Land Condition Trend Analysis (LCTA) is one of the four components of the Integrated Training Area Management (ITAM) program. The ITAM program is a DA DCSOPs program embedded in DPTMS - Range Control. The LCTA program's primary objective is to collect physical and biological resources data from training lands and ranges and use this information to provide insight, assessment, and recommendations to the land users to minimize their footprint on Fort Lewis' natural resources. LCTA is a tool for better decision making and stronger land stewardship.

In 1996, the ITAM program moved from PW-ENRD's umbrella to DPTMS-Range Control's reign. This move allowed the whole ITAM program to be more involved with the military's mission and land use needs and habits. Being in Range Control has also allowed for easier access into the training areas, maintaining a current understanding of the military's field exercises, and being able to contribute data and field experience to military proposals or exercises that could adversely impact Fort Lewis' natural resources. Being part of the Range Control makes supporting the training mission an easier focus for the ITAM program.

LCTA analyzes the condition of plant, bird, and butterfly populations and densities. The data is always collected within the Fort Lewis boundaries and can be used to monitor the trends of training, nonmilitary use, and land management techniques. The data is incorporated into a relational database that can be queried for specific variables that are to be studied. LCTA makes recommendations, based on the data, to minimize impact and to proactively manage the land before the disturbance is irreversible and expensive to rehabilitate. LCTA also provides species lists of plants, birds, and butterflies to the Fort Lewis community through the Fort Lewis ITAM webpage, at www.lewis.army.mil/itam/.

The 2000 field crew season was performed in 36 weeks with 4 temporary full-time contractors. The major data collection efforts during the 2000 field season were put towards monitoring 99 forest plots, 9 oak woodland plots, and 13 special use vegetation plots; surveying 65 bird plots; and completing land condition mapping of training areas 6, 7S, 14, 15, and mortar point 3 prairies. The information is available to all units and agencies on the Installation. LCTA works with the Range Officer to deliver the results of the surveys to better support units in their training missions. For the first year, the LCTA land condition mapping maps were specifically used for the placement of dig sites during a Brigade training exercise. LCTA is unlike any other program on Fort Lewis in that it is a comprehensive data collection method that monitors the trends of flora and fauna in the training lands to provide information for maintaining the highest quality training realism for the Army's soldiers.

Enclosed is the collection of the field reports for the 2000 season. The intent of each report is to provide the crew's perspective and professional experience on each project.

The majority of LCTA's 2000 field season was funded by Fort Lewis Public Works Forestry branch. These funds allowed the program to complete the 5-year monitoring rotation of forested plots. The LCTA crew also assisted Forestry survey 10 Ponderosa Pine plots in exchange for assistance with data analysis from the Forestry ecologist. The Fort Lewis Fish and Wildlife also provided funds to monitor a Federally Listed wetland species. A total of 18 wetlands were monitored and a report and analysis was completed for Fish and Wildlife (see status report for Water howellia). LCTA strives to incorporate cooperative projects between agencies on Fort Lewis into the yearly workplan. In addition to agencies on Fort Lewis, the LCTA program has been working closely with the State Fish and Wildlife on monitoring 4 target butterfly species. The cooperation between the State and the Army is in support of the Army's commitment to land stewardship. The goal of this cooperation is so LCTA will be able to suggest proactive land use recommendations to the training community to minimize the effects a listed species could have on training.

The work presented in this document is the result of professional, hard working personnel. If you have any comments or suggestions for improvement please contact Angela Lombardi, LCTA Coordinator at 967-1550.

Acknowledgments

The LCTA program would like to thank the following people for their comments and support of the work completed during the 2001 field season. Apologizes to anyone who may have been accidentally left off this list.

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SFC Richter	Range Control Safety Officer
Don Rolfs	Butterfly enthusiast
Debbie Warfield	Environmental Restoration Company
John Weller	Range Officer
Walt Wilson	Deputy DPTMS

Land Condition Trend Analysis
2000 Workplan

Prepared by Angela Lombardi, LCTA Coordinator

The overall goal for the 2000 season is to monitor the Fort Lewis core plots and areas of ecological importance. LCTA will also strive to fulfill the LCTA II requirement of providing current and predictive resource information that assists in training activities. At the end of the season all priorities will be written up in a "report of findings" by the lead field technician of the priority.

Priority #1 Vegetation Surveys **Est. Priority Cost: $44,700.00**

The following areas will be surveyed during the 2000 field season. The established LCTA methods will be used with the addition of quantitative military disturbance measurements. All the data collected from the surveys will be added to the LCTA relational database for analysis. (171 total plots)

- **Core Plots** All LCTA Core plots will be monitored. (142 plots)
- **Oak Woodland Plots** All LCTA Oak woodland plots will be monitored. (9 plots)
- **Ponderosa Pine Plots** LCTA will assist Jeff Foster monitor the Ponderosa Pine research plots. (20 plots)
- **Training Area 6 and 18 Plots** All LCTA special use plots in TA's 6 and 18 will be monitored due to its high tracked vehicle use. (29 plots) time dependent
- **Mortar Point 10** In continuation with the restoration project that was started in 1996, the ten special use plots will be monitored. The information from these plots will contribute to a better understanding of intensive restoration projects. (10 plots) time dependent
- **13th Division Special Use Plots** All 13th Division special use plots will be monitored. (34 plots) time dependent

Priority #2 Bird Surveys **Est. Priority Cost: $10,200.00**

Bird surveys will be conducted during the 2000-breeding season. The bird plots are located in mixed forest and oak woodland habitats. The surveys will be conducted by one of the LCTA field technicians. A winter bird count will be performed in November by all of the field technicians to identify resident species.

Priority #3 Water howellia Study plots **Est. Priority Cost: $6,600.00**

Monitor the 18 ponds that have populations of Water howellia using the monitoring plan produced by the WSNHP. Monitoring includes vegetation surveys, GPS data, and a field report.
*This monitoring is done with the support of Fort Lewis Fish & Wildlife.

Priority #4 Soil Compaction Impacts Study **Est. Priority Cost: $11,100.00**

Continue surveying the plots for both the dry and wet treatments. Data collection includes vegetation surveys, soil measurements, and photos. Dry treatment was conducted in September 1998 and the wet treatment will be conducted in February 2001.

Priority #5 Land Condition Mapping **Est. Priority Cost: $23,000.00**

Vegetative map training area 6 and training area 14 grasslands. The mapping will assist in knowing the hot spots for LRAM, the high activity areas for training, and the potential seed source sites for the prairie.

Priority #6 Butterfly Surveys **Est. Priority Cost: $4,600.00**

Continue monitoring butterfly species on the existing two transects in El Guettar and east Training Area 15. Survey known population of the Mardon Skipper (*Polites mardona*) within the southern part of the Artillary Impact Area. Begin general observation surveys of other prairies to determine if they would be appropriate for surveys. LCTA will coordinate with the State and Fort Lewis Fish and Wildlife so that efforts are not duplicated.
*This monitoring is done with the support of Fort Lewis Fish & Wildlife.

Priority #7 *Aster curtus* Demographics Study **Est. Priority Cost: $9,600.00**
Monitor the existing *Aster curtus* research plots and survey the plots within the tracked vehicle project.

Priority #8 Noxious Weeds Monitoring **Est. Priority Cost: $3,500.00**
Continue to monitor the known noxious weed populations within the training areas and along the section of the Nisqually River that flows through Fort Lewis's boundaries. A GPS point or UTM coordinate and plant density measurement will be assigned to each location. The report of findings will be disseminated to Fort Lewis' noxious weed coordinator and the Pierce and Thurston Counties noxious weed board.

Priority #9 TES Flora Species of Washington State **Est. Priority Cost: $0.00**
Continue monitoring the known populations of *Trillium parviflorum, Carex comosa, Carex interupta, Pityopus californica,* and *Aster curtus*. No new surveys will be performed this season.

Priority #10 Spot Reports **Est. Priority Cost: $3,700.00**
The Range Control Spot Report form will be completely filled out and given to the appropriate Range Control personnel.

Priority #11 Volunteer Internships **Est. Priority Cost: $0.00**
The LCTA Coordinator will train a volunteer intern to provide general support to the LCTA program. This will include assistance with data collection, data entry, and plant surveys. At the end of the internship period, the LCTA Coordinator will write an evaluation of the student for the student's college.

List of Acronyms

AIA	Artillery Impact Area
BA	Biological Assessment
BMP	Best Management Practice
CEMML	Center for Ecological Management of Military Lands
CG	Commanding General
CSU	Colorado State University
DA	Department of Army
DCSOPS	Deputy Chief of Staff for Operations and Plans
DOC	Directorate of Contracting
DPTMS	Directorate of Plans, Training, Mobilization, and Security
E&E	Engineering and Environment, Inc.
EA	Environmental Awareness
EIS	Environmental Impact Statement
ENRD	Environmental and Natural Resources Division
ERC	Environmental Restoration Company
F&W	Fish and Wildlife
FLMR	Fort Lewis Military Reservation
FLW	Fort Lewis Washington
FORSCOM	Forces Command
FP	Firing Point
FY	Fiscal Year
GC	Garrison Commander
GIS	Geographic Information Systems
GSA	General Supply Administration
HMCC	Hazardous Material Control Center
ITAM	Integrated Training Area Management
IWAM	Installation Workplan Analysis Module
LAV/IAV	Light or Interim Armored Vehicle
LCTA	Land Condition Trend Analysis
LRAM	Land Rehabilitation and Maintenance
MFR	Memorandum for Record
MOA	Memorandum of Agreement
MP	Mortar Point
OP	Observation Point
PW	Public Works
RFMSS	Range Facilities Management Support System
ROD	Record of Decision
ROTC	Reserve Officer Training Corps
SOW	Scope of Work
TA	Training Area
TNC	The Nature Conservancy
TO	Task Order
TRI	Training Requirements Integration
UAV	Unoccupied Aerial Vehicle
USAEC	U.S. Army Environmental Center
UTM	Universal Transverse Mercator
WPS	Work Plan Submission
YTC	Yakima Training Center

Summary Report of LCTA Vegetation Surveys
Fort Lewis, WA
2000 Field Report
Written by Mary Remsberg

Abstract

Vegetation surveys were conducted on Fort Lewis Military Installation, Washington (FLW) for the eighth year by the Land Condition Trend Analysis (LCTA) program. Vegetation surveys are used to collect trend data (a measurement of change over time) in forest, oak woodland and prairie habitats. The LCTA trend data provides a visual history of the average, or mean, change over time in cover, density, and presence/absence of vegetation. This data provides current and predictive resource information that assists in training activities by monitoring vegetative trends of FLW land, assisting military trainers in choosing appropriate locales to train, and identifying areas of good quality habitat. These habitats have become degraded both on FLW and elsewhere in the State by events such as urban development, agriculture and the invasion of exotic plants. As well, oak woodland and prairie habitats on FLW have become degraded due to military training, specifically tracked vehicle disturbance. This year, 122 vegetation plots were completed on FLW in forests, oak woodlands, and prairies (Training Area 6, and Range 51). Data collected in 2000 show that military disturbance levels in FLW's forests have remained the same. In oak woodlands, no conclusive trends can be detected. Of the two prairies surveyed in 2000, Training Area 6 has an increase in vegetative cover between 1999 and 2000, while disturbance has decreased. Range 51 has an increase in disturbance and vegetative cover. The trend data collected on these plots is used by LCTA to monitor the impacts of military training on natural resources.

Avian Report
Fort Lewis, Washington
December 2000

Written by Michael Clegg
And
Results by Angela Lombardi, LCTA Coordinator

Abstract:

The Land Condition Trend Analysis Program has conducted breeding bird surveys of songbird populations on Fort Lewis Military Installation, Washington (FLW) over the last four years to determine the effects of military training on the environment. Sixty-five study plots in Douglas-fir and oak woodland habitats are surveyed twice each spring using the Point Count methodology. Within each of the two habitat types, plots have been established in areas with obvious training use and others in areas with minimal training use for comparison. The Point Count methodology involves an observer standing at a fixed point and recording all birds heard or seen at an unlimited distance, however only breeding birds within 50 m are considered in statistical analysis of data. Over the last four years, the results of this project consistently indicate that bird abundance and diversity are negatively impacted in obvious training use areas as compared to minimal training use sites. However, these results also indicate that bird populations over all FLW have remained stable, with no major declines. Considering that bird populations overall have remained stable, it is apparent that FLW provides enough intact habitat to counteract the negative impacts of obvious training use. To maintain current bird population levels, FLW should continue directing military training to obvious training sites, keeping minimal training use sites as intact bird habitat.

Status Report for

Water Howellia (Howellia aquatilis)

On Fort Lewis

December 2000

Prepared by Michael Clegg and Results by Angela Lombardi

Abstract

Water Howellia is a Federally Threatened wetland plant species that occurs on Fort Lewis Military Reservation (FLMR). The Land Condition Trend Analysis Program has monitored Water Howellia populations on Fort Lewis Military Reservation (FLMR) over the last two years to ensure the integrity of its remaining populations. Water Howellia monitoring on FLMR is conducted according to the Endangered Species Management Plan developed by the Washington Natural Heritage Program. This monitoring methodology involves recording the size and location of Water Howellia populations along established survey routes, tracking the invasion of reed canarygrass into Water Howellia wetlands, as well as surveying potential wetlands for additional populations. The results of this monitoring effort indicates that Water Howellia populations on FLMR have remained stable, while reed canarygrass has become more abundant and is spreading into new areas. Reed canarygrass is known for its ability to overgrow and displace wetland vegetation and is a serious threat to Water Howellia. Monitoring of Water Howellia wetlands should continue as it provides land managers with an early warning of population reductions, allowing for corrective actions to be taken to ensure the survival of the existing populations on FLMR.

The Impacts of the M1A1 Abrams Tank on Vegetation and Soil Characteristics of a Grassland Ecosystem at Fort Lewis, Washington 2000 Field Report

Written by Rod Gilbert

Abstract

There has been increasing concern that repeated off-road maneuvers by tracked vehicles have negative impacts on Army training lands. The National Environmental Policy Act (1969) and U.S. Army Regulation 200-2 require that the Army minimize or avoid both short and long term training impacts. Tracked vehicle studies in similar grassland habitats at other western Army installations indicated that there were significant detrimental impacts to native habitats. Therefore, a five-year study conducted by Center for Ecological Management of Military Lands (CEMML) and LCTA to examine the effects of the M1A1 Abrams Tank on soils and vegetation on Fort Lewis was initiated in October 1998. Controlled tracking tests were conducted in high quality, native bunchgrass prairie habitat on Mortar Point 1 in the Northwest section of the Artillery Impact Area. Vegetation and soil compaction data were collected prior to and after tracking intensities of 1, 2, 4, and 8 passes. An artillery fire on MP 1 in 1999 limited data collection to just 2 of the 5 established plots. Preliminary CEMML analysis of the pre- and post-tracking data, and the 2 plots surveyed in 1999, provisionally indicate several trends after one year: all tracking intensities (1, 2, 4 and 8 passes) had reduced Idaho fescue (*Festuca idahoensis*) cover and intercept density; cover for non-native forbs were significantly higher for all treatments; native grasses were adversely impacted with increasing passes while non-native grasses benefited; an introduced annual, Silver hairgrass (*Aira caryophyllea*) had significantly higher cover and intercept density with 4 and 8 tracking treatments; cover for non-native forbs were significantly higher for all treatments; there were decreases in cryptogammic cover for all treatments and corresponding increases in bare ground. Data from the 2000 field season is currently being analyzed by CEMML.

Land Conditions Mapping Report
Fort Lewis, Washington
2000 Field Report

Written by Erika Ressa

ABSTRACT:

Land Conditions Mapping (LCM) was first developed and implemented on Fort Lewis Military Reservation (FLMR) in 1997 with the intent of providing a visual measurement of prairie quality. The survey methods are simple to conduct and easily repeatable. LCM provides an accurate estimate of native vs. non-native grassland cover, Scot's broom cover and height, and level of military disturbance on each prairie. As well as monitoring the presence or absence of two rare species including Puget balsamroot and white-topped aster. LCM maps can be useful for both military trainers and land managers in identifying areas for land rehabilitation, maintenance of drop zones, issuing of excavation and digging permits, lower quality prairie ideal for tactical vehicle training, and suitable seed source sites. LCM is an important tool in supporting the evaluation of FLMR land holding capacity in regards to military training in order to sustain multiple use activities while upholding land stewardship standards.

Summary Report of LCTA
Butterfly Surveys Conducted on
Fort Lewis, WA

Written by Mary Remsberg
With data and review from Ann Potter, Washington State Fish & Wildlife

Abstract:

The Land Condition Trend Analysis (LCTA) program conducted butterfly surveys on Fort Lewis Military Reservation (FLMR) in order to monitor populations of five rare butterflies species that are associated with Puget Sound prairies. The mardon skipper (*Polites mardon*), the Whulge checkerspot (*Euphydryas editha taylori*), the Puget blue (*Plebejus icaroides blackmorei*), the valley silverspot (*Speyeria zerene bremneri*) and the great-spangled fritillary (*Speyeria cybele pugetensis*), are targeted for research on FLMR. FLMR contains within its boundaries some of the last remaining expanses of Puget Sound lowland prairies. More than 95% of this native prairie habitat has been destroyed due to livestock grazing, fire suppression, urban development, climatic changes, and natural plant succession. As well, the prairies on FLMR are heavily affected by military training. LCTA field technicians conduct butterfly surveys on three prairie sites - Johnson Prairie, Training Area (TA) 15 and a small section in the southwest corner of the Artillery Impact Area (AIA). A total of fifteen transect surveys were completed in 2000 between these three sites. Butterfly surveys, which are conducted yearly, provide quantitative information on the fluctuation of butterfly numbers from year to year so that trends can be assessed and changes detected. Data taken from the four years this study has been conducted show that target species, with the exception of the Puget blue and great spangled fritillary, have been in decline at known locations on FLMR. In all stages of their life cycle, butterflies are highly susceptible to predation, natural elements, environmental factors, and human disturbance. Given the fact that butterflies rely on specific plants for food sources in both their larval and adult stages, habitat quality and composition is a critical factor in the health of a given population.

Aster curtus Demographic Survey

Fort Lewis, WA

2000 Field Report

Written by: Erika Ressa

&

Results by: Angela Lombardi, LCTA Coordinator

ABSTRACT:

White-topped aster (*Aster curtus)* is an endemic forb with a scattered distribution extending from Vancouver Island, British Columbia to the Willamette Valley. *A. curtus* has been listed as a species of concern in Washington State under the Endangered Species Act of 1973. Ft. Lewis Military Reservation (FLMR) was chosen for the demographic survey as it contains some of the last remaining tracts of outwash prairie habitat where *A. curtus* persists. This is the fourth season in a five year study plan for FLMR and prairies containing survey plots include: Marion (TA 18), Johnson (TA 22), Upper and Lower Weir prairies (TA 21). Currently *A. curtus* has little impact on the FLMR training mission, with exception to a few Siebert staked areas. If species listing should change and be up-graded to the Federal level than it would have serious impacts on the FLMR training mission effecting it's most valuable training lands, the prairie habitat. There are many threats to *A. curtus* population viability on FLMR and habitat destruction is by far the biggest threat. Simple protection of an individual species is not the answer for this native endemic forb, but more so the outwash prairie habitat which supports a whole community of unique species. A pro-active step should be considered in order to protect this dwindling habitat.

LCTA Noxious Weeds Status Report
Fort Lewis, Washington
2000 Field Report

Written by Rod Gilbert

Abstract

Noxious weeds are highly invasive, non-native plants that have the potential to rapidly, and radically, alter natural habitats by displacing native flora and fauna. In addition, they can alter hydrologic and fire regimes; cause erosion; cause severe financial loss to agriculture; and impact other land uses. Degradation of habitat from natural ecological processes, such as weed invasions, can compound and extenuate any effects caused by military training. State and County Noxious Weed Control Boards annually select and categorize plants to target for control. Fort Lewis Military Reservation (FLMR) is encouraged under Federal noxious weed statutes to comply with state and county weed laws. Several Class B noxious weeds are actively managed in all habitat types on FLMR. Practices that encourage the establishment and spread of weeds include any activity that causes soil disturbance or alteration of habitat. Once established, noxious weeds can spread rapidly to adjacent areas. As development increases and native habitat decreases in the Puget Sound region, it puts additional pressure on FLMR's diverse natural resources as a refuge for plants and wildlife. LCTA field technicians are able to assist with noxious weed control by identifying new plants while working in diverse and remote habitats across FLMR, and record their location using GPS. Proactive management of weeds reduces financial and human resources, reduces herbicide usage and protects native habitat.