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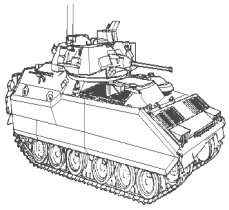

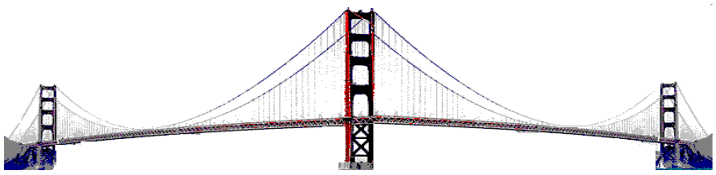

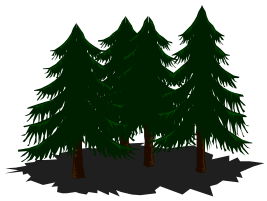

The Bridge

ISSUE 7 Fall 1998

Bridging the Gap

Between Army Training & Environmental Stewardship

Under the Guidance of the ITAM Executive Management Council

HIGHLIGHTS OF FALL 1998 - ISSUE 7

- Commanders Battle to Balance Priorities
- Lead Free Bullets
- Fort Hood Manages Junipers
- Holistic Training Land Management
- Fort Dix Implements LCTA Program
- The Bridge at Fort Benning
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Commanders Battle to Balance Competing Priorities

Article compiled by the Editor of The Bridge

Funding concerns have replaced manning as the number one issue confronting U.S. Army commanders. In spite of declining resources and fewer soldiers, U.S. Army Forces Command's (FORSCOM) number of annual deployments over the last 12 years increased from 26 to 68. The impact of increasing requirements and decreasing funding along with the already ongoing migration of funds from Operational Tempo (OPTEMPO) to Base Operations (BASOPS) and Real Property Maintenance (RPM) accounts are proving to be problematic for the ITAM Program.

According to 10 September 1998 congressional records, a letter from the Commanding General, FORSCOM reported that due to insufficient funds Commanders at Fort Bragg, Fort Stewart, and Fort Lewis reported a drop in readiness and predicted that the readiness ratings will continue to decline. On 24 September 1998, the Senate Subcommittee on Readiness met to receive testimony regarding the readiness challenges faced by the U.S. Army. General Thomas A. Schwartz, Commanding General, FORSCOM and General David A. Bramlett, Former Commanding General, FORSCOM testified on behalf of the U.S. Army. A few days later, on 29 September 1998, the full Senate Committee on Armed Services met with the Joint Chiefs of Staff (JCofS).

In his statement before the Committee, the Chairman JCofS, General Henry H. Shelton said, "We knew 1998 would be tough and that our commanders would face an enormous challenge balancing the competing priorities of maintaining current readiness, taking care of our people, and providing for future readiness through modernization."

General Shelton pointed out that the high demand for a U.S. military presence and capabilities, a higher-than-expected OPTEMPO, and increased wear on equipment directly impacted readiness. Combine these impacts with unit, personnel, base reductions and the effects that higher paying jobs in the private sector have on recruiting and retaining qualified soldiers and the readiness challenges are not surprising.

In his 29 September testimony General Dennis J. Reimer, Chief of Staff, United States Army said, "Army leaders at all levels are striving to meet expanding requirements with diminishing resources. Our Commanders are struggling to balance operational readiness, training, equipment and facilities maintenance, and quality of life with base operations expenses. At the Department of the Army, we recognize those challenges and face the additional task of modernizing the force. Resource constraints demand that we carefully allocate each dollar to ensure that our soldiers and units are ready today while concurrently marching the Total Army into the 21st century."

General Reimer further explained, “The Army relies on supplemental appropriations to pay for the high cost of contingency operations, such as peacekeeping in Bosnia and our recent deployments to Southwest Asia. In the short-term, until supplemental funding is provided, we reduce or eliminate scheduled activities, essentially draining funds appropriated for training, maintenance, and readiness, to fund ongoing operations. When supplemental funding comes late in the year of execution, there is not enough time to conduct all the different activities, and that has a direct impact on readiness.”

“**W**ith funding for BASOPS and RPM at critically strained levels, they [Commanders] were forced to reduce spending in their mission accounts, reducing OPTEMPO activity in the Active force from 800 to 650 miles. This resulted in deferring training until the fourth quarter, where commanders find insufficient time to make up all their shortfalls.” said Reimer.

General Reimer later remarked, “Frankly, right now we do not have sufficient resources to keep our soldiers trained and ready and maintain the quality of life that they and their families deserve.”

New Lead Free Bullet Nearing Reality

By Dave McFerren and Terri Bright,
USAEC Technology Division

On 7 October the Non-Toxic Ammunition Joint Service Work Group met for a status update on the USAEC sponsored project to eliminate lead-antimony from 5.56 mm service rounds. According to the USAEC project team, efforts are progressing according to schedule and the team is ready to proceed with near-term actions.

First quarter FY 99 actions include a series of tests scheduled by the U.S. Army Armament Research Development and Engineering Center (ARDEC). The tests will occur at the Naval Surface Weapons Center - Crane, Indiana where the team will test the use of Tungsten-Tin and Tungsten-Nylon 5.56 mm cores.

When the team completes the tests, they will prepare and present an Engineering Change Proposal (ECP) to the Small Caliber Ammunition Configuration Control Board (CCB) for their review. If all goes well and the CCB approves the ECP, the lead free core can be substituted into the M855 5.56 mm rounds with no noticeable impacts on the soldiers firing the weapons.

For more information on the lead-free bullets, contact either Mr. Dave McFerren, (410) 436-6869 or Ms. Terri Bright at (410) 436-6848; DSN - 584.

Fort Hood Manages Ashe Junipers

By Jerry Paruzinski, Fort Hood

Ashe Junipers, locally called cedars, appear to be harmless trees, but trainers and conservationists know better. Fort Hood received a $1.3 million FY-97 year-end funding supplement to help battle the juniper invasion and remove the cedars from 13,000 acres. One year later, Fort Hood's experiences support various studies that indicate that unmanaged ashe juniper populations can significantly degrade training land.

Unmanaged cedars tend to dominate existing vegetation, promote erosion, and reduce the amount of water in reservoirs and aquifers. They overpower the natural ecosystem and can degrade wildlife and endangered species habitats.

Cedars also degrade training -- the primary mission at Fort Hood. As cedars grow, thicken, and multiply they degrade the primary, non-live fire laser training devices in the Army's inventory (i.e., MILES).

By managing this invasive species, Fort Hood enhances soldier training to win the next war. Management of ashe junipers enhances land conditions and consequently allows vegetation growth to sustain wildlife and endangered species. Proper management also increases water in water sheds, and can reduce erosion.

Erosion contributes to water source contamination and damages irreplaceable archeological sites; it also degrades training by creating maneuver and safety problems for our soldiers.

At the Texas Water Conservation Association's, 24th Water for Texas Conference, Jan 95, Thomas Thurow and Charles Taylor presented a research paper on junipers. Their paper, "Juniper Effects on the Water Yield of Central Texas Range Land", made several findings. To summarize their findings: about 100 million acres of Texas range land is covered by juniper; the increase of junipers is associated with disappearance of springs and seeps. When junipers invade a pasture, they increase the amount of runoff and sediment loss; junipers reduce grass production.

Their paper also stated that junipers affect deep drainage on range land, taking water away from the range land and water tables. A 60% juniper density on an acre equates to a loss of about 100,000 gallons per acre per year to the range land and water tables. Data indicate that substantial water yields can be achieved through conversion of pasture vegetation, from brush back to grass. Using these data, the Fort Hood juniper management program estimates that 15,000 acres of restored land should return over 1 billion gallons of water to the installation ecosystem, per year.

This high return of water will enhance natural vegetation growth, land conditions, seeding operations, and training. It will also improve wildlife, endangered species, and recreation activities. Ultimately, there will be more water available to support the requirements of surrounding communities.

To sustain the ecosystem, Fort Hood must manage its juniper population through selective removal and follow-up seeding. For example, junipers supporting endangered species management are not touched. And when removing junipers from medium to high density areas, the areas are seeded to minimize erosion and regrowth.

Junipers have a role in Fort Hood's ecosystem, but without proper management, they will degrade the installation's ecosystem, training devices, and training areas.

Holistic Training Land Management
By Jerry Paruzinski, Fort Hood

Fort Hood has a valuable holistic management tool in the fight to sustain its training lands and ecosystem. This tool is the Installation Training Land Management (ITLM) Planning Group.

Hosted by G3, ITAM, the ITLM is composed of the key planners and land managers from the installation and combines the resources of military trainers; the Director of Public Works' Master Planning, Environmental, Cultural, and Natural Resource branches; the Natural Resources Conservation Service (NRCS), the Texas Nature Conservatory; and other agencies.

ITLM goals are to sustain training land capabilities -- understanding the primary mission for Fort Hood is to train soldiers to win the next war -- and to support the holistic ecosystem of the post.

ITLM enables land managers to maximize coordination and information use for short and long range planning, fosters the integration of all agencies that use or manage training land, and provides a forum to facilitate maintenance of the Fort Hood training land ecosystem.

The group actively strives to remove influences that degrade the ecosystem, such as erosion, loss of good vegetation, and invasive and noxious plant species like the ashe juniper. If left unchecked these influences can undermine the entire ecosystem.

Group planning allows the installation to collaboratively improve the ecosystem versus each staff agency focusing on a single aspect. Members work as a team and this is of benefit to the installation, the environment, and training mission.

ITLM works at Fort Hood and is improving land management from a holistic approach. Some of the group's successes are:

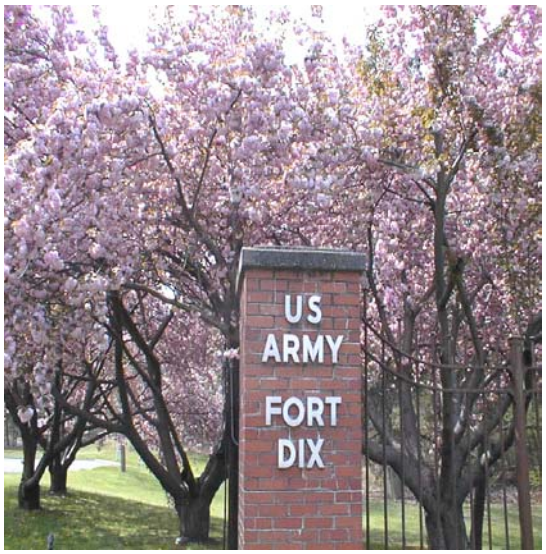
- data sharing to form updated, consolidated GIS data layers
- fire break construction to enhance the protection of endangered species and to support live fire training
- construction of dams and stream crossing structures to control erosion and to facilitate training
- identification of future training sites that the ecosystem can support
- proactive joint land management.

Fort Dix Implements LCTA Program

By Danielle Conboy, Fort Dix ITAM Coordinator

Over the last year, ITAM personnel at Fort Dix have worked to establish an LCTA program that:

- incorporates strategies reflecting the lessons learned by other installations' LCTA programs and LCTA II recommendations, and
- improves the relevance and timeliness of LCTA data so that extrapolations and recommendations would be more immediately useful to trainers.



Key strategies of our program include: use of Windows-based handheld computers for data collection, utilizing a cooperative agreement to obtain field crews with expertise in local flora and fauna, and incorporating a training intensity overlay in the plot allocation process.

Handheld computers run Microsoft Windows® CE with pocket versions of Microsoft Office® software. These computers not only cost less, but also perform better due to faster processors and increased memory. They also have a modem, voice memo recording function, and scheduling/calendar software. As these the computers operate in a Windows not DOS environment, Pocket versions of MS Excel, Word, and PowerPoint make interacting with desktop Office software very simple. This is an important benefit for us, since we are using CEMML's Access LCTA database to store our data. Spreadsheets can be designed to support other LCTA methods as well. In the event that older versions of the LCTA database are being used, a DOS shell could be loaded to enable use of the old handheld data entry program.

To improve data collection at Fort Dix, LCTA field crews were arranged through a cooperative agreement with the NRCS, instead of hired from local students. As a result, Fort Dix obtained professional and expert assistance from scientists familiar with the local flora and fauna.

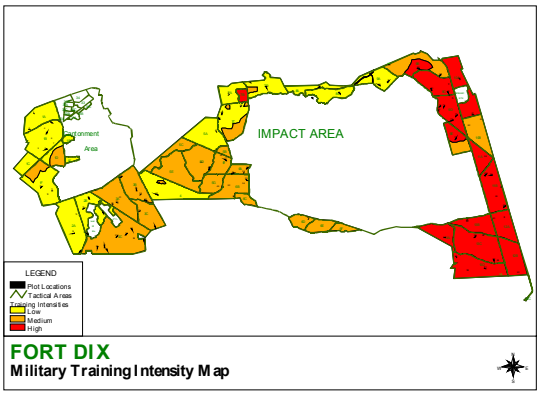
To integrate training intensity into the plot allocation process, the ITAM office at Fort Dix developed a training intensity map to be combined with a vegetation classification overlay. We used the digital vegetation mapping produced by The Nature Conservancy in 1995, but wanted to develop a training intensity map. To develop this training intensity map, the ITAM office provided all relevant personnel (including range management, maintenance, concept planners,

LRAM, Masterplanning, and Natural Resources) copies of the installation tactical training areas so that they could delineate areas according to the following scale:

1 = areas of low intensity training; no or minimal use and/or insignificant effects from training (e.g., light foot training)
2 = areas of medium intensity training; occasional use and/or intermediate effects from training (e.g., FTX)
3 = areas of high intensity training; frequent use and/or severely damaging training activities (e.g., mechanized exercises).

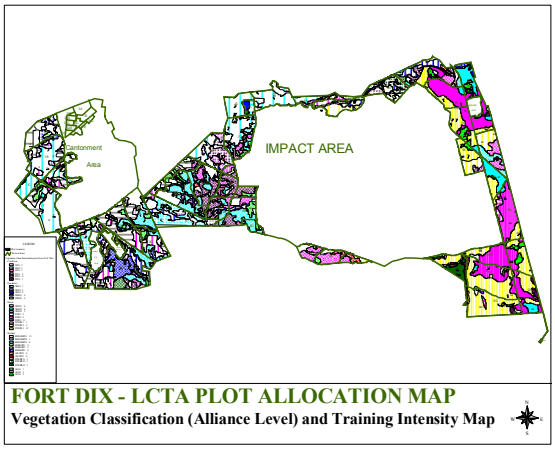
We also used data from data from the Range Facility Management Scheduling System.

Next, the relevant personnel met to discuss their hand-drawn coverages and identify specific use areas and conditions, which the GIS Operator digitized. The resulting training intensity map displays the tactical training areas on Fort Dix, according to the agreed upon training intensities and land uses.



Fort Dix Training Intensity map

Next, we used the digital vegetation map and delineated vegetation cover types at the Alliance level for areas greater than 2-3 acres. These two GIS overlays were then combined to produce the final plot allocation map. The resulting number of field plots allocated to each unique category of vegetation cover and training intensity was based on the proportion of acreage that a vegetation cover category possessed relative to total acreage.



Final LCTA plot map with 29 categories of vegetation cover/training intensity

By including information on training uses and intensity in the plot allocation process, ITAM office at Fort Dix hopes to collect data that we can analyze in ways that are specifically useful to trainers. Additionally, we will still be able to group data according to cover type for traditional LCTA analyses.

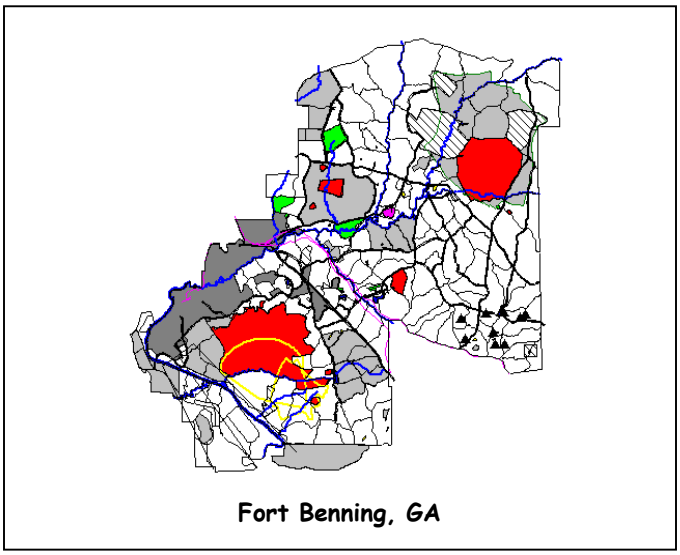
For example, we can examine and compare trends in disturbance, vegetation, and land use for the pine-oak-woodland (POW) cover type in lightly trained versus heavily used areas. We can also examine the effects of different intensities of training on the same habitat using simple, univariate statistics, such as correlation analysis. Then, if we determine that relationships exist, we can implement controlled special-use plots to test and quantify any suspected cause and effect relationships. Also, once we establish a baseline on disturbance levels in the various vegetation communities, we can establish plots to measure recovery rates in relation to different types of training activities and military land impacts.

At Fort Dix, we consider the use of the training intensity overlay in the plot allocation process as the first step towards producing more trainer oriented LCTA results. For more information on the Fort Dix LCTA Program, contact Danielle Conboy at COMM: (609) 562-2386; Email: conboyd@dix-emh6.army.mil.

The Bridge at Fort Benning

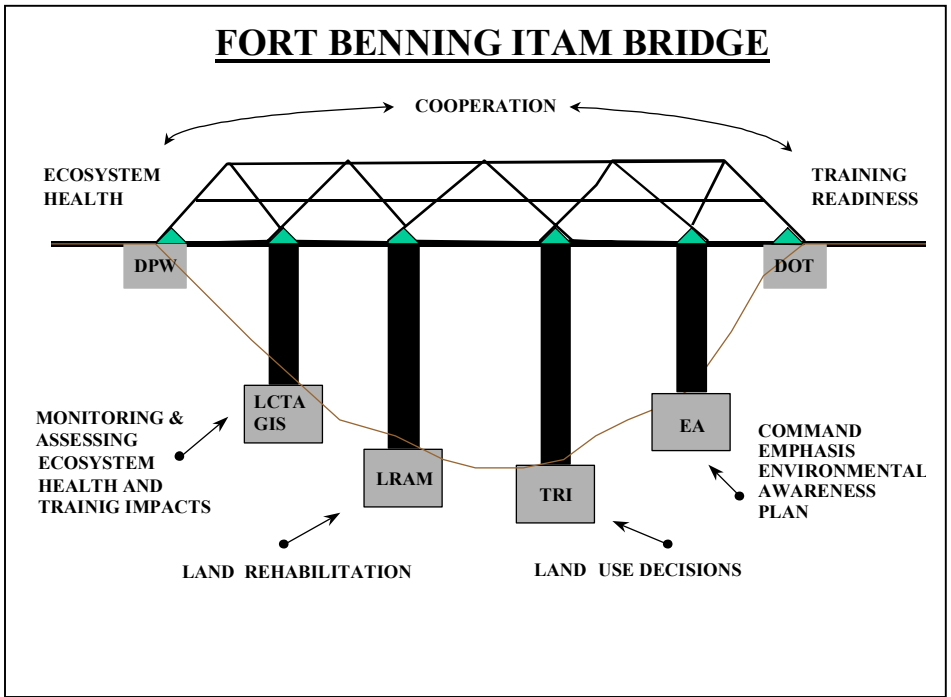
By Theresa Davo, U.S. Army Infantry Center, Fort Benning

TRADOC's Fort Benning, situated almost entirely in west central Georgia, trains five types of infantry, including mechanized, light, airborne, air assault, and ranger. The 73,533 hectares (ha) provide 46,210 ha of total available training area and are used for military training, weapons ranges, drop zones, and landing zones. The installation averages 20,000 troops in the field daily per year and has 63 action firing and non-firing ranges. There are currently 17,454 ha of mechanized training areas, 14,225 ha of established impact areas, and 6,866 ha are restricted dud areas. Approximately 5,759 ha comprise four cantonment areas. There are close to 50 threatened, endangered, and special concern species and 15 ecologically unique areas.



Fort Benning, GA

Fort Benning's ITAM Program began in October of 1990. The Fort Benning ITAM team established an LCTA baseline, initiated LCTA II, developed several GIS data layers, supported environmental awareness training, and have initiated and completed a number of LRAM projects.



At Fort Benning, the ITAM components form four support pillars emphasizing the Director of Public

Works (DPW) and Director of Operations and Training (DOT) as the stabilizing blocks on either side of the bridge. The DOT and DPW work together towards supporting the mission and accomplishing installation goals.

Significant events contributing to Fort Benning's ITAM Bridge include:

- transfer of ITAM proponency to the Deputy Chief of Staff for Operation and Plans (DCSOPS)
- development of the Integrated Natural Resources Management Plan (INRMP)
- initiation of the Strategic Environmental Research and Development Program (SERDP) Ecosystem Management Project (SEMP)
- establishment of the Fort Benning 2018 plan.

Because the ITAM Program started under the DPW and was moved to the DOT, both directorates have a good understanding of what the ITAM Program needs to accomplish. Since the shift in ITAM proponency, a Memorandum of Agreement established that the DPW provides environmental expertise while the DOT provides the funding and training requirements. The MOA also authorized ITAM positions -- laying the groundwork for Program continuity, cross training, and integration of the ITAM components at Fort Benning.

The Nature Conservancy (TNC) of Georgia will help develop the Fort Benning INRMP as part of a three-year contract. During 1997, the first year of the contract, NR issues and concerns were identified and steering and technical committees were established. The steering committee includes ITAM, DOT, and DPW personnel, along with the TNC facilitator.

The technical committee consists of experts from various agencies throughout the southeast. Accomplishments for the second year of the INRMP contract include identifying the training issues and needs, initiation of the NEPA process, development of an outline, and chapter drafts. The final year will consist of cleaning up and editing the draft INRMP, completing the NEPA process, and gaining approval of the INRMP. It is probable that an ITAM Coordinating Council, made up of ITAM, DOT, DPW, and training personnel, will serve as the implementation and execution council for the INRMP.

Because Fort Benning demonstrates a strong proactive support for ecosystem management, has a robust LCTA program and a current vegetation map, has in place the INRMP steering and technical committees, and is a Category I ITAM installation the DOD selected Fort Benning as a DOD SERDP/SEMP test site.

This summer the DOT and DPW worked together to host and participate in the second SEMP steering committee meeting at Fort Benning. In the Spring of 1999, Fort Benning will begin monitoring and research to observe ecosystem health, determine best indicators of change, and establish ecological thresholds.

The 2018 plan is Fort Benning's training plan for the future. The DOT, ITAM team, and DPW worked together with the training units to establish the plan. **O**ngoing

Eelbeck Landing Zone, Fort Benning

coordination between NRMB, ITAM personnel, and Trainers ensures that training requirements can be met and at the same time, ensures environmental compliance.

One example of the Fort Benning ITAM Bridge in action is a project to rehabilitate nine landing/drop zones, or LZs/DZs. Under direction of the DOT, an integrated ITAM team is taking the lead to rehabilitate nine of Fort Benning's LZs/DZs.

The LRAM coordinator developed a scope of work, and the LCTA coordinator will establish permanent photograph points and take soil samples to test soil fertility.

In addition**,** the Fire and Timber Management; Wildlife Management Sections of the NRMB; the Range, Roads and Grounds of the Buildings and Grounds Division of DPW; the 718th Reserve Unit; the 718th Engineers; and the NRCS also participate. Activities include grading, removing stumps, closing roads and trails, creating berms, planting pine trees, disking, mulching, seeding, applying straw mulch, bush hogging, installing signs, and applying erosion and sedimentation control.

The ITAM Program, DOT, NRMB, and Trainers each provide funding in support of the collaborative efforts.

Another good example of the Fort Benning ITAM Bridge is the Rowan Hill project. Rowan Hill is 49 ha in size, and is used for heavy mechanized attack, defend, and retrograde operations. Because the erosion of Rowan Hill has a direct and negative impact to the endangered Red Cockaded Woodpecker's foraging habitat and colony trees, the NRMB can contribute compliance funds to rehabilitate the area. As a result, ITAM, NRMB, and military users are working closely to determine the best means and

Red Cockaded Woodpecker

most appropriate use of funds to minimize the erosion and its impacts.

Fort Benning has a strong ITAM Program that is continually growing and adapting to the needs of the installation. For more information please contact Ms. Theresa Davo at (706) 545-6135, DSN 784.

Working Together to Reopen and Restore Fort Drum Training Areas

By Sheryl Rafferty, Environmental Restoration Company, ITAM Program, Fort Drum

In January of 1998, the worst ice storm of the century decimated the forest and trees at the Fort Drum military reservation and four nearby counties leaving the areas without power between four and nineteen days. Consequently, President Clinton declared Northern New York as a federal disaster area. The ice storm had an immediate effect on Fort Drum's priorities; military training came to a screeching halt. Fort Drum immediately initiated a four-phase emergency response strategy. During the four phases, soldiers dedicated over 600,000 man-hours to the emergency response efforts.

The focus of Phase I was to deploy the emergency operations team and to assess the local conditions and damages. The emergency operations team included the 10th Mountain Division, Fort Drum, and the New York Army National Guard together with federal, state, and local emergency management offices.

During Phase II the emergency operations team engaged in standard emergency response actions, such as preparation of emergency shelters, resumption of basic services, and establishment of a Federal Emergency Management Agency (FEMA) support base. Safety and quality of life was the first priority during Phase II operations. Within four days Fort Drum's power was completely reestablished for housing and office space, which was well before local communities. Soldiers worked around-the-clock to meet the challenges supporting relief activities such as medical and liaison support to emergency operations centers, cleanup, and neighborhood watch patrols. At the peak of emergency operations, Fort Drum provided 161 generators, 15 water trailers, 77 cargo trucks, 93 heaters, over 125,000 sandbags, 9 mobile kitchens, 26 chainsaws, 2 forklifts, and over 2,500 soldiers.

During Phase III, the goal was to return to normal operations and continue to support federal emergency management activities. The goal of Phase IV was to complete cleanup of ice-storm damages. The top priority at Fort Drum was to clear the main arteries and then to ready the record fire ranges. This included clearing trees and debris from ranges, and physically freeing and repairing iced-in targets. Units requested that the initial focus be on the small arms ranges and obstacle and bayonet courses, since they were closest to the cantonment area. After one week, the units and Combat Readiness Training Division (CRTD) personnel cleared the main tank trails and range facilities.

When training areas reopened, they had no power. Consequently, there were no remote electronic targeting system (RETS) ranges, pop-up targets, bath points, or after action review facility. Fort Drum has an alternate record fire course for pistols and M16s, but not for machine guns. Generators provided some power so qualification with machine guns could continue. Restoration of full commercial power to the firing ranges and facilities did not occur for eight months.

Once emergency conditions ended, members of the CRTD, Forestry and Archeological Programs of the Environmental Division, and the ITAM Program worked together to prioritize areas on the installation for cleanup (based on safety and accessibility) and establish a five-year recovery plan.

The Environmental Division completed an environmental assessment, which rendered a Finding of No Significant Impact (FONSI). The natural resources survey team noted that there was about three times the amount of deadfall as a result of the storm and that without cleanup it would negatively impact training maneuvers. The cultural resources team determined that no heavy equipment, such as commercial grade chippers, be allowed in areas that MIGHT have archeological importance.

Using the priorities provided by the CRTD and the survey results provided by the Forestry and Archeological Programs of the Environmental Division, the Fort Drum ITAM personnel went into action. After hiring a crew of 18 to operate the ITAM Program's three commercial grade chippers, the LRAM crews worked diligently to fully restore training areas by clearing bivouac areas, landing zones, trails, and training areas. The LCTA crews began monitoring the damage and assessing the impacts caused by the ice storm, which is quite different from the traditional objective to monitor military use effects. Initial data collection occurred through the summer of 1998; analysis of the data is in progress.

The natural disaster and emergency conditions provided Fort Drum with an opportunity to execute emergency operations, evaluate the effectiveness of those operations, and get a sense of how an emergency can affect Fort Drum's training mission. The reopening and restoration of Fort Drums training areas following the natural disaster is an example of dedication and hard work by the units and collective cooperative efforts by the Range Division, Environmental Division, and ITAM Program team.

For more information on the Fort Drum ITAM Program or recovery and restoration of training lands at Fort Drum, please contact Ms. Sheryl Rafferty at (315) 772-8056; email raffertys@drum-emh4.army.mil.

Evaluating Desert Seeding as an LRAM Technique for the NTC

By Ms. Ruth Sparks, Fort Irwin, CA

LRAM techniques are judged by how well they support land maintenance in relation to the cost to perform the technique. While land maintenance at many installations relies heavily on seeding, desert restorationists agree that this is not a reliable LRAM technique.

To help the NTC LRAM team to determine if, when, and where to seed, Fort Irwin initiated two seeding projects. **T**he Whale Seeding Area project was initiated during a year with low precipitation and the Alpha Seeding Area project began during the recent "El niño" year.

SEEDING IN DESERT CONDITIONS

In the Mojave desert only about two years in ten will have as much as 5 inches of precipitation. Seed germination depends on moisture and precipitation in desert conditions is unpredictable.

Because desert seeding has been tested for a relatively short time, there is not the wealth of knowledge about appropriate seed mix composition or application rates.

Additionally, seeds for native desert plant materials, which are best suited to the harsh environmental conditions, are expensive and difficult to obtain in the quantities needed.

SEEDING IN TEMPERATE CONDITIONS

Temperate regions have predictable rainfall patterns and amounts. Usually, reasonably priced seed mixes suitable for temperate regions are readily available.

The choice of seed mixes allows buyers to purchase a mix that combines plant species that perform well in varying terrain, soil conditions and under varying traffic conditions. Application rates are clearly prescribed, based on research results.

For these reasons, large-scale seeding in temperate regions to revegetate training areas damaged by military activities is a relatively routine effective LRAM technique.

The Whale Seeding Area is a 10-acre site that was established in January 1997. The substrate at this site was moderately compacted sandy soil, and site preparation consisted only of pitting to increase surface roughness. Due to limited availability of seed stocks, the seeding rate was somewhat low (155 live seeds per square meter).

The seed mix consisted of seven native species including two grasses, two forbs and three shrubs. Shortly after seeding, the site received approximately 0.2 inches of precipitation, but following that there was no appreciable rainfall until September 1997. No germination of seeded species was noted in the first growing season.

Frequency and percent cover data collected eighteen months after seeding (June 1998) showed a mean density of 0.33 (± 0.61) plants per square meter and a mean percent cover of 0.53 (± 1.01). In addition to the recruitment of seeded species, the site had higher density and cover of volunteer native shrubs and annuals than an adjacent unpitted area, indicating that the site preparation did in fact create microsites for germination.

The Alpha Seeding Area is a 17-acre site near a cantonment area that was seeded in December 1997. The area had been disturbed by engineer activity at least four years ago and showed little re-growth of native species or invasion by weed species.

Site preparation included re-contouring and ripping/pitting to loosen the soil, break up the surface crust and provide surface roughness. The seed mix was composed of one grass, one forb and eight shrub species. This project was designed not only to re-

vegetate the area, but also to test two seeding rates (100 and 250 live seeds per square meter) and several surface treatments (two tacifiers and two organic mulches).

In February 1998, this area, not ordinarily impacted by military activities, was the site of a rotational unit Assembly Area. Fortunately, this activity did not seriously damage the seeding project, as it occurred before germination, and it provided an opportunity to document the effect of traffic on a seeded site. In the five months following seeding there was approximately 4.0 inches of precipitation, so this project also offers a contrast to the low germination observed in the previous dry year.

Frequency and percent cover at the Alpha Seeding Area were determined in June 1998 from 80 plots distributed throughout the various treatments. Densities for the high and low seeding rates were 8.9 (± 2.84) and 6.6 (± 0.73) plants per square meter, respectively, but cover values were similar in the two areas. One of the tacifiers (a latex polymer) significantly increased the number of seedlings per square meter (13.1 ± 4.4), while one of the mulch treatments (shredded fir bark) apparently decreased seedling density (3.7 ± 1.3). Light applications of tacifier material probably improve the seed to soil contact and prevent loss of seeds to wind and granivores.

Plot frames placed in single-pass, multiple-pass, and well-traveled trails along with non-traveled portions of the site served to quantify the effects of vehicle traffic. Seedling density was higher in single-pass tracks than the other conditions probably due to better seed contact with the soil. Mean percent cover, however, was lower on all tracked areas than in the undisturbed plots, suggesting that even light compaction negatively affects water availability and seedling size.

Project Summary – So Far Long-term data from both seeding and container planting projects are needed to determine the *cost per established plant over time*. Initial costs associated with container plants are substantial, including the cost of growing them to planting age (at least 6 months), labor for planting, and maintenance watering.

One year success rates can be quite high (70-80%) if adequate care is provided at least through the first summer, but survival of plants over a five to ten year period is not well documented. Initial costs per acre of broadcast seeding are considerably lower than planting. At least ten years of seeding efforts, however, may be required to establish the cost of appropriate seed mixes, the effect of highly variable weather patterns on germination success, and the probability of seedling recruitment after the first year.

The NTC LRAM team and other desert restorationists will document the long-term success and costs of seeding and container planting projects to provide a basis for better management decisions in the future.

Supporting the Training Mission While Protecting Cultural Resources

By Brad Mincey, Fort Riley PAO

Fort Riley contains numerous historical and archaeological sites that must be protected. Yet at the same time, soldiers need to have areas where they can train and maneuver without hurting themselves or damaging their equipment. How to balance protecting these sites and training soldiers for battle is a constant struggle at Fort Riley.

One site under recent examination at Fort Riley is a limestone house built around 1860 located in the northern part of the post. It is being studied now because it will be taken down over the next several months. ``The building is unstable and when soldiers go in there, there is a danger of someone getting hurt,'' said John Dendy, an archeologist with Dynamac Corporation and the Directorate of Environment and Safety (DES). ``They try to get away from the wind during the winter and occasionally build fires around the area to help keep warm.”

Protecting the soldiers and the sites requires a lot of give and take from the DES and leaders who plan training. The soldiers need areas on post to train, but before they can dig on any part of the post, paperwork has to be filled out as a precautionary measure to protect the sites from harm. Occasionally, planned training has to be adjusted to compensate for the soldiers' safety and to avoid damaging a site. Recently, soldiers wanted to dig in a certain area, but because of a historical site that was there, they had to adjust the foxholes to the north and south of the initial dig site.

Some areas can be moved in and run over, but not dug in,'' said Dendy. In areas where soldiers train in vehicle movement, stone or metal barriers are in place to prevent vehicles from running over the areas while at the same time protecting soldiers from vehicle roll-overs. This was one aspect looked at recently when archaeologists were looking at World War I training trenches. Although many sites have been taken down or filled in, some sites are left intact because it helps training.

ITAM Website Goes Offline

By Lisa Booher, USAEC

From 1 to 25 October 1998, the ITAM Website went offline for a security review in accordance with procedures mandated by the Office of the Secretary of Defense (OSD) and HQDA.

HQDA is currently working with OSD to develop guidelines for publicly accessible Army websites. The resulting guidelines will ensure a balance between the Army's security needs, the requirement to release appropriate information to the public, and a desire to leverage the advantages of the internet.

The Hills Have Eyes: How High-Tech Monitoring Is Helping Endangered Birds In Texas

By Ben Thomas, The Nature Conservancy

Dusk, June 30, 1997. Fort Hood in Central Texas. Grainy images flicker across the screen. Through the lens of a surveillance camera, figures periodically enter and exit the scene. Though the picture is black-and-white, the camera's infrared light illuminates the evening with an eerie glow. Motion provides context, and we begin to understand what we are spying on: a pair of birds feeding their nestlings.

Night progresses and the scene grows darker. The adults leave, inexplicably, never to return. Shortly after 9 p.m., something disturbs the sleeping young. They twitch and jump at an invader hidden from our view. They grow more frantic with each passing moment. twenty minutes later, they are all dead. Come morning, the invaders have picked their bones clean.

This video, captured by a miniature camera stashed above the birds' nest, documents for the first time fire ants preying on a nest of black-capped vireos on the edge of Texas Hill country. It is grim visual evidence of one of several threats-all brought about by habitat loss and fragmentation-facing one of the most endangered songbirds in the country.

Video is just one monitoring device in a high-tech toolbox Nature Conservancy scientists are using to try to save the black-capped vireo and another songbird, the golden-cheeked warbler, from extinction. Other tools — satellite imagery, global positioning systems and radio telemetry — amount to kinds of "eyes" watching these birds, whether from a nest or from space. This monitoring is enabling conservationists to produce an unprecedented and comprehensive picture of the lives of these songbirds and, what's more, how to better protect them.

Fire in the Nest

On a warm spring day, Jim Koloszar picks his way through the brush at the Army's Fort Hood training base searching for the teacup-sized nests of the black-capped vireo and golden-cheeked warbler. The birds nest exclusively in sparse oak-juniper woodlands, which on Fort Hood cover about a third of its 340 square miles.

In such a vast landscape, it would be easy to wander, lost for hours. But this Conservancy field biologist knows exactly where he is. High above him, somewhere in the stratosphere, orbits a constellation of 24 satellites. He is connected to them by an electronic tether known as a Global positioning System, or GPS. About the size of a

cell phone, hand-held GPS allow users to pinpoint their location on a map to within a few yards.

Koloszar uses the birder's tired-and-true method of sight and sound to locate a bird, then hunts for a nest. He registers the nest's coordinates in the GPS receiver. This data is crucial, as vireos and warblers often return to the same area each year. The coordinates have an immediate twofold use: they allow researchers to monitor songbird populations from year to year, and they help the Army avoid prime nesting habitat while training.

In addition to orchestrating the maneuvers of Humvees, M-1 tanks and thousands of troops, Fort Hood commanders also have a mandate to manage the base for public uses, such as cattle grazing, hunting and off-road vehicles. Further, as the birds are listed under the Endangered Species Act, commanders have the mandate to protect and recover these species. To help meet this challenge, they enlisted The Nature Conservancy.

"Fort Hood contains the largest known breeding population of black-capped vireos and golden- cheeked warblers under any single management authority," says Terry Cook, director of conservation science for the Conservancy's Texas chapter. "The information we gather on Fort Hood about habitat management population viability will provide the critical data for recovery."

The golden-cheeked warbler nests only in the oak-juniper woodlands of Central Texas. Population estimates are fewer than 20,000 individuals, a decline of as much as 25 percent in the past three decades. Habitat loss from agricultural and urban development is the root cause.

The black-capped vireo, like its neighbor warbler, has very specific nesting requirements, opting for an open habitat of young trees and shrubs. Once found as far north as Central Kansas, the black-capped vireo now ventures no farther than Central Oklahoma to nest. The largest populations, an estimated 1,500 nesting pairs, are found on the Edwards Plateau in Central Texas.

The Conservancy and the Army have banded together in a model cooperative land management plan aimed at recovering the vireo and warbler. This cooperation has been so fruitful in recent years that in 1997, Fort Hood won a top Conservancy award: the President's Conservation Achievement Award.

"We have to work at two levels at Fort Hood," says Cook. "One level is narrowly focused on specific species — these birds. The other level is the landscape, the ecosystem. Both require different perspectives and the right corresponding tools." The miniature video camera provides the peek into the vireo's life.

"The idea is to put the camera where the human eye cannot be," says Richard Fuhrman, who designs video systems for wildlife research. "Video has opened a whole new world of research."

At Fort Hood, scientists wanted to get images of songbirds nesting without disturbing the birds in their tight quarters with lights and cameras. They took the problem to Fuhrman, whose Microcam II features a lens about the size of a dime.

"The longer you dwell around any bird, the greater chance you have for scaring it from the nest," says Fuhrman. "You clamp the flexible arm, which is camouflaged, on a nearby branch, then swig it around in the direction of the nest. A hand-held monitor plugs into the camera via a long cable, so you can see its view and position it properly. With practice, you can deploy the camera in 30 seconds and be out."

Arrayed around that tiny lens are six infrared lights about half the diameter of a pencil. To the naked eye, whether human or avian, the light is invisible. But the video registers the infrared light, so night becomes day. It was on a June night last year at Fort Hood that the Microcam II trained on a vireo nest revealed the invasion of fire ants, an unexpected and stealthy foe.

An exotic stowaway from South America, fire ants were recorded on video actually attacking live black-capped nestlings, not merely scavenging. This is altogether new data for conservation scientists. And such predation is not good news for a bird that has already taken severe losses in its traditional nesting grounds in recent years from a different kind of nest invader: the brown-headed cowbird.

Cowbird Recon

Although most nesting birds need to feed relatively close to home to protect and care for their young, not so the cowbird. Cowbirds seek out the nests of other birds, like vireos and warblers, and the female cowbird lays her eggs in this host nest. She then leaves her offspring for good. Evolutionarily adapted for a parasitic lifestyle, cowbird chicks hatch before other eggs do. By virtue of their superior size, cowbirds then outcompete the smaller birds for food. The result of this parasitism is that fewer vireo and warbler nestlings survive.

To track cowbirds, researchers at Fort Hood use radio telemetry, attaching miniature transmitters to the backs of cowbirds. They then monitor the birds movements, using trucks mounted with long antennae and researchers on foot with hand-held receivers.

One such tracking effort left researchers puzzled. As they homed in on a radio signal, instead of finding a cowbird in the underbrush, they found a copperhead snake that had swallowed the bird. Because the battery-operated radio transmitters have a life of about 60 days, and this particular cowbird's life had been cut short in less than half that time, the researchers did the conservation-minded and resourceful thing: They captured the snake and kept it in a tank until it digested the cowbird and passed the radio transmitter. Then they freed the copperhead and put the transmitter on a second bird to get another month's use out of it.

The information about cowbird behavior has been indispensable in formulating a recovery plan for the vireos and warblers at Fort Hood. In particular, radio telemetry is

allowing researchers for the first time to get a clear understanding of the relationship among feeding behavior, feed locations and areas where the frequency of nest parasitism is high.

The first studies of black-capped vireos at Fort Hood, conducted in 1987, revealed a rate of nest parasitism by brown-headed cowbirds at more than 90 percent. As a result, less than 5 percent of all black-capped vireo nests were successfully fledging a young vireo.

But the situation has improved. Since the 1987 study, intensive cowbird trapping has brought the parasitism rate down dramatically. Base-wide, less than 10 percent of vireo nests were parasitized in 1997. Meanwhile, nest success for vireos has increased to better than 40 percent.

"What happens if we stop trapping?" Says Cook. "Likely, nest parasitism rebounds, and vireo and warbler numbers decline again. But if our goal is species recovery to the point that it can be removed from the endangered list, trapping cannot be considered a long-term solution."

The new radio telemetry data on cowbird ranges, coupled with GPS data on vireo and warbler nest sites, begin to create a comprehensive picture of parasitism at Fort Hood and its relationship to land-use patterns. To bring this picture into focus, though, yet another piece of technology has to be brought out of the toolbox.

Virtual Flyover

The Conservancy's command central at Fort Hood is a weather-worn trailer alongside a skeet range. Inside, at a desktop computer, Mark Goering, a conservancy analyst, is in the middle of a virtual flyover of the base. Making it possible is GIS, or Geographic Information System, an integral part of the Conservancy's conservation work not only here but throughout the world. Essentially, GIS layers data – topography, vegetation, species occurrences – onto a color-coded computer map.

With a couple of clicks of the mouse, Mark's computer screen becomes an aerial window of the fort Hood landscape: dark green for oak-juniper woodlands, light green for hardwoods, tan for pasture and grasslands. Large patches of dark brown illustrate areas where wildfires burned in April 1996, sparked by munitions explosions. A few more clicks and Mark's view telescopes closer to the ground, detail growing more elaborate thanks to high-resolution aerial photography provided by the military. He can even count individual juniper trees.

More clicks, and the screen appears as a series of colored dots, highlighting the trees with vireo and warbler nests and the locations of cowbirds. Where once this data was painstakingly plotted on large, cumbersome charts, the computer makes the profusion of information manageable.

"The computer allows us to process and analyze a great deal of data with a lot more efficiency," says Cook. "We can bring up sets of vireo nest sightings, for instance, and

draw some conclusions about population density, reproduction patterns and return rates. We can also examine territorial information — like the slope of the terrain, its aspect and canopy cover — that helps us gain a sense of the bird's preferences. We can then check that against the information we have on the cowbirds and identify patterns."

It is this aggregation, synthesis and analysis of data at Fort Hood that put it on the leading edge of bird conservation, according to Jeffrey Parrish, conservation ornithologist with the Conservancy's Wings of the Americas program.

"Technology such as video, radio telemetry and GIS is used elsewhere in ornithological science," says Parrish. "But Terry and the others at Fort Hood are making the connection between raw scientific research — numbers of nest sites, land use — and conservation strategies like very few others are. That's what's so important about Fort Hood."

Watchful Eyes

Of the land management recommendations that the Conservancy is developing for Fort Hood, the one that has the greatest potential to make a difference in the viability of the two songbirds involves cattle grazing. Cowbird, as their name suggests, follow cattle herds. Cattle herds grazing close to vireo and warbler habitat give cowbirds access to prime nesting grounds. At issue at Fort Hood and, by extension elsewhere in vireo and warbler habitat, is whether cattle are fundamentally incompatible with recovery efforts.

Data collected during the 1997 nesting season have shown a strong relationship between distribution of cattle and the frequency of parasitism, according to Cook. When cattle were removed from lands adjacent to vireo nesting habitat, parasitism dropped from 36 percent in 1996 to zero in 1997. With cattle gone, so went the cowbirds.

Although removing cattle from land that contains endangered-species habitat may provide an effective solution to high rates of parasitism, it may not be practical given the economic realities of Central Texas. But there is a third option at Fort Hood. "Developing grazing practices that rotate cattle out of habitat during the nesting period would not only benefit the vireo and warbler, but would provide more forage for the cattle after the nesting season," says Cook.

Thus, Cook is optimistic that a long-term solution accommodating both people and birds may be emerging. It is a solution that would never have been possible without high-tech data and analysis. But species recovery, as Cook well knows, requires constant preparedness and vigilance. This spring at Fort Hood another squad of field biologists will be deployed to trap and track cowbirds. They will use even more video cameras — 15 total — to monitor more nests. Orbiting GPS satellites will add precision to the data.

Numbers will be crunched. Computers will whir to life. And the vireos and warblers will return under watchful eyes.

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