarvis Creek region, across the Donnelly Drop Zone, and into Texas Range. Additional survey flights observed movement of bison across Donnelly Drop Zone and into the Texas Range, prior to the calving season (Payne 2004).

Meadows Road is a popular bison viewing area in the summer. The bison feed on the food plots and use nearby saltblocks for mineral supplements. ADF&G also uses the area to capture and radio-collar bison for monitoring. Bison hunting is allowed on parts of the North Texas Range alternative. The area is important for bison management because crop depredation can be high if bison move to the Delta Agricultural Project before crops are harvested.

Seven bison food plots are within the proposed BAX and CACTF footprint. In 1999 and 2000, six of the plots were rehabilitated by cutting woody vegetation, re-seeding and fertilizing; and, in 2003, all seven plots were fertilized.

The North Texas Range alternative, which is popular for moose viewing, is also important moose habitat. ADF&G estimates moose densities in the area at four moose per square mile (USARAK 2004a). This area is within the DJMA, and hunting is restricted to 10 permit holders. The majority of moose harvested on the DJMA come from DTA, especially areas between Donnelly Dome and Big Lake (DuBois 2003).

In 1999, five plots (17 acres) were cleared for moose habitat within the North Texas Range alternative. Three of the plots would be within the proposed BAX and CACTF area, and two are immediately to the north. Continued habitat improvement projects would be conducted elsewhere on DTA East if this location is selection.

The North Texas Range alternative is used by grizzly bears, but bears den at higher elevations to the south. Caribou are uncommon in the area and wolverines are rare. Wolves are common and are frequently observed. Coyotes are also common in this area, especially during years of high snowshoe hare numbers. A recent small mammal survey found high densities of northern red-backed voles (Mason 2004).

Avian Species – A wide variety of birds occur within the North Texas Range alternative. Sandhill cranes roost along on the nearby Delta River during migration (Appendix, Figure 3.o). This portion of the Delta River has been identified as a sandhill crane special interest management area. Trumpeter swans are often seen on Big Lake and the Texas Range lakes, especially during migration. In 2003, the first pair of known nesting swans on DTA East was located just outside the proposed BAX footprint, using lakes within the alternative. USARAK personnel observed a nesting pair of swans near the same lake on Texas Range that had the successful 2003 brood.

The North Texas Range alternative includes important breeding and winter concentration areas for sharp-tailed grouse. Grouse hunting is popular at this location. A golden eagle nest on Donnelly Dome is near the area. Waterfowl are common and the USARAK conservation program maintains duck nest boxes (goldeneyes and buffleheads are targeted) on four lakes within the alternative. In 2003, there were several sightings of one (or more) great gray owl, and a nesting pair was believed to be in the North Texas Range alternative. Other confirmed species of concern include the northern goshawk and common loon.

Amphibians – Recent wood frog surveys by USARAK have documented high numbers of wood frogs in lakes and wetlands within the North Texas Range alternative.

Special Status Fauna – DTA has areas with special natural features that harbor sensitive or unique wildlife species or represent unique plant communities (USARAK 2002b). The North Texas Range alternative contains portions of the bison special interest management area and the sandhill crane special interest management area.

North Texas Range/Eddy Drop Zone Combination

The distribution and abundance of mammals, birds, and amphibians would be the same as at North Texas Range and Eddy Drop Zone.

3.2.6.2 Fisheries

Fisheries management on USARAK lands has traditionally supported recreational fishing, maintenance of fish populations, and preservation of biological diversity. The fisheries populations and their habitats are managed cooperatively by USARAK, ADF&G, and the USFWS. Management includes the development of population and habitat management plans, as well as inventorying and monitoring fish populations and habitats. Indicator species, such as salmon, are monitored closely.

ADF&G produces a "Statewide Stocking Plan for Recreational Fisheries" each year, establishing objectives and stocking plans for the subsequent five years (ADF&G 2005). The stocking plans are subject to revision. For example, stocking of rainbow trout fingerlings has been reduced in recent years, as fewer fish are now being raised in the Anchorage fish hatchery and stocking schedules have been altered to increase efficiency of the stocking operation (ADF&G 2002a).

USARAK fisheries resources in interior Alaska, including all DTA lakes, are managed within the Region III Tanana River drainage plans. Stocking programs are funded through the Federal Aid to Sport Fish Restoration Program (from Dingle-Johnson/Wallop-Breaux funds), which incorporates input from the general public and state and federal agency biologists into specific program plans.

Species that could be affected by the proposed BAX and CACTF at DTA are discussed below.

3.2.6.2.1 Fish Stocking

Sixteen lakes on DTA, ranging from three to 320 acres, are stocked by ADF&G (Appendix, Figure 3.p). (For a complete list, see Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*). With the exception of J Lake and Nickel Lake, these lakes are listed as Category 1 (completely landlocked lakes, where fish cannot escape and interact with wild fish populations). J Lake and Nickel Lake are Category 2 lakes that have an intermittent outlet, which may overflow with snowmelt during some years, thus allowing some fish to escape. USARAK constructed a rock gabion on J Lake to prevent encroachment by northern longnose suckers.

Koole Lake, the largest (320 acres) stocked lake on post, is managed under the Upper Tanana Valley Remote Lakes Sport Fishery Enhancement Plan. Koole Lake is located in DTA West. Stocking on the other 15 lakes is managed under the Upper Tanana Valley Rural Lakes Fishery Enhancement Plan.

Recent stocking plans on DTA lakes include the following five fish species (ADF&G 2005):

- **Rainbow Trout** – Bolio, Bullwinkle Chet, Doc, Ghost, Koole, Mark, Nickel, No Mercy, North Twin, Rockhound, South Twin, and Weasel lakes
- **Arctic Char** – Chet, Ghost, J, Mark, Nickel, and Sheefish lakes
- **Grayling** – Bolio, J, Luke, and Nickel lakes
- **Coho Salmon** – J and Mark lakes
- **Chinook Salmon** – Sheefish Lake (year 2000 only)

Lake trout are no longer a part of the stocking plan at DTA, but they may still be present in Chet, Ghost, Nickel, and North Twin lakes.

Angler use varies between 1,200 to 1,500 people per year on the 15 stocked lakes that are readily accessible from the Richardson Highway (Reidsma 2002b). Koole Lake is west of the Delta River and is inaccessible by road (USARAK 1999a).

3.2.6.2.2 Wild Fisheries

Major streams on DTA are generally silt laden and do not support fisheries. Jarvis Creek flows through DTA East and the Delta River flows along the western boundary of DTA East. These waters are glacially fed and flow from the north side of the Alaska Range to the Tanana River. Downstream of DTA, the Tanana River provides year-round habitat for some species, overwintering habitat for others, and supports migratory species. The mouth of the Delta River is important to chum salmon (*Oncorhynchus keta*). Grayling (*Thymallus arcticus*) migrate through these glacial streams to clear tributaries to spawn, and a few clear streams on DTA provide summer habitat for grayling (Parker 2004). Naturally occurring populations of lake chub (*Couesius plumbeus*), northern pike (*Esox lucius*), sculpin (*Cottus cognatus*), and the northern longnose sucker (*Catostomus catostomus*) are found in lakes at DTA (BLM and U.S. Army 1994a).

3.2.6.2.3 Fisheries by Alternative

Eddy Drop Zone – Jarvis Creek borders the Eddy Drop Zone alternative. These waters are glacially fed, and flow from the north side of the Alaska Range to the Tanana River. Grayling migrate through Jarvis Creek to clear tributaries to spawn (Parker 2004), although these tributaries are not within the boundary of the Eddy Drop Zone alternative. There are 23 unsurveyed lakes within the alternative, plus 10 dried lake beds. In addition, there are intermittent streams and shallow ponds in the proposed BAX and CACTF site within the Eddy Drop Zone alternative. None of them support fish.

Donnelly Drop Zone – Jarvis Creek, as well as two intermittent streams, cross the Donnelly Drop Zone alternative. Jarvis Creek is an important migration route for grayling moving between summer habitat in mountain streams to the south and winter habitat lower in the drainage. Grayling have been seen in the clear tributaries that run through the Donnelly Drop Zone alternative (Mason 2004). In addition to Butch Lake, only a few small lakes (smaller than two acres) are located on the far eastern edge of the alternative area. These smaller lakes are not stocked, and it is unknown what species they may contain.

North Texas Range – The multiple kettle lakes (in and around the North Texas Range alternative) support important local fisheries. Sport fishing is very popular in many of the stocked lakes in

this area. Fourteen stocked lakes on DTA are along Meadows and Windy Ridge roads. Big Lake and Lonestar Lake, which is on Windy Ridge Road, are used by ADF&G as rearing nurseries for rainbow trout (*Oncorhynchus mykiss*). They are too shallow to support year-round fish populations. No streams supporting fisheries or migrating fish flow through the alternative area.

North Texas Range/Eddy Drop Zone Combination – The distribution of wild and stocked fisheries would be the same as described under Eddy Drop Zone and North Texas Range.

3.2.7 Cultural Resources

Issue 8: Cultural resources impacts. The impact of construction and operation of the BAX and CACTF to cultural, historical, and grave sites was identified as a concern during tribal consultations. Additional information can be found in Section 1.8, *Government-to-Government Consultation.*

Pursuant to AR 200-4, *Cultural Resources Management*, the USAG-AK Installation Commander is responsible for compliance with historic preservation laws on all U.S. Army managed lands in Alaska. The Installation Commander and project planners are required by Section 106 of the National Historic Preservation Act (NHPA) to consider effects to historic properties that may occur as a result of federal undertakings. Historic properties include sites, buildings, districts, structures and objects dating to the prehistoric and historic periods that are eligible for listing in the National Register of Historic Places as created by the NHPA of 1966 (as amended). These properties are collectively referred to as cultural resources. This EIS evaluates impacts to historic properties under the NHPA, Native American cultural items under the Native American Graves Protection and Repatriation Act (NAGPRA), archaeological resources under the Archaeological Resources Protection Act (ARPA), and sacred sites under EO 13007, *Indian Sacred Sites*.

Cultural resources under the stewardship of USARAK consist of the material manifestations of the knowledge, beliefs, art, morals, laws, and customs particular to a people or society. Cultural resources may also be traditional cultural properties (TCPs) or sacred sites that have significance to Alaska Native cultures. Archaeological resources are related to the systematic study of the life, conditions and culture of a region's predecessors, and generally focus upon material evidence found primarily in surface and/or subsurface contexts. North American archaeology has traditionally been subdivided into prehistoric and historic periods. Cultural resources are also divided according to these two broad temporal categories of prehistory and history. The main categories of resources addressed in this EIS are archaeological sites, historic properties and TCPs; all of which are discussed below.

Management of historic properties on federal lands depends on their eligibility for inclusion in the National Register of Historic Places (NRHP). The NRHP classifies cultural resources in terms of five major categories:

District – A district is a geographically definable area that possesses a concentration or continuity of buildings, structures, or objects united by past events, or design, or physical development. It may contain individual elements, separated geographically, but linked by association or history.

Site – Sites are locations of significant events, prehistoric or historic occupations or activities, buildings or structures, whether standing, ruined, or vanished, where the location possesses historic or prehistoric value. A site may also hold significance related to traditional cultural values when it can be associated with a real property.

Building – A building is a structure erected to shelter any form of human activity, such as a house, church, barn, or similar structure. A building may also connote a historically related complex of buildings, such as a farmstead or an industrial complex, if all structures contribute to the significance of the property.

Structure – A structure is an engineering project that aids man's activities. It includes all standing structures not made for shelter.

Object – An object is a thing of functional, aesthetic, cultural, historical or scientific value that may be, by nature or design, movable yet associated with a specific setting or environment.

Although cultural resources in all five NRHP categories potentially exist on DTA, only one district, the Donnelly Ridge Archaeological District, is currently eligible for management under NHPA. This district encompasses 12 prehistoric archaeological sites and is not located within any of the proposed alternatives.

3.2.7.1 Prehistory

Prehistory refers to the period for which there is no documentary evidence of the events or people of that time period. The depth of Alaskan prehistory varies due to natural conditions that enhanced or limited human occupation in each region of the state. The extent of glacial coverage and the rate and directions of glacial retreat, largely influenced the capacity of each region to support prolonged human occupancy and activity. Interior Alaska was probably inhabited at least 13,000 years ago, whereas the coastal regions were likely inhabited more recently.

Evidence suggests that Alaska's earliest inhabitants were nomadic hunters who traveled in small bands. They arrived in interior Alaska at least 13,000 years ago, beginning a habitation that persisted through the arrival of European traders in the late 1810s, continuing through present day. The region's ice-free, steppe-tundra environment during the Wisconsin Ice Age set the stage for this long habitation period (Pewe 1975).

The nomadic lifestyle of Alaska's earliest inhabitants, the organic nature of the materials they manufactured and used, and changing environmental conditions over time have made it difficult to find evidence of their activities. Such evidence is generally limited to lithic (stone) artifacts such as projectile points, cutting tools, scrapers, waste flakes from the manufacture of these tools, and hearths. Archaeologists generally divide interior Alaska's prehistory into three broad archaeological periods according to the tools and tool-making technology characteristic of the region at various times: the Paleoarctic Tradition (12,000 to 8,000 years ago), Northern Archaic Tradition (6,500 to 1,000 years ago), and Athabascan Tradition (2,500 to 150 years ago) (Table 3.2.7.a).

Table 3.2.7.a Summary of Interior Alaskan Prehistory.

Era	Dates	Description
Paleoarctic Tradition	12,000 - 8,000 Before Present (BP)	Early inhabitants camped on terraces and bluffs above treeless steppes, hunted large mammals such as bison and mammoth; tools fashioned from stone, bone, antler, and ivory; artifacts include microblades and microblade cores
Northern Archaic Tradition	6,500 - 1,000 BP	Adaptations to boreal forest expansion; tools include side-notched projectile points, bifacial knives, microblades, and end scrapers
Athabascan Tradition	2,500 - 150 BP	Varied settlement patterns, often nomadic culture, subsisting primarily on terrestrial animals; subgroups exhibit distinct cultural characteristics

3.2.7.1.1 Prehistory of the Alternatives

This discussion applies to Eddy Drop Zone, Donnelly Drop Zone, North Texas Range, and the North Texas Range/Eddy Drop Zone Combination alternatives.

Paleoarctic Tradition (12,000 to 8,000 years ago) – The Paleoarctic Tradition represents the period when the earliest human group known to inhabit Alaska existed. More information on this period can be found in Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*. Archaeological sites containing prehistoric material have been found on DTA, some of which contain material that can assign them to this tradition.

Northern Archaic Tradition (6,500 to 1,000 years ago) – The Northern Archaic Tradition appears in the archaeological record approximately 6,000 years ago as an adaptation to the then-forested environment of interior Alaska and may have persisted until about 1,000 years ago. More information on this tradition may be found in Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*. Archaeological sites containing prehistoric material have been found on DTA, some of which contain material that can assign them to this tradition.

Athabascan Tradition (2,500 to 150 years ago) – Athabascan peoples are generally divided linguistically and geographically into subgroups that inhabit or have inhabited interior Alaska and Canada. More information on this tradition can be found in Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*. Archaeological sites containing prehistoric material have been found on DTA, at least one of which contains a copper projectile point that may place it within this tradition.

3.2.7.2 History

The term “historic” designates the period following the introduction of written documents. The timing of the transition from prehistoric to historic varies from region to region. In interior Alaska, this period begins around the 1830s, when Russian fur traders began entering the area.

The early historic period was marked by continuance of traditional activities and limited Euro-American presence in the region. In the late 1880s, gold rushes began to change the area’s

demography and economy. A 1901 gold strike in the Tanana Hills led to the establishment of Fairbanks, and the town soon became a regional center for mining and agriculture.

Transportation and communication networks, including the Richardson Trail and the Washington Alaska Military Cable and Telegraph System, were developed to link the new Interior settlements with the coast. The Big Delta area, which had previously been part of the river-based trade and subsistence economy, began to see the appearance of roadhouses and Signal Corps stations as the new infrastructure corridors passed through.

During the 1940s and 1950s, World War II and the Cold War drew thousands of people to the interior region for military service and defense employment. Ladd Field in Fairbanks, Allen Army Airfield south of Big Delta, and the Alaska Highway were all constructed during World War II. The community of Delta Junction developed around the terminus of the Alaska Highway following the war, and the nearby army airfield became Fort Greely in the 1950s. Since Alaska became a state in 1959, the Trans-Alaska Pipeline, Native land claims settlements, and public lands legislation have also influenced the region.

For cultural resource purposes, the historic period can be categorized into themes: Early Contact (1830s-1880s), Prospecting and Mining (1880s-1940s), Transportation Infrastructure (1890s - 1940s), and Military Activities (1880s-present) (Table 3.2.7.b).

Table 3.2.7.b Historical Themes of Interior Alaska.

Era	Dates	Description
Early Contact	1830s - 1880s	Contact between Native Alaskan groups and European and American traders.
Prospecting and Mining	1880s - 1940s	Gold rushes and subsequent mining activity in interior Alaska.
Transportation Infrastructure	1890s - 1940s	Establishment of roads connecting interior Alaska with other areas.
Military Activities	1880s - present	Army exploration surveys, early communications systems, and World War II and Cold War bases.

3.2.7.2.1 Historic Resources by Alternative

This discussion applies to Eddy Drop Zone, Donnelly Drop Zone, North Texas Range, and the North Texas Range/Eddy Drop Zone Combination alternatives.

Early Contact (1830s to 1880s) – Regular contact between the Athabascan and European cultures probably commenced with the availability of trade goods from Russian fur trading posts at Taral, on the Copper River, and Nulato, on the Yukon River. More information on this period can be found in Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*. No village sites associated with the early contact period have been reported in DTA East.

Prospecting and Mining (1880s to 1940s) – Gold discoveries at Fortymile and Birch Creek in 1886 and 1894 drew the first wave of prospectors to interior Alaska. The Fairbanks gold rush in 1903 had the largest impact on the region. The Big Delta area did not experience significant

impacts from the gold rushes, although prospecting and small scale mining occurred. Only one site associated with early mining has been located on DTA. This is the Ptarmigan Creek mining complex in DTA West which has been determined ineligible for inclusion in the NRHP (Neely 2001).

Transportation Infrastructure (1890s to 1940s) – The initial means of transport to interior Alaska was by riverboat. No historic properties associated with river transport are located within the alternatives. An overland trail was established in 1899, from Valdez to Eagle, and later to Fairbanks. The original Valdez-Fairbanks Trail crosses DTA East, following either just parallel to or along the present Richardson Highway right-of-way (Neely 2003). A winter trail, associated with the Valdez-Fairbanks Trail, crosses DTA West, from Donnelly Dome in the southeast corner of the training lands, to Washburn, along the Tanana River beyond the northwest corner of the training area. Properties associated with these two trails have not been evaluated for eligibility to the NRHP. The Alaska Highway, originally constructed as a World War II military road, is outside of the alternatives.

Military Activities (1880s to present) – Army reconnaissance parties traveled through the upper Tanana region in 1885 and 1898, but the first permanent military activity in the region began when the Signal Corps built and manned telegraph stations for the Washington Alaska Military Cable and Telegraph System in 1903. World War II brought an expanded military presence to the area. Just south of Delta Junction, the Allen Army Airfield supported the Alaska-Siberia Lend-Lease Program as an auxiliary landing field for aircraft headed north to Ladd Field for transfer to the Soviet Union from 1942-1945. The airfield is not under USARAK management and is not within any alternative.

By 1955, the airfield and surrounding training lands had been designated as Fort Greely. The drop zones in the alternatives were initially developed at this time. During the Cold War, Fort Greely supported the Northern Warfare Training Center and the Cold Regions Test Center. Fort Greely's Cold War context did not meet NRHP criteria for exceptional importance and no associated properties have been found eligible for listing in the NRHP (USACE 1999).

After the Base Realignment and Closure (BRAC) commission slated Fort Greely for closure, the training lands (DTA East and West) were separated from the Main Post and realigned under the jurisdiction of FWA in 2001. In 2000, the Space and Missile Defense Command (SMDC) took over the cantonment and nearby areas, and it is referred to as Fort Greely. These areas are not under USARAK management and are outside the alternatives.

3.2.7.3 Ethnography

Ethnography refers to the study of a particular group of people and their lifeways, traditions and beliefs. The following section briefly presents information regarding the Tanana Athabascan people and information presently known about their use of the alternatives from the early contact period through more recent times. This information is relevant to our understanding of TCPs and the alternative areas.

Ethnographically, the Tanana River valley is home for the Tanana Athabaskans (McKennan 1981). The three cultural units of the Upper Tanana, the Tanacross, and the Lower Tanana regions compose the Tanana Athabaskans. A number of bands make up each unit. The Upper Tanana consisted of the Upper Chisana-Upper Nabesna band, the Scottie Creek band, the Lower Nabesna

Band and the Tetlin-Last Tetlin band. The Tanacross unit consisted of the Mansfield-Ketchumstuk band and the Healy Lake-Joseph band. The Salcha band, Goodpaster/Big Delta band, Wood River band, Chena band, Nenana-Toklat band and the Minto band composed the Lower Tanana unit (Simone 1982; Andrews 1975).

DTA spans the Lower Tanana and Tanacross units. Specific bands of the Lower Tanana that used DTA are the Salcha and Goodpaster/Big Delta bands (Andrews 1975). The Goodpaster/ Big Delta band used areas west of the Delta River. The Salcha band used the Little Delta River drainage area. The Healy Lake-Joseph band used areas east of the Delta River. Precise territorial boundaries between the bands are extremely hard to establish. Communal hunting, trade, and intermarriages brought bands together (McKennan 1981), not only among Interior bands, but also to relationships with the Ahtna south of the Alaska Range. Distribution of resources also took place through a series of potlatches where guests included most of the northern Ahtna Copper River villages (Guedon 1974). Access to DTA was not limited to the Lower Tanana and Tanacross, but extended south of the Alaska Range among Ahtna bands, as well as north to the Yukon River.

Trade also formed an important means of obtaining natural resources that were not available in various regions. Tribes from the coast actively traded for natural resources with those in the Interior. The Delta River, and its associated pass through the Alaska Range, provided a major artery for trade between these coastal and Interior groups. Obsidian artifacts, found at DTA archaeological sites and other Interior sites, indicate such a trade network existing for the past 8,000 to 10,000 years.

There is a division in subsistence focus at the Goodpaster River. To the west of the Goodpaster River, the Salcha and Goodpaster/Big Delta bands focused on salmon. The degraded condition of the salmon beyond the Goodpaster River (to the east) becomes unsuitable for human consumption. East of this river, economic life of the Tanacross and Upper Tanana centered on caribou (Simone 1982; McKennan 1981).

The Athabaskan people used a fairly large territory and utilized different sites in their seasonal round. Those groups that focused on salmon for subsistence tended to have a settlement pattern with a centrally placed, semi-permanent village in the lowlands near the mouths of clearwater rivers and creeks. From these, they would travel to outlying areas during specific seasons for subsistence purposes (Shinkwin et al. 1980). The Upper Tanana bands, with their subsistence focus on caribou, had winter villages located in the uplands (Simone 1982; McKennan 1981; Andrews 1975).

Andrews refers to the Salcha band as having a subsistence pattern midway between a hunting-snaring emphasis and an inland riverine (caribou-salmon) emphasis (Andrews 1975). Mishler, in his study of the Goodpaster/Big Delta band, differs with Andrews, referring to a salmon emphasis for both bands (Mishler 1984). Both bands had access to salmon, and a harvest emphasis reflected in the placement of semi-permanent villages along clearwater streams that supported salmon runs. Both bands' subsistence rounds were similar.

In the early fall months, the bands separated into small family units. These dispersed up and down the Tanana River and its tributaries. Some Goodpaster/Big Delta band families went up to Donnelly Dome to hunt Dall sheep. Others hunted moose around Quartz Lake (Mishler 1984). Some Salcha band families went up Delta Creek to more central hunting areas (Andrews 1975,

1977). By mid-October the Goodpaster/Big Delta band would reunite at Big Delta with the Salcha band at the Salcha River to take advantage of the chum salmon runs. In late winter/early spring, the Goodpaster/Big Delta families moved back to the Goodpaster River and would hunt caribou upriver to Healy Lake and to the headwaters of the Goodpaster and Healy rivers. During their migration northward, caribou would appear in the Delta River region in great numbers and pass over the wooded hills along Shaw Creek. The bands regrouped at the semi-permanent villages during the summer months to harvest the salmon runs into early fall and prepare for winter storage.

3.2.7.3.1 Traditional Cultural Properties by Alternative

Properties of traditional and religious importance relating to Alaska Native tribes may be determined eligible for listing in the NRHP. Properties may be eligible for inclusion in the NRHP based on the role the property plays in a community's historically rooted beliefs, customs, and practices. Such sites may also be considered sacred sites and are generally referred to as TCPs. TCPs are expected to closely relate to traditional subsistence, cultural, and religious practices on lands managed by USARAK. Traditionally, natural resources and subsistence activities associated with those resources are intertwined with cultural beliefs and practices.

In order to be eligible for inclusion in the NRHP, a TCP must be real property, have an integral relationship to traditional cultural practices or beliefs, be in a condition that ensures that such relationships survive, and meet one of the NRHP criteria of eligibility. In addition, the TCP must not fall under any of the criteria considerations that would make it ineligible for inclusion in the NRHP.

A comprehensive survey for the presence of TCPs at DTA East has not been completed. It is expected that TCPs will be identified on DTA East and will consist of areas that have traditional, cultural and religious significance to tribes. The likelihood of TCPs within the proposed alternative sites is unknown. Tribal members have not yet determined the probability of TCPs occurring specifically within the alternative areas during consultations with tribes. Further research needs to be completed in this area. USARAK will continue to work with tribes who have the expertise in these geographical areas to determine the presence and nature of any TCPs.

3.2.7.4 Cultural Resource Surveys

3.2.7.4.1 Archaeological Surveys

Archaeological survey is the process of investigating an area for the presence of archaeological sites. Prior to conducting field surveys, literature reviews are undertaken to identify information regarding known sites, as well as a review of ethnographic, historic, and other research literature to begin identifying areas with a high probability for containing archaeological sites. Based on this information, a pedestrian survey is conducted over the area of interest, with sub-surface examinations occurring either (1) where the potential is high for archaeological material or (2) based on a testing strategy. A description of specific survey methods used by USARAK can be found in the appendix.

Twenty-four archaeological investigations have been conducted on DTA since 1963, identifying approximately 380 sites to date (Table 3.2.7.c). Twenty of these sites comprise the Donnelly Ridge Archaeological District, which is within DTA East. The majority of the archaeological

surveys conducted in DTA has been limited to DTA East, which comprises 25 percent of the entire Donnelly Training Area.

Table 3.2.7.c Archaeological Survey of DTA East [1].

Year	Researcher	Survey Location	Result
1963-64	West	Various locations on DTA	25 archaeological sites found
1977	Rabich and Reger	XMH-00253	1 site investigated
1979	Bacon	XM-1 Tank Range	No archaeological sites found
1979 [2]	Holmes	Various locations on DTA	62 archaeological sites found
1979 [2]	Bacon and Holmes	Various locations on DTA	6 archaeological sites found
1980a	Steele	Bison Trail DTA East	3 archaeological sites found
1980b	Steele	Squad Assault Range DTA East	No archaeological sites found
1980	Bacon	Cantonment	No archaeological sites found
1982	Steele	Various locations on DTA	No archaeological sites found
1982	Steele	Donnelly Dome Quarry Site	No archaeological sites found
1983	Steele	Texas Range Powerline	1 archaeological site found
1985	Kotani	XMH-00297	1 site investigated
1988	Reynolds	Donnelly Dome WACS	1 archaeological site found
1992	Staley	Various locations on DTA	No archaeological sites found
1995 [2]	Gamza	Sullivan's Roadhouse	1 site investigated
1998 [2]	Higgs et al.	Various locations on DTA	16 archaeological sites found
2002	Goodman	Powerline on DTA East	No archaeological sites found
2002	Headman et al.	Texas Range, Donnelly DZ, Eddy DZ	110 archaeological sites found [3]
2003	Robertson et al.	Eddy DZ	104 archaeological sites found [3]
2004	Robertson	North Texas and Eddy DZ	10 archaeological sites found
2005	Robertson	Texas Range, DTA Training Areas	42 archaeological sites found

[1] Less than 1 percent of the surveyed area represented in this table was conducted on DTA West.
[2] A portion of this survey was conducted on DTA West.
[3] Some of these sites represent previously reported sites whose locations were not well documented and which were relocated to obtain more accurate data.

Frederick West conducted the first regional survey of the Alaska Range foothills in the 1960s (West 1967). His survey at DTA included the Donnelly and Delta moraine physiographical areas. West located the 12 sites that comprise the Donnelly Ridge Archaeological District. This collection of sites has played a significant role in defining the Denali Complex of the American Paleoarctic Tradition.

In 1978, a reconnaissance-level survey was conducted in various areas of Fort Greely and DTA, resulting in the discovery of 62 sites (Holmes 1979). A 1979 survey located four sites (Bacon and Holmes 1980). Northern Land Use Research, Inc. conducted limited archaeological surveys in various areas of DTA, resulting in the identification of 16 additional sites (Higgs et al. 1999). Other smaller surveys have also been conducted for specific project areas. All of the sites that have been identified have been located in one of three physiographic settings: high points, bluffs or terraces overlooking a major river or site drainage, or lake margins. There is an inherent bias in these findings, however, as archaeological investigations have frequently focused on high probability settings such as these.

USARAK began archaeological surveys of large blocks of land within DTA East in 2002 to address proposed infrastructure construction on DTA East. Unlike previous surveys, these provided 100 percent pedestrian coverage of areas under consideration and an aggressive sub-surface testing strategy. These surveys (conducted 2002-2005) covered 53,500 acres, and identified over 266 new prehistoric sites of which approximately 91 have been evaluated for eligibility for listing in the NRHP. This includes one site that may be from the Athabascan Tradition or Early Contact period, which has been determined eligible for the NRHP, and one historic era site (possibly relating to Transportation and Infrastructure) that has not yet been evaluated for eligibility. Information obtained from these surveys is being used to generate a predictive model to better forecast the location of sites within other portions of DTA. Based on an evolving predictive model, sites are most likely found in areas containing kettle lakes. These are distinct topographical features paralleling either side of the Delta River and Jarvis Creek, and along the base of the foothills in DTA West.

The lands within DTA have likely supported human populations for 10,000 to 12,000 years. Because it was ice-free during the Wisconsin glaciation, interior Alaska contains the oldest verifiable prehistoric remains in the state and is significant in understanding the peopling of the New World. The oldest radiocarbon date for any item found on DTA is 8,555 (± 380) years BP, from charcoal at site XMH-00297. Some undated material resembles artifacts dating back to 12,000 BP.

3.2.7.4.1.1 Archaeological Surveys by Alternative

Archaeological surveys (2002-2005) have identified approximately 173 sites in the Eddy Drop Zone, Donnelly Drop Zone, North Texas Range and North Texas Range/Eddy Drop Zone Combination alternatives. Surveys were conducted in the proposed construction, maneuver and surface danger zone footprints of the four alternative locations. The portion of the surface danger zone of the North Texas Range alternative is within an existing impact area and was not surveyed. Cultural resource surveys are not conducted within active or former surface danger zones because of safety concerns regarding UXO.

Eddy Drop Zone – Surveys of the Eddy Drop Zone alternative identified 7 archaeological sites in the alternative's construction footprint and maneuver area. Surveys of the Eddy Drop Zone alternative identified 121 archaeological sites within the surface danger zone. The surface danger zones for Eddy Drop Zone and Donnelly Drop Zone alternatives overlap, therefore some of the same sites are included in the description of each alternative.

Donnelly Drop Zone – A survey of the Donnelly Drop Zone alternative identified one archaeological site within the alternative's construction footprint and maneuver area. However,

during the 2005 field season, only half of the construction footprint and maneuver area were surveyed. Based on topographical setting, it is anticipated that additional sites would be found in the unsurveyed areas. The remaining area would be surveyed only if this alternative was selected as the preferred alternative in the Record of Decision (ROD). A survey of the Donnelly Drop Zone alternative identified approximately 101 archaeological sites within the surface danger zone. The surface danger zones for Donnelly Drop Zone and Eddy Drop Zone alternatives overlap, therefore some of the same sites are included in the description of each alternative.

North Texas Range – A survey of the North Texas Range identified 21 archaeological sites within the proposed construction footprint and maneuver area. Surveys determined that 14 archaeological sites were located within the portion of the surface danger zone that is not located within an existing impact area. Cultural resource surveys were not conducted within those portions of the proposed surface danger zone boundary that fell within existing impact areas for safety reasons. The majority of the proposed surface danger zone at North Texas Range would be located within an existing dudded impact area.

North Texas Range/Eddy Drop Zone Combination – No archaeological sites were identified in the CACTF alternative's construction, maneuver and surface danger zone footprints at Eddy Drop Zone. A survey of the proposed BAX site at North Texas Range identified 27 archaeological sites within the proposed construction footprint and maneuver area, and those portions of the surface danger zone that did not fall within an existing impact area. Cultural resource surveys were not conducted within those portions of the proposed surface danger zone boundary that fall within existing impact areas for safety reasons. The majority of the proposed surface danger zone at North Texas Range would be located within an existing dudded impact area.

3.2.7.4.2 Architectural Surveys

Architectural surveying is the process of evaluating buildings and structures to identify those that may be eligible for listing in the NRHP. The process begins with archival and literature searches, to determine the potential of finding historic properties in the area of interest, followed by field surveys to record identified buildings and structures. Evaluations of buildings are performed under established historic contexts (i.e., World War II, Cold War Era) that have been identified as having significance, as defined by the NRHP. The survey also must determine whether identified buildings have "historic integrity," as required by the NRHP.

3.2.7.4.2.1 Architectural Surveys by Alternative

Historic context studies have been written on early mining and early transportation routes on DTA East and West. Based on the early mining study, no properties associated with this activity are expected in any of the alternatives. This study also concluded, with Alaska State Historic Preservation Office (SHPO) concurrence, that any found properties will be ineligible for inclusion in the NRHP. The study on early trails identified a number of historic trails on DTA. This study, however, only identified the Donnelly-Washburn Winter Cut-Off Trail as being potentially eligible for inclusion in the NRHP. This trail was located south of the North Texas Range alternative and west of Donnelly Drop Zone alternative, outside the area of potential effects. Roadhouses associated with the Valdez-Fairbanks Trail are no longer extant, with the exception of Sullivan's Roadhouse, which was moved to Delta Junction in 1996.

A historic context report on the Donnelly Flats MIDAS site, located within and to the south of the Donnelly Drop Zone alternative, is currently being prepared. Due to past demolitions at the site, the property is not eligible for inclusion in the NRHP. No other potential architectural resources have been reported in other field surveys within the remaining alternatives.

3.2.7.5 National Register of Historic Places Eligibility Evaluations

Archaeological sites and historic properties are evaluated for eligibility to the NRHP based on the NRHP "Criteria for Evaluation" developed by the National Park Service, the managing agency for the NRHP. These criteria are consistent with the *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation* (*Federal Register* Volume 48, Number 190). The criteria consist of four categories of value, or eligibility, identified as Criteria A, B, C, and D. Criteria A and B refer to association with important local, regional, or national events or persons demonstrating significant and far-reaching contributions to broad patterns of history. Properties can be eligible under Criterion C if they are characteristic of a distinct architectural type, period, style, or method of construction; embody unique artistic styles or display high artistic values; or represent the work of a master artist or craftsman. Criterion D refers to the research and data potential of a property

Typically, the most important factor in evaluating eligibility for archaeological sites is how well the site demonstrates research potential under Criterion D of the National Register Criteria for Evaluation; if a site has yielded, or may be likely to yield, information important in prehistory or history. This is often referred to as the research potential of a particular site. As such, the integrity of the site is very important. Even small sites and sites lacking datable material are very important for understanding interior Alaskan prehistory, local site formation processes and site distribution. In cases where site integrity was difficult to assess, 1m x1m test units were excavated strategically across the site to determine the extent of any site disturbance and the presence, location and densities of buried cultural material. Once the cultural deposit was characterized and the integrity was assessed, a determination of whether the site contains information that can significantly contribute to important research questions was addressed.

Archaeological site evaluations include a description of the artifacts and/or features identified, determination of eligibility, and justification of eligibility. Results of the evaluation phase work at each site will be presented in a formal Determination of Eligibility report to be submitted to the Alaska SHPO for review and concurrence. SHPO concurrence reflects the final stage in the Section 106 process. Non-concurrence results from a determination of adverse effect, which needs to be mitigated in a formal document, usually a Memorandum of Agreement between the SHPO, land manager, and other relevant parties. Final reports will contain a complete description of the evaluation methodology, site characteristics, site integrity and discussion of the research potential of the site, as well as all pertinent maps, photos and tables.

3.2.7.5.1 National Register of Historic Places Eligibility Evaluations by Alternative

A total of 37 sites have been determined by USAG-AK to be eligible for the NRHP. However, 87 are yet to be evaluated. No formal Determination of Eligibility reports have been submitted to the Alaska SHPO for review and concurrence. Submittal is schedule for mid 2006.

Eddy Drop Zone – All 5 archaeological sites within the construction footprint and maneuver area were evaluated and one of these sites was determined eligible for listing in the NRHP. Forty of the

121 archaeological sites within the surface danger zone were evaluated and of those evaluated, 24 sites were determined eligible for listing in the NRHP. Due to time and money constraints, not all sites within the surface danger zone have been evaluated. The remaining sites within the surface danger zone would be evaluated only if this alternative was selected as the preferred alternative in the ROD.

Donnelly Drop Zone – No sites within the surveyed portion of the construction footprint and maneuver area are eligible for listing in the NRHP. Sixteen sites within the surface danger zone are eligible for listing in the NRHP; however, 71 other sites have not been evaluated. The surface danger zones for Donnelly Drop Zone and Eddy Drop Zone alternatives overlap, therefore some of the same sites are included in the description of each alternative.

North Texas Range – Five sites within the construction footprints are eligible for listing in the NRHP. Cultural resource surveys were not conducted within those portions of the proposed surface danger zone boundary that fell within existing impact areas for safety reasons. Most of the proposed surface danger zone would be located within an existing dudded impact area. Six sites within the accessible portion of the surface danger zone are eligible for listing in the NRHP.

North Texas Range/Eddy Drop Zone Combination – No archaeological sites were located within the proposed CACTF footprint. Nine sites within the BAX construction footprint and maneuver area at North Texas Range are eligible for listing in the NRHP. Four sites within the accessible portion of the surface danger zone are eligible for listing in the NRHP.

3.2.8 Airspace

Issue 9: Airspace use and compatibility of range operations with other airspace users. The impact of construction and operation of the BAX and CACTF to airspace was identified as an issue of concern during the Draft EIS public comment period.

The definition of airspace includes vertical and horizontal boundaries and time of use. The FAA manages all airspace within the United States, including Alaska. In addition to airspace, the FAA manages air navigation systems, equipment, control towers, radar facilities, and implements the rules and regulations relating to powered flight. The FAA is responsible for managing commercial airline and air carrier, general aviation, and government agency airspace, including the U.S. military.

Use of airspace is required for the successful operation of the U.S. military. Some military flight activities are not compatible with civilian uses of airspace, and some military activities potentially conflict with other uses of military airspace. Airspace restrictions are needed within military installations to ensure safety and to avoid possible user conflicts.

3.2.8.1 Terminal and En Route Airspace

Terminal and en route airspace includes those areas where air traffic control service is provided in accordance with specific airspace classifications. All aircraft operators are subject to pilot qualifications, operating rules, and equipment requirements when using terminal and en route airspace. In addition, pilots operating under Instrument Flight Rules (IFR) operations in any

class of controlled airspace must file a flight plan with the FAA and receive appropriate air traffic control clearance. When a pilot is in operation under IFR, it may be in clouds, requiring the aircraft to be flown solely by instruments and therefore unable to see other aircraft. The air traffic controller takes the responsibility for the separation of aircraft from one another. Controlled airspace in the United States is designated as Class A, B, C, D or E.

3.2.8.1.1 Terminal and En Route Airspace by Alternative

A Class D area is centralized over the Allen Army Airfield located on Fort Greely, south of Delta Junction. A new air traffic control tower is in operation and provides communication 24 hours per day, seven days per week. The entire construction footprint and maneuver area for the BAX and CACTF at Eddy Drop Zone would be located within the Class D controlled airspace. Most of the Eddy Drop Zone surface danger zone would also be located within the Class D area. Only a portion of the Donnelly Drop Zone BAX surface danger zone would be within Class D controlled airspace (Appendix, Figure 3.l). No portions of the North Texas Range alternative would be within a Class D area. The ceiling of Class D airspace generally extends upward to 2,500 feet above ground level (AGL) over the airport surface. Class D requirements are that unless authorized, each aircraft entering this area must establish two-way radio communication with the air traffic control tower prior to entering the airspace and maintain the communication while transiting the area.

3.2.8.2 Special Use Airspace

Special use airspace is an area where certain activities (such as military aircraft training activities) are confined because of their potential to impact nonparticipating aircraft. The special use airspace program was originally established in the interest of National Defense, security and/or welfare. Special use airspace is identified on aeronautical maps to inform other airspace users where these activities occur. Limitations may be imposed upon aircraft operations that are not a part of those activities. The types of special use airspace are Prohibited Areas, Restricted Areas, Military Operations Areas (MOA), Warning Areas, Alert Areas, Controlled Firing Areas (CFA), and National Security Areas. While a CFA is designated a special use airspace, there are no restrictions on aircraft entering CFA designated areas as all obligations for ensuring flight safety fall upon the ground activity within the CFA. Small Arms Range Safety Areas (SARSA) are specific ground activity control measures used by the Army and are not considered special use airspace. However, these areas will be discussed under this topic heading.

To ensure the optimum use of airspace, agencies make their assigned special use airspace available for activities of other military units and agencies on a shared-use basis. Special use airspace is also located to impose minimal impacts on nonparticipating aircraft and air traffic control operations. Special use airspace is typically located to avoid airways/jet routes, major terminal areas, and known high volume visual flight rules (VFR) routes. Pilots operating in VFR routes have the responsibility for seeing and avoiding other aircraft, towers, buildings or landforms.

3.2.8.2.1 Special Use Airspace by Alternative

The types of special use airspace within the DTA area are Restricted Areas and MOAs including civilian flight corridors. CFAs and SARSAs are also used by the Army within DTA to ensure the safety of aircraft transiting the area.

Restricted Areas – Restricted areas contain airspace identified by an area on the surface of the earth within which the flight of aircraft is subject to restrictions. Activities within these areas must be confined because of their nature or because of the limitations imposed upon aircraft operations that are not a part of those activities. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. If the restricted area is not active and has been released back to the FAA, aircraft can operate in the restricted airspace with permission from the using or controlling agency.

Neither construction nor operation of a BAX or CACTF within a restricted area is proposed as part of the Eddy Drop Zone and Donnelly Drop Zone alternatives. However, all proposed activity areas (construction footprint, maneuver area and surface danger zone) for the BAX and CACTF at North Texas Range are located within a restricted area. With the exception of the extreme west and southwest corner of DTA, most of DTA West is within Restricted Area R2202A/B/C (Appendix, Figure 3.l). The proposed surface danger zone at North Texas Range would be located within DTA West. The western two-thirds of DTA West, including the Oklahoma and Delta Creek impact areas lie under R2202B. The remainder of DTA West and the western third of DTA East lie under R2202A and includes the Lakes, Mississippi, and Washington impact areas. R2202C overlies R2202A and R2202B. R2202A/B includes airspace from the ground surface to 10,000 feet above sea level. R2202C starts at 10,000 feet above sea level and is unlimited in height. (Complete restricted area descriptions can be found in *FAA Regulatory/Non-Regulatory Special Use Airspace Areas*). Access of restricted areas during periods of active use, without authorization from Eielson AFB Range Control on 125.30 MHz, may be extremely hazardous to the entering aircraft as military training exercises would be occurring.

Military Operations Areas, including Civilian Flight Corridors – All proposed activity areas (construction footprint, maneuver area and surface danger zone) for the BAX and CACTF at both Donnelly Drop Zone and North Texas Range are located within the Buffalo MOA. The Buffalo MOA overlays the portion of DTA East located east of the Richardson Highway (Appendix, Figure 3.l). This MOA extends from 300 feet AGL up to but not including 7,000 feet above mean sea level, excluding certain designated civilian flight corridors (see below). Under the Eddy Drop Zone alternative, the actual BAX and CACTF range facility would not fall within the Buffalo MOA. However, the BAX surface danger zone does fall within the Buffalo MOA, with the proposed range complex located just outside of the MOA boundary.

MOAs are designed to contain non-hazardous military flight activities including, but not limited to, air combat tactics, transition, formation training and aerobatics. MOAs are depicted on various aviation charts so that pilots can be aware of their location and parameters. The MOA structure in Alaska links the airspace between Eielson AFB, located near Fairbanks, and Elmendorf AFB near Anchorage, to air-to-ground weapons ranges located on interior Alaska Army installations (mainly FWA and DTA).

MOAs consist of airspace within defined vertical and lateral limits established for the purpose of separating certain military training activities from civilian aircraft operating under IFR conditions. Whenever a MOA is being used, nonparticipating IFR traffic will be rerouted or restricted by air traffic control. Pilots operating under VFR typically exercise extreme caution while flying within an MOA when military activity is being conducted. Pilots are encouraged to contact Eielson AFB Range Control on 125.30 MHz for real-time information regarding MOA hours of operation and traffic advisories near DTA.

The USAF prepared an EIS to evaluate the potential environmental effects of restructuring and using special use airspace in Alaska (USAF 1995). As a result of the decision to restructure existing MOA configurations, various mitigation measures were developed. Two civilian flight corridors were established along the Alaska Highway near Delta Junction and the Richardson Highway near Donnelly Dome. This corridor is established from the ground surface to 3,500 feet mean sea level to maintain civil aviation access along major VFR flyways along the Alaska Highway, Richardson Highway and the Trans-Alaska Pipeline. All proposed activity areas (construction footprint, maneuver area and surface danger zone) for the BAX and CACTF at Donnelly Drop Zone are located within at least a portion of the Richardson Highway VFR corridor. A portion of the surface danger zone proposed under the Eddy Drop Zone alternative is also within the Richardson Highway VFR corridor. Proposed actions under the North Texas Range alternative would not construct or operate a BAX or CACTF within either VFR corridor.

Controlled Firing Area – A CFA is airspace designated to contain activities that if not conducted in a controlled environment would be hazardous to nonparticipating aircraft. CFAs provide a means to accommodate, without impacting aviation, certain hazardous activities that can be immediately suspended if a nonparticipating aircraft approaches the area. The responsibility lies totally with the CFA user to terminate activities so there is not an impact on aviation. Typically spotter aircraft, radar, or ground lookout positions are used to indicate if an aircraft might be approaching the area. There is no requirement for nonparticipating aircraft to avoid the airspace or to maintain communications with air traffic controllers. In addition, CFAs are not indicated on aeronautical charts because the user terminates the activity when necessary to prevent endangering approaching aircraft.

The Allen Army CFA overlies a small portion of DTA East and West on both sides of the Delta River across from Allen Army Airfield. None of the proposed alternatives would be located within the Allen Army CFA.

Temporary Small Arms Range Safety Areas – Temporary SARSAs are Army control measures currently utilized throughout DTA. SARSAs could be utilized within all proposed activity areas (construction footprint, maneuver area and surface danger zone) for the BAX and CACTF at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range. A SARSA is an Army-established and Army-managed area designed to contain small arms range activities that, if not conducted in a controlled environment, would be hazardous to nonparticipating aircraft. It is the user's responsibility to provide for the safety of persons and property on the ground surface and in the air. Department of Army Pamphlet 385-63 requires that SARSAs be established at each small arms range not located within the confines of restricted areas or CFAs. SARSA altitude boundaries represent the highest ricochet vertical hazard for all weapon systems used on the range. Airspace above and adjacent to the range is adequately monitored to preclude endangering aircraft operations.

Several safety features to protect approaching aircraft that are used during operation of a SARSA include the requirement of cloud height to be at least 305 meters above the highest altitude of fire (maximum ordinance or ricochet height), sufficient visibility to detect nonparticipating aircraft and cease fire prior to entrance of the SARSA, monitoring of the adjacent five miles of airspace, and ceasing of fire upon notification of approaching aircraft.

3.2.8.3 Civilian Aviation Airspace Use

As of January 2005, there were 20,802 active pilots and 9,902 registered aircraft in Alaska. Air carriers in Alaska transport the equivalent of four times the state's population each year, compared to about 1.7 times the U.S. population carried by air commerce in the other states. Lake Hood in Anchorage is the world's largest and busiest seaplane base. It accommodates an average of 110 takeoffs and landings daily, and more than 600 on a peak summer day. Since 1982 the federal Airport Improvement Program has provided $1.3 billion for airport construction, development and planning in Alaska. These federal funds were provided for more than 900 projects within the state. In 2004 the FAA Alaskan Region distributed $221 million in grants to state and local airport sponsors (FAA 2005).

3.2.8.3.1 Civilian Aviation Airspace Use by Alternative

Both of the civilian flight corridors established along the Alaska Highway near Delta Junction and the Richardson Highway near Donnelly Dome are highly used for civil aviation access along major VFR flyways. The corridor along the Richardson Highway leads to Isabel Pass, which is one of two passes through the central Alaska Range between Fairbanks (and other interior Alaska locations) and south-central Alaska. Civilian air traffic primarily uses Isabel Pass due to its higher probability of favorable weather conditions. Civilian aircraft traffic through the VFR corridors generally operates at altitudes of 2,500 feet AGL or less. Although no specific use numbers are available along the VFR corridors, the FAA has estimated that as many as 84,000 itinerant flights departed from Fairbanks in 1994 and as many as 19,000 itinerant flights originated from the Gulkana area (located south of the Alaska Range and DTA) (USAF 1995).

All proposed activity areas (construction footprint, maneuver area and surface danger zone) for the BAX and CACTF at Donnelly Drop Zone are located within at least a portion of the Richardson Highway VFR corridor. A portion of the surface danger zone proposed under the Eddy Drop Zone alternative is also within the Richardson Highway VFR corridor. Construction or operation of a BAX or CACTF at the North Texas Range alternative would not be within either VFR corridor.

3.2.8.4 Military Aviation Airspace Use

All branches of the military have the potential to participate in joint/combined flying training, Major Flying Exercises, and Army ground combat exercises using existing MOAs and restricted airspace. Alaska is the closest U.S.-controlled tactical flying training area available to Pacific Air Force forces and U.S. allies in the Pacific region. In addition, Army and USAF aircraft are permanently assigned to Alaska and conducts routine training missions.

The USAF primarily uses special use airspace for flying training and Major Flying Exercises. These activities are designed to give aircrews their first exposure to mock air warfare. Typical training objectives include counter air, air interdiction, close air support, forward air control, or suppression of enemy defenses. During a Major Flying Exercise, a combat scenario is developed and roles are given to participating aircraft and ground forces (typically the Army). Ground forces position themselves to form a realistic air defense environment.

When the Army isn't participating in an USAF Major Flying Exercise, the Army uses restricted areas for training with live ordnance. Artillery, mortars and other ordnance are fired from firing

points to targets located within existing Army impact areas. Army regulations require special use airspace during any activity over 45 meters AGL, to include ricochet ordnance that would be hazardous to aircraft. Such activities include artillery fire, mortars, missiles and rockets, air-to-ground weapon systems, aerial target practice, laser operations, demolition and explosive devices, electronic warfare devices, remotely piloted and unmanned aerial vehicles and any other activity considered to be hazardous or non-compatible with other users of the airspace except for small arms activities authorized and conducted in a SARSA.

The Cold Regions Test Center (CRTC) also uses special use airspace for training and testing requirements. CRTC testing activities are similar to the other training activities that occur in the area.

Activities performed by the SMDC/Fort Greely do not involve the use of special use airspace. Activities involving Allen Army Airfield located on Fort Greely are currently subject to Class D airspace requirements.

3.2.8.4.1 Military Aviation Airspace Use by Alternative

Eddy Drop Zone – Currently Eddy Drop Zone is utilized for Army airborne training operations. The USAF may use Buffalo MOA as a high altitude transition route to nearby air-to-ground training ranges. No artillery fire or mortar training occurs at Eddy Drop Zone as there is no existing restricted area or impact area at the site. CRTC has no testing facilities at Eddy Drop Zone. Aircraft entering the Class D area, unless authorized, must establish two-way radio communication with the air traffic control tower prior to entering the airspace and maintain the communication while transiting the area.

Donnelly Drop Zone – The Donnelly Drop Zone is also utilized for Army airborne training operations. The USAF may use Buffalo MOA as a high altitude transition route to nearby air-to-ground training ranges. No artillery fire or mortar training occurs at Donnelly Drop Zone as there is no existing restricted area or impact area at the site. CRTC has no testing facilities at Donnelly Drop Zone.

North Texas Range – North Texas Range is primarily used for artillery fire or mortar training as existing restricted area and an impact area are located adjacent to North Texas Range. CRTC's testing facilities are located on or near North Texas Range. The USAF uses Buffalo MOA as a high altitude transition route to nearby air-to-ground training ranges. In addition, Army training activities at North Texas Range are incorporated into USAF Major Flying Exercises.

North Texas Range/Eddy Drop Zone Combination – Civil aviation airspace use under this alternative is similar to that described above for Eddy Drop Zone and North Texas Range.

3.2.8.5 Airspace Management

Shared military use of airspace and ranges located within U.S. Army controlled lands in Alaska is based on agreements made between USARAK, U.S. Army Garrison Alaska, 11th Air Force and the Cold Regions Test Center. A Memorandum of Agreement sets forth policy and procedures for the shared use of applicable restricted areas and MOAs. The Memorandum of Agreement designates the 353rd Combat Training Squadron as the scheduling agency for interior Alaska MOAs and USARAK as the scheduling agency for Restricted Area R2202 (A,B,C and D).

Information about the use of airspace primarily by the USAF is made available to the civilian aviation community through the Special Use Airspace Information Service (SUAIS). Details concerning military activity can be obtained by calling a toll-free phone number (1-800-758-8723). Pilots are able to talk directly to Eielson AFB Range Control to obtain detailed airspace use information. The Army utilizes the Notice to Airmen (NOTAM) system to inform users of airspace about any associated hazards. The NOTAM system is managed by the FAA. Individual pilots must inquire about existing NOTAMs when filing a flight plan. These notices are updated when information changes.

Military units schedule restricted areas for training with DTA Range Control or the Joint Scheduling Office, 353rd Combat Training Squadron, Eielson AFB. Once scheduled, the appropriate Range Control office includes the dates and times of aircraft operations for the NOTAM system. These notices are supplied to the FAA Regional Office. If the aircraft would fly in a MOA to get to a restricted area, the unit would schedule that MOA with the Joint Scheduling Office, 353rd Combat Training Squadron, Eielson AFB. Prior to entering and exiting any restricted area, military aircraft are required to monitor and then broadcast intentions to Eielson AFB Range Control. Operating units are required to monitor Range Control while operating inside of a restricted area. Safety procedures are detailed in USARAK Regulation 95-1, *Aviation*.

3.2.8.5.1 Airspace Management by Alternative

The above mentioned management procedures are applicable at Eddy Drop Zone, Donnelly Drop Zone and North Texas Range.

3.2.8.6 Airfields

At DTA, Allen Army Airfield can support C5/C17 aircraft in winter and C-130 aircraft at all other times. Donnelly Assault Strip in DTA East can accommodate rotary-wing aircraft and C-130 aircraft as well as most civilian light, single and twin-engine aircraft. DTA West contains three airstrips: Bennett, Sullivan, and Delta Creek Assault Strip. In their current configuration, they can support rotary-wing aircraft and certain fixed wing, single-engine aircraft. In addition, there is a landing strip located in Delta Junction that supports rotary-wing, fixed-wing single-engine, and certain twin-engine transport aircraft. This airstrip is the base of operations for the State of Alaska Division of Forestry, one air taxi business, guiding services, and a staging area for the nearby Pogo Mine. Black Rapids airstrip, located south of DTA near the Black Rapids Training Facility, can accommodate rotary-wing and certain fixed-wing, single-engine aircraft.

3.2.8.6.1 Airfields by Alternative

No airfields are located within any of the activity areas (construction footprint, maneuver area and surface danger zone) at Eddy Drop Zone, Donnelly Drop Zone or North Texas Range.

3.3 SECONDARY ISSUES OF CONCERN

3.3.1 Air Quality

The Clean Air Act (CAA) authorizes the EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health for six criteria pollutants (i.e., ozone [O_3], carbon monoxide [(CO)], nitrogen dioxide [NO_X], sulfur oxides [SO_2], particulate matter [PM_{10} and

$PM_{2.5}$] and lead [Pb]). Areas that are in compliance with the NAAQS are referred to as attainment areas, while areas in noncompliance with the NAAQS are designated as non-attainment areas. Visibility is a valued and important air quality resource that is regulated under the CAA. This resource is specifically regulated through the Regional Haze Rule (40 CFR 51). States are required to submit plans for improving visibility with the goal of reaching natural visibility conditions by 2004. Stationary, mobile, and area sources are regulated under the Regional Haze Rule. Alaska is currently developing regulations to implement the Regional Haze Rule and is in the process of developing a strategy for achieving the mandated goals. A more detailed description of the DTA air quality regulatory framework is provided in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2*.

When the ambient temperature drops below approximately -20 °F, ice fog, a condition unique to frigid climates, may form and contribute to pollution and visibility problems. Ice fog forms when water vapor is exposed to completely saturated air. Water vapor from sources such as automobiles is cooled so quickly when it is exposed to ambient air, that tiny ice particles are formed. Ice fog is a form of air pollution in populated areas where the topography, combined with strong inversions, causes air to stagnate (Benson 1970). In a study by Benson (1970), the largest source (64 percent) of ice fog in Alaska was cooling water released into rivers from power plants. Neither DTA nor Delta Junction has this source of ice fog. Combustion of fuels from automobiles, power plants, and fuel oil accounted for 32 percent of localized ice fog. The remaining 4 percent was contributed by miscellaneous sources such as people, animals, and leaks from houses and steam lines. In the Delta Junction area, frequent strong winter winds help prevent temperature inversions and extended periods of ice fog. On DTA, winter military exercises can cause localized ice fog when groups of vehicles are kept idling in the field, which is common when head bolt heaters are unavailable.

The Alaska Department of Environmental Conservation (ADEC) regulates ice fog as a pollutant. This pollutant is typically regulated through state issued permits. Permittees may be requested to reduce water vapor emissions (State of Alaska 2002). (See *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2* for additional information on air quality regulations.)

Pollutants can also be generated as a byproduct of industrial activities. Fugitive dust is typically generated from daily industrial activities such as bulk material handling, storage, and construction projects. The Delta River and Jarvis Creek are large sources of fugitive dust during wind events in summer, and sometimes during winter months. Heavy machinery and vehicles during construction and personal and tactical vehicles driving on unpaved roads and surfaces can also generate fugitive dust.

The central heating and power plant at DTA is located on the Main Post of Fort Greely, which has been transferred to SMDC. DTA facilities requiring central heating are supplied by the existing infrastructure at Fort Greely. Electrical power requirements at DTA are met through a combination of power supplied by the Golden Valley Electric Association and on-post generators run by SMDC personnel. This output would be expected to meet the demand for USARAK transformation activities and the proposed range projects. No crimping of public services would occur as a result of transformation or proposed action. Existing power, water and communications infrastructure would easily adapt to the projected increase in activity. Thus no mitigation measures are required to maintain adequate energy requirements.

3.3.1.1 DTA Regional Air Quality

DTA is designated an attainment area for the six regulated NAAQS. For permitting purposes, DTA is a separate facility from FWA. Since the annual potential emission is less than 100 tons for any of the criteria pollutants, no Air Quality Operating Permit is required at this time.

No air quality monitoring data exists for DTA East or West, or for any of the surrounding communities. Particulate sampling equipment was recently installed at Fort Greely, but insufficient data have been collected to provide an accurate measure of air quality relative to particulates. Air quality at DTA East approximates natural baseline conditions, given the low density of human development and emission sources present. While DTA East does experience periodic episodes of ice fog, the durations of these episodes are generally short. Strong and persistent temperature inversions do occur, but, due to the limited number of emission sources, the inversions are unlikely to cause pollutant levels that exceed the NAAQS.

3.3.1.1.1 Air Quality Status by Alternative

DTA is not a Prevention of Significant Deterioration (PSD) Major Facility. For permitting purposes, DTA is a separate facility from FWA, as it is outside the installation boundary and is noncontiguous. One small back-up generator is used to power lights in an on-site dining facility when necessary. The Golden Valley Electric Association provides primary electrical power.

3.3.1.1.2 Other Required Permits by Alternative

USARAK currently has a Conditional Fog Permit, amended and renewed in 2004 by the ADEC, to conduct fog oil training at DTA including Eddy Drop Zone, Donnelly Drop Zone, and North Texas Range alternatives. This permit was issued under 18 AAC 75.800 (Permit for Oil Discharge for Scientific Purposes). Fog oil is a battlefield obscurant used to produce a smoke screen to mask troops and troop locations. It is created when a petroleum distillate is heated and expelled from stationary and mobile smoke generators. Upon contact with the air, the expelled oil droplets condense to form a thick white smoke. The Conditional Fog Permit, renewed annually, allows the use of up to 6,000 gallons of fog oil and 2,000 gallons of kerosene per federal fiscal year. The impacts of fog oil smoke training activities at USARAK were previously assessed, leading to a Finding of No Significant Impact (USARAK 2000c).

Smoke generation training would be conducted within the BAX and CACTF facilities, including the use of fog oil smoke generators (both stationary and vehicular-mounted units), smoke grenades, and smoke pots. Smoke generation is subject to several limitations, as outlined in USARAK Regulation 350-2, *Range Regulation* (USARAK 2004b).

For the use of smoke grenades and smoke pots, regulations require the following:

- Computations to consider temperature gradients and the direction and speed of the wind.
- Test grenades to be used before smoke pots are employed.
- Complete dissipation of all smoke before leaving the reservation boundary.
- Under marginal conditions, an NBC-qualified officer should evaluate all factors and recommend the type and uses of smoke.

For the use of fog oil, regulations and permit conditions require the following:

- All requests for smoke generation to be reviewed (and commented on) by the 172nd Stryker Brigade Combat Team (SBCT), Chemical Platoon before submission to Range Control.
- Units to record the amounts of fog oil and diesel fuel-arctic used when smoke is produced, the rate of movement of the fogger, global-positioning-system data for locations of foggers, temperature, and wind speed and direction; and to provide the information to Range Control.
- Smoke generation not permitted within 300 meters of a water body (i.e. lakes, rivers, or streams); within 1,000 meters of the post border, urban area, and cantonment area; within 500 meters of the Richardson Highway; or within 100 meters of the Alaska Railroad tracks.
- Spill prevention measures to be taken to prevent spills while using and refueling smoke generators. Spill response equipment to contain and cleanup any spills that occur must be available in the field. All spills are to be immediately reported to Range Control.
- Use of the smoke generators to be annotated on all range requests that include smoke generation. Range managers are required to capture utilization data in the Range Facility Maintenance Support System (RFMSS).
- Units to give no less than 12 working days prior notice when requesting smoke operations.
- Units to consult fog-oil smoke maps when requesting such training. These maps will show the environmental/geographical restrictions and are available at Range Control.

In addition to maintaining a Conditional Fog Permit for the facility, USARAK must periodically obtain municipal burn permits in order to accomplish prescribed burns. These prescribed burns are conducted to maintain range safety. USARAK coordinates these prescribed burning activities with the BLM, AFS. AFS is the lead for prescribed burning on USARAK lands. USARAK and AFS coordinate with the ADEC and the local municipality when conducting prescribed burns that are greater than 40 acres in a given year. The burns are conducted in accordance with air quality regulations and conditions included in the burn permits.

3.3.2 Groundwater

Groundwater is found below the earth's surface and is comprised of water that percolates through the soil from the surface. Groundwater can be found almost everywhere at DTA, in variable quantities at different locations. The water table may be deep or shallow, and may rise or fall depending on many factors such as heavy rains, melting snow, or extended dry periods. These can also affect the pressure of groundwater, called the hydraulic head pressure, and groundwater yield (often measured in gallons per minute). Groundwater collects in formations called aquifers, in layers of substrate. The rate at which groundwater flows (hydraulic conductivity) depends on the hydraulic head pressure, the size of the spaces in the soil or rock (porosity), and how well the spaces are connected (Groundwater Foundation 2002). A confined aquifer has limited vertical movement due to a confining layer above, while an unconfined aquifer is attached to other aquifers and water can flow easily into (and out of) the aquifer.

3.3.2.1 Groundwater Flow

Groundwater flow determines the amount of groundwater available for diversion or use, as well as the recharge rates for groundwater withdrawals. The flow gradient indicates the direction in which

groundwater is flowing, thereby enabling better planning for groundwater withdrawal, recharge, or contamination.

Flow data may also indicate the type of groundwater system (or systems) located within an area. For example, many areas in interior Alaska contain both an upper overlaying water table (an unconfined aquifer) and a deeper groundwater pool (a confined aquifer).

3.3.2.1.1 Groundwater Flow by Alternative

The principal groundwater aquifer of the DTA East and the Delta Junction area is in the permeable sands and gravels of the broad coalescing alluvial fan or outwash plains that run from the Alaska Range north to the Tanana River. The alluvial aquifer system is recharged from streams and from infiltration of precipitation. Most recharge occurs in late spring and early summer, when ground thawing permits penetration of melt water and flow increases in surface streams. Jarvis Creek and the Delta River lie above the aquifer, and a considerable portion of their flow infiltrates from the streambeds to the groundwater table.

The water table slopes north at gradients ranging from one to 25 feet per mile, a lower gradient than the slope of the ground surface. Consequently, the depth to the water table decreases down slope from nearly 400 feet near the mountains to 180 feet in the vicinity of Fort Greely and Eddy Drop Zone to 80 feet at Delta Junction and to 10 feet at Big Delta at the Tanana River. Annual fluctuations of the water table depth ranges from 50 to 60 feet in the Fort Greely area to two to three feet at Big Delta. Data from the northern portion of DTA East indicate that groundwater levels are lowest in late May or early June, after which recharge from surface waters reaches the aquifer. The groundwater levels rise through the summer and peak in October after which the rivers freeze and recharge ceases (Wilcox 1980). The thick sand and gravel alluvium result in high transmissivity for the aquifer.

Well yields at DTA are as high as 1,500 gallons per minute (Wilcox 1980). In the northern, western, and eastern portions of DTA East, as the aquifer approaches the surface and the Tanana River, water is discharged from the alluvial aquifer system to the surface water system, often as springs. Clearwater River and Clearwater Lake are almost entirely spring fed. This is substantiated by the fact that these areas remain unfrozen during the winter months because of the inflow of relatively warm (40° F) groundwater. Springs are also present near the mouth of the Delta River (Wilcox 1980).

3.3.2.2 Groundwater Quality

Groundwater quality describes the presence and concentrations of various minerals and pollutants found in the groundwater. This data is useful in determining the level of hazard or health risk (environmental or human) associated with groundwater, as well as in determining the possible range of uses for groundwater resources.

Although surface water is abundant in the Tanana River Basin, most of DTA's potable water is obtained from groundwater wells. The largest potential groundwater supply is in the floodplain alluvium along the Little Delta River, Delta River, Delta Creek, and Jarvis Creek, and in alluvial fans extending along northern flanks of the Alaska Range. The surface to groundwater depth at DTA is between 100 and 210 feet, and most DTA wells draw water from unconfined aquifers in unconsolidated alluvial deposits. Groundwater recharge seeps from glacier-fed streams.

Population density near DTA is sparse. Few wells have been drilled on the installation, and data for groundwater quality are limited to areas in the immediate vicinity of the Fort Greely Main Post. Most of the available groundwater quality data were obtained during the early 1950s through the 1970s, and appear to provide a reasonable estimate of the region's natural groundwater quality. There are also groundwater monitoring wells within Fort Greely that were drilled in response to specific chemical or waste spills or hazardous materials operations. Groundwater data from these wells can be found in Appendix E of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a).

A limited number of groundwater monitoring wells have been drilled on DTA specifically to monitor for (and to measure) possible explosive contaminants. Monitoring for munitions residue and hydrologic data has occurred in 14 wells on Washington Range since 2001. No munitions residue has been detected in the groundwater at these wells (Collins 2005). If munitions residue is detected in nearby surface waters, additional groundwater monitoring wells will be installed.

3.3.2.2.1 Groundwater Quality by Alternative

Available data indicates that groundwater quality is good at DTA. All measurements were below concentrations recommended by the Alaska Drinking Water Standards. For example, pH values were within the acceptable range of 6.5 to 8.5, and sodium values ranged from 5.1 mg/l at Donnelly Flats to 3.2 mg/l at Black Rapids, all within the standard of 250 mg/l. Sulfate, chloride, fluoride, nitrate, and iron values are also within state standards. Dissolved solids values ranged from 153 mg/l (at well G-13) to 225 mg/l (at well G-10), and these values are within the standards (USARAK 2004a). Additional groundwater data can be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a).

3.3.3 Wetlands

Much of DTA is classified as wetlands, which are sociologically, ecologically, and economically important to the area. Wetlands in Alaska are unique compared to wetlands in lower latitudes because of features such as permafrost and aufeis (river channel ice).

The U.S. Army Corps of Engineers (USACE) (40 CFR Part 230) and the Environmental Protection Agency (EPA) (33 CFR Part 328) jointly define wetlands as: "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

3.3.3.1 Wetland Surveys

Various wetlands studies have been conducted on DTA. A National Wetlands Inventory (NWI) was conducted by the U.S. Fish and Wildlife Service (USFWS) for the DTA area in 1988. This study used aerial photos and maps to predict and classify wetland areas based on vegetation, visible hydrology, and topography, but did not include analysis of soils.

In 1997 and 1998, R. Lichvar completed a field survey to more precisely describe wetland ecotypes at DTA. Lichvar (2000) used field data and adapted findings from the NWI survey and an ecological land survey (Jorgenson et al. 2001) to delineate wetlands on DTA. Lichvar identified which ecotypes were most likely to be wetland and which were most likely to be upland

areas. Some of the ecotypes were problematic based on fire history or because of the methods used to combine vegetation types to create the ecological land survey.

The 1988 NWI maps coded wetlands according to Cowardin et al. (1979). Lichvar (2000) assigned a probability rating to each ecological land survey ecotype. Areas that are "almost always wetlands" have a high probability rating (>99 percent) and areas that are "usually wetlands" have a 67-97 percent probability of being wetland. Ecotypes that are "equally likely to be wetland or nonwetland" accounted for a small number of total acres (1 percent of DTA). For upland ecotypes, areas that are "usually nonwetlands" have a probability ranking of 67-99 percent and areas that are "nonwetlands" are estimated at 99 percent probability. Neither the ecotypes nor the probability rankings can be directly linked to the Cowardin et al. codes utilized for the NWI maps, but this mapping does allow for a general wetland or nonwetland determination to be made. Although both the NWI and Lichvar (2000) indicated areas of probable and possible wetlands, site visits are always needed to delineate wetlands at various projects on DTA for USACE permitting processes.

ABR Inc. was contracted to conduct wetland delineations and mapping in the Eddy Drop Zone and Donnelly Drop Zone alternatives in 2003 and 2004 (ABR Inc. 2004a,b). This was accomplished by interpreting NWI data, ecological land classifications and aerial photography. Field verifications by ABR, Inc., were performed at Eddy Drop Zone but not at Donnelly Drop Zone.

USAG-AK and USACE Regulatory, Alaska District surveyed the North Texas Range alternative, and completed field verifications of ABR Inc.'s Donnelly Drop Zone study (USAG-AK 2005a). These field studies resulted in verifications of the previous wetland delineations in accordance with the joint USACE and EPA wetland definition. Each wetland parcel was assigned a Cowardin et al. 1979 classification code. These classes were also categorized as higher function wetlands, other wetlands, and uplands for management purposes (Appendix, Figures 3.q, 3.r, 3.s and 3.t). These categories are further defined in Section 3.3.3.3.1, *Wetlands Use Management*.

Lichvar 2000 data was used to compare potential impacts to wetlands at each alternative to total wetlands at DTA East and West. This is the only data set that is complete for all areas of DTA.

3.3.3.2 Wetland Types

Approximately 68 percent (431,940 acres) of DTA is wetland (Lichvar 2000), with palustrine, riverine, and lacustrine classes included. Palustrine shrub wetlands are the most common types of wetlands found on DTA.

Palustrine wetlands are nontidal and tidal-freshwater wetlands intermittently to permanently flooded, open water bodies of less than 20 acres in which water is less than 6.6 feet deep. Vegetation is predominantly trees; shrubs, persistent or nonpersistent emergent, erect, rooted herbaceous plants; mosses and lichens; or submersed and floating plants (Cowardin et al. 1979).

Riverine wetlands are contained within a river channel except for sites dominated by trees, shrubs, or persistent emergent plants (Cowardin et al. 1979).

Lacustrine wetlands are found within topographic depressions or dammed river channels, or associated with lakes. Sites lack trees, shrubs, or persistent emergent vegetation. These sites are larger than 20 acres and/or have a depth greater than 6.6 feet at low water (Cowardin et al. 1979).

According to Lichvar 2000, the most prevalent ecotypes likely to be wetlands at DTA include:

Lowland Wet Low Scrub and Lowland Tussock Scrub Bog (35 percent of DTA) – These palustrine wetlands are characterized by loamy soils that are poorly drained because of permafrost. The bogs contain sedges, tussock meadows, and lowland moist meadows with bluejoint reedgrass (*Calamagrostis canadensis*). Willows, dwarf birches, and forbs may also be present.

Lowland Wet Needleleaf Forests (12 percent of DTA) – Soils are loamy, poorly drained because of permafrost, and moderately acidic. These forests are dominated by black spruce (*Picea mariana*). This type of wetland is common in the Donnelly Drop Zone and Eddy Drop Zone alternatives.

Alpine Wet Tussock Meadow and Alpine Wet Low Scrub (6 percent of DTA) – These ecotypes are characterized by loamy soils, underlain by permafrost, and are moderately to strongly acidic. These areas are found above tree line, primarily in the southern portion of DTA West, along the foothills of the Alaska Range.

Riverine Wetland Complex (6 percent of DTA) – These areas are located along inactive floodplains of meandering and headwater streams with soils consisting of inter-bedded silts and sands. Wetlands located along the Delta River and Jarvis Creek are riverine systems.

Lacustrine Wetland Complex (1 percent of DTA) – Lacustrine water bodies are ponds and lakes with or without emergent or floating vegetation, and wetland vegetation on the margins. This also includes basins in fine-grained lacustrine deposits with vegetation dominated by grasses.

3.3.3.2.1 Wetland Trafficability

Trafficability was defined in Section 3.2.1.1.1, *Soil Trafficability*, as the ability of soils to physically support military vehicle maneuvers. Soil trafficability is the primary factor used to evaluate potential damage from off-road military vehicle maneuvers in the analysis (primarily the Stryker). By determining the trafficability of soils at each alternative BAX site, an evaluation of the site's relative capacity (or ability) to support off-road vehicle maneuver can be made. Trafficability of soils at each alternative CACTF site was not assessed because vehicles are expected to primarily remain on roads and trails. Wetlands (which include areas of saturated soil) and slopes over 30 percent are considered not trafficable. USARAK used soil wetness (which was equated to wetland areas) as the primary factor for determining trafficability at DTA East, since slopes rarely exceed 30 percent in the study areas. The trafficability and maneuver capacity for each alternative area is described in USARAK 2006 and is described in Section 3.2.1.1.1, *Soil Trafficability*.

3.3.3.2.2 Wetland Types by Alternative

NWI and Lichvar (2000) both provide acceptable information about wetlands on the 650,000 acres of DTA. However, for the Clean Water Act, Section 404 permits, site mapping on a finer scale is required. More intensive wetland delineations were completed for the alternatives (ABR, Inc. 2004a,b and USAG-AK 2005a). Final field verifications or delineations for each alternative are described further in USAG-AK 2005a.

Eddy Drop Zone – A wetland survey was conducted within the BAX and CACTF construction footprint and maneuver area (ABR, Inc. 2004a,b) (Appendix, Figure 3.q). The wetland survey data completed by ABR, Inc. was verified by USAG-AK and USACE Regulatory, Alaska District during the summer of 2005 (USAG-AK 2005a). Site visits and fieldwork were focused on those sites where ABR, Inc. wetland determinations conflicted with NWI overlays (USFWS 1988).

Wetlands comprised about 14 percent of the BAX maneuver area (388 acres out of 2,872 acres) and 8 percent of the CACTF maneuver area (96 acres out of 1,184 acres). The predominant wetland type is dwarf needleleaf scrub, with permafrost located within 20 inches of the soil surface. The second most common wetland type is needleleaf forest. Wetland areas important to waterfowl or sites with regionally important hydrological and ecological functions are restricted mainly to the southeastern section of the proposed BAX area. These wetlands include ponds with margins of emergent vegetation (ABR, Inc. 2004a,b), along with the wetlands within the floodplain of Jarvis Creek (USAG-AK 2005). See Section 3.2.1.1.2 for a discussion of hydric soils at Eddy Drop Zone.

Donnelly Drop Zone – Using aerial photography, the ecological land survey for Fort Greely (Jorgenson et al. 2001), and information derived from the Eddy Drop Zone field delineation, ABR, Inc. mapped vegetation types and classified wetlands in the Donnelly Drop Zone construction footprint and maneuver area (Appendix, Figure 3.r). Field verifications of this aerial interpretation were conducted by USAG-AK and USACE during the summer of 2005 (USAG-AK 2005a).

Wetlands comprise approximately 73 percent of the BAX maneuver area (2,475 acres out of 3,413 acres) and 41 percent of the CACTF maneuver area (286 acres out of 694 acres). The predominant wetland type is dwarf needleleaf shrub types (black spruce forest). The second most common wetland type is deciduous shrub. Higher function wetlands at Donnelly Drop Zone include the riverine and emergent vegetation parallel to Jarvis and Ober creeks. See Section 3.2.1.1.2 for a discussion of hydric soils at Donnelly Drop Zone.

North Texas Range – Using aerial photography, the NWI wetland maps (USFWS 1988), and information derived from field surveys conducted in the summer of 2005, USAG-AK and USACE delineated and classified wetland types in the North Texas Range construction footprint and maneuver area (Appendix, Figure 3.s).

Wetlands comprise about 36 percent of the BAX maneuver area (923 acres out of 2,548 acres) and 45 percent of the CACTF maneuver area (347 acres out of 771 acres). The predominant wetland type is deciduous scrub-shrub. Higher function wetlands at North Texas Range include ponds, lakes and emergent vegetation mostly found in depressions (USAG-AK 2005a). See Section 3.2.1.1.2 for a discussion of hydric soils at North Texas Range.

North Texas Range/Eddy Drop Zone Combination – Wetlands comprise approximately 31 percent of the BAX maneuver area (1,246 acres out of 4,081 acres) and 8 percent of the CACTF maneuver area (96 acres out of 1,184 acres) (Appendix, Figure 3.t). The predominant wetland type is dwarf needleleaf scrub at Eddy Drop Zone, and deciduous scrub-shrub is the predominant wetland type at North Texas Range. See Section 3.2.1.1.2 for a discussion of hydric soils at North Texas Range and Eddy Drop Zone.

3.3.3.3 Wetlands Management

Wetlands management at DTA is implemented on the primacy of the military mission and the belief that effective training can be accomplished with minimal long-term environmental damage while complying with applicable laws and regulations. Effective military training and environmental stewardship are compatible and necessary for the maintenance of a quality military training environment and protection of sensitive wetland areas (USARAK 2002b).

Wetlands management helps maintain proper wetland functions while allowing military training and ensuring plant, wildlife and soil resources are not degraded. Implementation of wetlands management improves the quality of military training at DTA by providing realistic training options in wetlands, resulting in an overall increase in training opportunities. Wetlands management also establishes a basis for conservation and protection of wetlands (USARAK 2002b).

3.3.3.3.1 Wetlands Use Management

USARAK has classified wetlands as either "higher function" or "other" for management purposes, a distinction not mandated by federal or state policies. Higher function wetlands include riverine areas, permanent emergent areas, semi-permanent emergent areas, riparian areas, and other sensitive wildlife habitats that lie within any wetland areas. Higher function wetlands include palustrine short shrub, palustrine forested, lacustrine, riverine, and some palustrine emergent wetland areas (as classified under Cowardin et al. 1979). The "other" category includes all other wetland types. New wetland data gathered during 2005 prompted a revision of areas depicted as higher function or other wetlands for management purposes (Appendix, Figures 3.q, 3.r, 3.s, and 3.t) (USAG-AK 2005a). The importance of various functions may vary by alternative location.

Since 2000, USARAK has managed military training in wetlands at DTA by limiting maneuver or other military activities to upland and certain wetland areas based on the potential for environmental damage. Between 2000 and 2005, wetland damage was approximately 11 acres, of which a majority was restored.

Environmental limitations overlays were developed as a planning tool for protecting wetlands during military maneuver activities (Figures are located in Appendix A of the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*). Each overlay is available in a summer and winter version with approved and restricted activities listed in three color-coded categories. The summer version is the more restrictive of the two because when the ground is not frozen more severe impacts can occur. These overlays are available at Range Control or the Integrated Training Area Management (ITAM) office where staff can provide instructions on how to use them. See Appendix E of the *Final Environmental Impact Statement of U.S. Army Alaska, Vol. 2* for tables of specific training activities that are approved and restricted.

During summer, the green, yellow, and red categories on the environmental limitations overlays include the following restrictions:

- **Green.** No environmental restrictions. However, all normal procedures outlined elsewhere in USARAK Regulation 350-2 should be followed.
- **Yellow.** Notify Range Control when planning to train. Environmental/ITAM staff must pre-survey area. Stream crossings are permitted at 90-degree angles only.

- **Red.** Notify Range Control when planning to use areas. Environmental/ITAM staff must pre-survey red area to determine on-the-ground limits of each red area. Open water and streams have a 150-foot buffer. Only foot maneuvers are allowed in buffer. Vehicular maneuver is not allowed except during stream crossings, which must be crossed at a 90-degree angle to the direction of the stream flow. No stream crossing at shear or cut banks. Earth moving, mechanical digging, bivouacs, assembly areas, fighting positions, timber cutting, laundry and bath sites, portable latrines, slit trenches, vehicle decontamination, smoke generation, and any petroleum, oil, and lubricant (POL) distribution are restricted.

During winter, the green, yellow, and red categories on the environmental limitations overlays include the following restrictions:

- **Green.** No environmental restrictions. However, all normal procedures outlined elsewhere in USARAK Regulation 350-2 should be followed.
- **Yellow.** Notify Range Control when training. Environmental/ITAM staff must pre-survey these areas. Stream crossings may occur at 90-degree angles only. Use caution when snow plowing. Minimum of six inches of snow pack must remain on trails or other clearings to minimize damage to vegetation and soils. Limited activities include tracked and wheeled maneuvers, bivouacs, assembly areas, defensive fighting positions and timber cutting. These activities may be approved on a case-by-case basis by Range Control and ITAM staff if there are no seasonal wildlife restrictions.
- **Red.** Notify Range Control when using areas. Environmental/ITAM staff must pre-survey areas to determine on-the-ground limits of each red area. Open water and streams have 150-foot buffer. Only foot maneuvers are allowed in buffer. Vehicular maneuver is not allowed except during stream crossings, which must be crossed at a 90-degree angle to the direction of the stream flow. No stream crossing at shear or cut banks. Earth moving, mechanical digging, bivouacs, assembly areas, fighting positions, timber cutting, laundry and bath sites, portable latrines, slit trenches, vehicle decontamination, smoke generation, and any POL distribution are restricted.

3.3.3.3.2 Wetlands Reclamation Management

Wetland reclamation projects are coordinated through the Land Rehabilitation and Maintenance (LRAM) program. The LRAM program strives to sustain long-term training by enhancing and increasing training opportunities, repairing damaged training lands, and implementing procedures and technology to decrease future damage and long-term rehabilitation costs. LRAM incorporates professionally accepted best management practices for all projects designed to repair, rehabilitate, and maintain wetlands in training areas. *The Integrated Training Area Management (ITAM) Plan Five-Year Management Plan and Environmental Assessment* outlines rehabilitation procedures used by USARAK (USARAK 2005).

3.3.3.3.2.1 Wetlands Management by Alternative

Current wetlands management at DTA entails managing military, recreational, and other uses to minimize disturbance. Wetlands management also includes reclamation of disturbed areas. Wetlands management at Eddy Drop Zone, Donnelly Drop Zone, North Texas Range, and North Texas Range/Eddy Drop Zone Combination is parallel with those actions discussed in Section 3.3.3.3, *Wetlands Management*.

There has been minimal fill in wetland areas within the proposed alternative range locations. Approximately 27 permits have been issued by USACE Regulatory (involving approximately 290

acres of wetlands or streams) at DTA East since 1994. One of the 27 permits issued involved the extraction and stockpiling of gravel from Jarvis Creek over a 122-acre area.

3.3.4 Vegetation

The distribution of plant communities is influenced by factors such as climate, physiography, geomorphology, hydrology, soils, and fire. The major attributes of plant communities include growth form and structure, diversity, species dominance, and relative abundance (Krebs 1994).

The lands used by USARAK can be broadly classified into four terrestrial ecosystems (forests, scrub communities, barren lands and tundra) and a transitional ecosystem (wetlands) (discussed in Section 3.3.3). Within each of these ecosystems, a number of cover types exist, and these will be discussed in further detail.

3.3.4.1 Vegetative Cover and Ecological Land Classification

3.3.4.1.1 Vegetative Cover

Information on vegetative cover at DTA was obtained primarily from a survey performed by Jorgenson et al. (2001). This survey utilized a combination of field surveys and spectral classification of Landsat images. These methods are described in Jorgenson et al. 2001.

Forests

Forest cover at DTA is diverse and includes pure stands of spruce, hardwoods, and spruce/hardwood mixtures. Descriptions and general distribution of the forest cover types at DTA are as follows (Jorgenson et al. 2001; USARAK 2002a):

- **White Spruce:** White spruce occurs on well-drained upland sites that lack permafrost.
- **Paper Birch:** Paper birch is found primarily on upland sites and occurs on most exposures.
- **Quaking Aspen:** Quaking aspen is common on south slopes, well-drained benches, and creek bottoms to an elevation of about 3,000 ft.
- **Balsam Poplar:** Poplar stands are found along alluvial river deposits.
- **Black Spruce:** Black spruce, the most common forest cover type on DTA, is found on cold, wet, poorly aerated and poorly-drained sites, but also on dry sites that have gravelly soils and thin organic layer.
- **Spruce/Hardwood:** Spruce/hardwood forests predominate on lowland forest areas.

Scrub Communities

Scrub communities occur at high elevations, in small stream-valley bottoms, and as “pioneer” vegetation on disturbed sites, including areas recovering from fire. Typical scrub communities are composed of alder, willow, and dwarf birch.

Barren Lands and Tundra

Most barren areas on DTA are located on gravel bars along the Delta River, Little Delta River, Delta Creek, Jarvis Creek, and Granite Creek (Jorgensen et al. 2001). Barren lands occur above tree line (approximately 2,500 feet), along ridges, and adjacent to rivers and streams.

Higher elevation sites along the southern portion of DTA support moist tundra, which grades into alpine tundra, and then into barren lands. These areas occur on MacArthur Mountain, Patton Mountain, Molybdenum Ridge, and Trident Glacier (USARAK 1980; Jorgenson et al. 2001). Viereck et al. (1992) and Racine et al. (2001) described tundra communities for interior Alaska and DTA:

- **Dwarf Birch Low Shrub Tundra:** Usually found just above tree line of spruce forests.
- **Crowberry/Blueberry Dwarf Shrub Tundra:** This is the most common type tundra on DTA, and it is found above tree line.
- **Cassiope Dwarf Shrub Tundra:** Occurs on moist alpine sites, often on north-facing slopes.
- **Dryas-Sedge-Lichen Dwarf Shrub Tundra:** Found on many of the higher ridges and exposed slopes.

3.3.4.1.2 Ecological Land Classification

A four-tiered ecological classification system, developed by Bailey (1995), is used by federal agencies, including the DOD. The system describes geographical areas from regional to more localized ecosystem categories. DTA lies within the Polar Domain, Subarctic Division, Alaska Range Humid Taiga Tundra-Meadow Province, and Alaska Mountains Province (Bailey 1995). Vegetation can then be categorized further according to ecosystems, terrestrial cover types, and species associations.

The lands used by USARAK are within the Polar Domain, which is characterized by low temperatures, severe winters, and relatively low precipitation. These lands are also within the Subarctic Division, which is influenced by cold snowy climate. The dominant forests in the Subarctic Division are boreal subarctic type forests, open lichen woodlands, and taiga. Ecosystem divisions are further subdivided into ecosystem provinces and sections, depending on vegetative features. The *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E, presents additional descriptions of ecological features for relevant provinces and sections.

Bailey's general classification system is further detailed through an Ecological Land Classification System, described by Jorgensen et al. (1999, 2001, 2002). This system links vegetation cover types to specific ecological districts within each Alaska Army installation. DTA was intensively surveyed from 1998 to 2000. The maps created for the ecological land survey demarcate ecodistricts, ecosubdistricts, and ecotype classes (Jorgenson et al. 1999, 2001, 2002):

Ecodistricts are large physiographic units (1:500,000 scale) within a climatic region that have similar moisture regimes, radiant solar energy exposure, geology, geomorphology, and hydrology. Names of ecodistricts are based on prominent geographic features and broad land forms.

Ecosubdistricts are smaller physiographic units (1:100,000 scale) that have similar associations of vegetation, soils, permafrost characteristics, water, and fauna. These also tend to be named after prominent geographic features.

Ecotype classes are the smallest descriptive units (1:20,000 scale), and these have associated species lists. Ecotype classes represent vegetation types or successional stages within a uniform soil and geomorphic class.

3.3.4.1.3 Vegetative Cover and Ecological Land Classification by Alternative

Eddy Drop Zone – Potentially affected land at the Eddy Drop Zone alternative is primarily needleleaf, broadleaf, and mixed forest vegetation with some low scrub (Appendix, Figure 3.u). Ranges would be sited primarily in forested areas but would also make use of the existing cleared drop zone.

Broadleaf, needleleaf and mixed forest ecotypes cover over 80 percent of the Eddy Drop Zone alternative. All common DTA tree species occur here including some of the most vigorous stands of birch and white spruce. Soils are generally moist to dry, though wetland areas do occur. Understory shrub species include willow (*salix sp*), alder (*alnus sp*), rose (*Rosa acicularis*) and Labrador tea (*Ledum groendlandicum*). Common grasses and forbs include bluejoint reedgrass (*Calamagrostis canadensis*), altai fescue (*Festuca altaica*), fireweed (*Epilobium angustifolium*), twinflower (*Linnaea borealis*) and bunchberry (*Cornus canadensis*).

Donnelly Drop Zone – The Donnelly Drop Zone alternative is primarily low scrub, needleleaf forest, and shrub tussock vegetation (Appendix, Figure 3.v). Needleleaf and mixed forests cover 47 percent of the Donnelly Drop Zone alternative, primarily west of Jarvis Creek. Most forest types are classified as "wet" or "moist." Another 48 percent of this area is covered by "scrub" ecotypes, primarily east of Jarvis Creek. Most of this area is wetland. Black spruce predominates in the forest ecotypes and is a significant component of the scrub ecotypes as well. White spruce and cottonwood are the other dominant tree species in this area. The shrub components of the forest ecotypes are similar to dominant species in the scrub ecotypes and include willow, alder, dwarf birch (*Betula nana*) and Labrador tea. Common grasses and forbs are similar to those in the Eddy Drop Zone alternative.

North Texas Range – Potentially affected land at the North Texas Range alternative is primarily low scrub and shrub tussock vegetation (Appendix, Figure 3.w). There is relatively little forest or other taller vegetation on the North Texas Range alternative compared to the other alternatives.

Much of the North Texas Range alternative is grass/herb and classified as "scrub" successional vegetation from a 1981 fire. The majority of this area is wetland. The remaining ecotypes are mostly forest. Shrub and grass/forb species in this area are similar to those at the Donnelly Drop Zone alternative. This site also contains a number of small lakes, ponds and wet sedge meadows.

Eddy Drop Zone/North Texas Range – The Eddy Drop Zone/North Texas Range alternative includes needleleaf, broad leaf, and mixed forest at Eddy Drop Zone and low scrub and shrub tussock vegetation at North Texas Range (Appendix, Figure 3.x).

3.3.4.2 Floristic Inventory

Racine et al. (2001) completed a floristic inventory of DTA. Although the survey did not include all possible taxa on DTA, it is the most comprehensive to date. The inventory documented 497 vascular taxa (including subspecies and varieties) in 64 families and 198 genera. About 26 percent of vascular plants found in Alaska (Hulten 1968) were identified on DTA. The authors also documented over 20 vascular plant range extensions (Racine et al. 2001).

USARAK's RTLA program includes an annual study of flora on DTA lands (1997-2005). This program provides for the collecting, inventorying, monitoring, managing, and analyzing of

DTA plant species (including rare plants). Physical and biological resource data are collected to correlate land conditions to military training and testing activities. These data provide information to effectively manage land use and natural resources.

During the summer of 2004, RTLA field personnel specifically surveyed for rare plants listed in Table 3.3.4.a at each of the alternatives (Mason 2004). They targeted potential and unusual habitats, and looked at areas that could be impacted by construction and maneuver activities.

Table 3.3.4.a Rare Plants at DTA Tracked by the Alaska Natural Heritage Program.

Species	Scientific Name
Lacinate sagewort	*Artemisia laciniata*
Scabrous black sedge	*Carex atratiformis*
Crawford's sedge	*Carex crawfordii*
Dewey sedge	*Carex deweyana*
Bristleleaf sedge	*Carex eburnea*
Manyhead sedge	*Carex sychnocephala*
Fragile rock-brake	*Cryptogramma stelleri*
Few flowered shooting star [1]	*Dodecatheon pulchellum* ssp. *pauciflorum*
Yellowstone draba	*Draba incerta*
MacKenzie Valley mannagrass	*Glyceria pulchella*
Spiny phlox	*Phlox hoodii*
Richardson's phlox	*Phlox sibirica* ssp. *richardsonii*
Bluntleaf pondweed	*Potamogeton obtusifolius*
Setchell's willow	*Salix setchelliana*
Small saxifrage	*Saxifraga adscendens* spp. *oregonensis*
Strict blue-eyed grass	*Sisyrinchium montanum*
Alaska starwort	*Stellaria alaskana*
Selkirk's violet	*Viola selkirkii*

[1] As of April 2005, this species is no longer being tracked by the AKNHP.
Source: AKNHP 2005

Salix setchelliana and *Stellaria alaskana* are endemic to the region. Other taxa in Table 3.3.4.a are peripheral species, with larger populations centered further south in North America or west in Asia.

3.3.4.2.1 Floristic Inventory by Alternative

Eddy Drop Zone – Previous inventories documented four of the AKNHP-listed species within the Eddy Drop Zone alternative (Table 3.3.4.b). *Carex atratiformis* and *Viola selkirkii* are common, but *Carex eburnea* is uncommon due to the absence of suitable habitat. *Carex deweyana* and *Cryptogramma stelleri* were discovered within the Eddy Drop Zone alternative (the only known locations on DTA), but populations could not be located during the 2004 survey. The Eddy Drop

Zone alternative also contains the only known population of *Viola selkirkii* on DTA. Plants are abundant, though restricted to a very small area.

Donnelly Drop Zone – Carex atratiformis has been documented in previous inventories within the Donnelly Drop Zone alternative and during the 2004 survey (Table 3.3.4.b). *Carex eburnea* was found at a few sites in favorable habitat near Jarvis Creek. *Carex deweyana* and *Dodecatheon pulchellum ssp. pauciflorum* were not located in 2004, but could be located at Donnelly Drop Zone, based on available habitat.

North Texas Range – The 2004 plant surveys documented AKNHP-listed rare plants in the North Texas Range alternative (Table 3.3.4.b). Large populations of *Carex crawfordii* and scattered populations of *Carex sychnocephala* were located along pond margins. *Carex atratiformis* was found at several sites. *Dodecatheon pulchellum ssp. pauciflorum* is common in upland areas at this alternative. Previous inventories have documented *Artemisia laciniata* and *Potamogeton obtusifolius* near the North Texas Range alternative, but these plants were not found in the 2004 survey.

North Texas Range/Eddy Drop Zone Combination – The plants found at Eddy Drop Zone and North Texas Range are essentially a combination of those listed for each respective alternative, including four of the AKNHP-listed species within the Eddy Drop Zone alternative and four within the North Texas Range (Table 3.3.4.b).

Table 3.3.4.b AKNHP-listed Plant Species by Alternative.

Alternative and Species			
Eddy Drop Zone	**Donnelly Drop Zone**	**North Texas Range**	**Eddy Drop Zone/ North Texas Range**
Carex deweyana *Carex atratiformis* *Viola selkirkii* *Crytogramma stelleri*	*Carex atratiformis* *Carex eburnean*	*Carex crawfordii* *Carex sychnocephala* *Dodecatheon pulchellum ssp. pauciflorum* *Artemisia laciniata* *Potamogeton obtusifolius*	*Carex deweyana* *Carex atratiformis* *Crytogramma stelleri* *Carex crawfordii* *Carex sychnocephala* *Dodecatheon pulchellum ssp. pauciflorum* *Artemisia laciniata* *Potamogeton obtusifolius*

3.3.4.3 Forest Management

DTA forest management areas are described in USARAK Regulation 200-3, *Natural Resources – Land, Forest, and Wildlife Management* (USARAK 2002a). Many potential timber stands at DTA are unharvestable as they are located in areas contaminated by UXO. Current commercial potential for the remainder is limited to firewood and sawtimber and half-log white spruce markets. Commercial quality forest land is defined as having spruce or hardwoods greater than 4.5 inches in diameter at breast height Current forest management at the alternatives include a combination of timber and fuelwood, accomplishment of military or ecosystem objectives and/or timber stand improvement, timber management, timber sales, and timber salvage cuts to

accomplish habitat improvement, or improvement of the commercial value of forest tree species (USARAK 2002c).

About 60 percent of DTA (391,851 acres), as well as the Gerstle River Training Area, were inventoried for forest resources in 1993 (Tanana Chiefs Conference Inc. 1993). Cover types were classified according to their commercial forest potential.

Approximately 40 percent (158,000 acres) of the surveyed area at DTA had commercial forest potential, while 54 percent was classified as non-forested land, 3 percent as rivers, and 3 percent as other waters. Sawtimber stands at DTA covered 1,555 acres and pole timber stands comprise 58,102 acres. Approximately 132 acres of white spruce sawtimber could be harvested annually. Hardwood harvest could occur on 219 acres per year (Tanana Chiefs Conference Inc. 1993).

USARAK is currently conducting a forest inventory of all USARAK lands, based on the U.S. Forest Service permanent plot protocol. Completion of data analysis is estimated by 2006. An updated wildfire fuels map and a forest stand map will also be completed in 2006. A survey within each alternative was completed during the summer of 2002 for all forest stands with potential commercial timber (saw-logs and firewood). A total of 778 acres contain commercially valuable timber within all three proposed sites. This represents 1,795,327 cubic feet of timber (Buzby and Rees 2003).

The BLM has management responsibility for vegetation rights at the alternative BAX and CACTF locations. BLM requires any usable timber that cannot be sold in a timber sale to be made available to the public at no cost. A USARAK and BLM firewood permit is required.

3.3.4.3.1 Forest Management by Alternative

Eddy Drop Zone – The Eddy Drop Zone alternative is classified as a medium priority for forest management during 2002-2006. The actual Eddy Drop Zone, however, is high priority, as it has been continuously maintained free of trees since the 1950s. Drop zones at DTA are used for military airborne operations, which require a large, open area to ensure safe landings.

The Eddy Drop Zone alternative consists of 858 acres of commercial forest land. The white spruce forest types over nine inches in diameter at breast height comprise 175 acres and 347,550 cubic feet. Birch and aspen forest types account for 190 acres and 149,340 cubic feet. White spruce, birch, and aspen mixed forest types account for 437 acres and 414,280 cubic feet. White spruce and balsam poplar mixed forest types account for 56 acres and 139,940 cubic feet (Buzby and Rees 2003).

Donnelly Drop Zone – The Donnelly Drop Zone alternative is a medium priority for forest management west of Jarvis Creek and a low priority for forest management east of Jarvis Creek during 2002-2006. The actual Donnelly Drop Zone, however, is high priority, as it has been continuously maintained free of trees since the 1950s. Drop zones at DTA are used for military airborne operations, which require a large, open area to ensure safe landings.

The Donnelly Drop Zone site consists of 254 acres of commercial forest land. The white spruce forest types comprise 254 acres and 432,050 cubic feet (Buzby and Rees 2003).

North Texas Range – The North Texas Range alternative has a medium priority for forest management during 2002-2006. The North Texas Range site consists of 255 acres of commercial forest land. The white spruce forest types comprise 84 acres and 142,880 cubic feet. Birch and aspen forest types account for 22 acres and 17,290 cubic feet. White spruce, birch, and aspen mixed forest types account for 149 acres and 141,250 cubic feet (Buzby and Rees 2003).

Eddy Drop Zone/North Texas Range – The North Texas Range and Eddy Drop Zone alternatives would have a medium priority for forest management during 2002-2006. The North Texas Range BAX site consists of 46 acres of commercial forest land. The white spruce forest types comprise 84 acres and 42,846 cubic feet. Birch and aspen forest types account for and 5,347 cubic feet. The Eddy Drop Zone CACTF site includes 641 acres of commercial forest with a volume of 936, 924 cubic feet of timber (Buzby and Rees 2003). Of this, 577,605 cubic feet are white spruce and 274,710 cubic feet are aspen or birch.

3.3.4.4 Invasive Species Management

According to EO 13112, *Invasive Species*, invasive species are species non-native to a particular ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Committee for Noxious and Invasive Plants Management in Alaska 2005). Listed in Table 3.3.4.c are selected invasive species in Alaska (U.S. Forest Service 2004).

Table 3.3.4.c Selected Invasive Plant Species in Alaska.

Species	Scientific Name
Canada thistle	*Cirsium arvense*
Bull thistle	*Cirsium vulgare*
Oxeye daisy	*Leucanthenum vulagre*
Spotted knapweed	*Centaurea biebersteinii*
Orange hawkweed	*Hieracium aurantiacum*
Meadow hawkweed	*H. caespitosum*
Mouse-ear hawkweed	*H. pilosella*
Narrowleaf hawkweed	*H. umbellatum*
Narrowleaf hawksbeard	*Crepis tectorum*
Hairy catsear	*Hypochaeris radicata*
Fall hawkbit	*Leontodon autumnalis*
Perennial sowthistle	*Sonchus arvensis*
Common tansy	*Tanacetum vulgare*
Tansy ragwort	*Senecio jacobaea*
Western salsify	*Tragopogon dubius*
Japanese knotweed	*Polygonum cuspidatum*
Garlic mustard	*Alliaria petiolata*
White (Yellow) sweetclover	*Melilotus alba*
Bird vetch	*Vicia cracca*

Species	Scientific Name
Scotchbroom	*Cytisus scoparius*
Common toadflax	*Linaria vulgaris*
Ornamental jewelweed	*Impatiens glandulifera*
Brittlestem hempnettle	*Galeopsis tetrahit*
Reed canarygrass	*Phalaris arundinacea*
Downy brome (cheatgrass)	*Bromus tectorum*
Foxtail barley	*Hordeum jubatum*
Bluebur	*Lappula squarrosa*

Source: U.S. Forest Service 2004

The RTLA program at DTA monitors for invasive plants. Recent surveys have not revealed any major invasive plant infestations (Clark 2005). At DTA, vegetation control is conducted along roadsides, around range buildings, fences and targetry infrastructure. Weeds such as dandelions, knotweed, and crabgrass are treated when requested through the USARAK Directorate of Public Works. Plant control activities associated with withdrawn lands, including DTA East, take the BLM's Strategic Noxious Weed Control Plan into consideration.

3.3.4.4.1 Invasive Species Management by Alternative

A detailed inventory of invasive plant species infestations has not been completed for DTA. Recent site surveys have indicated low levels of invasive plants within the Eddy Drop Zone, Donnelly Drop Zone, North Texas Range and the North Texas Range/Eddy Drop Zone Combination alternatives (Clark 2005).

3.3.5 Threatened or Endangered Species and Species of Concern

3.3.5.1 Threatened or Endangered Species

The USFWS (1999) has defined the following categories for listing of endangered species in the United States:

- **Endangered** – Species is in danger of extinction throughout all or a significant portion of its range.
- **Threatened** – Species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- **Proposed** – Species formally proposed for listing in the *Federal Register* as endangered or threatened.
- **Candidate** – Sufficient information exists on biological vulnerability and threat(s) to a species to support proposals as threatened or endangered.
- **Delisted** – Species has been removed from the list of threatened or endangered species. The USFWS will monitor these species for at least five years following delisting.

Federally listed (threatened, endangered, and delisted) plant and animal species in Alaska are presented in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E. No federally listed, proposed, or candidate threatened or endangered species have been found on DTA or USARAK lands (USARAK 2002b,c), but there are a number of

rare species (this designation refers to plants, see Table 3.3.4.a) or priority species (developed by USARAK for each installation based on conservation issues or importance as game species) (USARAK 2002b).

The appendix contains a copy of a letter from the USFWS confirming that no federally listed species reside or breed on Army lands in Alaska and that consultation under Section 7(a)(2) of the Endangered Species Act, 16 USC 1536(a)(2) is not required. Although the American peregrine falcon was delisted as an endangered species in 1999, the USFWS requests consultation on any projects that may hinder their recovery. The installation is within their breeding range, and they have been known to nest at one location along the east bluff of the Delta River (Mason 2005). Proposed activities will have no effect on the recovery of the peregrine falcon in this area.

3.3.5.2 Species of Concern

By definition, a species of special concern is any species (or subspecies) of fish or wildlife, or population of mammal or bird native to Alaska, that has entered a long-term decline in abundance or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. The list of species of special concern is an administrative listing established (in May 1993 and amended in October 1998) by the Commissioner of the Alaska Department of Fish and Game (ADF&G) (ADF&G 1998b).

The State of Alaska has a cooperative agreement with the Alaska Natural Heritage Program (AKNHP) to identify "species of concern." Plants considered species of concern are vulnerable to extirpation at the global or state level due to factors such as restricted geographic range, small population size, low population density, specialized habitat requirements, loss of habitat, or extreme sensitivity to habitat disturbances (Alaska Natural Heritage Program 2004). This list also considers rare vascular plants that may be imperiled but require further analysis (Table 3.3.4.a).

The State of Alaska also maintains a list of sensitive species, endangered species, and species of special concern for wildlife (See the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E [USARAK 2004a]). State listed species are not afforded the same legislative protection as federally listed species (ADF&G 1998b). Animals may not be imperiled, but because of their status, require further analysis. The AKNHP monitors and evaluates these species (Alaska Natural Heritage Program 2004).

3.3.5.2.1 Vegetation

Conservationists in Alaska have become increasingly aware of the important role that rare plants and rare plant communities play in the maintenance of biological diversity. Given the vastness of the Alaskan landscape, the botanical profile in many areas is often poorly understood, and land management agencies, including the Army, should survey, monitor, and conserve rare plants. The AKNHP helps agencies track rare plants. Moreover, the designations of rare, endangered, and species of concern are the same as with wildlife and fisheries.

The AKNHP's vascular plant tracking list is updated regularly and currently contains 18 species of concern that occur on DTA. The 1999 floristic survey of Fort Greely (as DTA was then named) is the basis for the DTA list (Racine et al. 2001) that is compared to the AKNHP list. DTA has been surveyed for rare plants, and these plants were listed Section 3.3.4, *Vegetation*. During the summers of 2004, RTLA field personnel specifically surveyed for rare plants listed in Table

3.3.4.a at each of the alternatives (Mason 2004). They targeted potential and unusual habitats and looked at areas that could be impacted by construction and maneuver activities. These are listed in Section 3.3.4.2.1, *Floristic Inventory by Alternative*.

3.3.5.2.2 Wildlife and Fish

State of Alaska and/or USFWS species of concern and sensitive species at DTA include the white-winged crossbill, Townsend's warbler, blackpoll warbler, American osprey and American peregrine falcon. (The trumpeter swan, listed as a species of concern by the U.S. Forest Service, is discussed in Section 3.2.6, *Wildlife and Fisheries*). Suitable nesting habitat for American peregrine falcons occurs along the bluffs of the Little Delta River on the western boundary of DTA and along the Delta River bluffs (USARAK 1999a, 2002b, Anderson et al. 2000, Mason 2004). There are no fish species of concern on DTA.

Methodology

The USARAK Natural Resources staff has developed a system to rank priority species and to quantify availability of high value habitat (USAG-AK 2005b). Rankings for each mammal and bird species are based on the following factors: rarity, population trends, habitat specialization, spatial distribution, sensitivity to disturbance from military construction, training or land management practices, potential to respond to management and recovery efforts, and status as game animals (see Table 3.2.6.c).

Habitat and management concerns are listed in Table 3.3.5.a. See Section 3.2.6, *Wildlife and Fisheries* for additional detail for each alternative.

Table 3.3.5.a Habitat and Management Concerns for Wildlife Species of Concern and Sensitive Species Found on DTA.

Species	Habitat	Management Concerns
White-winged crossbill	Coniferous forest	Habitat loss and fragmentation are indicated as the major concerns (Benkman 1992).
Townsend's warbler	Mature coniferous forests (white spruce)	Habitat loss and fragmentation are indicated as the major threat to survivorship of this species. Inadequate population monitoring in Alaska, Canada, and along migratory route (Wright et al. 1998).
Blackpoll warbler	Riparian woodland or coniferous, deciduous, or mixed forest	Documented population decline, possibly caused by tropical deforestation. Inadequate monitoring in Alaska, Canada, and along migratory route (Hunt and Eliason 1999).

Species	Habitat	Management Concerns
American osprey	Riparian areas	Inadequate monitoring of Alaskan populations. Susceptible to disturbance during May-June nesting period that can cause abandonment of young. Adversely affected by stream or waterway alterations, specifically those that reduce fish populations or visibility in areas traditionally used as feeding areas. Susceptible to egg thinning by pesticide contamination (VanDaele 1994).
American peregrine falcon	Mountain ranges, river valleys, and coastlines	Recovered and delisted in 1999 from federal list of endangered and threatened species. Five year monitoring period will determine long-term success of recovery.

Source: ADF&G 1998b

Analysis

The distribution and acreage of medium and high quality habitat for each of the state of Alaska and USFWS species of concern was calculated for DTA East (USAG-AK 2005b). The methodology was the same as described in Section 3.2.6, *Wildlife and Fisheries* for ecosystem management priority wildlife. These data are summarized in Table 3.3.5.b

Table 3.3.5.b Acres of Preferred Habitat for Priority Species within DTA East.

Species	Acres			Percent of DTA East with Moderately and Highly Preferred Habitat
	Not Preferred	Moderately Preferred	Highly Preferred	
White-winged crossbill	86,933	1,239	16,429	16.9
Townsend's warbler	68,148	31,460	4,993	34.8
Blackpoll warbler	78,009	21,533	5,059	25.4
American osprey	89,559	14,353	689	14.4
American peregrine falcon	100,008	4,593	0	4.4

3.3.6 Socioeconomics

3.3.6.1 Description of Southeast Fairbanks Census Region and Donnelly Training Area East

DTA East is located within the Southeast Fairbanks Census Area. Most of the area is unincorporated and is not a well-defined region in terms of political, economic or social boundaries. For census purposes, this southeast Fairbanks area includes the region surrounding the Alaska Highway between the Fairbanks North Star Borough and the Canadian border.

A large disparity exists between those populations living "in the bush" (off the road system) and those living on the road system, a primary distinction for communities in Alaska. Generally speaking, income, education, public services and employment levels are lower in the bush, and poverty levels are higher. Utility systems in the bush, particularly wastewater treatment, are expensive, inferior, or nonexistent. In bush communities, subsistence harvesting of fish and game plays a much more important role in the economy and culture. It is difficult to place a dollar value on these subsistence activities, and these communities tend to reject any market evaluation of them. While the region contains several communities off the road system, they lie outside the social and economic regions of influence for military activities.

Doyon, Ltd. serves as the regional Alaska Native, for-profit corporation for this area pursuant to the Alaska Native Claims Settlement Act. The *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E (USARAK 2004a) lists village corporations within the Doyon region. Tanana Chiefs Conference Inc. is the Alaska Native non-profit corporation for this area charged with advancing tribal self-determination and enhancing regional native unity. Tanana Chiefs Conference Inc. works towards meeting the health and social service needs of more than 15,000 Alaska Natives in interior Alaska. For further discussion of Alaska Native communities located near DTA East, see Section 3.3.7.1.2, *Proximity and Community Information*.

The non-native community of Delta Junction is the closest community directly affected by DTA East activities. At one time, Fort Greely was the largest single employer in the Delta Junction region, accounting for over 50 percent of the area's total employment (USARAK 1999a). As a part of Base Realignment and Closure (BRAC) in the 1990s, uniformed military personnel at DTA were dramatically reduced. Soldiers were transferred to FWA (in Fairbanks) and are now transported (from Fairbanks, Anchorage and other DOD installations) to conduct training exercises on DTA. Fort Greely is now under SMDC. In 2004, there were only 161 personnel employed at Fort Greely, only seven of which were uniformed.

Initially, the loss of personnel at Fort Greely caused significant unemployment and reduced property values. The community worked hard to attract other industries and the area is currently experiencing a significant economic expansion with low unemployment and rising housing costs. This turnaround is due to several new projects in the area including construction of the SMDC's Ground-Based Missile Defense System and development of the Pogo Mine.

3.3.6.1.1 Demographics

Since Delta Junction is the closest community to DTA East, demographic data is reported for this community instead of the larger southeast Fairbanks region. Delta Junction's racial profile (Table 3.3.6.a) indicates a higher proportion of white individuals and a lower proportion of Alaska Native individuals when compared to statewide averages. In recent years there has been an influx of Russian immigrants to the area. This area also exhibits a smaller proportion of black or Hispanic persons.

Table 3.3.6.a Delta Junction Population Profile for 2000.

Population by Race	Number	Percent
Population in 2000	840	100
One Race	*820*	*97.6*
White	768	91.4
Alaska Native or American Indian	34	4.0
Black or African American	9	1.1
Asian	8	1.0
Native Hawaiian or Other Pacific Islander	0	0
Other Race	1	0.1
Two or More Races	*20*	*2.4*
Hispanic or Latino (of any race)	7	0.8
Not Hispanic or Latino	*833*	*99.2*

Source: U.S. Census Bureau 2005

The age profile of Delta Junction contrasts with Fairbanks, Anchorage, and the state average as there is a larger proportion of older individuals – twice the proportion over age 62. The median age of 36 contrasts to those of Fairbanks (29) and Anchorage (32).

3.3.6.1.2 Housing, Social and Public Services, and Public Education

Previous DTA manpower reductions created surplus housing and depressed property values. Some 26 percent of houses were vacant according to the 2000 Census, a situation that has recently reversed as a consequence of SMDC and other big construction projects. For a while, insufficient housing stocks inflated home prices as the influx of construction employment increased housing demand. While no current statistics are available, realtors in the area report a strong increase in new home construction over the past two years.

Because Delta Junction has a small and dispersed population, it does not have the public facilities that are available in larger metropolitan areas. While some medical services are provided by the Delta Junction Family Medical Center, including emergency care, most medical services are obtained in Fairbanks. As part of the SMDC project, federal funds amounting to $25 million have been earmarked for infrastructure development. These funds have financed a new fire station, ambulance, and other fire protection equipment.

The Delta School District exhibits a somewhat higher student/teacher ratio and lower expenditures per student than Fairbanks and Anchorage. With a lower tax base, the district cannot fully supplement state educational expenditures. As a result, less is spent per student. A new elementary school was started in 2005 and significantly upgrades the quality and capacity of Delta's school district.

Recent economic activities have increased the demand for utility services by both commercial and residential customers. Golden Valley Electric Association, the region's primary electricity provider, is increasing its power generation capabilities in the Delta area to handle current and forecasted demands.

The region's social services and public safety are funded through a combination of federal, state and local sources. These services have expanded to meet the population increase from the area's recent economic boom. Army transformation and the development of DTA have had a positive (although minimal) impact on social services and public safety through the overall beneficial economic impacts associated with these activities.

3.3.6.1.3 Regional Economic Activity

Income and poverty data displayed in Table 3.3.6.b indicate a substantially lower per-capita income and higher poverty level for Delta Junction than other communities on the road system.

Table 3.3.6.b Delta Junction Region Income and Poverty Statistics for 1999.

Per Capita Income	$19,171
Median Household Income	$43,500
Median Family Income	$58,250
Percent of Population Below Poverty Level	19.4%

Source: U.S. Census Bureau 2005

Given Department of Labor privacy regulations, insufficient data exists to produce detailed tables of employment and income for the Delta Junction community. As a result, the entire Southeast Fairbanks Census Area must be used to assess local conditions. While uniformed military statistics are not included in labor publications (as they do not participate in unemployment compensation programs), this category has been added (in bold) to Table 3.3.6.c.

The average monthly earnings in the Southeast Fairbanks Census region in year 2004 were $3,250. The earnings for uniformed Fort Greely personnel on post averaged $3,893. The recent boom of construction in the area is reflected in increased construction employment and average wages. Outside of construction, government employment remains the largest and highest paying employer, representing 34 percent of total jobs in the region.

Table 3.3.6.c Southeast Fairbanks Region Average Monthly Employment and Earnings Statistics for Year 2004.

Industrial Classification	Average Monthly Employment	Average Monthly Earnings ($)
Total		
All Industries	1,989	3,250
Private Ownership	1,311	3,051
Government	678	5,142

Industrial Classification	Average Monthly Employment	Average Monthly Earnings ($)
By Industry		
Agriculture, Forestry and Fishing	15	*
Mining	4	*
Construction	120	6,234
Manufacturing	40	3,190
Trade, Transportation, and Utilities	320	3,097
Information	43	3,607
Finance, Insurance and Real Estate	34	1,890
Services	317	4,040
Federal Government	222	5,142
State Government	123	4,106
Local Government	333	2,465
Uniformed Military	**7**	**3,893**

* Data not reported due to small number of observations
Source: Alaska Department of Labor and Workforce Development 2005; DIOR Statistical Abstracts 2004.

Continued beneficial economic impacts are expected from maintenance and construction activities associated with mission-essential projects that provide contractual employment and material purchases. These expenditures benefit the local economy, although some of the impact would likely be felt in the Fairbanks area. The projected amount for DTA mission-essential construction was estimated at $68 million (USARAK 2004a). Increased Army transformation deployments to DTA (East and West) are likely to have a small stimulating effect on the Delta Junction economy. No additional uniformed DTA personnel are currently being considered, but support staff would add non-uniformed employment opportunities in the Delta Junction area. Impacts of Army transformation on Delta Junction's economy are minimal, but such impacts are beneficial from a social and economic perspective (USARAK 2004a).

Deployments (travel to DTA for training) will increase substantially under transformation, but will remain far below previous (pre-BRAC) levels of continuous activity at DTA. Scheduled deployments may temporarily cause elevated noise and traffic congestion in the Delta Junction area. Increased congestion has a social impact to both recreational and commercial drivers, through the increased opportunity cost of time spent in traffic. This impact can be offset through public announcement of scheduled deployments and smaller convoys. As Soldiers will only be at DTA East and West for the duration of training exercises, the impacts of their presence will likely be incidental and minimal.

3.3.6.1.4 Recreational Activities: Hunting and Fishing

During scoping meetings for Transformation of USARAK EIS, sporting groups expressed concern over impacts on outdoor recreation opportunities due to (1) competition with local

residents for natural resources and additional pressure on outdoor recreational activities (fishing, hunting, and trapping), (2) the negative influence of military activities on game populations, and (3) restriction of public access to natural resources and recreation.

These concerns represent unique social issues in Alaska and were analyzed in depth in the *Transformation of U.S. Army Alaska Final Environmental Impact Statement* and supporting analyses (USARAK 2004a). Increased levels of training due to Army transformation will primarily result in decreased public access to DTA lands. As DTA contains significant recreational resources (accessible hunting, fishing, and other outdoor activities), economic evaluations for principal outdoor activities were surveyed and reported in detail. Results of the fishing and hunting usage valuation indicated a maximum possible impact of approximately $3.75 million for fishing and $3.5 million for hunting (USARAK 2004a). These amounts provide a benchmark for estimating the cost associated with decreased public access to DTA.

3.3.7 Subsistence

Subsistence plays a vital role in the lifestyles of rural Alaskans. In acknowledgement of the importance of subsistence practices to rural Alaska, Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) provides procedural requirements designed to perpetuate customary and traditional subsistence activities on federal land. In addition, ANILCA requires federal agencies to give rural Alaskans preference in the take of fish and wildlife on federal lands when resources are scarce (16 USC §3114).

Federal law recognizes that access to subsistence resources is essential to recognized subsistence activities such as hunting, fishing, and trapping – as well as the harvesting of nongame resources such as plants and berries. Subsistence users often do not have ready access to commercial sources of food and supplies on a regular basis. Subsistence is also an intrinsic element of traditional and cultural practices of rural Alaskans. For residents of Alaska Native villages, there are essential cultural and spiritual values attached to subsistence hunting and fishing. Subsistence harvest often involves a community effort, as some residents will harvest food for others in the community as well as for themselves. For example, 60 percent of rural households harvest game while 86 percent of rural households consume harvested game (ADF&G 2000). This widespread sharing of foods reflects core cultural beliefs.

Subsistence practices depend upon the availability and accessibility of customary useful subsistence resources. The sections of DTA East being considered for the proposed action possess a wide range of plants, animals and fish suitable for regional subsistence activities. The type and availability of vegetation are discussed in detail at Section 3.3.4, *Vegetation* of this EIS. The types and availability of wildlife and fish are discussed in Section 3.2.6, *Wildlife and Fisheries*. Because many recreational users of DTA East engage in gathering of resources important to subsistence (i.e., berries, fish and fowl), the factors governing recreational access to various areas of DTA East (as described in Section 3.3.8, *Public Access and Recreation*) are relevant to the issue of subsistence access.

3.3.7.1 Subsistence Topics

3.3.7.1.1 Subsistence Resources

Subsistence has been legally defined to include the customary and traditional uses of fish, plant materials, and game in all of Alaska's rural areas. Customary and traditional use is defined by a long-established, consistent pattern of use and incorporating beliefs and customs that have been transmitted from generation to generation. This use plays an important role in the economy of the community.

Food is one of the most important subsistence uses of wild resources. However, there are other important uses of subsistence products such as:

- **Clothing:** Wild furs and hides are still the best materials for ruffs (wind guards), mitts, parkas, kuspuks, clothes lining, and mukluks (winter boots) in many regions.
- **Fuel:** Wood is a major source of energy in rural homes, and is used for smoking and preserving fish and meat.
- **Transportation:** Fish, seals, and other products are used to feed dog teams.
- **Construction:** Spruce, birch, hemlock, willow, and cottonwood are used for house logs, sleds, fish racks, and innumerable other items.
- **Home goods:** Hides are used as sleeping mats. Seal skins are used to store food. Wild grasses are made into baskets and mats.
- **Sharing:** Fish and wildlife are widely given out to support neighbors who cannot harvest for themselves because of age, disability, or other circumstances.
- **Customary trade:** Specialized products like seal oil are bartered and exchanged in traditional trade networks between communities. Furs sold to outside markets provide an important source of income to many rural areas.
- **Ceremony:** Traditional products are used in funerals, potlatches, marriages, native dances, and other ceremonial occasions.
- **Arts and crafts:** Ivory, grass, wood, skins, and furs are crafted into beautiful items for use and sale.

Harvesting of nongame resources, such as edible or medicinal plants, is determined by public access (when and where). There are no federal restrictions on the season, take, and eligibility of rural residents for nongame resources. Refer to Section 3.3.8, *Public Access and Recreation* for access opportunities and restrictions on USARAK lands.

3.3.7.1.2 Proximity and Community Information

DTA is situated within federal subsistence game management unit (GMU) 20. GMU 20 is subdivided into six very large subunits. DTA East is in subunit 20D and makes up approximately 2.5 percent of the subunit. Federal subsistence management regulations apply to all of GMU 20 (Appendix, Figure 3.m). Immediately south of DTA East, and running along the length of the Richardson Highway to the town of Glennallen, are vast tracks of federal land. Much of this land is very similar to that found in DTA East and is managed to allow a subsistence harvest. The close proximity of these lands to a major public highway also offers ready access to game and plant resources.

To qualify for subsistence permits, individuals must have their primary, permanent residence in a rural area. Under federal subsistence regulations, all communities and areas in Alaska are considered rural with exception of the following:

- Adak
- Municipality of Anchorage
- Fairbanks North Star Borough
- Homer area (Homer, Anchor Point, Kachemak City and Fritz Creek)
- Juneau area (including Juneau, West Juneau and Douglas)
- Kenai area (Clam Gulch, Kalifonsky, Kasilof, Kenai, Nikiski, Salamantof, Soldotna and Sterling)
- Ketchikan area (including Ketchikan City, Clover Pass, North Tongass Highway, Ketchikan East, Mountain Point, Herring Cove, Saxman East, Pennock Island and parts of Gravina Island)
- Seward area (Seward and Moose Pass)
- Valdez
- Matanuska-Susitna area (including Palmer, Wasilla, Sutton, Big Lake, Houston and Bodenberg Butte)

Regional rural populations with recognized subsistence interests and rural status on DTA East include Healy Lake Village, Village of Dot Lake, Native Village of Tanacross, Native Village of Tetlin, Northway Village, Delta Junction, Big Delta, Deltana, and Dry Creek (Appendix, Figure 3.a). Data gathering on subsistence activities on (and around) USARAK lands is currently ongoing. The following sections describe the proximity, community, and resources use for several communities near the proposed alternative sites.

Healy Lake Village – The Healy Lake archaeological record indicates that a site within the Healy Lake Village provides the best evidence of the Athabascan tradition within the state of Alaska. It represents perhaps 11,000 years of continuous occupation, based on radiocarbon chronology (Cook 1969; Griffen 1990).

The current community of Healy Lake is located about a half mile from the traditional site of the old village and is inhabited by the relatives of Athabascan Indians who have resided there since at least 1910 (Callaway and Miller-Friend 2001). This community was heavily impacted by an epidemic in the mid 1940s that killed many residents, and a resurgence population began in the 1980s (Callaway and Miller-Friend 2001).

The bulk of the Healy Lake diets come from wildlife resources. Accessible by an ice road in winter and by plane or boat in summer, Healy Lake has no store, few amenities, and very little employment. Thus, the residents live a subsistence lifestyle (Calloway and Miller-Friend 2001).

Residents of Healy Lake Village briefly discussed their use of DTA and surrounding areas for subsistence activities during a government-to-government meeting held in the village on August 28, 2002. USARAK personnel learned that villagers trap animals at the bottom of Donnelly Dome and that Healy Lake Village residents are dependent on the game that comes from Donnelly Dome, including caribou and sheep. These statements will undergo further analysis as part of an effort to study TCPs on military lands (see Section 3.2.7.3.1, *Traditional Cultural Properties*).

Village of Dot Lake – The Village of Dot Lake is about 60 miles east-southeast of Delta Junction, along the Alaska Highway. Most of the village's historic subsistence harvest areas end at the Gerstle River (Marcotte 1991). Dot Lake was used as a seasonal hunting camp for Athabascans from George Lake and Tanacross (Alaska Department of Community and Economic Development 2002).

About 74 percent of the 37 inhabitants (Alaska Department of Community and Economic Development 2002) are Alaska Native or part native. The Native Village of Dot Lake is a traditional Upper Tanana Athabascan village located two-tenths of a mile southeast of the highway. During the 2000 U.S. Census, there were 25 total housing units. Eight residents were employed. The median household income was $16,250, per capita income was $7,476, and 19.05 percent of residents were living below the poverty level. Employment in the area is limited to the village council, Tanana Chiefs Conference and the school. In the summer, the BLM hires firefighting crews.

Supplies are brought into Dot Lake by truck or bus. Regular bus service to Fairbanks and Delta Junction is available. Cars, trucks, snowmachines and ATVs are used for local transportation. Dot Lake is not accessible by water, since the Tanana River is over two miles away. A few residents own riverboats, which they use for fishing and hunting.

As wage employment opportunities are limited in Dot Lake, residents rely heavily on the local harvest of wild food. A study that addresses the use of natural resources by the current residents of Dot Lake states that Dot Lake residents participate in a wide variety of resource harvest activities, including hunting for moose, caribou, sheep, black bear, grizzly bear, spruce grouse, ruffed grouse, willow ptarmigan, rock ptarmigan, snowshoe hare, porcupine, squirrels, and waterfowl; trapping twelve species of furbearers; fishing for four species of whitefish, five species of salmon, northern pike, suckers, lake trout, and Dolly Varden; and gathering seven species of berries, roots, mushrooms, edible greens, birch bark, spruce root and firewood (Martin 1983). Salmon are primarily obtained from the Copper River area, where a number of residents have extended families. Local residents sell parkas, moccasins, beadwork, and other handicrafts.

During the 1987 through 1988 period, Dot Lake residents harvested an average of 377.7 pounds of food per household or 114.5 pounds per capita. Moose are an important contributor to the Dot Lake harvest, comprising 34.2 percent of the total edible pounds, while fishing, for all species of fish, resulted in 45.3 percent of the total (Marcotte 1991).

Native Village of Tanacross – Tanacross is located on the south bank of the Tanana River, 12 miles northwest of Tok at Milepost 1324 of the Alaska Highway (Alaska Department of Community and Economic Development 2002).

Tanacross is a traditional Athabascan village with a subsistence lifestyle. The population was 144 according to an estimate by the Alaska State Demographer in 2003. Nearly every family depends on subsistence activities for food. Whitefish, moose, porcupine, rabbit, ptarmigan, ducks and geese are utilized. Caribou may be hunted by lottery permit, and some travel to Copper River for salmon each summer (Alaska Department of Community and Economic Development 2002). A study conducted from June 1987 through May 1988 showed that Tanacross residents harvested an average of 684.9 pounds of food per household, or 250.4 pounds per capita. Together, moose and whitefish accounted for 62 percent of the total harvest in Tanacross and salmon accounted for an additional 15 percent of the annual harvest (Marcotte 1991).

Many residents also work during the summer as emergency firefighters, while others engage in trapping or in making native handicrafts to sell. Employment at the laundromat and clinic is provided by the tribe, which has also formed the profit-making corporation Dihthaad Global Services, LLC (Alaska Department of Community and Economic Development 2002).

Native Village of Tetlin – Tetlin is located along the Tetlin River, between Tetlin Lake and the Tanana River, 20 miles southeast of Tok. It lies in the Tetlin National Wildlife Refuge and is not connected by road to the Alaska Highway. Almost 98 percent of the population is Alaska Native or part native (Alaska Department of Community and Economic Development 2002). Tetlin is accessible year-round by road. Many residents own cars, trucks, skiffs, and snowmachines for hunting, fishing, and hauling wood and access to the Alaska Highway.

Due to the community's isolation, the residents are able to pursue a traditional Athabascan culture and lifestyle. During the 2000 U.S. Census, there were 55 total housing units and 13 were vacant (of which 12 are used only seasonally). Seventeen residents were employed. The unemployment rate at that time was 46.88 percent, although 75.71 percent of all adults were not in the work force. The median household income was $12,250, per capita income was $7,371, and 48.42 percent of residents were living below the poverty level. The school, tribe, clinic, store and post office provide the only employment. Members of the community are employed to fight fires for BLM in the summer.

Nearly all families participate in subsistence activities throughout the year. Whitefish, moose, ducks, geese, spruce grouse, rabbits, berries, and roots are harvested (Alaska Department of Community and Economic Development 2002). In the 1987 through 1988 period, Tetlin residents harvested an average of 854.1 pounds of food per household or 213.5 pounds per capita. Fishing for whitefish accounted for 49.4 percent of the total harvest, which was the greatest single-resource harvest found in the region. Moose hunting added another 29.7 percent of the total harvest (Marcotte 1991). Many residents engage in trapping or making handicrafts for sale.

Northway Village – Northway Village is located between Nabesna River and Skate Lake, on a nine-mile spur road off the Alaskan Highway. It lies in the Tetlin National Wildlife Refuge, 42 miles from the Canadian border. It is connected to the Alaska Highway by an unpaved road. Regular buses and truck services are available (Alaska Department of Community and Economic Development 2002).

Northway Village is a traditional Upper Tanana Athabascan community, practicing a subsistence lifestyle. The current population is 95, according to an estimate made by the State Demographer in 2003. 95.3 percent of the population are Alaska Native or part native. Traditions such as dancing, crafts, hunting, and trapping continue today (Alaska Department of Community and Economic Development 2002).

During the 2000 U.S. Census, there were 39 total housing units and seven were vacant. Six of these vacant housing units are used only seasonally. Thirty residents were employed. The unemployment rate at that time was 31.82 percent, although 59.46 percent of all adults were not in the work force. The median household income was $24,688, per capita income was $10,300, and 25 percent of residents were living below the poverty level. The tribal office, school, clinic and other local services provide the only employment opportunities in the village (Alaska Department of Community and Economic Development 2002).

Subsistence activities provide most food sources including moose, rabbit, ptarmigan, ducks, geese, whitefish, and berries. Some residents travel to the Copper River for salmon. Families also trap and sell furs, and produce birch-bark baskets, moccasins, mukluks, mittens, hats, and beadwork accessories (Alaska Department of Community and Economic Development 2002). In general, local resource harvesting activities are a continuation of historic patterns, with a slight difference in the seasonal scheduling of moose and caribou hunting. Decreases in harvesting of sheep, marmots, and ground squirrels are found in the more remote mountainous habitats of former band areas. Reestablishment of the local caribou populations likely would coincide with greater use once again (Case 1986). During the 1987 through 1988 time period, Northway residents harvested an average of 1,001 pounds of food per household or 278.0 pounds per capita. Whitefish fishing accounted for the largest portion of the Northway total at 36.0 percent. Moose hunting was the second largest contributor, comprising 26.8 percent (Marcotte 1991).

Delta Junction, Big Delta, Deltana, and Dry Creek – The towns of Delta Junction (population 840) and Big Delta (population 749) lie adjacent to DTA at the junction of the Richardson and Alaska highways. These towns are rural and thus qualify for subsistence preference under current law.

Deltana (population 1,570) is a Census Designated Place (unincorporated) and an Election District composed of the populated area east of Delta Junction and DTA. It is bound by the Johnson River to the east, the Tanana River to the north, and the Granite Mountains to the south. Deltana residents are also eligible for subsistence preference (U.S. Census Bureau 2005).

The non-native community of Dry Creek (population 128) is approximately 45 miles east-southeast of Delta Junction. According to the Alaska Department of Community and Economic Development (2002), at least 15 adult residents rely on the exploitation of natural resources and a number of Dry Creek residents can be characterized as subsistence hunters/trappers.

Given the close proximity of federal land to these communities, the traditional and customary practices of the region, and the documented recreational practices within DTA, these communities are presumed to use portions of DTA for subsistence resources. These resources would include game animals, fish, and plant materials.

3.3.7.1.3 Resource Availability

A variety of subsistence resources are readily available on DTA. Due to the size and relatively remote location of these areas, natural resources and wildlife populations are generally well preserved. DTA annually hosts a variety of hunting activities based on access and available big game populations.

3.3.7.1.3.1 Resource Availability by Alternative

All alternative locations for the proposed BAX and CACTF range complex are within GMU 20D. Customary and traditional use has been determined for hunting of the following species in GMU 20D: black and brown bear, moose, caribou, sheep, beaver, coyote, red fox, hare, lynx, marten, mink and weasel, muskrat, otter, wolf, wolverine, grouse, and ptarmigan. Subsistence permits can be obtained for the take of those species within an established open season (which are subject to annual review and changes). At this time there is no federal subsistence season for moose, caribou, or sheep within 20D. Subsistence regulations published annually set restrictions

on season, take, and which rural residents are eligible to harvest under subsistence regulations on particular sections of federal land.

Federal subsistence opportunities are available for trapping of the following species in GMU 20D: beaver, coyote, red fox, lynx, marten, mink, weasel, muskrat, otter, wolf and wolverine. Subsistence permits can be obtained for the take of those species within an established open season. Subsistence regulations for trapping are published annually set restrictions on season, take, and which eligible rural residents are eligible to harvest under subsistence regulations on particular sections of federal land.

Anadromous fish stocks are not present on the training areas, but other freshwater fish can be harvested. For more information on these resources, see Section 3.2.6, *Wildlife and Fisheries*. Opportunity for harvesting nongame resources, such as edible or medicinal plants, is determined by public access (when and where training lands are not closed for training). There are no federal restrictions on the season, take, and eligibility of rural residents for nongame resources. Subsistence users may access DTA and harvest nongame subsistence resources under USARAK's current recreational use policy, as described in Section 3.3.8, *Public and Access Recreation*. A description of USARAK's new call-in system (USARTRAK) for updated information on public access to USARAK lands can be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix H (USARAK 2004a).

3.3.7.1.4 Resource Use

Federal subsistence regulations (50 CFR Part 100 and 36 CFR Part 242) recognize the city of Delta Junction and surrounding communities as rural. Accordingly, these communities may hunt under federal subsistence regulations on federal land. USARAK maintains an interactive relationship with local communities, providing opportunities for the public to use Army training land for subsistence. DTA is a large, relatively undeveloped open space. The associated outdoor activities are perhaps DTA's best attributes in terms of community quality of life.

USARAK manages access to Army lands through a Recreational Access Permit required for everyone 16 and over. On FWA and DTA, these permits are free. Permit holders are required to make a phone call to the automated USARTRAK system prior to entering training lands. This allows the permit holder to determine which training areas are open for public use. Training areas are only closed during range operations or other military activities that are incompatible with public use.

3.3.8 Public Access and Recreation

3.3.8.1 Access

The public must obtain permission before entering military lands. Persons must first get a Recreational Access Permit before entering. Using their permit number, interested parties must call the USARTRAK automated check-in phone system and indicate where they will be going. When individuals check in, the latest information on military range closures and construction can be obtained. This information is also given in weekly bulletins and radio announcements. More information on USARTRAK may be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix H (USARAK 2004a).

DTA East is readily accessible to the public. Access roads, including 33-Mile Loop Road, Meadows Road, Dome Road, Old Richardson Highway, and Fleet Street, connect directly to either the Richardson or Alaska highway. Additional access was historically available through the Fort Greely cantonment area (now managed by SMDC), but is no longer available for recreation or general access.

In addition to vehicle access via roads, much of DTA is available to off-road recreational vehicles (ORRV) and aerial access. ORRV and winter trails exist across both the eastern and western parts of the training area. The 33-Mile Loop Road is one of the more popular trail systems on DTA East.

3.3.8.1.1 Road Legal Vehicles

Ground vehicles include standard cars and trucks. Ground access on maintained roadways is allowed on USARAK lands and is the most popular mode of access. Ground vehicles must obey all Army rules and regulations involving posted speed limits and are not allowed in restricted areas.

3.3.8.1.2 Boat

Boats are considered those aquatic vehicles that require open channels and waterways to operate. Since they are limited to open waterways, only certain areas are available for boat use. Additionally, boats may not operate in restricted areas, even though they may have waterways flowing through them.

3.3.8.1.3 Off-Road Vehicles

ORRVs include those motorized vehicles that do not require maintained roads or open waterways such as snowmachines, all-terrain vehicles (three- and four-wheeled), and airboats. ORRV use is allowed on maintained roadways and trails in designated areas. USARAK Regulation 190-13, *Military Police – Enforcement of Hunting, Trapping and Fishing on Army Lands in Alaska*, describes the restrictions for DTA. ORRVs are allowed at DTA for hunting, trapping, fishing, and other recreational purposes, provided that they are in compliance with all state and federal laws and applicable Army regulations. In addition, entrants may not use ORRVs to gain access to restricted areas.

ORRV use also varies seasonally. Three and four-wheeled all-terrain vehicles are commonly used during the summer while snowmachines are popular in winter. Off-road vehicles usually stay on cleared trails and snowmachines often use frozen waterways in winter. General guidelines state that, during break-up (time of year when the ground begins to thaw, usually in April or May), all areas are closed to ORRV use. Restriction dates during this time are determined by the USARAK Environmental Resources Department and are recorded on the USARTRAK system. ORRVs are prohibited from designated ranges and training areas, and users must check with USARTRAK to determine which areas are open for ORRV use.

3.3.8.1.4 Aerial Access

Aerial access involves small aircraft such as single-engine planes and ultralights. Aerial access is allowed over USARAK lands subject to restricted airspaces and closures. Aerial vehicles are

prohibited from landing in restricted areas on USARAK lands. Federal Aviation Administration (FAA) regulations require the military to generate "Notices to Airmen" when hazards exist to the safe flow of air traffic. USARAK Regulation 350-2 addresses use of restricted airspace over USARAK lands (USARAK 2004b). Further information on airspace use over USARAK posts can be found in Section 3.2.8, *Airspace*. Many restricted airspace areas are conditionally available for public aerial access or overflight. If landing is to occur on USARAK lands, a Recreational Access Permit and phone call to the USARTRAK system is mandatory.

3.3.8.1.5 Unauthorized Access

Illegal entry, without a valid Recreational Access Permit and without the use of USARTRAK to indicate locations of interest, is the most common form of trespass and is often premeditated and deliberate. Only a small portion of the installation is fenced or posted with boundary signs.

Trespass also includes structures built on USARAK lands without Army approval, such as permanent base camps for hunting and trapping. Trespass structures were identified as early as 1982. The Army started the Training Area Cleanup Program in 1999 and continues to work to locate these structures, identify their occupants or users, and coordinate the removal of the structures from Army lands.

3.3.8.2 Use Areas

Public use is limited on some parts of DTA. These areas may be permanently closed to public access due to specific military activities. Range Control can provide a listing and description of such access restrictions within DTA.

Temporary recreational use restrictions also exist on DTA. These closures are due primarily to military training exercises in those training areas reserved for the exercise on those properties that would conflict with recreational use and could possibly increase risk of accidental injury. In addition, seasonal closures are implemented during freeze-up or break-up. The Range Control office at DTA East is in charge of temporary training closures. Users should call the USARTRAK automated check-in phone system to ensure that lands are available for recreational use. This information is also available through both the Range Control office and Environmental Resources Department.

Specific use areas are defined for DTA. Limitations and restrictions on public access also depend on the type of designated military use for each area. Some common incompatible uses of military lands include nonmilitary structures, easements, and leases (USARAK 2002b,c). The three general categories of military land use affecting public access are:

Training areas and non-firing facilities – Public access is allowed on training areas, subject to safety restrictions, military security, military training or when access does not impair the military mission. Compatible uses may include hunting, fishing, trapping, bird watching, hiking, skiing, dog sledding, and ORRV operation.

Firing ranges, surface danger zones, and non-dudded impact areas (Dedicated impact areas) – Public access into firing ranges, surface danger zones, and non-dudded impact areas is normally disallowed due to conflicts with the military mission. However, there are times during

the year when public use does not conflict with military training and public access is allowed into these areas.

Dudded impact areas – Public access into dudded impact areas is prohibited due to the hazard of UXO.

Impact areas are those parts of military lands that are used for weapons targeting and firing practice. High hazard (dudded) impact areas are closed to the public. Non-dudded impact areas are not permanently restricted, although permission to enter these areas is limited. Impact areas on DTA West are shown in Appendix, Figures 2.g and 2.h. Information on closures can be obtained from the USARTRAK automated check-in phone system or Range Control, prior to entering the post.

A two-mile-wide buffer zone surrounds each impact area, and these buffer zones are closed during firing maneuvers on that impact area. This buffer zone contains the safety fan (i.e., the maximum firing or detonation range) of weapons used against targets within the impact areas. All (or parts of) these buffer zones may be temporarily closed to the public during firing.

USARAK is required to post warning signs near all closed training lands and/or dangerous areas. USARAK Range Regulation 350-2 states that all impact areas will be marked with warning signs, barriers and/or guards. Passing any of these hazard warnings without permission from the Range Control office is forbidden (USARAK 2004b).

DTA East is predominantly managed as Open Use (available year-round for all forms of recreation), with the exception of some isolated wetland areas and Jarvis Creek channel, which are considered Limited Use (all non-motorized forms of recreation year-round) areas. The 33-Mile Loop Road runs through this area, along with a number of additional trails. Other access west of Richardson Highway includes Windy Ridge and Meadows roads (Appendix, Figures 2.e, 2.f, 2.g and 2.h).

Portions of DTA west of the Delta River are primarily designated as an impact area. Because of this, most of the central area is Off-Limits. Permanent impact areas include Oklahoma, Delta Creek, Mississippi, Washington, and parts of the Allen Army Controlled Fire Area. USARAK has revised the designation of the Lakes Maneuver Impact Area, and it is now considered Off-Limits due to presence of UXO. This decision was based on discovery of Range Control records showing a chance of unrecovered explosives dating from the 1940s and 1950s. Modified (open year-round for non-motorized recreation and motorized recreation during appropriate snow cover) and Open Use areas exist to the north and south, along the northern boundary of the training area and the foothills of the Alaska Range.

The Texas Range and Washington Range areas, east of and adjacent to the Washington Impact Area, cover 8,961 acres to the east of the Delta River. In addition, the CRTC complex at Bolio Lake is off-limits to public access and use.

Warning signs have been placed on DTA, with the majority being west of the Delta River. Eleven gates restrict access along the eastern boundary of the Delta River, and one is located in the north portion of Allen Army Controlled Fire Area. The lands between Meadows Road and the impact area boundary (Delta River) are off-limits and are posted accordingly. The Wills Small Arms

Complex and the battalion bivouac site are also off-limits and gated and posted. Warning signs exist on all probable approaches to restricted areas.

3.3.8.3 Recreation

USARAK lands are available for a variety of recreational uses, such as hunting, fishing, trapping, ORRV use, hiking, boating, picnicking, berry picking, bird watching, skiing, and dog sledding. Due to its acreage, condition, and proximity to population centers, DTA East is a popular recreational destination for Alaska residents. Historic recreational use numbers for DTA are shown in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E (USARAK 2004a). The BRAC process realigned Fort Greely in 1999 and the number of Soldiers and civilians working on post and living in the community were dramatically reduced. Recreation user days decreased with this closure and realignment action. Recreational use is now increasing due to the construction and manning of the U.S. Army SMDC Ground-based Midcourse Defense facility. Morale Welfare Recreation on Fort Greely promotes outdoor recreation and rents all kinds of recreational equipment that is often used on DTA.

USARAK also provides wildlife viewing opportunities for Soldiers, civilians, Alaska residents, and visitors. Programs include wildlife viewing platforms, nature trails, interpretive signs, public presentations, and cooperative publications with local, state, and federal agencies.

A USARAK Recreational Access Permit is required for everyone 16 and over before entering Army lands. On DTA, these permits are free. A phone call to the automated USARTRAK system is then required to check into the training areas of choice. Recreation opportunities are only closed during range operations or other military activities that are incompatible with outdoor recreation.

Statements made by the public indicate that a portion of the local population, beyond that reflected in Army data, access DTA East for a variety of recreation activities.

3.3.8.4 Hunting

Military lands host numerous game species such as moose, bear, caribou, bison, and small game. Harvest data indicates a constant, annual interest in access to hunting opportunities on USARAK lands. Hunters must hold state hunting licenses and follow all federal and state guidelines while hunting on Army properties. In addition, before hunting on Army lands nationwide, hunters must first take an approved hunter safety course (as required by AR 210-21, *Army Ranges and Training Land Program*). Similarly, bow hunters must complete a bow hunter proficiency course to hunt on Army lands.

While specific annual hunter access numbers do not exist for all Army properties, existing DTA access data can be used as an approximate guide for hunting access on Army lands (See the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix E [USARAK 2004a]).

Hunting occurs on DTA lands throughout the year, with a disproportionate amount of use occurring in fall. Most big game, upland birds and migratory waterfowl seasons begin in August or September. The recorded data (indicating hunting use by month) indicates that moose is the most popular game species pursued on DTA (See the *Final Environmental Impact Statement for*

Transformation of U.S. Army Alaska, Vol. 2, Appendix E ([USARAK 2004a]). Its season starts on or about September 1. Other hunted big game species include caribou, bison, and bear. More data on wildlife populations on DTA can be found in Section 3.2.6, *Wildlife and Fisheries*. Hunting is allowed on DTA East, within open areas as determined by Range Control.

Most of the moose hunting on DTA East occurs along the east side of 33-Mile Loop Road. This area is a non-permit area, but it does have antler restrictions for moose. The open views from ridgelines provide excellent vantage points for hunters. Training Areas 8, 9, 10, 11, 16, 17, 19, and Gerstle River are the only areas on DTA East within state GMU 20D that are open for non-permit moose hunts in September.

The Delta Junction Management Area (DJMA) encompasses most of DTA East (Appendix, Figure 3.m). ADF&G hunting restrictions within the DJMA apply only to moose. To hunt moose in this area, one must apply for a permit through the ADF&G drawing process. Only 20 permits have been issued through this lottery per year. Although Texas Range, Washington Range, and Washington Impact Area are within the DJMA, USARAK restricts recreational access to these areas.

State of Alaska regulations allow black bear hunting year-round in GMU 20D, with a harvest limit of three per regulatory year. Black bears may also be taken over a state registered baitstand from approximately 15 April to 30 June. Black Bear baiting is allowed on DTA after registration of the stand with the state of Alaska and USARAK. As with all recreational activities, some areas may be temporarily closed to bear baiting due to training.

Grizzly (brown) bear hunting is open from approximately 10 August to 30 June, with a harvest limit of one per regulatory year. The caribou hunt (bulls) on DTA East is open to residents only through a registration hunt. This season occurs approximately 15 August to 25 August. Bison hunts are allowed through the ADF&G drawing process. The number of permits issued is based on that year's population estimates and composition. There is insufficient habitat for Dall sheep on DTA East; thus no hunting occurs. Access through DTA East for Dall sheep hunting in other areas off-post does occur, as the Granite Mountains (to the east of DTA East) are part of an ADF&G drawing permit sheep hunting area.

3.3.8.5 Trapping

Popular furbearer species for trapping include lynx, beaver, pine marten, fox, and wolves. Trapping on DTA East requires registration of traplines with the USARAK Natural Resources Office, a Recreational Access Permit, and a daily phone call to the USARTRAK system. Trapping records for DTA have been compiled into an annual summary (Reidsma 2001, 2002a, 2003a, 2004).

3.3.8.6 Fishing

Fishing is a popular recreational activity at DTA East. In addition to naturally existing populations of many sport fish, there are a number of stocked lakes on Army lands (Appendix, Figure 3.p). ADF&G is responsible for maintaining stocked fish populations on military lands. Some stocking information can be found in Section 3.2.6, *Wildlife and Fisheries*. Fishing on Army properties requires a Recreational Access Permit and a daily phone call to the USARTRAK system.

There are 16 lakes on DTA with stocked sportfish populations. Stocked lakes include Bolio, Bullwinkle, Chet, Nickel, J, Doc, Sheefish, Mark, North and South Twin, Rockhound, Luke, Ghost, and No Mercy lakes within the Meadows Road/Windy Ridge Road loop. Weasel Lake (near the southern boundary of the training area) and Koole Lake (in the northwest) are also stocked. Additional fish stocking data may be found in the *Alaska DF&G Statewide Stocking Plan for Recreational Fisheries, 2005* (ADF&G 2005).

3.3.8.7 Trail Use

Hiking opportunities exist within all USARAK locations. Hiking is most popular in mountainous or hilly terrain and is much less popular through lowland and wet areas. Hiking on military lands usually occurs on training and maneuver trails. Few other trails exist on Army lands.

DTA contains many trails east of the Delta River. The most common hiking route at DTA is from the Richardson Highway to the top of Donnelly Dome. Public access for trail use is allowed with a valid Recreational Access Permit, but is subject to closures, safety restrictions and military security. A call to the USARTRAK system is also required before entering the area.

Other popular trail activities on Army lands include sightseeing, bird watching, berry picking, skiing, and dog sledding. Many recreational activities are seasonal and occur in brief bursts each year. Records of non-extractive recreational use of military lands are unavailable for most Army lands.

3.3.8.8 Off-Road Recreational Vehicles

ORRV use on DTA includes airboats, snowmachines, dirt bikes, three and four-wheelers, and four-wheel drive vehicles. ORRVs are used in association with many activities in interior Alaska. These vehicles are primarily used to access hunting, fishing, and trapping areas, and for recreational riding.

3.3.8.9 Resource Use by Alternative

Eddy Drop Zone – Access to the BAX and CACTF at Eddy Drop Zone by land would be through the northern entrance point to 33-Mile Loop Road, accessible either from the north or the south along the Richardson Highway located at Mile Marker 264.8. Approximately the first five miles of 33-Mile Loop Road would be used to access the BAX and CACTF under this alternative. The construction and maneuver areas encompass approximately 12 miles of 33-Mile Loop Road. The proposed location of the BAX and CACTF, and their associated surface danger zones, would encompass nine training areas (Training Area 6 through 10, and 19 through 22) at DTA East. During operation of the BAX and CACTF (and their associated surface danger zones), these training areas would be closed to public access (Appendix, Figure 2.e), which includes the 12-mile portion of 33-Mile Loop Road within the construction and maneuver area. The 33-Mile Loop Road is the major access trail to training areas in this part of DTA East, and to the areas south and east of DTA that are used for recreation. There are also about 37 miles of minor trails in the area, some drivable with an ORRV or during winter when the ground is frozen, but the rest are overgrown and impassable.

The Eddy Drop Zone alternative is one of many good locations for blueberry picking and grouse hunting for local residents. The trails and surrounding forests are also used for moose and small

game hunting, trapping, and dog mushing. The extensive trail network in this area creates easy access, and numerous small ridges or hills provide good overlooks. Most of the Eddy Drop Zone alternative is in the DJMA, which restricts moose hunting to 10 permit holders each fall. However, the southeast corner of the proposed BAX and CACTF maneuver and construction footprints lies just outside of this permit-only moose hunting area. Since this is a close and convenient open hunting area to the Delta Junction and Big Delta communities and outside of the DJMA, many hunters utilize 33-Mile Loop Road for access. The 33-Mile Loop Road area is probably the heaviest used area for moose hunting on DTA.

Recreational use within the proposed surface danger zone is the same as the construction footprint and maneuver area, with the continuation of 33-Mile Loop Road and side trails used for access. In addition, the 12-Mile Crossing Road lies at the southern edge of the surface danger zone.

Recreational data was kept for four years (1996-1999) by the Military Police, and information was recorded for general recreation areas. Eddy Drop Zone and 33-Mile Loop Road data show the top recreational activities for those three years were hunting, sightseeing, ORRV and snowmachine use, trapping, dog mushing, and berry picking (Reidsma 2004).

Donnelly Drop Zone – The Donnelly Drop Zone alternative contains 40 miles of existing trails, some of which are overgrown and not drivable. Access to the BAX and CACTF at Donnelly Drop Zone by land would be accessed through MIDAS Site Road (located at Mile Marker 249.2), which bisects Donnelly Drop Zone, with entry from the north or the south along the Richardson Highway. The proposed location of the BAX and CACTF, and their associated surface danger zones, encompasses ten smaller training areas (TA 6, 7, 9, 10, 11, 16, 17, 19, 20, and 21). During operation of the BAX and CACTF, these training areas would be closed to public access (Appendix, Figure 2.f).

The 33-Mile Loop Road is the only access to training areas in this part of the post, but it is severely degraded and may be impassable in some areas when wet (except in the winter). Hunting for moose, Dall sheep, bear and caribou all occur in the Granite Mountains located to the southeast of DTA, and many recreational users access the area by using 12-Mile Crossing Road. An improved gravel road ends just inside the proposed BAX footprint (about 1.5 miles). In the northwest corner of the proposed CACTF area, there are 2.5 miles of trails that are part of a network created for a Cold Regions Test Center test in the 1970s or 1980s.

The Donnelly Drop Zone alternative is popular for firewood cutting (following the 1999 Donnelly Flats fire), dog mushing, trapping, and hunting. Hunting is popular within the Donnelly Drop Zone alternative, as it is just outside the DJMA, and is easily accessible from the Richardson Highway. The 12-Mile Crossing Road is also used to access the east side of Jarvis Creek.

Recreational use within the proposed surface danger zone is the same as the construction footprint and maneuver area, with 12-Mile Crossing Road joining 33-Mile Loop Road in the northern half of the surface danger zone. Numerous side trails are also within the surface danger zone.

Recreational data from DTA (1996-1999) was recorded for two general recreation areas that overlap the Donnelly Drop Zone alternative. The top recreational activities for those four years were hunting, sightseeing, ORRV use, trapping, and berry picking (Reidsma 2004).

North Texas Range – Meadows Road, near the North Texas Range alternative, is a maintained, year-round gravel road. Access to the BAX and CACTF at North Texas Range by land would be through Meadows Road accessed either from the north or the south along the Richardson Highway, located at Mile Marker 257.6. The construction and maneuver areas encompass approximately three miles of Meadows Road. The proposed location of the BAX and CACTF, their associated surface danger zones, and six training areas (TA 52, 53, and 57 through 60) would be closed to public access during military training exercises (Appendix, Figure 2.g). This would include the three-mile portion of Meadows Road within the construction and maneuver area.

Meadows Road, Windy Ridge Road, and the Old Richardson Highway provide access to the training areas west of the Richardson Highway and north of Donnelly Dome. Windy Ridge Road is a less frequently maintained gravel road that crosses the southern edge of the proposed CACTF area (for approximately two miles). The western third of the proposed BAX footprint can be accessed by using OP 8/9 Road, which is a gravel road (approximately 4.5 miles long) that is occasionally maintained. An additional 31 miles of old military trails traverse the area, but most of these trails are either overgrown, impassable, or cross boggy areas (winter trails). Recreational use within the surface danger zone is prohibited, due to the hazard of UXO within existing dudded impact areas.

The North Texas Range alternative is very popular for recreational use due to a number of stocked lakes. Grouse hunting, fishing, trapping and wildlife viewing are popular activities. The stocked lakes most likely affected by the proposed BAX and CACTF at North Texas Range are North and South Twin, Rockhound, No Mercy, Doc, and Mark. Recreational data from DTA (1996-1999) was recorded for two general recreation areas that overlap the North Texas Range alternative. The top recreational activities for those four years were fishing, sightseeing, hunting, and camping (Reidsma 2004).

After a drop in fishing pressure during BRAC, the last two to three years have seen an large increase in use of these stocked lakes. This was one of the only recreational opportunities available to transient contract workers and others associated with the construction and manning of the SMDC facilities. Recently, more long-term Army personnel and a more comprehensive Morale Welfare and Recreation program have added to the recreation choices, although fishing is still very popular (Benner 2004, Clark 2005).

North Texas Range/Eddy Drop Zone Combination – Access roads and trails and recreational use within the proposed BAX at North Texas Range and the CACTF at Eddy Drop Zone are similar to those discussed above. The construction and maneuver areas encompass approximately four miles of Meadows Road. The proposed location of the BAX, and its associated surface danger zones, and six training areas (TA 52, 53, and 57 through 60) would be closed to public access during military training exercises (Appendix, Figure 2.h). This would include the four-mile portion of Meadows Road within the construction and maneuver area. The CACTF construction, maneuver and surface danger zone areas encompass approximately three-and-a-half miles of 33-Mile Loop Road.

The stocked lakes most likely affected by the proposed BAX at North Texas Range are North and South Twin, Rockhound, No Mercy, Doc, and Mark Lakes. No stocked lakes are located within the proposed CACTF footprint.

3.3.9 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs each federal agency to identify and address any disproportionately high and adverse environmental effects of its programs, policies, and activities on minority populations and low-income populations. Environmental effects include effects on human health, cultural resources, and socioeconomics.

The Presidential Memorandum accompanying EO 12898, sent to heads of departments and agencies, specifically recognizes that environmental justice concerns should be identified and addressed under NEPA procedures. Additionally, the DOD Strategy on Environmental Justice requires implementation of EO 12898, principally through compliance with the provisions of NEPA.

In addition, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires the identification and assessment of environmental health and safety risks that may disproportionately affect children.

Environmental justice analysis ensures that minority and low-income communities do not bear a disproportionate share of negative environmental consequences resulting from federal activities.

In particular, EO 12898 directs agencies to pay special attention to subsistence issues when dealing with environmental justice, since these communities often rely heavily on hunting, fishing, and gathering for their primary dietary/nutritional needs. Moreover, agencies are reminded to consider the environmental consequences of their actions in the context of cumulative effects stemming from all other activities – past, present, and future – that have impacts on the community. Subsistence is discussed in Section 3.3.7, *Subsistence*.

The issue of environmental justice is considered separately from government-to-government consultations with Alaska Native tribal government entities.

3.3.9.1 Region of Influence

For purposes of this analysis, demographic research focused on the census area where each alternative is located. In addition, since census areas in Alaska cover broad geographic regions, individual communities in close proximity to the alternative sites were analyzed separately in order to identify potential environmental justice issues. The region of influence for environmental justice analysis was established by determining the most geographically far-reaching potential effect and including encompassed communities in the analysis.

DTA is located in the Southeast Fairbanks Census Area, a large region encompassing a number of communities (Table 3.3.9.a). These communities are analyzed separately because of their inclusion within the ADF&G GMU 20D and their subsistence ties to this region (Appendix, Figure 3.a and 3.m).

Table 3.3.9.a Minority and Low-Income Percentages for Southeast Fairbanks Census Area Communities.

Area	Total Population	Percent Minority	Percent Native	Percent Low-Income
State of Alaska	636,932	30.7	15.6	11.2
Big Delta	749	4.5	2.1	30.0
Delta Junction	840	8.6	5.6	19.4
Deltana	1,570	8.4	3.8	15.1
Dot Lake	19	15.8	5.3	5.6
Dot Lake Village	38	76.3	73.7	19.1
Dry Creek	128	0.0	0.0	69.4
Fort Greely	461	34.3	2.0	10.4
Healy Lake	37	73.0	73.0	9.1
Northway Village	95	98.2	95.3	25.0
Tanacross	144	91.5	90.0	33.3
Tetlin	137	97.5	97.5	48.4

Source: Alaska Department of Community and Economic Development 2002
* These numbers refer to "Percent Below Poverty," which is defined as annual income less than $15,134.

3.3.9.2 Minority and Low-Income Communities

Minorities are defined as members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic (Council on Environmental Quality 1997). According to the 2000 U.S. Census, the percentage of persons in Alaska identified as minority was 30.7 percent in 1999. This includes 3.5 percent Black or African American, 15.6 percent American Indian or Alaska Native, 4.0 percent Asian, 0.5 percent Native Hawaiian or other Pacific Islander, 1.6 percent Other Race, 5.4 percent Two or more races, and 4.1 percent Hispanic or Latino (of any race).

Minority communities are identified where either: (1) the minority population of the affected area exceeds 50 percent or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (Council on Environmental Quality 1997). A conservative estimate of five percent is considered "meaningfully greater" in this analysis. According to 2000 Census data, the total 1999 minority population in the Southeast Fairbanks Census Area was 21 percent and consisted of 2 percent Black or African American, 12.7 percent American Indian or Alaska Native, 0.7 percent Asian, 0.1 percent Hawaiian or other Pacific Islander, 0.7 percent Other Race, 4.8 percent Two or more races, and 2.7 percent Hispanic or Latino (of any race).

Although the percentage of Alaska Natives in the Southeast Fairbanks Census Area is actually less than the statewide average, they are by far the largest minority group in Alaska and in the Southeast Fairbanks Census Area (Table 3.3.9.a). Due to the importance of subsistence and cultural resources on USARAK lands, they are considered separately from other minority community in USARAK analyses.

Low-income communities are identified according to Council on Environmental Quality (1997) guidelines by using statistical poverty thresholds from the U.S. Bureau of Census. Census data for 2000 indicate 9.4 percent of individuals and 6.7 percent of families in Alaska are below the poverty level. In the Southeast Fairbanks Census Area, these percentages are double. The population living below the poverty level in the Southeast Fairbanks Census Area (and thus its low-income community) consists of about 18.9 percent of the area's individuals and 12.4 percent of the area's families.

The region of influence for transformation activities occurring on DTA includes seven minority or low-income communities: Big Delta, Delta Junction, Dot Lake Village, Dry Creek, Fort Yukon, Healy Lake, and Tanana. In addition, a number of Alaska Native tribes outside of this region may experience impacts due to their use of subsistence resources on and around the installation, as well as association with archaeological sites and TCPs. For further community information on Dot Lake Village, Healy Lake Village, Northway Village, Native Village of Tanacross, and Native Village of Tetlin, see Section 3.3.7.1.2, *Proximity and Community Information*.

3.3.9.3 Impacts on Children

According to the Task Force on Environmental Health Risks and Safety Risks to Children, four priority areas of concern regarding children's health and safety are: childhood asthma, unintentional injuries, developmental disorders, and childhood cancer. With these priorities in mind, analysis of potentially disproportionate effects on children from the proposed action will focus on the areas of air quality, surface water and groundwater resources, and human health and safety.

In accordance with the mandates of EO 13045, training plans and construction site maps for projects undertaken on DTA East and West are reviewed to prevent dangerous or hazardous activities from occurring near schools or child care facilities.

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