SECTION 4
LAND AND WATERSHED MANAGEMENT

4.1 PROGRAM DESCRIPTION AND OVERALL MANAGEMENT GOALS

The Land and Watershed Management Program provides a foundation of all other natural resources program components, and serves as a basic land use and conservation management guide. Sound practices of land and water resources that conserves soil and water are paramount to the overall natural resources conservation program. Soil and water resources form the basis for supporting the remaining components of the system.

This program is integrated with other missions, land use, and environmental planning processes at the installation, as well as all other natural resources management programs. Issues addressed under the Land and Watershed Management Program include:

- Vegetation management practices that include mechanical treatments, prescribed burn operations, invasive species control, and seeding and outplanting of native species;
- Wetlands management;
- Riparian management;
- Oak wilt control;
- Stormwater management; and
- Erosion and sediment control.

Overall management goals for the Land and Watershed Management Program include the following:

- Conserve, develop, manage, and maintain all land and water resources in accordance with proven scientific methods, procedures, and techniques to facilitate the military mission;
- Integrate a safe and effective prescribed burn program into vegetation management practices to facilitate the military mission;
- Avoid, reduce, or eliminate any contribution of pollution due to erosion and sedimentation;
- Maintain no net loss of installation wetlands and protect the biodiversity, functions, and values of wetlands communities;
- Prevent the introduction of invasive species and control populations of such species in a cost-effective and timely manner;
- Comply with all applicable federal and state laws and regulations, as well as DoD policies that mandate land and water conservation; and
- Implement ecosystem and multiple use management practices to achieve program goals.

4.2 PROGRAM STATUS AND MANAGEMENT ISSUES

4.2.1 Vegetation Management

Historically, vegetation of the Edwards Plateau was originally savanna composed of scattered oak mottes in a matrix of herbaceous vegetation and the now ubiquitous Ashe juniper restricted only to steep slopes (Nadkarni, *et al.* 1985). The demise of roaming bison herds and their subsequent replacement by year-round grazing of livestock, along with a change in fire regime have led to a widespread increase in woody species and loss of grasslands across the Edwards Plateau (Smeins 1980). Removing fire from the landscape coupled with overgrazing has allowed woody species to proliferate across the Edwards Plateau. At CSSA, Ashe juniper is the primary manifestation of woody species encroachment, and is the focus of brush management activities.

Management of Ashe juniper infestations are of concern to both the ecological management of CSSA, as well as the military mission. At CSSA, Ashe juniper encroachment has reduced visibility along fence lines, increased fuel loading for potential wildland fires, and overgrown existing fuel breaks, roads, and trails necessary to meet installation security requirements. As a secure and closed facility, CSSA security personnel require access and visibility along the installation perimeter. Since munitions storage is a primary component of the military mission, brush management to reduce fuel loading (and potential subsequent catastrophic wildfires) and maintenance of fuel breaks is necessary.

Ashe juniper encroachments are of ecological concern because they can reduce grazable area for livestock and wildlife, reduce production and diversity of plant species, restrict access to desirable forage plants, and reduce rainfall effectiveness (Lyons, *et al*. 1998). Interfering with grass and forb production by intercepting rainfall before it reaches the surface, Ashe junipers may out-compete other plants. Further, Ashe junipers appear to be heavy consumers of soil nitrates, therefore, soil under and adjacent to Ashe juniper stands may be less favorable to other grasses, forbs, and woody species. Ashe juniper infestation that progresses to a closed canopy can reduce forage production from 1,900 pounds per acre to approximately 280 pounds per acre (Rollins 2001).

Interception of rainfall by Ashe junipers is of further ecological concern to water availability within watersheds. A mature live oak canopy can intercept approximately 25 percent of annual precipitation, while Ashe juniper canopy intercepts approximately 37 percent (Lyons, *et al.* 1998). Beneath the canopy, the litter layer of an Ashe juniper can intercept an additional 40 percent of the annual rainfall, while the litter layer of a live oak will remove an additional 21 percent. Ashe junipers, therefore, may remove 77 percent of the annual precipitation that reaches the mineral soil, compared to 10.8 percent for shortgrass prairies, 19.1 percent for tallgrass prairies, and 46.1 percent for live oak stands (Thurow and Hester 1997).

Brush-dominated rangelands occur over vast areas of Central Texas that were once dominated by grasses, with only scattered trees present. Coping with excessive tree and shrub cover has been costly and often a futile effort for land managers for several decades. Brush eradication was the prevailing strategy throughout the 1950s which attempted to maximize grazing area for cattle. Large-scale, broadcast mechanical or chemical methods were applied over entire pastures (Hamilton, *et. al.* 2004).

Range scientists, resource managers, and landowners now recognize the tangible and intrinsic value of woody plants to game and non-game wildlife habitat, erosion control, watershed management, recreation, as well as traditional livestock grazing (Wiedemann, *et al.* 1999). "Brush sculpting" is a concept of sculpting brush-infested rangeland for these multiple uses. As land managers addressed resource management practices simultaneously, the practice of an integrated brush management system (IBMS) developed (Hamilton 2000).

Management of Ashe juniper at CSSA as an IBMS would be focused on existing grasslands, emerging Ashe juniper shrublands, areas identified as BCVI habitat, and along fuel breaks and roads that have been determined as necessary to the military mission. GCWA is the only endangered species that requires Ashe juniper as a habitat component; therefore, brush clearing in GCWA habitat areas will be limited to selective thinning along necessary fuel breaks and roads to support the military mission or selective thinning of Ashe junipers to enhance growth of other tree species important to GCWA. Management methods of Ashe juniper at CSSA will include mechanical treatments with hand tools (chainsaws), hydraulic shearing machines (cedar eaters), and periodic mowing, as well as a prescribed fire program.

CSSA pesticide applications have been conducted by facility personnel authorized to apply pesticides. In the past, CSSA has stored chlordane, malathion, diazinon, and weed killers. The only known application areas are along the railroad tracks for weed control and along perimeter security fencing. Some application equipment is stored adjacent to the locomotive building. Additional application equipment and locations of equipment cleaning and disposal are unknown. Current practice is to employ contract pesticide applicators to perform large-scale applications. CSSA personnel store only small quantities of nonrestricted-use pesticides in building 66 near the headquarters building. During a site visit in November 1992, only Kocide 101 (copper hydroxide), copper sulfate, and rat traps and bait were observed (Parsons 1993). A pest management plan is currently being updated by CSSA for the entire facility (Sanchez 2006).

Assets of current operations associated with land and watershed management activities at CSSA include a knowledgeable and motivated work crew familiar with regional land management concerns and ownership of mechanical brush control equipment.

4.2.1.1 Needs Assessment

Needs assessment will identify road, trail, fence line, and fuel break segments necessary to the military mission and ecological management at CSSA. The assessment will include a mapping inventory of existing segments, documentation of the current segment condition, management recommendations for each segment, scheduling of segment treatments based on condition and priority, and management recommendations will include either (1) decommission of the segment with rehabilitating the segment to wildlife habitat, (2) continued maintenance of the segment, and (3) new segment establishment to meet military mission and ecological management goals.

In addition, vegetation management treatment areas to meet ecological management goals will be identified. In areas with environmental constraints, such as unexploded ordinance or unsurveyed areas, mechanical treatments will be applied to brush areas to simulate burn effects on live oak and shin oak mottes. CSSA currently operates a "Cedar Eater," a type of mechanical treatment that shreds targeted woody species. Since Ashe juniper is an important component of

GCWA habitat, control for Ashe juniper will follow GCWA management guidelines. Figure 4.1 shows tentative locations for focused vegetation management activities.

4.2.1.2 Prescribed Burn Operations

Burning treatments will be applied to maintain or enhance grasslands, reduce fuel loading, enhance wildlife habitat, and to eliminate existing brush piles. Initially, prescribed burn operations will coincide with brush pile burnings. Figure 4.1 shows a map of preliminary prescribed burn units at CSSA. Each prescription fire will have a Prescribed Burn Plan, as a part of the larger installation prescribed fire management program, which stipulates prior notification with county fire departments, cooperating agencies, and adjacent schools and neighborhoods. Appendix G contains a copy of the Draft CSSA Wildland Fire Management Policy. Some burns may occur in summer months, if conditions fall within adequate prescriptions for burn operations. These possible summer burn units would not occur in habitat areas, however, effects of burn operations (namely smoke) may adversely affect GCWA and BCVI. The effects are considered in the estimation of potential take, described in Section 2.11.

CSSA is currently coordinating with the USFWS Fire Management Office at Balcones Canyonlands National Wildlife Refuge. USFWS wildland fire personnel will conduct prescribed burn operations and have submitted draft burn plan (included in Appendix G). CSSA may elect to contract with a certified burn boss to conduct prescribed burns. Burn boss certification is required at CSSA to ensure that fire as a management tool is applied appropriately in line with safe practices and within burn prescriptions. In addition, certification limits CSSA liability for property damage, injury, or death resulting from prescribed burn operations. Prescribed burns are regulated in the State of Texas by Texas Natural Resources Code §§153.001-153.081 (2002).

4.2.1.3 Modified Mowing Regimes

Mowing frequencies and blade heights over certain areas will be modified to meet multiple use criteria. Normal mowing schedules will be applied to designated areas around buildings, security fence line corridors, and around igloo structures. Periodic mowings with frequencies varying between 6 and 12 months will be applied to areas where prescribed burning is prohibited or not practical. These areas include much of the savanna and grassland areas in the inner cantonment. Figure 4.2 shows a preliminary map of mowing regimes at CSSA.

There are 120 munitions igloos, or earth-covered magazines at CSSA. Maintaining and managing brush and other vegetation cover is a high mission priority. As described in *Guidelines for Managing Vegetation on Earth Covered Magazines* (Palazzo, *et al.* 1994), the establishment and maintenance of vegetation cover reduces erosion potential. According to AMC-R385-100, a minimum of 2 feet of earth cover is required for safety purposes. Maintaining woody species around igloos will also increase shading (Palazzo, *et al.* 1994). Only trees that grow quickly and have shallow root systems should be considered, however, and low-lying and dead branches must be removed to reduce fire danger.

4.2.2 Wetlands Management

Activities in wetlands areas at CSSA are regulated under Section 404 of the Clean Water Act (CWA). The U.S. Army Corps of Engineers (USACE) is responsible for protecting the integrity of the nation's waterways through Section 404 of the CWA, a program established to regulate the discharge of dredged and fill material into waters of the U.S. Regulated activities in

wetlands and waters of the U.S. are controlled by a permit review process administered by USACE, and the objective of the program is to ensure that no discharge of dredged or fill material be permitted if the nation's waters would be significantly degraded or if a practicable alternative exists that is less damaging to the aquatic environment.

When applying for a permit from USACE for the discharge of dredged or fill material into wetlands and waters of the U.S., CSSA must consider (1) designing projects that avoid impacts to wetlands, (2) minimizing potential direct and indirect impacts to wetlands, and (3) compensation in the form of wetlands mitigation for unavoidable impacts to wetlands. Future construction projects at CSSA will follow USACE permitting procedures for possible future impacts to wetlands.

Mitigative actions may include the following:

- ***Onsite mitigation*** Because of the size and characterization of CSSA, onsite mitigation may be the most prudent of all mitigation options when impacts to wetlands cannot be avoided. Mitigative actions may include stream bank stabilization, enhancements to existing wetlands, or wetlands creation, and be subject to USACE approval.
- ***Mitigation banking*** Mitigation banking is the restoration, enhancement, creation, and, in exceptional circumstances, preservation undertaken to compensate in advance for adverse impacts to the aquatic ecosystem. Mitigation banking may be appropriate when on-site mitigation cannot be practicably achieved or would not be as environmentally beneficial at the impact site or a nearby site. A mitigation bank receives payments for wetlands losses, and must be in the geographical context of CSSA. Currently, there are no USACE-approved mitigation banks that would be acceptable to USACE for CSSA potential wetlands mitigation needs.
- ***In-lieu fee program*** An in-lieu fee program would allow CSSA to pay a fee to an established trust fund in lieu of implementing specific on-site or off-site compensatory mitigation. The amount of the in lieu fee paid will normally represent the fair market cost of replacing those aquatic ecosystem resources that would be lost or impaired as a result of the authorized activity. The trust fund, in turn, finances mitigation projects that are designed to restore, enhance, create, or preserve aquatic ecosystem functions. Organizations that receive payments may include the Texas chapter of The Nature Conservancy or the Hill Country Conservancy.

Two wetlands delineations were performed in December 1995 and April 1996 (SAIC 1997a). Based on the survey results, four jurisdictional wetlands totaling 1.1 acres and seven non-jurisdictional wetlands totaling 3.2 acres occur on CSSA (Figure 2.8). The non-jurisdictional wetlands are all man-made impoundments. However, two impoundments are classified as jurisdictional because they intercept flows from defined channels, springs, or seeps. The other jurisdictional wetlands appear to be associated with either springs or seeps. In addition, approximately 32,250 linear feet of stream drainages on CSSA have defined channels and can be classified as jurisdictional waters of the U.S. (CSSA 1997). In November 1996, a wetlands specialist from USACE visited the site to verify the findings of the delineation (CSSA 1997). Definitions for wetlands types are from Cowardin, *et al.* 1979, and include:

- ***Palustrine Unconsolidated Bottom Wetlands*** Stock ponds essentially lacking in woody species, persistent emergents, or emergent mosses or lichens.

- ***Palustrine Emergent Wetlands*** Dominated by hydrophytic vegetation including woody species and macrophytes.
- ***Lacustrine Littoral Unconsolidated Bottom*** Depressional wetlands that lack vascular vegetation, and exceed 2 meters in depth at low water.

Additional wetlands work is required to meet compliance needs at CSSA. Wetlands delineations are considered valid by USACE for a period of 5 years after the survey. Therefore, new construction projects in drainage areas would require additional wetlands surveys.

4.2.3 Riparian Management

The broader floodplains at CSSA are generally maintained as open fields. The smaller drainages contain few cedar elms or other mixed hardwood species normally associated with riparian areas in the region, and are instead dominated by live oaks and Ashe junipers. Riparian management includes protection measures consistent with wetlands management practices at CSSA.

Future enhancement projects may be conducted in conjunction with flood control projects, such as outplanting of woody species typical of Edwards Plateau riparian corridors. These woody species would include cottonwood, sugarberry, sycamore, cedar elm, river walnut, pecan, and hickory, and they would be planted at varying distances from the creek centerline.

4.2.4 Oak Wilt Prevention and Suppression

Oak wilt, one of the most destructive tree diseases in the United States, is killing oak trees in central Texas in epidemic proportions. Oak wilt is an infectious disease of the vascular system of susceptible trees, caused by the fungus *Ceratocystis fagacearum*. All oaks vary in their susceptibility to oak wilt. Red oaks, particularly Spanish oak, are extremely susceptible and may play a unique role in the establishment of new oak wilt infections. Spanish oaks are present at CSSA. CSSA also contains several white oak species, such as chinkapin (*Quercus muehlenbergii*) and bur oaks (*Quercus macrocarpa*), which are resistant to the disease and rarely die from oak wilt. Live oaks, present in large numbers at CSSA, are intermediate in susceptibility to oak wilt, but are most seriously affected due to their tendency to grow from root sprouts and form vast interconnected root systems that allow movement (or spread) of the fungus between adjacent trees (USDA 1991). Successful management of oak wilt depends on correct diagnoses and an understanding of how the pathogen spreads between different oak species. Appendix C contains oak wilt identification and management information.

The foliar symptoms, patterns of tree mortality, and the presence of fungal mats can be used as indicators of oak wilt. The following two projects will be implemented, as part of a management program for oak wilt prevention and suppression:

- ***Oak wilt identification training for CSSA staff, contractors, and hunters:*** Publications will be compiled from existing sources on oak wilt identification and be distributed to CSSA staff by the EPM. Presentations to the Wildlife Management Committee, as well as to other section groups at CSSA, on how to identify oak wilt will be conducted. All instances of suspected oak wilt will be reported to and investigated by the EPM. Field pocket guides will be developed, including oak identification keys relevant to CSSA and oak wilt diagnosis information.

- ***Oak wilt management actions:*** Oak wilt management will follow an eight-step program devised by the Texas Agricultural Extension Service (Johnson and Appel 2001) and is included in Appendix C with other oak wilt information. The process outlined in the program begins with identification of oak wilt symptoms in the field, including leaf manifestations and tree defoliation. Further, red oaks will typically die within a few weeks of infection, while other species (including live oak) will live much longer after infection. Therefore, these characteristics will be used to identify the presence of oak wilt and the probable rate of spread to determine the most appropriate management options. If oak wilt is positively identified, the process proceeds with buffer zone creation, sanitization of buffer zone interior, pruning, tree wound protection, fungicide treatments, and replanting of resistant native tree species.

The Texas Forest Service Project Forester, based in San Antonio, will be consulted when there is any suspected presence of oak wilt at CSSA. Below is the contact information for the Project Forester:

Mark Peterson
Texas Forest Service Project Forester
600 Hemisphere Plaza, Bldg. #277
San Antonio, TX 78204
(210) 208-9306
mpeterson@tfs.tamu.edu

4.2.5 Erosion and Sediment Control

Activities associated with the military mission at CSSA result in minimal ground disturbance, and no training related soil erosion problems currently exist. Consequently, potential erosion and sediment control issues would primarily be related to future construction activities. Descriptions of best management practices (BMP) for erosion and sediment control in Texas are included in Appendix F. The BMPs discuss uses of temporary vegetation, blankets and matting, mulch and sod, interceptor swales, various berms, and silt fences. Site specific burn plans will address post-burn erosion concerns.

Recently, several construction projects have been undertaken in the inner cantonment and east pasture area. Stormwater Pollution Prevention Plans (SWPPPs) have been developed and implemented for these projects. Future construction projects that disturb 1 to 5 acres require the development and implementation of a SWPPP, and posting of the SWPPP at the CSSA entrance. In areas that exceed 5 acres, a Notice of Intent (NOI) will be submitted to TCEQ along with a SWPPP. In addition, because construction projects occur within the contributing zone of the Edwards Aquifer, construction activities may also be subject to Chapter 213 of TCEQ Regulations, made effective in September 2005.

4.2.6 Stormwater and Wastewater Management

Most stormwater runoff is currently discharged into Salado Creek and a tributary of Salado Creek in the southwest portion of the inner cantonment. Wastewater generated at CSSA is collected in a sanitary sewer system operating on a gravity feed from the inner cantonment area. In accordance with a Texas Pollution Discharge Elimination System (TPDES) permit, treated

wastewater is discharged into a tributary of Leon Creek at a point upstream of the recharge zone of the Edwards Aquifer.

4.3 PROJECT AND GOALS SUMMARY

Table 4.1 presents a list of land and watershed management projects with specific goals. Project locations are shown in Figure 4.3.

Table 4.1 Land and Watershed Management Projects

Project ID	Project Name	Description and Goals	Duration and Schedule	Priority Classification
4A	Brush Management Needs Assessment	Inventory of existing segments of roads, trails, fuelbreaks, and fence lines. Assessment of condition and management scheduling.	Inventory and mapping activities: 10 days - January.	Compliance / Class 0
4B	Mechanical treatment along existing and new fuel breaks, roads, and security fence lines.	Maintenance of fuel breaks to reduce range fire danger from Camp Bullis or CSSA and compliance with DoD security requirements.	10 days - October 2006. No activities associated with this project will occur between 15 February and 31 August (BCVI and GCWA nesting season).	Compliance / Class 0
4C	Prescribed fire operations for grassland management	To maintain grasslands in lieu of grazing activities and to reduce fuel loadings. Game wildlife habitat enhancements.	Annual winter burns, exact date and duration are contingent on weather conditions and training schedules, or availability from supporting resource agencies (USFWS).	Compliance / Class 0
4D/6D	Small plot prescribed burning in BCVI habitat	Low intensity burns in areas with low growing oak mottes will encourage lateral growth and remove low growing Ashe junipers.	2 days – January.	Stewardship / Class III
4E	Mechanical treatment for habitat management	Topping of young oak mottes to encourage lateral growth. Selective removal of Ashe junipers.	2 days – January	Stewardship / Class III
4F	Brush pile burnings	Safely dispose of numerous brush piles throughout the facility. Reduction of predator habitat on non-game wildlife (snakes, rats, etc.).	Cooperative agreement (CA) w/ USFWS extends through January 2007. Options for continuing CA are available. Burning will be conducted as weather and schedule permits.	Stewardship / Class III
4G	Modified mowing regimes	Modification of mowing frequencies and schedules to reduce emissions,	Periodic schedule throughout the year.	Compliance / Class 0
4H	Update Wetlands Delineations	Project areas will be identified to determine the need for wetlands / jurisdictional waters delineations. Documentation will be prepared for USACE Section 404 permit applications for future projects	Subject to identification of compliance needs for upcoming projects.	Compliance / Class I
4I	Oak wilt awareness at CSSA	Development of training material for distribution to CSSA staff, contractors, and hunters.	5 days – August 2006	Stewardship / Class III
4J	Oak wilt management	Oak wilt management will follow an 8 step program devised by the Texas AES (Johnson and Appel 2001). This project is contingent on a positive diagnosis of oak wilt at CSSA.	Continuous	Maintenance / Class II