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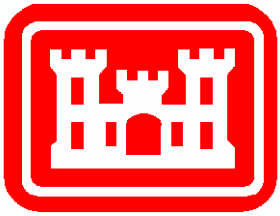
U.S. ARMY INSTALLATION FLORISTIC INVENTORY DATABASE



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U.S. ARMY INSTALLATION FLORISTIC INVENTORY DATABASE

1. Purpose. This Public Works Technical Bulletin (PWTB) describes a Microsoft Access database that integrates vascular plant lists from 18 Tier 1 U.S. Army installations in the United States.

2. Applicability. This PWTB applies to all Tier 1 continental U.S. Army training and testing facilities.

3. References.

a. Army Regulation (AR) 200-1, “Environmental Protection and Enhancement,” 21 February 1997.

b. AR 200-2, “Environmental Effects of Army Actions,” 23 December 1988.

c. AR 200-3, “Natural Resources – Land, Forest and Wildlife Management,” 20 March 2000.

d. AR 350-4, “Integrated Training Area Management (ITAM),” 08 May 1998.

e. National Environmental Policy Act of 1969 (Public Law 90-190, 42 USC 4321), 01 January 1970.

f. Executive Order 13112, “Invasive Species,” 03 February 1999.

g. See additional references in Appendix D.

4. Discussion.

a. Floristic surveys are conducted in order to determine the environmental effects of proposed projects that affect rare, threatened, and endangered plants and plant communities and to determine the presence/absence of invasive plants on an Army installation. A complete list of plant species occurring on an installation should be included in floristic inventory reports. As part of the ITAM program, baseline floristic surveys of all major Army installations have been completed and floristic inventory reports are maintained by land management personnel. Unfortunately, the information from the inventories is not readily available to potential users since no effort has been made to standardize the information for several installations.

b. Enhanced regulatory compliance could be achieved if an all-encompassing floristic inventory database were made available as a reference tool for Army environmental staff at installation, regional, and national offices. A compilation of floristic inventories from multiple installations will perpetuate better communications between managers facing similar land management problems such as invasive species control or endangered species management. One of the greatest benefits is the prevention of the introduction of invasive species between installations via the movement of equipment contaminated with seeds. Knowledge about the invasive species located at the source and destination installation will allow actions to be taken to minimize the risk of spreading invasive species.

c. This report summarizes efforts to develop a Microsoft Access database that integrates vascular plant lists from 18 Tier 1 U.S. Army installations in CONUS. Plant lists were provided by Forts Benning, Bliss, Bragg, Campbell, Carson, Drum, Hood, Hunter Liggett, Irwin, Knox, Leonard Wood, Lewis, Polk, Riley, Rucker, Sill, Stewart, and Wainwright as Microsoft Word, Microsoft Excel, or Adobe Acrobat files. The plant lists were integrated into a searchable database for use by U.S. Army land managers. The database can be searched for plants by installation, state, or Installation Management Command (IMCOM) region; by invasiveness as defined by the United States Department of Agriculture(USDA) Natural Resources Conservation Service (NRCS) PLANTS database; by Federal or State noxious weeds status; and by core data on plant taxa in the United States. Taxonomic information is consistent with the nomenclature in the USDA NRCS PLANTS database and includes USDA

symbol for accepted name, synonym symbol, scientific name, USDA accepted common name, Family, Genus, Species, infraspecific names and their ranks, and whether the plant is naturalized. In addition, plants are classified as being invasive or native and if they have been identified as being on an installation. Users can generate reports by any combination of plant name (scientific and common), installation, state, IMCOM region, plant nativity, and invasiveness. The database will be distributed on a compact disk (CD) to all of the installations that provided floristic inventories and will be made available to any installation manager that requests a copy. Alternatively, the database can be downloaded from the ftp site, ftp://erdcftp.erdc.usace.army.mil/pub/PERM/plantdatabase, and opened in Microsoft Access.

d. Appendix A contains background information.

e. Appendix B contains project details and database structure information.

f. Appendix C contains summary information.

5. Points of Contact (POCs). Headquarters, U.S. Army Corps of Engineers(HQUSACE) is the proponent for this document. The POC at HQUSACE, CEMP-II, is Malcolm E. McLeod. He can be reached at 202-761-0632, or by e-mail: Malcolm.E.Mcleod@usace.army.mil.

Questions and/or comments regarding this subject should be directed to the technical POC, Michael Denight, U.S. Army Engineer Research and Development Center (ERDC), Construction Engineering Research Laboratory (CERL), CN-C. He can be reached at (217) USA-CERL, x6749, or by e-mail at Michael.L.Denight@erdc.usace.army.mil.

FOR THE COMMANDER:

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APPENDIX A

INTRODUCTION

The U.S. Army manages over 12 million acres of land (Houston et al. 2001), most of which is in constant use by military trainers to meet mission requirements (Fang et al. 2002; Milchunas et al. 2000). Environmental impacts due to military training are similar to consequences from military actions during wartime (Austin and Bruch 2000; Whitecotten et al. 2000; Dudley et al. 2002). As a result, plant populations may be greatly reduced or altered due to vehicle operations that can result in the clearing of vegetation and severe soil compaction. Soil conditions are changed due to the removal of vegetation, the erosion of topsoil, and the mixing and compaction of soil horizons. These changes can result in erosion, water pollution, and loss of habitat for species (Jansen 1997). Environmental impacts in military training areas can result in significant reductions in plant diversity and community structure (Dale et al. 2002).

Floristic surveys are conducted in order to determine the environmental effects of military operations that affect rare, threatened, and endangered plants and plant communities and to determine the presence/absence of invasive plants on an Army installation. A complete list of plant species occurring on an installation should be included in floristic inventory reports. As part of the Integrated Training Area Management program, baseline floristic surveys of all major Army installations have been completed and floristic inventory reports are maintained by land management personnel. However, information from the inventories is not readily available to installation land managers who have similar plant communities, since no effort has been made to compile and standardize the floristic inventory data for several installations.

Enhanced regulatory compliance could be achieved if an all-encompassing floristic inventory database were made available as a reference tool for Army environmental staff at installation, regional, and national offices. A compilation of floristic inventories from multiple installations will perpetuate better communications between managers facing similar land management problems, such as invasive species control or endangered species management. One of the benefits is the prevention of the introduction of invasive species between installations via the movement of equipment contaminated with seeds. Knowledge about the invasive species located at the source and destination

installation will allow actions to be taken to minimize the risk of spreading invasive species.

APPENDIX B

PROJECT DETAILS AND DATABASE STRUCTURE

The purpose of this project was to develop a Microsoft Access database that integrates vascular plant lists from U.S. Army Tier 1 installations in the continental United States (CONUS). The inventories were solicited from installation land managers, environmental and natural resources personnel, Integrated Training Area Management coordinators as Microsoft Word, Microsoft Excel, or Adobe electronic files. A total of 18 floristic inventories from CONUS installations (Table 1) were collected and compiled into a searchable database for use by installation land managers Army-wide.

Floristic inventories were standardized to ensure taxonomic consistency. The inventories were reviewed by botanists to make sure that the most recent scientific nomenclature was used in database construction, reconciling genera and species with common names that can vary by region.

An Access database structure was developed to allow users to search and generate reports by any combination of plant name (scientific and common), installation, state, Installation Management Command (IMCOM) region, plant nativity (native to the installation vs. exotic), and degree of invasiveness (using several national and state criteria).

Once the floristic inventory was collected, the installation plant lists were migrated from their original format into the Access database. Data sets from the online U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) PLANTS database (plants.usda.gov) were downloaded and integrated into the Access database. Installation floristic inventories were verified against the PLANTS data to ensure consistency.

Table B-1. List of U.S. Army CONUS installations that are included in the floristic inventory database and their associated IMCOM regional designation.

Installation Name	IMCOM Region
Ft. Benning, GA	Southeast
Ft. Bliss, TX	West
Ft. Bragg, NC	Southeast
Ft. Campbell, KY	Southeast
Ft. Carson, CO	West
Ft. Drum, NY	Northeast
Ft. Hood, TX	West
Ft. Hunter Liggett, CA	West
Ft. Irwin, CA	West
Ft. Knox, KY	Southeast
Ft. Leonard Wood, MO	West
Ft. Lewis, WA	West
Ft. Polk, LA	West
Ft. Riley, KS	West
Ft. Rucker, AL	Southeast
Ft. Sill, OK	West
Ft. Stewart, GA	Southeast
Ft. Wainwright, AK	Pacific

DATABASE STRUCTURE

The following data tables are included in the Access database.

I. FedNoxiousWeeds

Description: Plants on the Federal Noxious Weed list

Field(s)

Symbol (Text): USDA symbol for listed plant

II. InstallationList

Description: Installations in the database

Field(s)

ID (Long Integer): Arbitrarily assigned ID number of installation

Installation (Text): Installation name

State (Text): Postal abbreviation of state where installation is located

IMCOM Region (Text): Abbreviation of IMCOM region where installation is located

III. Invasives

Description: Plants considered weedy or invasive, or having the potential to become weedy or invasive, in all or part of their U.S. range; compiled by the USDA NRCS from various state and national lists

Field(s)

Symbol (Text): USDA symbol for listed plant

IV. PlantLists

Description: Plant lists from installations

Field(s)

PLID (Long Integer): Sequential number for record

InstallID (Long Integer): Installation number, tied to key in InstallationList table

OriginalSymbol (Text): USDA symbol used for initial identification in installation list

Symbol (Text): USDA symbol of accepted name for plant in PLANTS database

Certainty (Text): Certainty of identification according to installation list

Comments (Memo): Comments on plant added by G.A. Levin

Native (Yes/No): Plant native to state where installation is found

V. PLANTS

Description: Core data on plant taxa in the United States, from the PLANTS database (7 March 2006 version)

Field(s)

PLANTID (Long Integer): Sequential number for record

Symbol (Text): USDA symbol for accepted name

Synonym Symbol (Text): USDA symbol for name

Scientific Name with Author (Text): Complete scientific name with authors

National Common Name (Text): USDA accepted common name for taxon

Family (Text): Plant family

SimpleSciName (Text): Complete scientific name without authors

Genus (Text): Genus name

Species (Text): Specific epithet

Rank1 (Text): Rank of first infraspecific name, if any

Infraspecies1 (Text): First infraspecific name, if any

Rank2 (Text): Rank of second infraspecific name, if any

Infraspecies2 (Text): Second infraspecific name, if any

Naturalized (Yes/No): Is plant known outside cultivation in the US (not "excluded" in PLANTS database)

VI. StateNoxious

Description: USDA symbols for plants on state noxious weed lists (currently only for the 14 states associated with the 18 installations)

Field(s)

SNID (Long Integer): Sequential number of record

Symbol (Text): USDA symbol of accepted name

Status (Text): Abbreviation of the associated state's official noxious weed designation for the plant

State (Text): Postal abbreviation of state designating the plant as a noxious weed

VII. StateNoxiousCodes

Description: Codes and full text of state noxious weed status designations

Field(s)

Status (Text): Abbreviation of the noxious weed designation

Full Text (Text): Full text of the noxious weed designation

VIII. States

Description: Abbreviations and full names for states

Field(s)

Abbreviation (Text): Postal abbreviation of state

Full name (Text): Full name of state

The relationships among the tables are shown in the Figure B-1. These relationships link data among the tables and also link accepted scientific names with their synonyms, as contained in the PLANTS database.

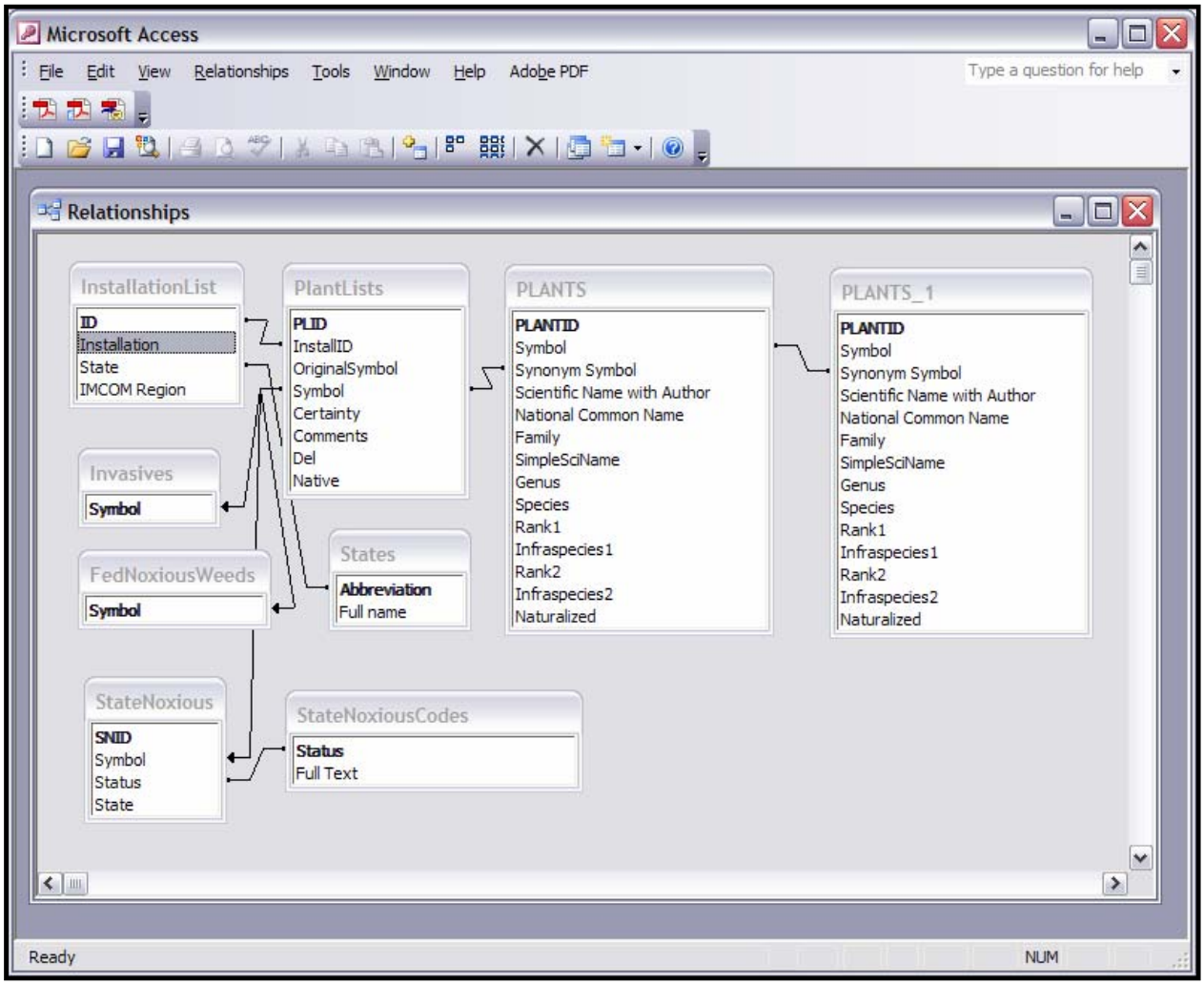

Figure B-1. Relationships among the tables of the installations floristic inventories database.

IX. Reports and Forms

Description: Forms for underlying queries to allow users to search the database and generate reports by any combination of plant name (scientific and common), installation, state, IMCOM region, plant nativity, and invasiveness.

APPENDIX C

SUMMARY

Floristic inventories support the Army Integrated Training Area Management Program, specifically, the Range and Training Lands Assessment program that has been instituted on all major U.S. Army installations. Inventories are used to monitor vegetation on the installation in order to assess invasive species infestation, to assess the general health of native plant communities, and to protect the habitats of a variety of threatened and endangered species occurring on Army lands.

Inventories from several installations, grouped by regions, should be of significant value to Army land managers since they can provide information about community structure and invasive species distribution by comparing similar environmental conditions. The inclusion of 18 Tier 1 installation floristic inventories into a searchable database allows for queries by any combination of plant name (scientific and common), installation, state, IMCOM region, plant nativity, and invasiveness.

The database will be distributed on a compact disk (CD) to the installations that provided floristic inventories and will be made available upon installation request. Alternatively, the database can be downloaded from the ftp site, ftp://erdcftp.erdc.usace.army.mil/pub/PERM/plantdatabase, and opened in Microsoft Access. Copies of the database on CD can be obtained by contacting the technical point of contact listed for this PWTB.

APPENDIX D

REFERENCES

Austin, J.E., and C.E. Bruch (eds.). 2000. The Environmental Consequences of War: Legal, economic, and scientific perspectives. Cambridge University Press, New York. 691 pp.

Dale, V.H., S.C. Byeler, and B. Jackson. 2002. "Understory vegetation indicators of anthropogenic disturbance in longleaf pine forests at Fort Benning, Georgia, USA." *Ecological Indicators* 1: 155-170.

Dudley, J.P., J.R. Ginsberg, A.J. Plumptre, J.A. Hart, and L.C. Campos. 2002. "Effects of war and civil strife on wildlife and wildlife habitats." *Conservation Biology* 16: 319-329.

Fang, S., S. Wente, G.Z. Gertner, G. Wang, and A. Anderson. 2002. "Uncertainty analysis of predicted disturbance from off-road vehicular traffic in complex landscapes at Fort Hood." *Environmental Management* 30(2): 199-208.

Houston, S.T., W.W. Doe III, and R.B. Shaw. 2001. "Environmental risk of army ranges and impact areas: an ecoregional framework for assessment." *Federal Facilities Environmental Journal*. Spring 2001, pp 93-111.

Jansen, A. 1997. "Terrestrial invertebrate community structure as an indicator of the success of a tropical rainforest restoration project." *Restoration Ecology* 5(2): 115-124.

Milchunas, D.G., K.A. Schulz, and R.B. Shaw. 2000. Plant community structure in relation to long-term disturbance by mechanized military maneuvers in a semiarid region. *Environmental Management* 25(5): 525-539.

Whitecotton, CPT R.C.A., M.B. David, R.G. Darmody, and D.L. Price. 2000. "Impact of foot traffic from military training on soil and vegetation properties." *Environmental Management* 26(6): 697-706.

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