UPDATED
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FOR THE

WENDELL H. FORD REGIONAL TRAINING CENTER

MUHLENBERG COUNTY, KENTUCKY

KENTUCKY ARMY NATIONAL GUARD

JUNE 2010

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
2010 UPDATE

WENDELL H. FORD REGIONAL TRAINING CENTER
MUHLENBERG COUNTY, KENTUCKY

This updated Integrated Natural Resources Management Plan (INRMP) meets the requirements for INRMPs per NGB and Army policy, meets the intent of the Sikes Act, as amended (16 USC §670a *et seq.*), and contributes to the conservation and rehabilitation of natural resources on military installations. It has set appropriate and adequate guidelines for conserving and protecting the natural resources of the Wendell H. Ford Regional Training Center.

APPROVED BY:

EDWARD W. TONINI
Major General, KYNG
The Adjutant General

DATE: 28 July 2010

MICHAEL J. BENNETT
Colonel, US Army
Chief, Environmental
Programs Division

DATE: 20 Aug 10

VIRGIL LEE ANDREWS, JR.
Field Supervisor
Kentucky Ecological
Services Field Office

DATE: 7/30/10

REVIEWED BY:

WAYNE L. BURD
COL, J3
Kentucky Army National Guard

DATE: 16 July 2010

STEVEN T. KING
LTC, Construction and Facilities
Management Officer
Kentucky Army National Guard

DATE: 10 July 2010

WILLIAM L. McDANIEL
LTC, Training Site Commander
Kentucky Army National Guard

DATE: 24 Jul 2010

FAITH FIENE
Environmental Program Manager
Kentucky Department of Military
Affairs

DATE: 22 June 10

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EXECUTIVE SUMMARY

This Integrated Natural Resources Management Plan (INRMP) is an update of the 2003 INRMP for the Wendell H. Ford Regional Training Center (WHFRTC). The INRMP has been updated for use by the National Guard Bureau (NGB) and the Kentucky Army National Guard (KYARNG) as the primary tool for managing natural resources at WHFRTC. The WHFRTC covers approximately 10,804 acres and is located in Muhlenberg County near Greenville, Kentucky (**Figure 1**). The WHFRTC is on state-owned land.

The primary purpose of the WHFRTC is to support the military missions of the KYARNG. To properly train soldiers, the KYARNG must provide a variety of environmental conditions and ecosystems. This training objective must be met in a way that provides for sustainable, healthy ecosystems, complies with all applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation.

INRMPs help installation commanders steward or manage natural resources more effectively so as to ensure that installation lands remain available and in good condition to support the installation's military mission. The KYARNG published the first INRMP for the WHFRTC in 1997, and revised it in 2003, to guide resources management on the installation for the years 2002-2006. The reasons for the INRMP update include (1) the acquisition of approximately 3,921 acres of additional training land; (2) the development of a forestry management plan; (3) the collection of updated resource information; (4) and Army National Guard (ARNG) guidance.

The Sikes Act Improvement Act (SAIA) of 1997, 16 U.S. Code (USC) §670a et seq., as amended, requires Federal military installations with adequate wildlife habitat to develop a long-range INRMP and implement cooperative agreements with other agencies. All of WHFRTC land is state owned. For this reason, WHFRTC is not a "military installation" as defined in the SAIA. Therefore, the INRMP is an Army policy INRMP pursuant to the U.S. Army policy dated 21 Mar 97 entitled *Army Goals and Implementing Guidance for Natural Resources Planning Level Survey (PLS) and INRMP ("Army INRMP Policy")*. An INRMP is required by Army INRMP Policy for the WHFRTC because the installation conducts intensive, on-the-ground military missions that require conservation measures to minimize impacts (e.g. soil erosion, prescribed burning, invasive species control) and sustain natural resources.

The updated INRMP is intended to be consistent with the SAIA as well as Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*; 32 Code of Federal Regulations (CFR) 651, *Environmental Analysis of Army Actions*; Department of Defense (DoD) Directive 4700.1, *Natural Resources Management Programs*; Department of Defense Instruction (DoDI) 4715.3, *Environmental Conservation Program*; and NGB policy.

Overall, the WHFRTC has benefited from using the INRMP as a management tool. An evaluation as to operation and effect of the 2003 INRMP, including natural resources management goals, objectives, and projects and their implementation status, can be found in **Appendix A**. A summary of the completion status for the 2003 INRMP projects is provided in **Table ES – 1**.

The review of the 2003 INRMP was developed in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the Kentucky Department of Fish and Wildlife Resources (KDFWR). Developed using an interdisciplinary approach, information has been gathered from the KYARNG Environmental Office and training site staff, as well as other Federal, State and local agencies and special interest groups with an interest in the management of natural resources at the WHFRTC.

Specific goals identified by the updated INRMP in Section 7 are listed in **Table ES-2**. These goals are supported in the updated INRMP by objectives and projects, which provide management strategies and specific actions to achieve these goals. Objectives are listed in Section 7 of the updated INRMP, and projects are listed in **Section 8**.

These goals will ensure the success of the military mission and conservation of natural resources. The general philosophies and methodologies used throughout the WHFRTC natural resources management program are focused on conducting doctrinally required military training while maintaining ecosystem viability.

This updated INRMP provides a description of the installation (e.g. location, history and mission), information regarding the on-site and adjacent physical and biotic environment, and an assessment of the anticipated impacts to natural resources as a result of mission activities. Included within the updated INRMP are recommendations for various management practices designed to enhance the natural resource base and mitigate anticipated negative impacts that may result through the successful execution of the military mission at the WHFRTC.

Additionally, this updated INRMP presents methods that will increase the environmental awareness of KYARNG personnel, guest units using the WHFRTC for training, and the general public. The implementation of this updated INRMP at the WHFRTC will ensure the successful accomplishment of the KYARNG's military missions while providing for multiple uses of natural resources and promoting adaptive stewardship practices that sustain ecosystem and biological integrity. The updated INRMP complies with applicable Army and DoD policies, as well as applicable Federal, State and local mandates.

TABLE ES-1. COMPLETION STATUS OF PROJECTS FROM THE 2003 WHFRTC INRMP

2003 PROJECT	DESCRIPTION	STATUS
4.1	Non-RTLA (formerly LCTA) protocol natural resource management surveys	Ongoing. KYARNG Environmental staff prepares annual INRMP review and update if needed. This project is continued to the following planning period.
4.2	Non-plot erosion surveys	Ongoing; staff conducts periodic windshield survey and reviews orthophotographs. This project is continued to the following planning period.
4.3	GIS data acquisition and management	Partially accomplished. Most of the available layers have been incorporated into central database in Environmental Office in Frankfort. This project is continued to the following planning period.
4.4	Brief ITAM Committee on GIS capabilities	ITAM Committee discontinued. However, KYARNG staff is briefed as needed on GIS capabilities.
4.5	Hire an ITAM Coordinator	Completed
4.6	Cost for ITAM Coordinator TDY and ITAM training (to include conference costs)	Completed
4.7	Lease GSA vehicles for ITAM support	Ongoing
4.8	ITAM Coordinator Vehicle Maintenance	Ongoing
4.9	Costs associated with upgrades to facilities to support ITAM staff and technical functions (All ITAM components).	Not yet completed; continued through next planning period.
4.10	Office supplies. Miscellaneous supplies to support the ITAM function	Ongoing.
4.11	Identify ITAM requirements at WHFRTC in the Integrated Workplan Analysis Module (IWAM)	Ongoing.
4.12	Convene ITAM committee semi-annually	ITAM Committee discontinued. However, KYARNG staff is briefed as needed on GIS capabilities.
4.13	Sieber stake environmentally sensitive areas (e.g., LRAM project sites, waterway management zones, wetland buffer zones, rare species habitats) and other costs to protect wildlife management areas, food plots, restricted areas, non-hunting areas, and nesting and breeding areas from damage from military maneuvers.	Ongoing, annual inspections. Sieber stakes or other methods used.
4.14	- Include Training Site Regulation revisions in annual revisions of the INRMP. - Include policies identified in the INRMP in Training Site Regulation revisions.	Not yet completed; continued through next planning period.
4.15	Correct maneuver damage and control erosion caused by training activities. Replant vegetation to include native grasses and other species recommended by KDFWR and NRCS.	Ongoing.

TABLE ES-1. COMPLETION STATUS OF PROJECTS FROM THE 2003 WHFRTC INRMP

2003 PROJECT	DESCRIPTION	STATUS
4.16	Apply fertilizer, lime, seed and mulch for proactive and continuous maintenance of areas damaged by military maneuvers. Provide continuous maintenance for tactical assault strip.	Ongoing.
4.17	Reduce maneuver/training inhibiting vegetation. - brush plowing and mowing in grasslands (approximately 300 acres per year) - remove tree branches below 8 feet in bivouac areas for troop safety. - tree shredding	Ongoing; performed annually or as needed.
4.18	Purchase LRAM equipment for maintenance of training site lands (such as grass chisel).	Ongoing. Includes replacement of equipment at end of life cycle (typically 20 years).
4.19	Costs of constructing/maintaining hard stands or hardened sites in the maneuver area (bivouac areas)	Ongoing
4.20	Costs of constructing noise buffers for ranges using trees and shrubs	Completed – 2003.
4.21	Provide dust control for gravel trails, as well as other routine maneuver trail maintenance	Ongoing; this covers bivouac sites; general dust control is now conducted using conservation funds.
4.22	Costs of maintaining a sod farm for revegetation of highly erodible LRAM sites.	Not yet completed; continued through next planning period; equipment has been obtained and areas located.
4.23	Provide low water stream crossing structures to prevent erosion and sedimentation by tracked vehicles.	Ongoing; conducted on as-needed basis.
4.24	Projects and expenses associated with land acquisitions (constructing hard stands in heavy use areas, such as bivouac sites, firing points, and staging areas; maneuver area dust control, land rehabilitation following training activities).	Ongoing; official plans have not been decided; conducted on as-needed basis.
4.25	Construction and maintenance of fire breaks or other fuels modifications, directly associated with ranges/training areas fire management resulting from training activities. Does not include conservation or structural fire/fuels breaks.	Ongoing.
4.26	Prepare/purchase posters, booklets, displays, films and training materials for troop environmental awareness training. - training site environmental awareness video	Ongoing. Soldier Card updated in 2007.

TABLE ES-1. COMPLETION STATUS OF PROJECTS FROM THE 2003 WHFRTC INRMP

2003 PROJECT	DESCRIPTION	STATUS
4.27	Assemble Environmental Information Packets to be handed out to Officers-In-Charge (OIC) at Yearly Training Coordination Conferences.	Ongoing. Annual briefing/presentations.
5.1	Update the biological inventory, including endangered species survey; floristic survey; vegetaion community survey; small mammal surveys; fish survey; terrestrial invertebrate survey.	Floristic and vegetation community survey updated December 2006. Mammal, fish and invertebrate surveys not updated.
5.2	Conduct planning level soil survey of approximately 2,223 acres that have not yet been mapped.	Completed.
5.3	Conduct surveys of bird species in coordination with KDFWR and Partners in Flight.	Annual surveys ongoing.
5.4	Construct firebreaks for fires not resulting from training activities (e.g., prescribed burn program)	Ongoing; as needed.
5.5	GPS firebreaks and include in future versions of the INRMP.	Completed.
5.6	Train WHFRTC employees in the latest fire management techniques at TNC fire management course.	Ongoing; new training, when needed; will comply with updated Army policies.
5.7	Develop burn prescriptions for individual units to be burned each year.	Completed.
5.8	Plant additional food plots in coordination with Quail and Turkey Unlimited.	Discontinued.
5.9	Develop a food plot database and enter locations into GIS.	Food plots discontinued.
5.10	Control invasive pest plants (e.g., musk thistle, honeysuckle) using mowing, prescribed burning, or the most appropriate means.	Ongoing annual efforts.
5.11	Monitor effects of prescribed fire through post burn evaluations.	Ongoing; system update initiated with Environmental Office.
5.12	Conduct detailed forest inventory and develop forest management prescriptions for forest stands based on the forest inventory.	Forest Inventory not completed; continued for next planning period. Forest Management Plan (FMP) included as part of 2010 Updated INRMP. KYARNG does not intend to manage forests for harvesting.
5.13	Develop a plan for reclamation of pre-law abandoned mine land areas with the Division of Abandoned Lands and implement as funding allows.	Completed for property owned prior to 2006. Newer acquisition areas eligible for funding under Abandoned Mine Lands/Superfund programs. Implementation subject to available funding.
5.14	Introduce fire to pine forests to reduce brush and invasive plants (ex. honeysuckle).	Not implemented due to smoke and safety concerns.

TABLE ES-1. COMPLETION STATUS OF PROJECTS FROM THE 2003 WHFRTC INRMP

2003 PROJECT	DESCRIPTION	STATUS
5.15	Conduct water quality monitoring of long-term water quality monitoring sites.	Scope modified, project continued.
5.16	Conduct surveys for macroinvertebrates at long term monitoring sites to determine jurisdictional status when projects require.	Additional surveys scheduled as mission needs require. None completed since 2003.
5.17	Update wetlands planning survey in 10 years and schedule surveys to determine jurisdictional status when projects require.	Wetland survey on TA 7 and TA 8 complete 2005. Additional surveys scheduled as mission needs require.
5.18	Conduct pesticide monitoring survey and spray for mosquitoes.	Aerial spraying done by state with funding from Department of Agriculture County Pest and Weeds.
5.19	Update pest management plan as needed.	Completed update 2007; ongoing as needed.
5.20	Determine annual hunting quotas in advance of hunting season with KDFWR.	Ongoing; annual coordination.
5.21	Coordinate annual hunts with KDFWR.	Ongoing; annual coordination.
5.22	Hire security guards to run the hunter check station.	Modified. Installation staff are used for this.
5.23	Continue to enforce the training site regulation.	Ongoing.
5.24	Apply liquid fertilizer 3x/year to selected lakes to help control invasive water plants. Purchase boat, trailer, and motor.	Purchases complete. Ongoing control activities as needed.
5.25	Continue to fund the Wildlife Specialist position for WHFRTC.	Discontinued.
5.26	Travel and training expenses for Wildlife Specialist	Discontinued.
5.27	Hire a statewide GIS Specialist	Completed.
5.28	Travel and training expenses for GIS Specialist	Completed.
5.29	Hire one or more student interns to assist with conservation, wildlife, environmental, and range projects as needed at WHFRTC.	Ongoing, considered on an annual basis.

TABLE ES-2. MANAGEMENT GOALS (2010 UPDATED INRMP)	
GOAL NO.	INRMP MANAGEMENT GOAL
1	Manage natural resources to *support the military mission* in a manner consistent with the KYARNG Environmental Management System and in compliance with Federal and State laws, Army regulations and policies.
2	Coordinate mission requirements and land maintenance activities to minimize land impacts from training,
3	Manage *fish and wildlife resources* in a manner compatible with the military mission and within the limits of the natural habitat.
4	Protect, restore, and maintain populations of *rare plant and animal species* in compliance with Federal and State laws and regulations.
5	Protect, maintain, and improve *soil and water quality* in accordance with State and Federal laws and regulations to sustain the overall condition of the WHFRTC training lands.
6	*Protect and maintain riparian, wetland and aquatic habitats* in accordance with state and federal laws and regulations while adhering to ecosystem principles management for water quality enhancement, wildlife food and cover, and aquatic habitat.
7	Maintain the *grassland habitats* for the purposes of military training, wildlife food and cover, and soil stabilization.
8	Maintain the *forest resources* for the purposes of military training, wildlife food and cover, noise buffers, and watershed protection.
9	*Provide cost-effective and compatible landscaping* for the Cantonment Area to reduce maintenance costs and provide wildlife habitat.
10	*Use prescribed fire* to reduce risk of wildfires, to enhance ecological process and functions, maintain rare species habitat, to control undesired exotic vegetation, and to sustain the military mission.
11	*Use Integrated Pest Management (IPM) practices* that maximize safety and minimize pesticide use and potential hazards to humans, wildlife and their environments.
12	Continue to *develop and maintain a Geographic Information System (GIS) system* providing efficient data storage, retrieval, and presentation to facilitate fully informed management decisions.
13	*Protect and preserve cultural resources* in accordance with atate and federal laws and regulations.
14	*Form communication links* with other agencies, organizations, and the public to share information and aid in decision-making.
15	*By implementing the Sustainable Range Awareness (SRA) program*, educate site users about environmental concerns and responsibilities to minimize resource damage and to instill a sense of pride and stewardship responsibility by implementing the SRA program.
16	*By implementing the RTLA program*, identify and evaluate land impacts from training, and identify training activities compatible with WHFRTC topography, soils, land cover, and ecosystems.
17	*By implementing the TRI program*, minimize training impacts, prevent excessive or irreversible land damage, and minimize training-related land rehabilitation costs.
18	*By implementing the LRAM program*, apply BMPs to ensure rehabilitation, repair and maintenance results are commensurate with the applied resources and to ensure long-term sustainability of installation lands, training and testing missions.

This INRMP includes, as **Appendix C**, a Record for Environmental Consideration (REC). The Environmental Assessment (EA) for the 2003 WHFRTC INRMP presented the Proposed Action (implementation of the INRMP) and alternatives, summarized the affected environment, and assessed the environmental consequesnces of implementation. The EA concluded the known and potential impacts of the Proposed Action on the physical, biological, and cultural environment will generally be of a positive nature. Implemention the INRMP will not result in significant adverse environmental effects. This National Environmental Policy Act of 1969 (NEPA) analysis is still valid, and adequately covers the actions in this updated INRMP. The REC describes the Proposed Action and explains why futher environmental analysis is not needed.

This updated INRMP is intended to provide a benefit to, and gain a critical habitat exemption for, the federally listed endangered gray bat (*Myotis grisescens*). The National Defense Authorization Act (NDAA) of 2004 made a significant revision to the Endangered Species Act (ESA). NDAA stated that, "The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense (DoD), or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 United States Code [USC] 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." Under the 2004 NDAA, a military installation may have its INRMP obviate the need for critical habitat designation if the INRMP provides a benefit to listed species, and manages for the long-term conservation of the species.

CONTENTS

TABLES

FIGURES

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ACRONYMS AND ABBREVIATIONS

ABC	American Bird Conservancy
AEDB-EQ	Army Environmental Database Environmental Quality module
AHPA	Archeological and Historic Preservation Act
AIRFA	American Indian Religious Freedom Act
AML	Abandoned Mine Land
AMLR	AML Reclamation
AR	Army Regulation
ARNG	Army National Guard
ATV	All Terrain Vehicle
BBS	Breeding Bird Survey
BS	Bivouac Site
CES	Center for Earthquake Studies
CFMO	Construction and Facilities Management Office
CFR	Code of Federal Regulations
CWA	Clean Water Act
DA	Department of Army
DENIX	Defense Environmental Network Information Exchange
DoD	Department of Defense
DoDI	Department of Defense Instruction
DUSD	Deputy Under Secretary of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EL	Environmental Laboratory
EMS	Environmental Management System
EO	Executive Order
EPR	Environmental Program
EQR	Environmental Quality Report
ERDC	Engineering Research and Development Center
ESA	Endangered Species Act
EST	Engagement Skills Trainer
^{o}F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FMP	Forest Management Plan
FMO-EN	Facilities Management Office-Environmental
FTX	Field Training Exercises
FY	Fiscal Year
GIS	Geographic Information System
GPS	Geographic Positioning System
GSA	General Services Administration
ICRMP	Integrated Cultural Resources Management Plan
IDT	Inactive-duty training
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IWFMP	Integrated Wildland Fire Management Plan
IPM	Integrated Pest Management
ISO	International Standards Organization
ITAM	Integrated Training Area Management
IWAM	Integrated Workplan Analysis Modeling
K2O	Water-soluble potash
KCWCS	Kentucky Comprehensive Wildlife Strategic Action Plan
KDEP	Kentucky Department for Environmental Protection
KDFWR	Kentucky Department of Fish and Wildlife Resources
KDMA	Kentucky Department of Military Affairs
KDNR	Kentucky Department of Natural Resources
KDOF	Kentucky Division of Forestry
KGS	Kentucky Geologic Survey
KSNPC	Kentucky State Nature Preserves Commission
KYANG	Kentucky Air National Guard
KYARNG	Kentucky Army National Guard
KY-EPPC	Kentucky Exotic Pest Plant Council
KYNG	Kentucky National Guard
LCTA	Land Condition Trend Analysis
LRAM	Land Rehabilitation and Maintenance
MBTA	Migratory Bird Treaty Act
MCDC	Muhlenberg Career Development Center
METL	Mission Essential Task List
M-Day	Mobilization Day

MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
N	Nitrogen
NAGPRA	Native American Graves Protection and Repatriation Act
NCO	Non Commissioned Officer
NCOIC	NCO In Charge
NEPA	National Environmental Policy Act of 1969
NDAA	National Defense Authorization Act
NGB	National Guard Bureau
NGB-ARE	NGB Army Environmental Programs Division
NGB-ARI	NGB Army Installations Division
NHPA	National Historic Preservation Act
NMSZ	New Madrid Seismic Zone
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
OIC	Officer in Charge
P2O5	Available phosphorous
PA	Public Address
PAO	Public Affairs Office(r)
PCA	Plant Conservation Alliance
PEM	Palustrine Emergent Marsh
PLS	Planning Level Surveys
POW	Palustrine Open Water
REC	Record of Environmental Consideration
RETS	Remote Engagement Target System
RPDP	Real Property Development Plan
RTLA	Range and Training Land Assessment
RTLP	Range and Training Land Program
SAIA	Sikes Act Improvement Act
SHPO	State Historic Preservation Office
SJA	Staff Judge Advocate
SOP	Standard Operation Procedure
SPB	Southern Pine Beetle
SRA	Sustainable Range Awareness
SRP	Sustainable Range Programs
STEP	Status Tool for the Environmental Program
T&E	Threatened and Endangered
TA	Training Area
TAG	The Adjutant General
TCP	Traditional Cultural Properties
TDY	Temporary Duty
TRI	Training Requirements Integration
TSC	Training Site Commander
TSM	Training Site Manager
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCHPPM	U.S. Army Center for Health Promotion and Preventative Medicine
USD	Under Secretary of Defense
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WES	Waterways Experiment Station
WHFRTC	Wendell H. Ford Regional Training Center
WMA	Wildlife Management Area
WQC	Water Quality Certification

SECTION 1: GENERAL INFORMATION

1.1 PURPOSE

This Integrated Natural Resources Management Plan (INRMP) is an update of the 2003 INRMP for the 10,804-acre Wendell H. Ford Regional Training Center (WHFRTC), located in Muhlenberg County, Kentucky (**Figure 1**). The site is owned by the Commonwealth of Kentucky and operated by the Kentucky Department of Military Affairs (KDMA) for the training of National Guard and Reserve Components of the armed services. The reasons for the INRMP update include (1) the acquisition of approximately 3,921 acres of additional training land; (2) the development of a forestry management plan; (3) the collection of updated resource information; (4) and Army National Guard (ARNG) guidance. The natural resources management philosophies and existing programs have not changed. With this update, the INRMP has been reorganized to focus on natural resource management issues and associated mission support.

The INRMP has been updated for use by the National Guard Bureau (NGB) and the KYARNG as the primary tool for managing natural resources at WHFRTC. The WHFRTC must provide a variety of environmental conditions and ecosystems in which to train soldiers. This objective must be met in a way that provides for sustainable, healthy ecosystems, complies with all applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation. An INRMP helps installation commanders manage natural resources more effectively so as to ensure that installation lands remain available and in good condition to support the installation's military mission. The KYARNG published the first INRMP for the WHFRTC in 1997, and updated it in 2003. An evaluation as to operation and effect of the 2003 INRMP, including natural resources management goals, objectives, and projects and their implementation status, can be found in **Appendix A**. A summary of the completion status for the 2001 INRMP projects is provided in **Table 1**.

The Sikes Act Improvement Act (SAIA) of 1997, 16 U.S. Code (USC) §670a et seq., as amended, requires Federal military installations with adequate wildlife habitat to develop a long-range INRMP and implement cooperative agreements with other agencies. All of WHFRTC land is state owned. For this reason, WHFRTC is not a "military installation" as defined in the SAIA. Therefore, the INRMP is an Army policy INRMP pursuant to the U.S. Army policy dated 21 Mar 97 entitled *Army Goals and Implementing Guidance for Natural Resources Planning Level Survey (PLS) and INRMP ("Army INRMP Policy")*. An INRMP is required by Army INRMP Policy for the WHFRTC because the installation conducts intensive, on-the-ground military missions that require conservation measures to minimize impacts (e.g. soil erosion, prescribed burning, invasive species control) and sustain natural resources.

The National Defense Authorization Act (NDAA) of 2004 made a significant revision to the Endangered Species Act (ESA). NDAA stated that, "The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense (DoD), or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 United States Code [USC] 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." Under the 2004 NDAA, a military installation may have its INRMP obviate the need for critical habitat designation if the INRMP provides a benefit to listed species, and manages for the long-term conservation of the species.

1

TABLE 1. COMPLETION STATUS OF PROJECTS FROM THE 2003 WHFRTC INRMP

2003 PROJECT	DESCRIPTION	STATUS
4.1	Non-Range and Training Land Assessment (RTLA) - formerly Land Condition Trend Analysis (LCTA) protocol natural resource management surveys	Ongoing. KYARNG Environmental staff prepares annual INRMP review and update if needed. This project is continued to the following planning period.
4.2	Non-plot erosion surveys	Ongoing; staff conducts periodic windshield survey and reviews orthophotographs. This project is continued to the following planning period.
4.3	GIS data acquisition and management	Partially accomplished. Most of the available layers have been incorporated into central database in Environmental Office in Frankfort. This project is continued to the following planning period.
4.4	Brief Integrated Training Area Management (ITAM) Committee on Geographic Information System (GIS) capabilities	ITAM Committee discontinued. However, KYARNG staff is briefed as needed on GIS capabilities.
4.5	Hire an ITAM Coordinator	Completed
4.6	Cost for ITAM Coordinator Temporary Duty (TDY) and ITAM training (to include conference costs)	Completed
4.7	Lease General Service Administration (GSA) vehicles for ITAM support	Ongoing
4.8	ITAM Coordinator Vehicle Maintenance	Ongoing
4.9	Costs associated with upgrades to facilities to support ITAM staff and technical functions (All ITAM components).	Not yet completed; continued through next planning period.
4.10	Office supplies. Miscellaneous supplies to support the ITAM function	Ongoing.
4.11	Identify ITAM requirements at WHFRTC in the Integrated Workplan Analysis Module (IWAM)	Ongoing.
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2003 PROJECT	DESCRIPTION	STATUS
4.14	- Include Training Site Regulation revisions in annual revisions of the INRMP. - Include policies identified in the INRMP in Training Site Regulation revisions.	Not yet completed; continued through next planning period.
4.15	Correct maneuver damage and control erosion caused by training activities. Replant vegetation to include native grasses and other species recommended by the Kentucky Department of Fish and Wildlife Resources [KDFWR] and the Natural Resources Conservation Service [NRCS].	Ongoing.
4.16	Apply fertilizer, lime, seed and mulch for proactive and continuous maintenance of areas damaged by military maneuvers. Provide continuous maintenance for tactical assault strip.	Ongoing.
4.17	Reduce maneuver/training inhibiting vegetation. - brush plowing and mowing in grasslands (approximately 300 acres per year) - remove tree branches below 8 feet in bivouac areas for troop safety. - tree shredding	Ongoing; performed annually or as needed.
4.18	Purchase LRAM equipment for maintenance of training site lands (such as grass chisel).	Ongoing. Includes replacement of equipment at end of life cycle (typically 20 years).
4.19	Costs of constructing/maintaining hard stands or hardened sites in the maneuver area (bivouac areas)	Ongoing
4.20	Costs of constructing noise buffers for ranges using trees and shrubs	Completed – 2003.
4.21	Provide dust control for gravel trails, as well as other routine maneuver trail maintenance	Ongoing; this covers bivouac sites; general dust control is now conducted using conservation funds.
4.22	Costs of maintaining a sod farm for revegetation of highly erodible LRAM sites.	Not yet completed; continued through next planning period; equipment has been obtained and areas located.
4.23	Provide low water stream crossing structures to prevent erosion and sedimentation by tracked vehicles.	Ongoing; conducted on as-needed basis.
4.24	Projects and expenses associated with land acquisitions (constructing hard stands in heavy use areas, such as bivouac sites, firing points, and staging areas; maneuver area dust control, land rehabilitation following training activities).	Ongoing; official plans have not been decided; conducted on as-needed basis.

TABLE 1. COMPLETION STATUS OF PROJECTS FROM THE 2003 WHFRTC INRMP

2003 PROJECT	DESCRIPTION	STATUS
4.25	Construction and maintenance of fire breaks or other fuels modifications, directly associated with ranges/training areas fire management resulting from training activities. Does not include conservation or structural fire/fuels breaks.	Ongoing.
4.26	Prepare/purchase posters, booklets, displays, films and training materials for troop environmental awareness training. - training site environmental awareness video	Ongoing. Soldier Card updated in 2007.
4.27	Assemble Environmental Information Packets to be handed out to Officers-In-Charge (OIC) at Yearly Training Coordination Conferences.	Ongoing. Annual briefing/presentations.
5.1	Update the biological inventory, including endangered species survey; floristic survey; vegetaion community survey; small mammal surveys; fish survey; terrestrial invertebrate survey.	Floristic and vegetation community survey updated December 2006. Mammal, fish and invertebrate surveys not updated.
5.2	Conduct planning level soil survey of approximately 2,223 acres that have not yet been mapped.	Completed.
5.3	Conduct surveys of bird species in coordination with KDFWR and Partners in Flight.	Annual surveys ongoing.
5.4	Construct firebreaks for fires not resulting from training activities (e.g., prescribed burn program)	Ongoing; as needed.
5.5	Use Geographic Positioning System (GPS) technology to record location of firebreaks and include in future versions of the INRMP.	Completed.
5.6	Train WHFRTC employees in the latest fire management techniques at TNC fire management course.	Ongoing; new training, when needed; will comply with updated Army policies.
5.7	Develop burn prescriptions for individual units to be burned each year.	Completed.
5.8	Plant additional food plots in coordination with Quail and Turkey Unlimited.	Discontinued.
5.9	Develop a food plot database and enter locations into GIS.	Food plots discontinued.
5.10	Control invasive pest plants (e.g., musk thistle, honeysuckle) using mowing, prescribed burning, or the most appropriate means.	Ongoing annual efforts.

TABLE 1. COMPLETION STATUS OF PROJECTS FROM THE 2003 WHFRTC INRMP

2003 PROJECT	DESCRIPTION	STATUS
5.11	Monitor effects of prescribed fire through post burn evaluations.	Ongoing; system update initiated with Environmental Office.
5.12	Conduct detailed forest inventory and develop forest management prescriptions for forest stands based on the forest inventory.	Forest Inventory not completed; continued for next planning period. Forest Management Plan (FMP) included as part of 2010 Updated INRMP. KYARNG does not intend to manage forests for harvesting.
5.13	Develop a plan for reclamation of pre-law abandoned mine land areas with the Division of Abandoned Lands and implement as funding allows.	Completed for property owned prior to 2006. Newer acquisition areas eligible for funding under Abandoned Mine Lands/Superfund programs. Implementation subject to available funding.
5.14	Introduce fire to pine forests to reduce brush and invasive plants (ex. honeysuckle).	Not implemented due to smoke and safety concerns.
5.15	Conduct water quality monitoring of long-term water quality monitoring sites.	Scope modified, project continued.
5.16	Conduct surveys for macroinvertebrates at long term monitoring sites to determine jurisdictional status when projects require.	Additional surveys scheduled as mission needs require. None completed since 2003.
5.17	Update wetlands planning survey in 10 years and schedule surveys to determine jurisdictional status when projects require.	Wetland survey on TA 7 and TA 8 complete 2005. Additional surveys scheduled as mission needs require.
5.18	Conduct pesticide monitoring survey and spray for mosquitoes.	Aerial spraying done by state with funding from Department of Agriculture County Pest and Weeds.
5.19	Update pest management plan as needed.	Completed update 2007; ongoing as needed.
5.20	Determine annual hunting quotas in advance of hunting season with KDFWR.	Ongoing; annual coordination.
5.21	Coordinate annual hunts with KDFWR.	Ongoing; annual coordination.
5.22	Hire security guards to run the hunter check station.	Modified. Installation staff are used for this.
5.23	Continue to enforce the training site regulation.	Ongoing.
5.24	Apply liquid fertilizer 3x/year to selected lakes to help control invasive water plants. Purchase boat, trailer, and motor.	Purchases complete. Ongoing control activities as needed.
5.25	Continue to fund the Wildlife Specialist position for WHFRTC.	Discontinued.
5.26	Travel and training expenses for Wildlife Specialist	Discontinued.
5.27	Hire a statewide GIS Specialist	Completed.
5.28	Travel and training expenses for GIS Specialist	Completed.

TABLE 1. COMPLETION STATUS OF PROJECTS FROM THE 2003 WHFRTC INRMP		
2003 PROJECT	DESCRIPTION	STATUS
5.29	Hire one or more student interns to assist with conservation, wildlife, environmental, and range projects as needed at WHFRTC.	Ongoing, considered on an annual basis.

If an Army Guard installation has federally listed threatened or endangered species, proposed federally listed threatened or endangered species, and/or candidate species on the installation, or unoccupied habitat for a listed species where critical habitat may be designated, the INRMP must specifically address the benefits of management of these actions for these species or habitats in the document. The benefit should be clearly identified in the document and included in the table of contents. This updated INRMP is intended to provide a benefit to, and gain a critical habitat exemption for, the federally listed endangered gray bat (*Myotis grisescens*) and Indiana bat (*Myotis sodalis*).

The updated INRMP is intended to be consistent with the SAIA, which indicates that an INRMP "*shall, to the extent appropriate and applicable, provide for:*

a) *Fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation;*

b) *Fish and wildlife habitat enhancement or modifications;*

c) *Wetland protection, enhancement, and restoration, where necessary for support of fish, wildlife, or plants;*

d) *Integration of, and consistency among, the various activities conducted under the plan;*

e) *Establishment of specific natural resources management goals and objectives and time frames for proposed action;*

f) *Sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources;*

g) *Public access to the military installation that is necessary or appropriate for the use described in subparagraph (F), subject to requirements necessary to ensure safety and military security;*

h) *Enforcement of applicable natural resource laws (including regulations);*

i) *No net loss in the capability of military installation lands to support the military mission of the installation;*

j) *Such other activities as the Secretary of the military department determines appropriate".*

The KYARNG has embraced the concept of integrating ecosystem management with its mission activities. The KYARNG recognizes that its on-going and proposed training activities can potentially use or consume the natural resources on mission land, and that successful execution of their mission is dependent upon the optimum maintenance of their environment in a mode of sustainable use. The KYARNG recognizes its responsibility to guarantee continued access to its land, air and water resources for realistic military training while ensuring that the natural and cultural resources entrusted to their care are sustained in a healthy condition for scientific research, education and other compatible uses by future generations.

The KYARNG is justifiably proud of its excellence in training, its natural resources heritage, and its tradition of stewardship. As such, the KYARNG is committed to the planned, deliberate management of natural resources, supporting the installation operational mission, meeting or exceeding stewardship requirements, and enhancing the quality of life for its personnel and guests.

1.2 AUTHORITY

This updated INRMP has been prepared pursuant to the laws, regulations, guidances, and directives listed in **Table 2**.

TABLE 2. LAWS, REGULATIONS, DIRECTIVES, GUIDANCE, AND POLICIES APPLICABLE TO INRMP DEVELOPMENT AT WHFRTC	
REQUIREMENT	**TITLE**
Law	The WHFRTC is a state-owned facility and is not directly subject to the Sikes Act "*Conservation Programs on Military Reservations*" (16 U.S. Code (USC) §670a et seq.), as amended. However, Army policy is to follow DoD and ARNG guidance on state-owned facilities. The Sikes Act requires Federal military installations with adequate wildlife habitat to develop long-range INRMPs and implement cooperative agreements with other agencies. Natural resources are to be managed for multipurpose uses and provide public access consistent with the military mission. The act also sets guidelines for the collection of fees for the use of natural resources such as hunting and fishing.
U.S. Army policy	*Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys and INRMP (*"Army INRMP Policy"); 21 March 1997. *Army National Guard INRMP Template*, created 16 March 2005, ("Draft NGB Policy")
Department of Defense Instruction (DoDI)	DoDI 4715.3, Environmental Conservation Program DoDI 4700.1, Natural Resources Management Programs DoDI 4715.3, Environmental Conservation Program
Army Regulation (AR)	AR 200-1, *Environmental Protection and Enhancement* AR 350-19, *Army Sustainable Range Program*, 30 August 2005
Code of Federal Regulations (CFR)	32 CFR 651, *Environmental Analysis of Army Actions*
	32 CFR 190, *Appendix – Integrated Natural Resources Management*
Kentucky Laws and Regulations	Kentucky Revised Statute (KRS) 146 Natural Resources KRS 217b, Fertilizer And Pesticide Use And Application KRS 249, Trees, Plants, Weeds, And Pests KRS 250, Agricultural Seeds, Feeding Stuffs, And Fertilizers KRS 224 Environmental Protection Kentucky Administrative Regulation (KAR) Title 401, Natural Resources And Environmental Protection Cabinet Department For Environmental Protection KAR Title 402, Natural Resources And Environmental Protection Cabinet Department For Natural Resources
Guidance	Office of the Under Secretary of Defense (USD), *Implementation of Sikes Act Improvement Act: Updated Guidance*, 10 October 2002 Office of the Deputy Under Secretary of Defense (DUSD), *Updated Guidance for Implementation of The Sikes Act Improvement Act*, 5 November 2004 DoD Directive 4700.1, *Natural Resources Management Programs*
Note: Not all applicable Federal and State laws, regulations, and Executive Orders are listed in this table, but are incorporated by reference through the listed documents.	

1.3 RESPONSIBILITIES

1.3.1 NATIONAL GUARD BUREAU RESPONSIBILITIES

Within the NGB headquarters, the Chief of Environmental Programs (NGB-ARE) is responsible for reviewing and approving the INRMP and advising the KYARNG Environmental Office before the KYARNG formally submits the plan to the U.S. Fish and Wildlife Service (USFWS), the Kentucky Department of Fish and Wildlife Resources (KDFWR), the public, and others as appropriate. The

Environmental Directorate ensures operational readiness by sustaining environmental quality and promoting the environmental ethic, and is responsible for tracking projects, providing technical assistance to states, quality assurance, and validation and execution of funds.

1.3.2 KENTUCKY ARMY NATIONAL GUARD RESPONSIBILITIES

The KYARNG is one entity of the KDMA. KYARNG responsibilities for implementation of the natural resources management plan are identified below.

1.3.2.1 THE ADJUTANT GENERAL

The Office of the Adjutant General is directly responsible for the operation and maintenance of WHFRTC, which includes implementation of this INRMP. The Adjutant General (TAG) determines what the state's force structure (types and number of units, types of equipment, training events, etc.) will be at WHFRTC. TAG establishes a formal natural resources program for KYARNG/KDMA by implementing this INRMP. TAG also serves as the agency official to ensure that natural resources projects and activities follow the intent of the SAIA and DoDI 4715.3 and ensures that all installation land users are aware of and comply with procedures, requirements, or applicable laws and regulations that accomplish the objectives of this INRMP.

Two key positions within the TAG Office are the State Executive Director and the Chief of Staff. These positions ensure that natural resources issues are considered in state and federal budget and policies and also ensure coordination of projects and construction among environmental, training, and engineering staffs. The Chief of Staff also serves as chairman of the Environmental Quality Control Committee, which provides overall guidance and policy direction to the environmental program, including management of WHFRTC natural resources.

Within the State Executive Director's Office, the Director of Facilities Division is responsible for property management, construction, operation, and maintenance of buildings and land statewide for the KDMA. This Director ensures that natural resources management is considered during land acquisition, utilities excavation, construction, and maintenance and repair activities on all property managed by the KDMA.

Two key offices on the federal side within TAG's Office that participate in natural resources decision-making in Kentucky are Joint Forces-Operations (J3) and the Construction and Facilities Management Officer (CFMO).

1.3.2.2 JOINT FORCES – OPERATIONS (J3)

The J3 has the primary responsibility for scheduling of military training and safety of all personnel while training exercises are being conducted. The J3 and the Training Site Commander (TSC) determine the training load of WHFRTC based upon the force structure determined by TAG. The J3 coordinates with the CFMO on matters of construction and maintenance priorities. The J3 determines Integrated Training Area Management (ITAM) projects and submits an annual ITAM workplan.

1.3.2.3 CONSTRUCTION AND FACILITIES MANAGEMENT OFFICE

The statewide CFMO manages federal construction, maintenance, and engineering for all KYARNG facilities under the jurisdiction of the KDMA, including WHFRTC. The CFMO is responsible for master planning and for ensuring that natural resources consultation requirements are included in timelines for project design and delivery schedules for all military construction projects.

1.3.2.4 ENVIRONMENTAL OFFICE

The statewide Environmental Program Manager is responsible for establishing funding priorities and programming funds for natural resources compliance and management activities into the federal Status Tool for the Environmental Program (STEP) and works with the J3 to manage the ITAM program budget; advising KYARNG on best ways to comply with federal and state environmental laws and regulations;

ensuring that natural resources efforts are accomplished either in-house or through contract by individuals with appropriate training; and oversight of Natural Resources Manager activities. The Environmental Program Manager provides technical assistance to KYARNG/KDMA personnel including: developing INRMPs; National Environmental Policy Act (NEPA) documents as appropriate; securing permits; conducting field studies; providing Sustainable Range Awareness (SRA) materials; locating, mapping, and inventorying natural resources; and revising and/or updating the INRMP based on internal/external reviews. The Environmental Program Manager oversees the NEPA process for the KYARNG.

1.3.2.5 PUBLIC AFFAIRS OFFICE

The Public Affairs Officer (PAO) serves as a liaison with the public for public review, in public meetings, and in community educational events. The PAO gives assistance to the Environmental Office in NEPA public review efforts.

1.3.2.6 STAFF JUDGE ADVOCATE

The Staff Judge Advocate (SJA) reviews legally binding natural resources documents for legal sufficiency and advises on laws and regulations that affect natural resources management.

1.3.3 TRAINING SITE RESPONSIBILITIES

The Training Site Non-Commissioned Officer in Charge (NCOIC) and the statewide TSC will ultimately implement this plan and ensure its success. The Training Site NCOIC is familiar with all aspects of the training site, including training scheduling (and conflicts), locations of training facilities, impairments or problems with human-made structures or natural functions, and needs for improvement or maintenance of the training land.

The Training Site NCOIC at WHFRTC reports to the TSC and J3. The Training Site NCOIC's natural resource-related responsibilities include the following: (1) control of all training areas; (2) operation and maintenance of training site facilities; (3) conducting briefings concerning safety and orientation; (4) conduct investigations of and require reports of fires; and (5) integration of the INRMP with the training mission. The Training Site NCOIC ensures that maintenance projects are identified and executed, vegetation cover is maintained on erodible soils, wetlands and rare species habitats are compatible with construction and training activities, and SRA materials are distributed to the troops.

1.4 MANAGEMENT PHILOSOPHY

The KYARNG has developed this updated INRMP using an interdisciplinary approach, with information gathered from the KYARNG Environmental Office and military trainers as well as other Federal, State and local agencies and special interest groups with an interest in natural resources management at WHFRTC. Agency coordination conducted as part of the INRMP development is included in **Appendix B**. This updated INRMP describes baseline conditions of natural resources at the WHFRTC and provides management programs and guidance for successful military training that conserves renewable natural resources, preserves rare and unique resources, and provides long-term resource sustainability. Specific plan expectations are listed in **Table 3**.

TABLE 3. PLAN EXPECTATIONS FOR INTEGRATED NATURAL RESOURCE MANAGEMENT

PLAN EXPECTATION	
1	Provide a comprehensive plan for the KYARNG to carry out its mission while promoting ecosystem health and biodiversity at the WHFRTC and in the surrounding region.
2	Document goals, objectives, guidelines, and future direction for natural resources management.
3	Establish a framework for implementing natural resources programs and ecosystem

TABLE 3. PLAN EXPECTATIONS FOR INTEGRATED NATURAL RESOURCE MANAGEMENT	
PLAN EXPECTATION	
	management.
4	Provide centralized information on the natural resources program status.
5	Identify environmental constraints to land use so that military training can be matched to ecosystem carrying capacity.
6	Identify mission-related impacts and options for conflict resolution.
7	Serve as a baseline of existing environmental conditions for defensible future Environmental Assessments (EAs) and Environmental Impact Statements (EIS).
8	Ensure that installations comply with environmental regulations.
9	Identify, prioritize, and schedule long-term budget requirements.

The KYARNG's overall policies and philosophy of land management are derived from AR 200-1 and 32 CFR 651. These policies and regulations are based on the concept that natural resources management is an integral component of the primary mission of military use. The KYARNG must train; therefore, the KYARNG will manage WHFRTC to preserve valuable training resources, including the natural environment. Management of natural resources on an ecosystem basis ensures the sustainable use of training lands while considering the effects on the surrounding environment and public concern.

1.4.1 MILITARY MISSION

This updated INRMP integrates aspects of natural resources management into the military mission. As such, it becomes the primary tool for ecosystem management at WHFRTC while ensuring the successful, efficient accomplishment of the military mission. A multiple-use approach will continue to be implemented through this INRMP to accommodate mission-oriented activities and provide for good stewardship.

Specific military missions and training requirements are fluid and change from time to time with realignments, transformations, and changes in equipment and tactics. This requires the establishment of basic underlying natural resource management principles and practices that have broad application and can be adapted in multiple situations. Implementation of this updated INRMP will continue to successfully promote adaptive management that protects and enhances natural resources for multiple use, sustainable yield and biological integrity, while supporting the military mission.

THE PURPOSE OF NATURAL RESOURCES MANAGEMENT AT **WHFRTC** IS to ***maintain sustainable natural resources as a critical training asset*** upon which to accomplish the KYARNG mission. To accomplish this goal, natural resource managers need to:

- Ensure ***no net loss*** in capability to support existing and projected military training.
- Maintain ***quality training lands*** through monitoring, minimizing damage, mitigation, and rehabilitation.

1.4.2 ENVIRONMENTAL MANAGEMENT SYSTEM

The NGB and KYARNG consider the subject installation to be the combined KYARNG operations in Kentucky. The Environmental Management System (EMS) is part of the overall KYARNG management system and includes organizational structure, planning, responsibilities, practices, procedures, processes, and resource allocation for developing, implementing, achieving, reviewing, and maintaining environmental commitments.

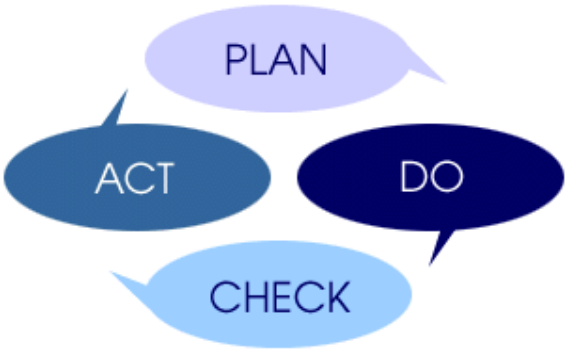
This updated INRMP directly supports the KYARNG's and the NGB's EMS. Annual review of the INRMP with the USFWS and

DEVELOPING AND IMPLEMENTING AN EMS IS REQUIRED AT ALL ARNG INSTALLATIONS.

In 2000, Executive Order (EO) 13148, *Greening the Government through Leadership in Environmental Management* established a five-year EMS implementation goal for federal facilities.

KDFWR will be conducted to support the concept of EMS. Annual reviews are discussed in **Section 8.3.**

The International Standards Organization (ISO)-14001 EMS model used by the KYARNG leads to continual improvement based upon a cycle of "plan, do, check, act":



- *PLAN* – Planning, including identifying environmental aspects and establishing goals
- *DO* – Implementing, including training and operational controls
- *CHECK* – Checking, including monitoring and corrective action
- *ACT* – Reviewing, progress reviews and acting to make needed changes to the EMS

The EMS is continually updated through this cycle, fine-tuning management of operations that may harm the environment. This continual improvement cycle is a fundamental attribute of the EMS that allows the EMS system to adapt to the KYARNG's operations as they change.

1.4.3 ECOSYSTEM MANAGEMENT

An ecosystem is the "sum of the plant community, animal community, and environment in a particular region or habitat" (Barbour et al, 1987). Ecosystem management may be defined as management "to restore and maintain the health, sustainability, and biological diversity of ecosystems while supporting sustainable economies and communities" (U.S. Environmental Protection Agency [USEPA], 1994).

Natural resources at the WHFRTC will continue to be managed with an ecosystem management approach. The DoD's goal for ecosystem management is "to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity" (DoDI 4715.3). Principles of ecosystem management, per DoDI 4715.3 are listed in **Table 4.**

TABLE 4. DOD PRINCIPLES OF ECOSYSTEM MANAGEMENT

PRINCIPLE	
1	Guarantee continued access to land, air and water for realistic military training.
2	Maintain and improve the sustainability of native biodiversity of ecosystems.
3	Administer with consideration of ecological units and timeframes.
4	Support sustainable human activities.
5	Develop vision of ecosystem health.
6	Develop priorities and reconcile conflicts.
7	Develop coordinated approaches to work toward ecosystem health.
8	Rely on the best science and data available.
9	Use benchmarks to monitor and evaluate outcomes.
10	Use adaptive management.
11	Implement through installation plans and programs.

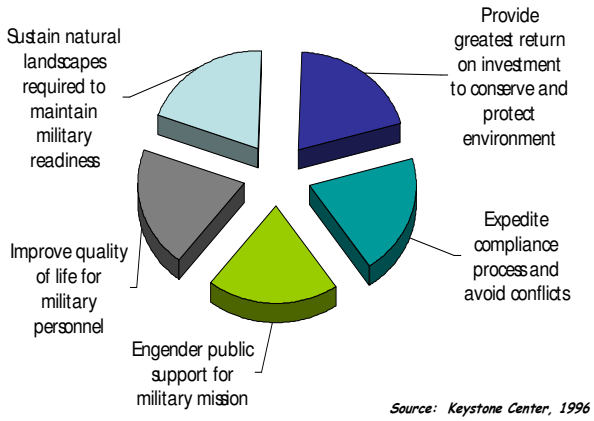
Source: DoDI 4715.3

Biological diversity or biodiversity may be defined as "the variety of living organisms considered at all levels of organization, from genetics through species, to higher taxonomic levels, and including the variety of habitats and ecosystems, as well as the processes occurring therein" (Meffe and Carrol, 1994).

The DoD's challenge is "***to manage for biodiversity in a way that supports the military mission***". The INRMP is identified by DoD as the primary vehicle for conserving biodiversity on military installations (Keystone Center, 1996)**.**

Specific management practices identified in this updated INRMP have been developed to enhance and maintain biological diversity within the ecosystems at the WHFRTC. DoD principles of conserving biodiversity on military lands are listed in **Table 5.**

Why Conserve Biodiversity on Military Lands?



Source: Keystone Center, 1996

TABLE 5. DOD PRINCIPLES FOR CONSERVING BIODIVERSITY ON MILITARY LANDS

PRINCIPLE	
1	Support the military mission;
2	Use joint planning between natural resources managers and military operations personnel.
3	Integrate biodiversity conservation into the INRMP and other planning protocols.
4	Involve internal and external stakeholders up front.
5	Emphasize the regional (ecosystem) context.
6	Concentrate on results.

Source: Keystone Center, 1996

1.5 SUSTAINABLE RANGE PROGRAM

The Sustainable Range Program (SRP) is the Army's overall approach for improving the way in which it designs, manages, and uses its ranges to ensure long-term sustainability. Requirements for the SRP are set forth in AR 350-19, *Army Sustainable Range Program*, effective August 2005. The two core SRP components are the Range and Training Land Program (RTLP) and the ITAM Program. To ensure the accessibility and availability of Army ranges and training land, the SRP core programs are integrated with the facilities management, environmental management, munitions management, and safety program functions supporting the doctrinal capability.

Information acquired under the SRP/ITAM umbrella is incorporated into this updated INRMP to guide overall military training within the constraints of NEPA and other applicable requirements, threatened and endangered (T&E) species management, rehabilitation activities, and projected sustainability guidelines.

1.5.1 RANGE AND TRAINING LAND PROGRAM

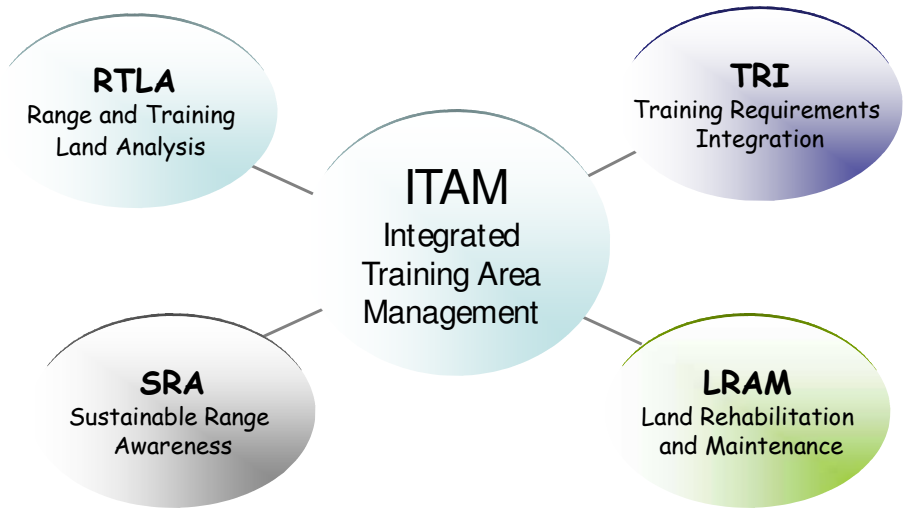
The RTLP provides a range operations and modernization capability for the central management and prioritization and the planning and programming of live-fire training ranges and maneuver training lands, including the design and construction activities associated with them. The RTLP planning process integrates mission support, environmental stewardship, and economic feasibility and defines procedures for determining range projects and training land requirements to support live-fire and maneuver training. The RTLP defines the quality assurance and inspection milestones for range development projects and the Standard Operating Procedures (SOP) to safely operate military training, recreational, or approved civilian ranges under Army control and support Commanders' Mission Essential Task List (METL) and Army training strategies. RTLP also establishes the procedures and means by which the Army range infrastructure is managed and maintained on a daily basis in support of the training mission.

1.5.1.1 INTEGRATED TRAINING AREA MANAGEMENT

The ITAM program is the U.S. Army standard for sustaining the capability of installation land units to support military training missions, to ensure compliance with existing statutory regulations, and to promote sound stewardship of natural resources contained therein. The ITAM Coordinator is stationed at the WHFRTC.

In addition to maintaining key personnel and natural resources data collection efforts, the ITAM work plan budget funds a number of projects of major importance to maintaining, preserving and protecting the natural resources.

The ITAM subcomponent consists of four proactive subprograms designed to facilitate these processes. The four components of the ITAM program are discussed in the following sections.



1.5.1.2 RANGE AND TRAINING LAND ANALYSIS

The RTLA, formerly known as the Land Condition Trend Analysis (LCTA) provides for the collecting, inventorying, monitoring, managing, and analyzing of tabular and spatial data concerning land conditions on an installation. The intent of RTLA is to collect essential natural resources baseline information that is needed to effectively manage training lands. The Army initiated RTLA in the mid-1980s and emphasized uniform data collection methodologies to provide regional, Major Command, or national-level land assessments.

RANGE AND TRAINING LAND ANALYSIS (RTLA)

The ecological monitoring component of ITAM is used to characterize and monitor installation natural resources

With the adoption of SRP/ITAM by the Training and Operations community, RTLA has evolved into a decentralized, installation-level program. This allows installation-level land managers and range operations staff to determine how they can best collect and use resource data to support short- and long-term land management decisions such as training area allocation, training area use, and land rehabilitation.

The RTLA program at WHFRTC was informally initiated in 1992, when baseline data on natural resources (vegetation mapping, plant and animal surveys, aquatic benthos) were first collected and the NRCS developed a resource inventory and conservation plan for the site. The KYARNG has since customized their data collection to focus on areas of known heavy use rather than random formal RTLA plots. This is intended to provide the most effective data package, when combined with site-wide recurring PLS. Geographic Information System (GIS) technology is used to integrate natural and cultural resources data and graphically display the relationships between individual resource components.

1.5.1.3 TRAINING REQUIREMENTS INTEGRATION

TRI is the land degradation prevention component of the ITAM program. The main goal of TRI is scheduling training exercises and other land uses in areas most capable of supporting these activities. TRI relies heavily on RTLA-generated data to evaluate land capability to sustain particular training activities with minimal resource impact.

TRAINING REQUIREMENTS INTEGRATION (TRI)

Uses RTLA data to prevent or minimize harmful practices or activities within given training areas through military exercise scheduling and logistics.

Disturbances produced by training may be minimal and not appear to require restoration efforts. However, even small areas of disturbance can start a gully on sloping lands. Gullying can damage vehicles and structures, cut off access to training areas, degrade wildlife habitat, and deposit soil into streams.

TRI matches a training activity with the most suitable site, and includes a rotation schedule for training lands. TRI also incorporates restrictions required to maintain site quality, protect significant natural resources and minimize land damage while providing a safe training environment. Implementing TRI requires coordination between installation/operations training staff and natural resources management/environmental staff.

TRI allows appropriate allocation of specific training requirements to specific land parcels. The decision-making and allocation process is based on the land's "carrying capacity" with respect to training activities. Possible land use options exercised through TRI are listed in **Table 6.**

TABLE 6. LAND USE OPTIONS EXERCISED THROUGH TRI

PRINCIPLE	
1	Re-designate the parcel's use to an alternative training, mission, or non-mission activity to permit natural recovery; prolong sustainable use; or allow for rehabilitation, repair and maintenance.
2	Re-design or reinforce a given parcel to support higher impact training.
3	Alter likely training use of a given parcel by redesigning and reconfiguring the parcel.

TABLE 6. LAND USE OPTIONS EXERCISED THROUGH TRI	
PRINCIPLE	
4	Accept training-related degradation of a given parcel.
5	Cease training temporarily on a given land parcel to permit rehabilitation, repair and maintenance.
6	Cease training permanently on a given parcel of land due to severe impacts and initiate restoration of that parcel.
Source: (Department of the Army [DA], 1999*)*	

1.5.1.4 LAND REHABILITATION AND MAINTENANCE

LRAM is the component of the ITAM Program that provides preventive and corrective land rehabilitation and maintenance to reduce long-term impacts of training on an installation. It includes training area redesign and/or reconfiguration to meet training requirements. Training-damaged lands can be repaired and land construction technology can be used to avoid future damage.

Land Rehabilitation and Maintenance (LRAM)

Provides training-related mitigation and land rehabilitation.

Projects are specifically designed to maintain quality military training lands, minimize long-term costs associated with land rehabilitation or additional land purchase, ensure compliance with environmental laws and regulations, and reduce erosion. The LRAM process begins with identification of potential LRAM projects, which may be planned and conducted in-house or through contract. RTLA data and GIS technology are typically used to help identify projects. Two common types of LRAM projects are training area rehabilitation and hardened sites.

Training area rehabilitation uses a wide array of techniques to correct erosion features, minimize disturbance, and revegetate denuded areas. Rehabilitation areas may also be temporarily “off-limits” or protected through other restrictions. Techniques are specific to each project. Revegetation techniques use native plant species proven effective for erosion control.

Hardened sites are areas that have been resurfaced with a base material, often overlaid with gravel. Sensitive areas within hardened sites may also be protected using barriers. Hardened sites are created in areas that receive repetitive training within a small area to the point where vegetation is damaged and “realism” is already drastically compromised. Potential locations include bivouac sites, firing points and troop assembly areas.

1.5.1.5 SUSTAINABLE RANGE AWARENESS

SUSTAINABLE RANGE AWARENESS (SRA)

Promotes awareness of environmentally sensitive issues and fosters stewardship ethic among unit commanders, ground troops, neighboring communities, and other concerned or involved parties.

Awareness is crucial to the protection of diverse resources, such as sensitive species and wetlands. SRA is an educational program that promotes environmental stewardship and responsible use of natural resources on military lands. The KYARNG SRA program focuses on all land users including soldiers, leaders, civilians, and the local community. SRA serves to educate the public on the military mission's natural resources needs and impacts.

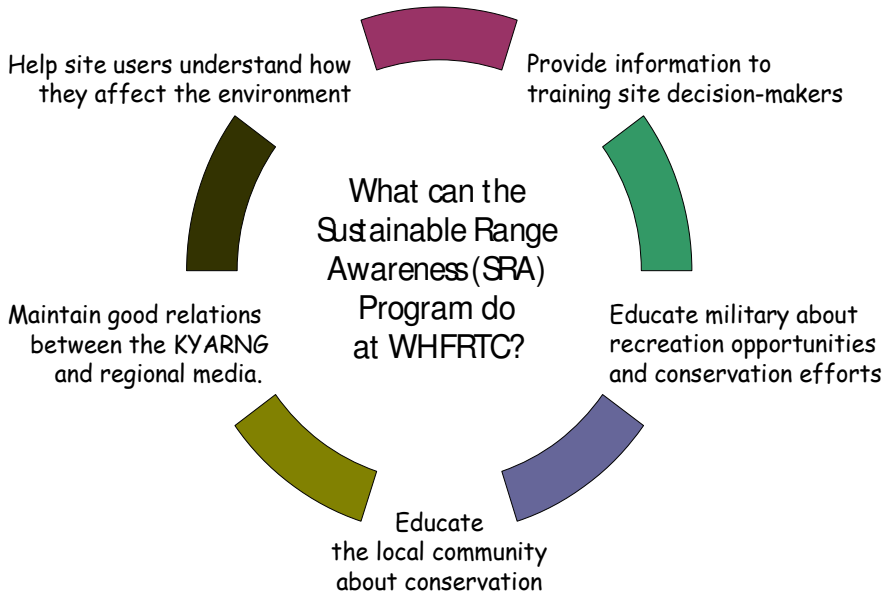
Military Personnel Awareness – The SRA program particularly focuses on developing and distributing awareness materials, such as soldier's handbooks, leader's handbooks, field cards, training videos, and posters. Site-specific information can be provided to training site users to prevent unnecessary damage to the environment and in particular, training lands. Through the dissemination of information, site users can improve their understanding of the effects of their mission and training activities on natural resources.

The KYARNG issues SOPs to troops using any training site. These SOPs address fire protection, hazardous materials spills, restricted areas, pyrotechnics use, and environmental considerations. Restricted areas can include impact areas and sensitive ecological and cultural resource areas with use restrictions.

Briefings are usually informal, conducted as needed. For instance, a military unit preparing to bivouac near a sensitive area or a contractor preparing to work near a wetland will be briefed on environmental requirements by Environmental Office personnel or the trainer. The unit commander will ensure compliance of the troops. Resource awareness training includes: a briefing on wetland locations; rare, threatened, and endangered species locations; cultural resources; restricted areas; pest management; information on dangerous or toxic plants and animals on the site such as poison ivy, poisonous snakes, and ticks; and any other pertinent information that helps reduce the risk of negative impacts to resources on the site and dangers to personnel at the site.

Public Awareness – The KYARNG is committed to cultivating a conservation ethic in the community, especially local youth. Natural resources personnel work with community and youth groups on conservation programs whenever possible. Scouts, in particular, often need support with projects, merit badges, and conservation talks. The KYARNG will continue to work with community and youth groups whenever possible.

Articles published in local newspapers and public service announcements on television and radio are excellent means of promoting new or existing programs involving training sites. Educating and informing the public of management



practices generally increases support rather than opposition of the public. Such media reaches a diverse audience, and can be specifically designed to promote the KYARNG mission within the context of stewardship. Awards presented to training site personnel are a good topic for such articles/announcements, and can highlight a "good neighbor" ethic. All media reports should be coordinated through the PAO in Frankfort, Kentucky.

1.6 CONDITIONS FOR IMPLEMENTATION AND REVISION

1.6.1 IMPLEMENTATION

The Environmental Office is responsible for directing natural resource management and developing and implementing the updated INRMP. Successful INRMP implementation requires:

- Administrative and technical support;
- Agency cooperation and technical assistance;
- Funding;
- Priorities and scheduling;
- Production of project scopes and budgets;
- The ability to amend and revise this document as necessary.

These resources are discussed in **Section 6.1**.

Where projects identified in the plan are not implemented because of lack of funding, or other compelling circumstances, the KYARNG will review the goals and objectives of this updated INRMP to determine whether adjustments are necessary.

1.6.2 EFFECTIVENESS

The primary measure of INRMP effectiveness is whether it helps prevent "net loss in the capability of military lands to support the military mission". The KYARNG is preserving the WHFRTC's capability to support training through its natural resource management practices outlined in the 2003 INRMP and in this revision. Long-term management effectiveness is also evaluated through periodic inventories of species populations, habitat quantity and quality, and habitat values through the recurring PLS. Trends can be used to indicate the degree of success. The KYARNG will evaluate these recurring data as they become available. The KYARNG continues to work with USFWS, KDFWR, Natural Resources Conservation Service (NRCS), and Kentucky Division of Forestry (KDOF) etc., to manage the forest, preserve sensitive areas, and practice effective soil conservation. These activities are coordinated through ongoing INRMP implementation.

A practical evaluation of INRMP implementation includes reviewing whether planned projects have been accomplished. Overall, the WHFRTC has benefited from using the INRMP as a management tool. The goals articulated in the 2003 INRMP are being addressed through implementation of management actions recommended in the updated INRMP. Most of the specific management actions have been implemented through projects. A large number of the projects are recurring actions that are continued in this updated INRMP. **Appendix A** contains an evaluation of goals, objectives, and status of projects from the 2003 INRMP. A summary of the completion status of 2003 INRMP projects is provided in **Table 1**.

1.6.3 AGENCY AND PUBLIC PARTICIPATION

This updated INRMP has been developed in cooperation with the USFWS and the KDFWR. Developed using an interdisciplinary approach, information has been gathered from the KYARNG Environmental Office and military trainers, as well as other Federal, State and local agencies and special interest groups

with an interest in the management of natural resources at the WHFRTC. Agency coordination and response letters have been included in **Appendix B**.

1.6.4 REVISIONS

Per DoD policy, the KYARNG reviews the INRMP annually in cooperation with the USFWS and KDFWR. The KYARNG will converse with the agencies annually to determine if changes or issues indicate the need for a meeting. If warranted, a meeting will be held with the USFWS and the KDFWR and documented by meeting minutes. If a meeting is not necessary, the conversation will be documented via email correspondence or record of conversation.

If not already determined in previous annual meetings, a determination will be jointly made to continue implementation of the existing INRMP with minor updates or to proceed with a revision by the forth year annual review. If the parties feel that the annual reviews have not been sufficient to evaluate operation and effect and they cannot determine if the INRMP implementation should continue or it should be revised, a formal review for operation and effect will be initiated. The determination on how to proceed with INRMP implementation or revision will be made after the parties have had time to complete this review.

Section 1.4.2 describes how the EMS of Plan, Do, Check, and Act is tied into INRMP reviews and updates / revisions. **Section 8.3** provides specific guidance on the INRMP review process including review for operation and effect and annual reviews.

1.6.5 RECORD OF ENVIRONMENTAL CONSIDERATION

This INRMP includes, as **Appendix C**, a REC. The EA for the 2003 INRMP presented the Proposed Action (implementation of the INRMP) and alternatives, summarized the affected environment, and assessed the environmental consequences of implementation. The assessment concluded the known and potential impacts of the Proposed Action on the physical, biological, and cultural environment will generally be of a positive nature. Implementing this INRMP will not result in significant adverse environmental effects. This NEPA analysis is still valid, and adequately covers the actions in this updated INRMP. The REC describes the Proposed Action and explains why further environmental analysis is not needed.

SECTION 2: INSTALLATION OVERVIEW

2.1 LOCATION AND AREA

The approximately 10,804-acre WHFRTC is located in western central Muhlenberg County, Kentucky, approximately 2,000 feet west of the corporate boundary of Central City, Kentucky and four miles north of Greenville, Kentucky (**Figure 1**). The site can be accessed via Exit 53 of the Wendell H. Ford Western Kentucky Parkway at Kentucky Highway 181. The Wendell H. Ford Western Kentucky Parkway forms the southern boundary of the site with the exception of the recently acquired Training Area (TA) 8, located south of the Parkway. The site is bordered on the north by Kentucky Highway 70 and is bisected by Little Cypress Creek in TA 8, Cypress Creek in TA 7, and from the north to south by Kentucky Highway 181.

The WHFRTC is located east of the Peabody Wildlife Management Area (also previously mined land) which is managed by the KDFWR. A wildlife management area in the northern part of the WHFRTC property was established by Peabody Coal Company in 1986 and has been maintained by the KY Department of Military Affairs (KYARNG, 2006).

Lands surrounding the WHFRTC are utilized for coal mining, oil and gas production, agriculture, and forest production. There are also numerous residences and farms along KY Highway 70 to the north of the training center as well as a few residences along KY Highway 601 in the New Cypress area to the southwest of the training center. Gas pipeline pumping facilities and a major regional gas storage field lie to the northwest of the training center.

2.2 HISTORY OF KYARNG AND WHFRTC

2.2.1 HISTORY OF THE KYARNG

Throughout its history, Kentucky has cherished the tradition of rendering military duty with zeal when called upon. Kentucky's history teems with incidents of self-sacrifice unsurpassed in daring and achievement. Kentuckians have answered the call to arms in all wars of our country. The present-day KYARNG began as part of the Virginia militia in 1775 during the American Revolution. When Kentucky became a state in 1792, provisions were made at that time to maintain a militia force. The Kentucky militia played a major part in the War of 1812 and also supported the War for Texas Independence (1836) and the Mexican War (1846-1848). When the Civil War began in 1861, the Kentucky militia, then known as the State Guard, was split between loyalty to the South and the North. Many men left the State Guard to join either the Union or Confederate armies, with those remaining known as the Home Guard. The Kentucky State Guard served during the Spanish-American War of 1898. In 1903, the State Guard was federalized, meaning that standards of uniformity were enforced, and federal monies would be used to train and arm the men.

During World War I (1917-1918), men from the Kentucky National Guard were assigned to replace fallen soldiers from the regular Army. Most of these men were sent overseas to serve in the LeMans area of France. The Kentucky National Guard was called up again for World War II. Once again, every organized National Guard unit was involved in active service during the war. The majority of National Guardsmen fought in the Pacific Theater. The men who fought in the Pacific Theater were stationed in the ZigZag Pass region of Luzon Island. During their time in the region, they earned the nickname, “Avengers of Bataan.” During the Korean War, men from the 1/623rd Field Artillery were in support of other regular Army units. Kentucky Guard troops were there from 1951-1952, and spent roughly a one-year tour of duty in support of the Tenth Corps, and 1st and 7th South Korean Infantry Division. Only the 2nd Battalion, 138th Field Artillery (2/138th) of the KYARNG was sent to Vietnam. This regiment, along with a Battalion from West Virginia, was the only National Guard Battalion in the country to serve in Vietnam.

In 1990-91, KYARNG units were mobilized for active duty to Saudi Arabia in support of Operations Desert Shield and Desert Storm. The 217th Quartermaster Detachment (Water Purification unit), 1/623rd Field Artillery, 438th and 223rd Military Police and 2123rd Transportation companies were sent to active duty. Following September 11, 2001, and in conjunction with the war effort in Iraq and Afghanistan, the training

mission of KYARNG units has shifted from one of heavy armor/maneuver training to Military Police, infantry, and dismounted/wheel training.

2.2.2 HISTORY OF WHFRTC

The KDMA has operated the WHFRTC, formerly known as the Western Kentucky Training Center, for the KYARNG since 1969. Between the years of 1969 and 1988, Peabody Coal Company leased 3,000 acres of mining company land to the KDMA. Training was rotated annually around active mining sites in coordination with Peabody's mining plans. Then, in two separate acquisitions in 1988 and 1994, the Commonwealth of Kentucky acquired 6,760 acres of abandoned and reclaimed strip-mined land from Peabody Coal Company. In 1997, use of approximately 750 acres was obtained through a lease from Peabody Coal Company. At the same time, approximately 50 acres on the northeastern corner of the training center was transferred back to the original land owner, bringing the official acreage of WHFRTC to 6,787.35 acres. On 17 October 1997 the training center was officially dedicated as the WHFRTC in honor of retired United States Kentucky Senator Wendell H. Ford. In 2006, the KDMA acquired approximately 3,921 acres of additional land from the Peabody Coal Company and the Peabody Development Company, LLC (subsidiaries of Peabody Energy). The new acquisition is known as Training Area (TA) 7 and 8. The KDMA currently is comprised of approximately 10,804 acres.

2.3 MILITARY MISSION

Per DoD Supplemental Guidance, the 2003 INRMP was reviewed "as to operation and effect," to determine whether it is developed per NGB and Army policy, meets the intent of the Sikes Act, and contributes to the conservation and rehabilitation of natural resources on military installations. Revisions required as a result of this review have been included within this INRMP.

The primary federal mission of the KYARNG is to maintain properly trained and equipped units available for prompt mobilization for war, national emergency, or as otherwise needed. At the federal level, the National Guard provides decisive land power for major war and essential combat support and service support units for contingency operations. The KYARNG federal mission is to provide National Command Authority with units capable of performing their wartime mission. In their federal role, members of the KYARNG are also part of the US Army Reserve Component and can be called to active duty by the President.

The state mission is to provide trained and disciplined forces for domestic emergencies or as otherwise required by state law. At the state level, the Guard provides a return on the federal investment through domestic support capabilities embedded in its units. The KYARNG is a resource to assist local law enforcement and emergency management agencies at the direction of the Governor.

2.4 LAND USE

The land within WHFRTC is divided into eight numbered TAs, a 429-acre Obstacle Course TA, a 450-acre Flight Landing Strip (FLS) TA, and a 149-acre Cantonment Area. The majority of permanent building structures are found within the Cantonment Area or in its vicinity. Some structures also exist within the Obstacle Course TA (see **Figure 2**).

Land cover at the WHFRTC includes open grassland and shrubs (ideal for maneuver training exercises), pine and hardwood forest (ideal for dismounted training, bivouacking, and concealment), open water bodies, wetlands, and riparian areas along Little Cypress Creek and Cypress Creek, and the developed Cantonment Area. Numerous active or abandoned oil wells and oil/water separation tanks can be found in the western portion of the WHFRTC.

2.4.1 TRAINING AREAS

WHFRTC numbered TAs include firing ranges, bivouac sites, Military Operations on Urban Terrain (MOUT) sites, maneuver areas for wheeled vehicle, tracked, and dismounted training as well as other

support facilities that contain a variety of support facilities. The TAs and their corresponding support facilities are summarized in **Table 7**.

TABLE 7. TRAINING AREAS

TA	ACRES	TYPES OF TRAINING	SUPPORT FACILITIES
1	1,467	Dismounted Heavy armor	Five bivouac sites (include mess area) Two MOUT sites Drop Zone Secondary Reverse Osmosis Water Purification Unit (ROWPU)
2	1,115	Dismounted Heavy armor Live Fire	Drop Zone One MOUT site Range Tower
3	713	Dismounted Amphibious	One bivouac site
4	991	Light armor Dismounted	One MOUT site
5	1,135	Light armor Dismounted	Live fire ranges One bivouac site Primary ROWPU Engagement Skills Trainer (EST) Ammunition Supply Point Nuclear, Biological and Chemical (NBC) chamber
6	954	Dismounted	None
7	2,300	Dismounted	Two MOUT sites/Surface Danger Zone (SDZ)
8	668	Dismounted	None

Live fire ranges are located within TA 5. They include a tower with public address (PA) system, ammunition breakdown point, bleachers, mess area, and latrines. The ranges are as follows:

- M-16 Zero Range - 25-meter range with 20 firing points
- M-16 Qualification Range – 300-meter Remote Engaged Target Systems (RETS) range with 16 firing points.
- Combat Pistol Range (M-9/M11) includes a Combat Pistol Qualification Course with 15 firing points.

An Engagement Skills Trainer (EST) is also located within TA 5 along Cypress Creek Road near the range complex area. The EST is an indoor, 12-lane simulated weapons training facility capable of providing both marksmanship and squad-level weapons training in a variety of weapons (e.g., M-9, M-16A2, M-203, M-60, M-249, AT-4, and Mark-19).

2.4.2 OBSTACLE COURSE AND FLIGHT LANDING STRIP TAS

The Obstacle Course Training Area (TA) includes 12 obstacles (logs, weaver, balancing logs, hurdles, fence, slide for life, low belly over, high step over, swing stop and jump, inclining wall, confidence climb, and tough one). A Unit Training Equipment Site (UTES) and Range Control are located in the River Queen Complex located east of KY Highway 181. A wheeled vehicle refueling point also occurs within this area of the WHFRTC.

The FLS TA contains the Peabody Army Airfield. The airfield is a 3,500 feet long dirt air strip with a 300-foot turn around on each end. The CCT are ground combat forces assigned to the Special Tactics Squadrons within the USAF Special Operations Command. The airstrip is currently out of certification for touch-and-go maneuvers. A washrack and rappel tower are located along the northwestern boundary of the FLS TA. The rappel tower is comprised of a 43 feet tall treated wood frame, a pole-reinforced structure consisting of vertical and inclined walls, and a simulated helicopter skid descent point.

2.4.3 CANTONMENT AREA

The 149-acre Cantonment Area, the developed portion of the training center, is located along the southern boundary of the training center along Highway 181 and adjacent to the Wendell H. Ford Western Kentucky Parkway. Current facilities on the Cantonment Area include:

- Training Center headquarters
- Troop Medical Center
- Battalion/brigade headquarters building
- Barracks and officer quarters
- Dining facility/Mess Hall
- Regional Training Institute (RTI)
- Physical Fitness Center
- Running Track
- Storage facilities
- Helipad

2.5 WHFRTC TRAINING ACTIVITY AND SITE USAGE

2.5.1 MILITARY TRAINING

The WHFRTC is used for 2-week AT, and weekend inactive-duty training (IDT) to conduct weapons qualification, command post exercises (CPX), and field training exercises (FTX). The small arms ranges are used to fire the 5.56 mm/M16 rifle and 38 caliber or 9mm/pistol. The WHFRTC does not fire artillery or missiles because of space constraints and resulting safety and environmental reasons. Tanks, instead, use computer simulation systems. The simulation system used is the non-firing Multiple Integrated Laser Engagement System (MILES) which uses infrared light and computerized targets. Current aircraft used at the training site include helicopter, small fixed-wing aircraft, and an occasional C-130.

Weapons currently used at WHFRTC include: M-16, M-4, 9mm pistol, shotgun, squad automatic, Mark 19, and M-203. The following types of military training operations are available at the WHFRTC:

- Weapons qualification on ranges for 5.56 mm / M-16 rifle and .38 caliber/9 mm pistol.
- CPX, which often rely on a computer simulation, guide decision-makers through a hypothetical scenario. A CPX normally takes place in one central location, such as a military headquarters.
- FTX simulate actual operations "in the field" and focus more on improvement of skills than on the making of command decisions.
- Gunnery training with MILES (non live fire tank electronic simulation system), which uses infrared light and computerized targets.
- Nuclear, Biological, and Chemical (NBC) train soldiers to don protective clothing, test gas masks and perform precise decontamination procedures to protect equipment and personnel against warfare agents (no live agents are used).
- Aircraft Operations to include the use of C-130 cargo airplanes, UH-60 Black Hawk utility helicopters, AH-64 Apache helicopters, CH-47 Chinook cargo helicopters, OH-58 Kiowa observation helicopters, AH-1 Cobra helicopters, and UH-1 Iroquois utility helicopters.
- Additional types of military training at WHFRTC include Soldier Qualification Training and Common Task Training testing, recovery operations, land navigation, patrolling, bivouac and mess operations.

Since the onset of the war effort in 2003, the main training thrust at WHFRTC has been weapons qualification and pre-deployment expertise in both urban and mounted weapons systems. Other types of training include combat lane training, defensive convoy training, and anti-terrorism training. In the past few years, five MOUT sites were constructed to train soldiers in urban warfare. The MOUT sites do not contain permanent structures. They are comprised of steel convexes with wood deck structures and are developed on gravel pads. The larger MOUT site includes a tunnel from one side of the road to another. The large brigade training at WHFRTC in conjunction with Fort Campbell has not occurred since 2003, nor has engineer construction or infantry/armor training.

2.5.2 SITE USAGE

The WHFRTC serves as the primary training area for the KYARNG. Training center utilization data shows that approximately 60 percent of all training occurs from June through October, 13 percent occurs from November through February, and approximately 27 percent occurs from March through May.

Historically, approximately 94 percent of all authorized WHFRTC utilization is by military users. Military users include units of the KYARNG and Kentucky Air National Guard (KYANG), the Army and Marine Reserves, Active Army units from Fort Knox and Fort Campbell, and Army schools. The WHFRTC is also used for other training activities for Reserve Components from Kentucky and surrounding states. Youth Challenge and civilian users account for the remaining portion of the total training center utilization. Groups that utilize the WHFRTC year-round include 4-H and Boy Scouts, Junior and Senior Reserve Officer's Training Corps (ROTC), deer and turkey hunters (during scheduled hunts), Kentucky State Police, Department of Corrections, and local law enforcement agencies.

Historic usage levels are listed in **Table 8**. Since 2001, usage has been lower due to deployment.

TABLE 8. HISTORIC USAGE LEVELS, WENDELL H. FORD REGIONAL TRAINING CENTER

TRAINING YEAR	TOTAL USERS IN SOLDIER DAYS* PER YEAR
1985	34,743
1986	6,167
1987	29,122
1988	16,828
1989	47,867
1990	15,754
1991	12,892
1992	21,967
1993	7,346
1994	10,187
1995	6,273
1996	8,673
1997	135,197
1998	32,387
1999	90,189
2000	112,275
2001	134,187
2002	56,789
2003	88,101
2004	71,400
2005	95,762

TABLE 8. HISTORIC USAGE LEVELS, WENDELL H. FORD REGIONAL TRAINING CENTER	
TRAINING YEAR	TOTAL USERS IN SOLDIER DAYS* PER YEAR
2006	78,382
2007	73,633
*Each day a soldier is at the training site = 1 soldier day. Usage levels shown include military and civilian use.	

The Training Site Yearly Training Coordination Conference is held during the third (3rd) quarter of the preceding fiscal year. At that time, each unit presents a tentative training schedule, estimate of personnel in attendance, and requests for facilities, training areas, and ranges. The training site schedules the final Yearly Training Coordination Conference for the fourth (4th) quarter of the fiscal year. At that time, units present confirmed plans, updated estimates of personnel in attendance, and approved requests.

2.6 FORCE STRUCTURE AND UNIT CHANGES

The KYARNG units include Armor, Infantry, Engineering, Transportation, Medical, Aviation, and Maintenance specialties. The KYARNG has projected statewide mobilization day (M-day) strength of approximately 8,400 soldiers. Current troop strength is 8,469. Major elements of the KYARNG force structure include:

- 63d Aviation Group, Frankfort;
- 149th Manuever Enhanced Brigade), Louisville.
- 138th Field Artillery Brigade, Lexington;
- 75th Troop Command, Bluegrass Station;
- 238th Regiment (CA) Greenville

Under the current Army Division Redesign Study, the following KYARNG units would either be deactivated or replaced with chemical or military police units:

- 1st Battalion, 123rd Armor
- 206th Engineer Battalion
- 103d Forward Support Battalion

2.7 SURROUNDING COMMUNITIES AND LAND USE

The surrounding area is sparsely settled. Adjacent land uses include the Western Kentucky Parkway along the southern boundary, reclaimed and abandoned strip mine lands to the south, west and north, small farms and residential areas along state and county highways, a gas storage field (Texas Gas Co) and a state wildlife management area to the west. The nearest residences are located ½ mile southeast of the cantonment area along Highway 11 or one mile west adjacent to the Parkway (U.S. Army Center for Health Promotion and Preventative Medicine [USACHPPM], 2007). The Muhlenberg Career Development Center (MCDC) is located immediately south of the Parkway on 2000 acres of state land operated by the U.S. Department of Labor. Enrollment in 2007 includes 404 trainees between 16 and 25 years old (MCDC 2007).

The corporate boundary of Central City lies 2,000 feet east of the training center's easternmost boundary. There are also numerous residences and farms along KY Highway 70 to the north of the training center as well as a few residences along KY Highway 601 in the New Cypress area to the southwest of the training center.

Non-residential or urban lands surrounding the WHFRTC are used for coal mining, oil and gas production, agriculture, and forest production. Gas pipeline pumping facilities and a major regional gas storage field lie to the northwest of the training center.

Mining remains the industrial mainstay of the Muhlenberg County economy although approximately 39 percent of the land is farmed and used for grazing. Adjacent lands surrounding WHFRTC are used for underground and surface coal mining, oil and gas production, agriculture, and forest production. Portions of the surrounding lands are economically non-productive but provide other benefits to the environment, for example, the extensive Cypress Creek wetland system to the north of the training site. This system is important to the surrounding region as it filters and stores groundwater and provides habitat diversity for fish and wildlife.

2.8 NATURAL AREAS

Peabody Wildlife Management Area (WMA), managed by the KDFWR, encompasses approximately 60,000 acres in Ohio and Muhlenberg Counties, Kentucky. The majority of the property is reclaimed strip mine land although some tracts of undisturbed forest land are present. Most of the mined land has been reclaimed to grassland. Approximately 3,000 acres of the site is comprised impoundments ranging from one to 150 acres as well as numerous wetlands and marsh areas. The Peabody WMA provides an excellent opportunity to observe grassland bird species, a variety of waterfowl, wading and shore birds, and many raptor species. A portion of the Peabody WMA adjoins the western boundary of the installation and the northern boundary of TA 3.

The Cypress Creek State Nature Preserve (SNP) consists of a 97-acre portion of bottomlands lying adjacent to Cypress Creek in Muhlenberg County. A SNP is a legally dedicated area that has been recognized for its natural significance and protected by law to protect and preserve rare species and the natural environment for scientific and educational purposes. The preserve and adjacent areas contain a mosaic of natural communities including bald cypress (*Taxodium distichum*) swamp and bottomland hardwood forest complex that supports numerous rare species typically associated with wetlands. Public visitation is encouraged; however access is by written permission only.

Lake Malone State Park, approximately 15 miles from the WHFRTC, includes 788 lake acres enclosed by 50 foot sandstone bluffs and hardwood forests. The park has campgrounds, a marina, beach, and hiking trails.

SECTION 3: THE PHYSICAL ENVIRONMENT

3.1 CLIMATE

Kentucky lies within the hot continental division of the humid temperate domain (Bailey, 1996) and is characterized by hot summers and cool winters. Average monthly temperature and precipitation data between 1948 and 2005 was obtained from Station 155067 in Madisonville, Kentucky (SERCC 2007) and is summarized in **Chart 3**.

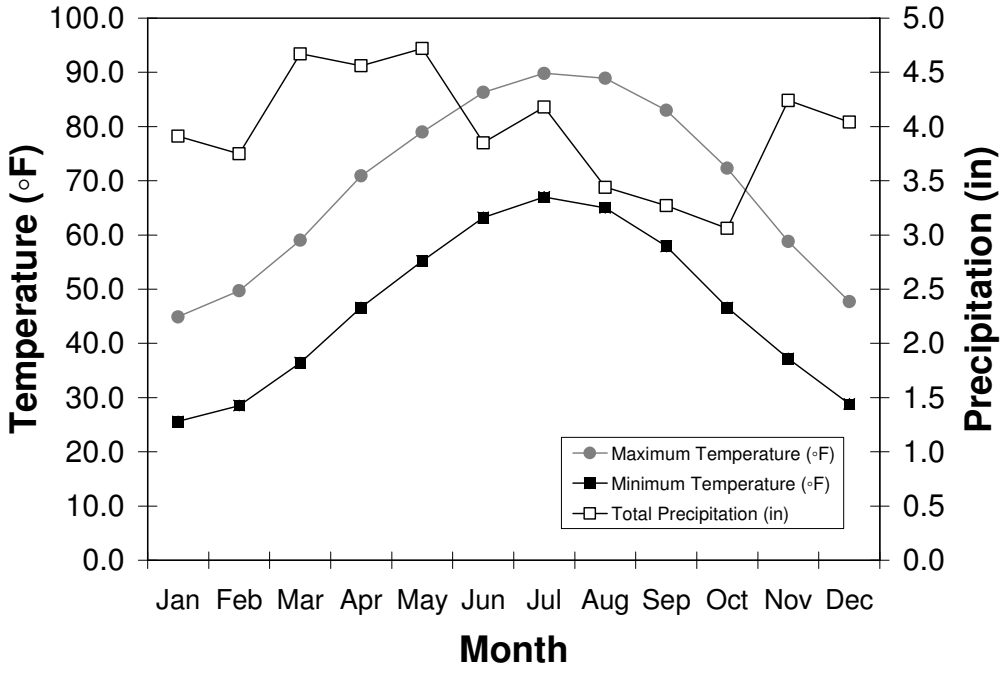


CHART 1. AVERAGE MONTHLY TEMPERATURE AND PRECIPITATION

The mean annual temperature maximum and minimum temperature are 69.2 and 46.5 degrees Farenheit (°F), respectively. On average July is the warmest month and January is the coldest. The lowest temperature on record is -23°F on 22 February 1951. The highest recorded temperature in Madisonville is 105°F, which occurred on three separate dates, 30 June 1952, 27 July 1952, and 05 September 1954.

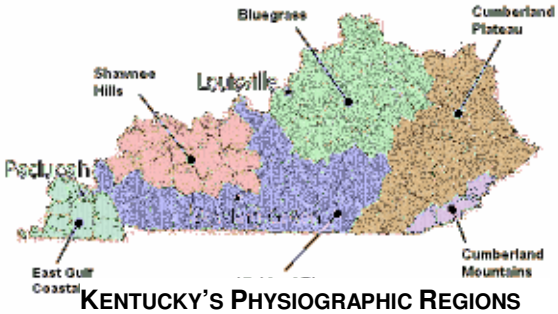
The total mean annual precipitation is 47.69 inches. Of the total annual precipitation, approximately 30 percent falls between March and May. The months between August and October are the driest on average. The average annual snowfall (usually between the months of November and March) is 7.1 inches, with the greatest snow depth at any one time during the period of record being 24.5 inches in January 1978 (Kentucky Climate Center 1996). The growing season or frost-free period continues for five to six months between mid-April and mid-October.

The prevailing wind is from the south-southwest. Wind speed is greatest in March with average wind speeds at 10 miles per hour (USDA-SCS 1994). The sun shines approximately 75 percent of the time in summer and 45 percent in winter. The average relative humidity in mid-afternoon is approximately 60 percent and approximately 80 at dawn.

3.2 PHYSICAL SETTING AND TOPOGRAPHY

WHFRTC lies within the Shawnee Hills section of the Interior Low Plateaus Physiographic Province (Fenneman 1938, Quarterman and Powell 1978). This physiographic region has also been called the Western Kentucky Coalfield Region. Within the Shawnee Hills, the site is situated near the middle of the Ohio River Hills and Lowlands subsection (Quarterman and Powell 1978).

The area surrounding the WHFRTC is characterized by hilly uplands of low to moderate relief, dissected by streams, which occupy wide poorly drained valleys. However, the topography of most of the site has been drastically changed by both surface and deep coal mining operations. Elevation varies from approximately 395 feet along Cypress Creek and Little Cypress Creek to just over 645 feet at the crests of strip mine spoil banks near the southern boundary of the training site (**Figure 3**).



KENTUCKY'S PHYSIOGRAPHIC REGIONS

The abandoned strip mined areas have very rugged topography with 50 feet or more of relief; whereas, the reclaimed strip mine areas have gently rolling topography with less severe relief.

3.3 GEOLOGY AND SOILS

Geologic resources of an area typically consist of surface and subsurface materials and their inherent properties. Geologic factors influencing the ability to support structural development are seismic properties (for example, potential for subsurface shifting, faulting or crustal disturbance), soil stability, and topography. Soils are unconsolidated materials overlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Soil structure, elasticity, strength, shrink-swell potential and erodibility determine the ground's ability to support man-made conservation practices, structures and facilities. Soils are typically described in terms of complex type, slope, physical characteristics and relative compatibility or constraining properties with regard to types of land use and/or construction activities.

3.3.1 GEOLOGY

3.3.1.1 GEOLOGIC FORMATIONS

The training site is in the west-central region of the state where primarily coal-bearing strata dominate. The surface bedrock is of Pennsylvanian-aged materials where part of the bedrock is of the Lisman Formation of Upper Pennsylvanian age and part is of the Carbondale Formation of Middle Pennsylvanian age (Palmer 1969). These formations are made up mostly of sandstone, siltstone, and shale. Thin beds of limestone, coal, and clay also occur. Limestone layers include the Madisonville and Providence Members of the Lisman Formation (USDA-SCS 1994). The geology of the WHFRTC is summarized in **Table 9**.

TABLE 9. GEOLOGIC FORMATIONS OF THE CENTRAL CITY-WEST GEOLOGIC QUADRANGLE MAP		
MAP SYMBOL	**GEOLOGIC FORMATION**	**CHARACTERISTICS**
Qal	Quarternary alluvium	Silt, clay, sand, and gravel. Generally light brown to reddish brown, poorly sorted.
Pl	Lisman Formation--Upper Pennsylvanian	
15a	Upper Lisman	Sandstone, siltstone, shale, limestone, coal, and underclay. Contained the No. 15a and 15 coal beds.
15		Sandstone and shale.
m	Madisonville limestone member	Limestone, shale, coal, and underclay. Contained the No. 14a coal bed.
14	Lower Lisman	Sandstone, shale, coal, and underclay. Contained the No. 14 coal bed.
13		Sandstone, shale, coal, and underclay. Contained the No. 13 coal bed. Shale and limestone.
12		Limestone, coal, shale, and underclay. Contained the No. 12 coal bed and the Providence Limestone Member (the base of the LIsman Formation).
Pc	Carbondale Formation	
11		Sandstone, shale, and underclay. Contained the No. 11 and 10 coal beds.
10		Shale, coal, and underclay. Contained the No. 9 coal bed.
9		Shale, coal, and underclay. Contained the No. 9 coal bed.
Palmer 1969		

3.3.1.2 SEISMICITY

The WHFRTC is located approximately 145 miles northeast of the New Madrid Seismic Zone (NMSZ), the most seismically active zone east of the Rocky Mountains. The western side of the training center is bisected by the two inactive faults, the North Graham Fault and the South Graham Fault.

The NMSZ has produced damaging earthquakes in historical time including at least three earthquakes estimated to have had magnitudes of 8.0 or greater during the years from 1811 to 1812. An earthquake of magnitude 6.0 or larger is expected somewhere in the zone about every 70 years. Considering that a magnitude 6.0 or larger earthquake has not occurred in the NMSZ since 1895, Johnston and Nava (1984) estimated a 40-63 percent chance of a magnitude 6.0 or larger earthquake in the NMSZ by the year 2000, and an 86-97 percent chance of this size earthquake by the year 2035.

Western Kentucky could experience earthquakes of magnitudes greater than 5.5 to 6.0 on the Richter scale (Modified Mercalli intensity of VIII) if an earthquake of Richter magnitude 7.0 to 7.9 occurs again in the New Madrid, Missouri epicenter (Center for Earthquake Studies 1994).

3.3.1.3 ECONOMIC GEOLOGICAL RESOURCES

Coal, natural gas, and oil are the principal economic mineral resources within the Central City-West Quadrangle. Gas and oil reservoirs were discovered in the area by 1960 with the New Cypress Oil Pool lying to the southwest and the Graham Lake Gas Storage Field underlying part of the western side of the training site. The mineral rights to coal, oil, and gas, and the existing wells and mining operations on the property are owned by Peabody Coal Company and operated by private companies; the KDMA has no control over their operations.

Commercial coal mining has occurred throughout the Central City-West Quadrangle. Prior to 1950 all mining took place underground. Since 1950 most coal has been mined by strip or auger methods. Numerous coal seams occur in the sedimentary rocks of the Pennsylvanian System. The Western Kentucky Number 9, 11, and 12 coal beds have been removed from most areas of the training center property by strip mining operations during the last 60 years (Palmer 1969; USDA-SCS 1994). Mining progressed from southwest to northeast on the various tracts within the WHFRTC. For this reason, areas located in the southwestern and southern half of the site contain older vegetation and have been disturbed less recently than areas to the north and northeast.

Land that was surface mined prior to 1968 is considered “abandoned mine land (AML)” or “pre-law”. Mining companies were not required to reclaim land post-mining. Land surface mined between 1968 and 1977 is subject to reclamation requirements including providing a less than 12 percent slopd and either planting grasses or trees. Post 1977, reclamation includes recontouring to original contour, topsoil, and are revegetated with at least 90 percent cover (Surface and Mining Control and Reclamation Act of 1977).

3.3.2 SOILS

3.3.2.1 SOIL DESCRIPTIONS

A soil survey for the training site was completed in 1994 and supplemented in 2007 for new acquisition parcels. Twelve soil series that occur either singly or in combination with other series in 28 distinct map units were identified (**Table 10**).

Approximately 23 percent of the soils have recently developed in parent materials disturbed during the surface mining for coal. These soils are loamy and contain a mixture of fine earth and rock fragments that once were bedrock layers above the coal seams. They generally comprise the central portion of the training site and are found on the uplands. Representative soils include Bethesda, Fairpoint, and Sewell. These are very deep, well drained soils. Working the soil will result in exposed and “worked up” rock fragments large enough to damage vehicles. These soils are low in natural fertility and are highly erodible when exposed. For this reason, they require good vegetative cover.

Approximately 28 percent of soils occur naturally on the landscape, including silty alluvium on floodplains or in small upland depressions (Belknap, Collins, and Waverly soils), and soils formed in loess and silty or clayey materials weathered from sandstone, siltstone, or shale bedrock (Sadler, Frondorf-Lenberg complex, Wellston, and Zanesville soils).

Approximately 46 percent of soils are strip-mined areas that have been returned to original contour and covered with topsoil collected from original soils stockpiled prior to mining. Topsoiled areas are represented by the Fairpoint-Bethesda silt loams and Farmerstown silt loam.

TABLE 10. SOIL TYPES ON THE WHFRTC

SYMBOL	SOIL MAP UNIT NAME	ACREAGE	%
Be	Belknap silt loam, occasionally flooded	747	7.3%
BsF	Bethesda-Fairpoint-Sewell, 20 to 70 percent slopes	1,837	18.0%
Co	Collins silt loam, occasionally flooded	65	0.6%
Du	Dumps	43	0.4%
FbB	Fairpoint-Bethesda silt loams, 0 to 6 percent slopes	999	9.8%
FbC	Fairpoint-Bethesda silt loams, 6 to 12 percent slopes	868	8.5%
FbD	Fairpoint-Bethesda silt loams, 12 to 20 percent slopes	546	5.3%
FcB	Fairpoint-Bethesda soils, 0 to 6 percent slopes	460	4.5%
FcC	Fairpoint-Bethesda soils, 6 to 12 percent slopes	1,080	10.6%
FcD	Fairpoint-Bethesda soils, 12 to 25 percent slopes	692	6.8%
FcD3	Fairpoint-Bethesda soils, 12 to 25 percent slopes, severely eroded	18	0.2%
FeB	Farmerstown silt loam, 0 to 6 percent slopes	50	0.5%
FlD	Frondorf-Lenberg complex, 12 to 20 percent slopes	278	2.7%
FlE	Frondorf-Lenberg complex, 20 to 30 percent slopes	92	0.9%
FlF	Frondorf-Lenberg complex, 30 to 50 percent slopes	69	0.7%
RC	Active Reclamation	184	1.8%
RE	Road And Embankment	34	0.3%
SaB	Sadler silt loam, 2 to 6 percent slopes	177	1.7%
SbB	Sewell-Bethesda-Fairpoint soils, 0 to 6 percent slopes	46	0.4%
SbC	Sewell-Bethesda-Fairpoint soils, 6 to 12 percent slopes	160	1.6%
SbC3	Sewell-Bethesda-Fairpoint soils, 6 to 12 percent slopes, severely eroded	33	0.3%
SbD	Sewell-Bethesda-Fairpoint soils, 12 to 20 percent slopes	213	2.1%
SbD3	Sewell-Bethesda-Fairpoint soils, 12 to 20 percent slopes, severely eroded	37	0.4%
Ts	Topsoil stockpiles	34	0.3%
Wa	Waverly silt loam, occasionally flooded	659	6.4%
WlC	Wellston silt loam, 6 to 12 percent slopes	161	1.6%
WlC3	Wellston silt loam, 6 to 12 percent slopes, severely eroded	33	0.3%
WlD	Wellston silt loam, 12 to 20 percent slopes	79	0.8%
WlD3	Wellston silt loam, 12 to 20 percent slopes, severely eroded	17	0.2%
ZaB	Zanesville silt loam, 2 to 6 percent slopes	241	2.4%
ZaC	Zanesville silt loam, 6 to 12 percent slopes	255	2.5%
ZaC3	Zanesville silt loam, 6 to 12 percent slopes, severely eroded	21	0.2%
	TOTAL	10,227	

Note: Acreages reflect soil only – buiilt areas and water not included.

3.3.2.2 SOIL EROSION POTENTIAL

Physical and chemical factors contributing to the susceptibility of a soil to sustain damage from military training include texture, organic matter content, permeability, clay mineralogy, structure, and depth. Indices incorporating these physical and chemical factors into numeric scales or broad categories more easily related to potential training impacts include the K-factor, T-factor Hydrologic Soil Groups, and Land Use Capability Class (see Glossary for definitions of each index). An in depth review of these factors can be found in the Soil Survey for the Western Kentucky Training Site (USDA-NRCS 1994) and the soil survey for McLean and Muhlenberg Counties (USDA-SCS 1980).

Soil erosion is a major management concern at the training site, based on WHFRTC soil data. More than 40 percent of WHFRTC has slopes greater than 12 percent, which become highly erodible when vegetative cover is damaged. More than 20 percent of WHFRTC soils have a high K-factor or "erodibility factor" values (>0.34) and low T-factor or "soil loss tolerance" values (< 4.0) which indicate that the soils are highly erodible.

Capability class/subclasses from the soil survey reveal that 21 percent of all soils require very careful management due to risk of erosion; 58 percent of all soils require careful management due to being shallow, droughty, or stony; and 3 percent require special conservation practices due to wetness. Up to approximately 80 percent of WHFRTC soils are susceptible to training damage.

Hydrologic soil group classifications refer to soils grouped according to their runoff-producing characteristics. Because infiltration rate generally is inversely related to runoff and erosion, the hydrologic soil group is an indirect index to site erodibility. Group A soils have high infiltration rates when thoroughly wet and have a low runoff potential (i.e, they are the least erodible of all soils). Group B soils have moderate infiltration rates when thoroughly wetted. Group A and group B soils are generally most desirable for maneuver training activities (USA-CERL no date). Group C soils have slow infiltration rates when thoroughly wetted and are borderline for military training activities. Group D soils have a very slow infiltration rate when thoroughly wetted and are undesirable for military training activities. Of all soils, 5 percent are in Group "B"; 89 percent are in Group "C"; less than 1 percent are in Group "D", and 5 percent of soils were not assigned an hydrologic soil group (USDA-SCS 1994).

3.3.2.3 PRIME FARMLAND AND UNIQUE SOILS

A prime farmland designation is given to an area prior to mining if soils are present that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops (USDA-SCS 1994). Land that is designated as prime farmland on WHFRTC was reclaimed to the original A, B, and C horizons to a minimum depth of 36 inches. The land must be at least as productive as unmined prime farmland of the same type, in the same area, and under the same farm management. Peabody Coal Company was able to obtain adequate crop yields to satisfy the bond requirements and the land was released from the bond; however, there is no legal requirement to maintain this acreage as farmland.

Approximately 50 acres of WHFRTC soils are recognized as potential prime farmland soils. Four separate areas, including the 19 acre field north of the railroad tracks, have been designated as prime farmland under the Surface and Mining Control and Reclamation Act of 1977 and range from 4 to 22 acres (soil type FeB) (see **Figure 4**). These soils are from the Farmerstown series and received 20-55 inches of subsoil and top soil as a final treatment during reclamation. Farmerstown soils are more susceptible to compaction damage from heavy armor traffic than the Bethesda, Fairpoint, and Sewell soils. Prime farmland soils are 36 inches or more in depth, have moderate natural fertility and moderate permeability. No areas within the 2007 survey boundaries are considered to be prime farmlands.

3.4 HYDROLOGY

3.4.1 SURFACE WATER RESOURCES

The WHFRTC is situated in the Cypress Creek sub-basin of the Pond River Watershed Basin (Hydrologic Unit Code [HUC]# 05110006) (USEPA 2007). The only major tributary to Cypress Creek is Little Cypress Creek. Cypress Creek originates in west-central Muhlenberg County and flows 35.5 miles north and then west through McLean County before discharging into the Pond River 1.1 miles upstream from its confluence with the Green River (Hannan et al. 1982). The third-order creek has a drainage area of 153 square miles (Bower and Jackson 1981).

The Pond River Basin drains into the Lower Green River Basin (HUC# 05110005), which drains approximately 920 square miles into the Highland – Pigeon River Basin (HUC# 05140202) (USEPA 2007). The Pond River flows a distance of 43.6 miles draining a total of 797 square miles (Bower and

Jackson 1981) in Kentucky before its confluence with the Green River near Calhoun, which flows into the Ohio River near Henderson, Kentucky.

The immediate watershed receiving discharge from the site is Cypress Creek. Cypress Creek is a low-gradient stream with 97 percent of its channel having been altered by channelization (Harker et al. 1980). The only other major tributary in the watershed is Little Cypress Creek (a second-order creek), which originates 4.16 miles north of Greenville and flows 9.32 miles in a northerly direction before joining Cypress Creek northwest of Central City. Approximately 35 percent of Cypress Creek and 44 percent of Little Cypress Creek were channelized during the 1920s (Burroughs 1924). Materials from dredging were placed into two spoil banks on either side of the creek, impeding the natural flow of water to adjacent wetlands.

Snyder and Sendlein (1997) divided the training site into 11 unique hydrologic planning units based on topography, direction of water flow, and receiving perennial stream. Cypress Creek Watershed (on the training site) was divided into four subwatersheds: Upper Cypress, Middle Cypress #1, Middle Cypress #2, and Lower Cypress. Little Cypress Creek Watershed (on the training site) was divided into three subwatersheds: Upper Little Cypress, Middle Little Cypress, and Lower Little Cypress. One additional hydrological planning unit was identified and determined to have no external drainage from the site; it was given the name “Internal Hydrologic Planning Unit.”

Several small unnamed tributaries and intermittent streams cross the property and drain into Cypress Creek on the west and north and into Little Cypress Creek on the south and east (see **Figure 5**). In addition to surface streams, there are numerous sediment retention basins and ponds and lakes on the property related to mine reclamation activities.

3.4.2 FLOODPLAINS

Floodplains generally are areas of low, level ground present on one or both sides of a stream channel that are subject to either periodic or infrequent inundation by flood waters. Floodplains are typically the result of lateral erosion and deposition that occurs as a river valley is widened. High water tables and flooding are associated with floodplains. Inundation dangers associated with floodplains have prompted federal, state, and local legislation limiting the development in these areas to recreation, agriculture, and preservation activities. Floodplains are regulated by the Federal Emergency Management Agency (FEMA) with standards outlined in 44 CFR Part 60.3.

Based on the Flood Insurance Rate Maps, the 100-year floodplain occurs within the vicinity of both Cypress Creek and Little Cypress Creek and comprises approximately 673 acres (FEMA 1991).

Flood-prone areas are identified by FEMA on Flood Insurance Rate Maps (FIRM) based on historic, meteorological, hydrologic, and hydraulic data. Open space conditions, flood control works, and development are also taken into account in creating the maps. Base flood areas, or 100-year floodplain, are delineated on the maps. An area within the 100-year floodplain has a 1 percent chance of flooding each year or a 26 percent chance of flooding over a 30-year period.

3.4.3 WETLANDS

The U.S. Army Corps of Engineers (USACE) and the USEPA define wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Both Federal and State laws and regulations protect waters of the state, which includes wetlands. The Clean Water Act (CWA) is the primary law protecting U.S. waters. Section 404 of the CWA (33 USC 1344) prevents the discharge of dredged or fill material into waters of the U.S. without a permit from the USACE. Generally, whenever a Section 404 permit is required, a Section 401 Water Quality Certification (WQC) issued by the Commonwealth of Kentucky is also required.

EO 11990 (*Protection of Wetlands*) requires Federal agencies to take action to minimize the destruction, loss or degradation of wetlands, and to conserve and enhance the beneficial values of wetlands.

In 1999, the U.S. Army Engineer Research and Development Center, Waterways Experiment Station (WES) conducted a planning level survey of WHFRTC to locate and map "Waters of the U.S." that would potentially be regulated (i.e., jurisdictional) by the USACE under Section 404 of the CWA (Gravatt et al. 1999). An addendum to the 1999 study was conducted in 2005 for the newly acquired WHFRTC land parcels (TA 7 and 8) (Lee and Noble 2005). Delineated waters include streams, ponds, lakes and wetlands. All features are delineated either to the limits of the Ordinary High Water Mark (OHWM) or by wetland protocols identified in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987).

Areas potentially subject to Section 404 CWA jurisdiction on the WHFRTC are summarized in **Table 11** and illustrated in **Figure 5**.

Table 11. POTENTIAL WETLANDS AND OTHER WATERS OF THE US (BY COWARDIN CLASSIFICATION)

WETLANDS	DESCRIPTION	FREQUENCY	ACRES	PERCENT
PEM	Palustrine Emergent Wetlands	371	497	71%
PSS	Palustrine Scrub-Shrub Wetlands	24	47	7%
PFO	Palustrine Forested Wetlands	57	160	23%
	Total	**452**	**704**	
LAKES AND PONDS	**DESCRIPTION**	**FREQUENCY**	**ACRES**	**PERCENT**
L2OW	Lacustrine, Littoral, Open Water/Unknown Bottom	59	332	51%
POW	Palustrine, Open Water/Unknown Bottom	969	315	49%
	Total	**1028**	**647**	
STREAMS	**DESCRIPTION**	**FREQUENCY**	**MILES**	**PERCENT**
R2UB	Riverine – Lower Perennial, Unconsolidated Bottom	2	1	4%
R4SB	Riverine – Intermittent, Streambed	70	23	96%
	Total	**72**	**24**	

Perennial streams on the site include Cypress Creek and Little Cypress Creek which have non-vegetated, defined beds and banks with bedrock or recently deposited sediments in the streambed. Many of the intermittent streams are the result of earth movements associated with previous mining activities. The open water bodies are the result of impoundments of the streams or are isolated surface depressions that fill with water. Areas that were mapped as wetlands are primarily palustrine emergent (PEM), palustrine scrub-shrub (PSS) and palustrine forested (PFO) systems. Most of the wetland areas are associated with surface depressions that have shallow inundation and/or sub-surface saturation or low-lying vegetated fringes bordering open water bodies or streams.

Prior to impacting wetlands or other Waters of the U.S. at the WHFRTC, the KYARNG will conduct a wetland delineation and obtain a jurisdictional determination from the USACE. KYARNG will coordinate with the USACE Louisville District office regarding wetland impacts and permitting.

3.4.4 GROUNDWATER RESOURCES

Water-bearing units in the region are the Tradewater and the Caseyville Formations. These formations yield significant quantities of water but become saline with depth. Median depths to water level in the Tradewater and Caseyville Formations are 18.2 feet and 34.4 feet below the ground surface (bgs), respectively. Regional ground-water flow is toward the broad alluvial area along the Green River, northeast of the WHFRTC. No sole source aquifers have been designated in Kentucky. A freshwater

aquifer – approximately 1,100 feet deep – lies several miles west of the WHFRTC. The aquifer is within the New Cypress Pool (USACHPPM 2006).

The natural water table and drainage patterns beneath WHFRTC have been altered by mining activities. The water table is relatively close to the surface throughout most of WHFRTC as a result of surface mining activities. Abandoned underground mines found in the Kentucky No. 9 coal seam beneath WHFRTC are known to be flooded. Water levels in ten monitoring wells installed on WHFRTC ranged from 5 feet to 64 feet bgs and averaged 29.74 feet bgs in a ground-water sampling event conducted in June 2004. Ground-water flow in the unconfined aquifer is generally perpendicular to topographic contours and toward downgradient surface streams (USACHPPM, 2006).

Because of the proximity of the Green River, most water supplies are obtained from surface-water. Public water supplies obtained from the Green River are available to residents near the proposed training areas. Wells are not used to obtain drinking water (USACHPPM, 2006).

Peabody Coal Company maintained and monitored several ground water monitoring points on the property, as required by previously held mining permits; however, this monitoring is no longer required. The Kentucky Geological Survey (KGS) installed 10 ground water wells on WHFRTC in the spring of 2001 to monitor the ground water quality and water level fluctuation in the spoil through wet and dry seasons (spring and fall).

3.4.5 WATER QUALITY

Cypress Creek has been severely degraded by acid mine waters (Harker et al. 1980; Kentucky Division of Water [KDOW] 1998). As recently as 1998, the KDOW listed Cypress Creek among its most impaired rivers and streams in the state and cited low pH (activity of hydrogen ions in water) values as the reason for this designation. Non-point source effects of greatest concern to Cypress Creek in 1998 were pH (KDOW 1998).

SECTION 4: ECOSYSTEMS AND THE BIOTIC ENVIRONMENT

Several studies have been conducted to describe the biotic environment of the WHFRTC. **Table 12** lists natural resources-related studies conducted at WHFRTC. Many species of flora and fauna are now known from the site as a result of these studies. This section of the INRMP will describe natural vegetation communities and the flora and fauna that inhabit them using an ecosystem classification.

TABLE 12. NATURAL RESOURCES STUDIES AT WHFRTC

YEAR COMPLETED	STUDY	STUDY COMPLETED BY:
1993	Aquatic Investigation	Laudermilk et al.; Kentucky State Nature Preserves Commission
1993	Terrestrial Vertebrate Survey	Palmer-Ball; Kentucky State Nature Preserves Commission
1993	Soil Survey of Muhlenberg County	Natural Resources Conservation Service
1994	Resource Inventory and Conservation Plan	Natural Resources Conservation Service
1995	Biological Inventory	White et al., Kentucky State Nature Preserves Commission
1999	Delineation of Wetlands and Other Regulated Waters	U.S. Army Engineer Research and Development Center, Waterways Experiment Station, CEERD-ER-W
2001	Water Quality Investigation	Galceran and Dinger; Kentucky Geological Survey
2002	Update of Biological Inventory	Kentucky State Nature Preserves Commission
2004	Water Quality Investigation	Cumbie et al., Kentucky Geological Survey
2005	Wetland Survey, Training Areas 7 and 8	USACHPPM
2006	Update of Biological Inventory	Kentucky State Nature Preserves Commission
2008	Addendum to Soil Survey	AMEC Earth & Environmental, Inc.

4.1 ECOSYSTEM CLASSIFICATION

The U.S. Forest Service (USFS) identifies ecoregions that are used to classify geographical locations based on four general levels of order. In some instances, more specific sub-divisions of these levels can be made. From the broadest to the most specific, these orders are:

- Domain – consisting of groups of related climates
- Division – consisting of climates within domains
- Province – based on vegetation or natural land covers (includes influences of elevation)
- Section – based on local terrain features

WHFRTC is located within the Eastern Broadleaf Forest (Continental) Province of the Hot Continental Division of the Humid Temperate Domain as described by Bailey (1995). This region has also been called the Ozark/Interior Plateaus (Harker et al.1993). The training site lies within the Shawnee Hills

section of the Interior Low Plateaus Physiographic Province (Fenneman 1938; Quarterman and Powell 1978). Within the Shawnee Hills, it is situated near the middle of the Ohio River Hills and Lowlands subsection (Quarterman and Powell 1978).

4.2 VEGETATION

The KDMA/KYARNG requested that the Kentucky State Nature Preserves Commission (KSNPC) provide additional and updated information to revise the INRMP for the WHFRTC (Littlefield and Yahn 2006). A biological survey was completed in 1993-94 including vegetation mapping, a wetland delineation, a floristic survey and inventories for rare plants and animals (White et al. 1995). A second update of the endangered species present and other aspects was completed in 2002 (KSNPC 2002). This section provides results of the biological field surveys conducted in 2005 and 2006 as well as updated maps and descriptions of the plant communities (Littlefield and Yahn 2006). Species lists are included as **Appendix D**.

4.2.1 HISTORIC VEGETATION COVER

At the time of European settlement, Muhlenberg County was primarily covered by Oak-Hickory Forest (Harker et al.1993). Other ecological upland ecosystems that were found in the region are Oak Barrens, Bluestem Prairie, and Glades (Harker et al.1993). Wetland ecosystems include; Floodplain Forest, Swamp Forest, Marsh, and Wet Prairie. Since that time, extensive clearing for agriculture, grazing, logging, and more recently coal strip-mining have fragmented or destroyed the pre-settlement ecosystems (Bryant et al. 1993).

4.2.2 CURRENT VEGETATION COVER

The extent of plant communities found on WHFRTC is much reduced (since pre-European settlement) and where present, mostly of poor quality due to intense alterations including: agriculture, grazing, logging and coal mining. Vegetation communities at the WHFRTC were surveyed and classified during the biological inventory in 1995 (White et al. 1995) and subsequent updates conducted in 2002 and 2006 (KSNPC 2002; Littlefield and Yahn 2006). Vegetation communities at the WHFRTC are listed in **Table 13** and summarized in the following sections. **Figure 6** shows the vegetation communities.

Communities described as “(successional)” in the title of a natural community are recovering from more recent disturbance and are developing with more stable conditions. Even though many of these forests are young and invaded by non-native species, they are low-quality representations of natural communities. Hence, Bottomland Hardwood Forest (successional) is a low-quality representation of Bottomland Hardwood Forest and distinctive from the anthropogenic highly–disturbed Deciduous Forest.

Communities grouped in the anthropogenic category represent a vegetation pattern that has resulted from the removal or degradation of the natural vegetation, modification by planting and/or subsequent successional changes. In general, anthropogenic communities reflect characteristics of human manipulation rather than that of natural succession. Natural succession, exotic species invasion, and recent anthropogenic plantings, create more variability in species composition within each anthropogenic community, but are similar across the landscape in structure, function and land use history.

Table 1310. WHFRTC VEGETATION COMMUNITIES

COMMUNITY[1]	ACRES	TYPICAL WILDLIFE
NATURAL WETLAND COMMUNITIES		
Bottomland Marsh (successional)	196	Wild turkey, quail, dove, teal, rail, gallinule, river otter, snipe, woodcock, owls.
Shrub Swamp	13	
Wet Flatwoods	5	
Bottomland Hardwood Forest (BHF)	52	
Bottomland Hardwood Forest (Successional)	146	
Bottomland Hardwood Swamp successional)	57	
Cypress-Tupelo Swamp (successional)	20	
ANTHROPOGENIC WETLAND COMMUNITIES		
Wet Meadow	7	Wild turkey, quail, dove, teal, rail, gallinule, river otter, snipe, woodcock, owls
Disturbed Herbaceous Wetland (Phragmites)	279	
Disturbed Lowland Forest/Shrubland	543	
NATURAL UPLAND COMMUNITIES		
Acidic Mesophytic Forest	142	White-tailed deer, squirrels, mice, rabbits, foxes, raccoons, grackles, wild turkey, grouse, quail, blue jays, woodpeckers, and waterfowl
Acidic Mesophytic Forest (Successional)	59	
Acidic Sub-xeric Forest	8	
Acidic Sub-xeric Forest (Successional)	85	
ANTHROPOGENIC UPLAND COMMUNITIES		
Native-Grassland (planted)	38	White-tailed deer, raccoon, quail, mice, cottontail rabbit.
Non-native Grassland	3,958	
Native Shrubland	1,668	
Non-Native Shrubland	441	
Highly-disturbed Deciduous Forest (Successional)	2, 282	Waxwings, bobwhite, quail, ruffed grouse, pheasant, wild turkeys, rabbits, foxes, raccoons, skunks, opossums, and coyotes.
Pine Forest	1,038	Wild turkey, quail, owls.
[1] As defined by the Biological Inventory (White and Yahn, 2006)		

4.3 NATURAL VEGETATION COMMUNITIES: WETLAND

4.3.1 BOTTOMLAND MARSH (SUCCESSIONAL)

Bottomland Marsh (successional) community is found scattered throughout the northern tract and is an extensive community along Little Cypress Creek in the southern tract. Pre-settlement conditions along Little Cypress Creek probably supported more forested bottomland communities. Hydrological changes and logging have allowed herbaceous wetland species to stabilize the system and may mimic natural marsh communities especially those flooded by beaver activity. This community is inundated most of the year and is characterized by native wetland species. Common species include common rush (*Juncus*

effuses), broadleaf arrowhead (*Sagittaria latifolia*), broadleaf cattail (*Typha latifolia*), rice cutgrass (*Leersia oryzoides*), and smartweeds (*Polygonum spp.*). Common reed (*Phragmites australis*) and barnyardgrass (*Echinochloa crus-galli*), invasive non-native species, can also be locally abundant in this community and represent areas of disturbance and low quality.

4.3.2 SHRUB SWAMP

Shrub Swamp community is associated with and usually grades into bottomland marsh communities. This community is dominated by buttonbush (*Cephalanthus occidentalis*) on WFRTC and has similar species to that of the marsh community.

4.3.3 WET FLATWOODS

Wet flatwoods is a naturally occurring community that is distinguished by having an impermeable to slowly permeable hardpan or fragipan. This community occurs in a lowland depression on TA 8 and is the smallest community at the WHFRTC. The community retains a good quality despite past hydrological changes and logging. Cherrybark oak (*Quercus pagoda*), sweetgum (*Liquidambar styraciflua*), and red maple (*Acer rubrum*) characterize the canopy. The ground cover is low in diversity and dominated by smallspike false nettle (*Boehmeria cylindrica*) and Virginia creeper (*Parthenocissus quinquefolia*). High-quality examples of the Wet Flatwoods community are rare in Kentucky and thus this community warrants protection. Minimal disturbance of this area is recommended for long-term sustainability.

4.3.4 BOTTOMLAND HARDWOODS

The remnant Bottomland Hardwood Forest is a naturally occurring community generally associated with the Cypress Creek drainage basin as a riparian buffer, although drainage patterns have been substantially altered by the mining process. The canopy is dominated by sweetgum, tuliptree (*Liriodendron tulipifera*), red maple, cherrybark oak, green ash (*Fraxinus pennsylvanica*), and river birch (*Betula nigra*) with pockets of black willow (*Salix nigra*). Canopy trees are mature and average diameter at breast height (dbh) is approximately 50 centimeters (cm). Dominant mid-story species include sweetgum and red maple saplings. Understory species include poison ivy (*Toxicodendron radicans*), cypress panicgrass (*Dichanthelium dichotomum*), Indian woodoats (*Chasmanthium latifolium*), Christmas fern (*Polystichum acrostichoides*), and Nepalese browntop (*Microstegium vimineum*). High-quality examples of the bottomland hardwood forest community are uncommon in Kentucky and thus this community warrants conservation protection. Because of natural flooding disturbance, this community is being invaded by non-native species such as Nepalese browntop and multiflora rose (*Rosa multiflora*). Herbicide treatment for non-native species is recommended to keep this community healthy. The successional community differs from the naturally occurring community in being a young forest (~20-40 years old), typically invaded by weedy non-native and native species in the understory. Red maple and sweetgum are typically more prolific in the successional community, responding to more recent disturbance.

The 23-acre Bottomland Hardwood Forest along the western boundary of the training center and Cypress Creek is a KSNPC “notable” natural community, which corresponds to the Waverly soil unit (see **Figure 6**). The remnant bottomland hardwood forest is generally associated with the Cypress Creek drainage basin as a riparian buffer, although the drainage patterns have nearly completely been altered by the mining process. Dominant trees vary throughout this system and include green ash (*Fraxinus pennsylvanica*), river birch (*Betula nigra*), red maple (*Acer rubrum*), and some pockets of black willow (*Salix nigra*). The southern portion of this forest has been cleared and is regenerating. Mature parts of this forest will provide a seed source for younger portions.

4.3.5 BOTTOMLAND HARDWOOD SWAMP (SUCCESSIONAL)

The Bottomland Hardwood Swamp (successional) community is found in the lowland areas of TA 8. It is distinctive in having flooded soil most of the year and is dominated by hardwoods. Silver maple (*Acer saccharinum*), pin oak (*Quercus palustris*), eastern cottonwood (*Populus deltoides*), and black willow are

characteristic canopy species. Buttonbush and possumhaw (*Ilex decidua*) are typical understory shrubs. Groundcover is sparse with scattered wetland species, such as smallspike false nettle and lizard's tail (*Saururus cernuus*).

4.3.6 CYPRESS-TUPELO SWAMP (SUCCESSIONAL)

Cypress-Tupelo Swamp (successional) community occurs on TA 7 and has a high concentration of bald cypress (*Taxodium distichum*) with silver maple and red maple as co-dominates in the canopy and sub-canopy. The soils in this community are deep and organic, poorly drained and flooded throughout all or most of the year. Smallspike false nettle, lizard's tail, greater marsh St. Johnswort (*Triadenum walteri*) and caric sedges (*Carex* spp.) are characteristic species in the understory.

4.4 ANTHROPOGENIC VEGETATION COMMUNITIES: WETLAND

4.4.1 WET MEADOW

Wet Meadow is a unique community in a lowland field of the northern tract acquisition of WHFRTC. This community is dominated by wetland and upland forbs with a mixture of graminoid species and represents only 7 acres. Common forbs include common boneset *(Eupatorium perfoliatum)*, hairy white oldfield aster *(Symphyotrichum pilosum)*, rough cockleburr *(Xanthium strumarium)*, American water horehound *(Lycopus americanus)*, and seedbox *(Ludwigia alternifolia)*. Maintained through mowing, these species would quickly disappear if allowed to succeed back to forest.

4.4.2 DISTURBED LOWLAND FOREST/SHRUBLAND

Disturbed Lowland Forest/Shrubland community is found in lowland areas where widespread soil disturbance from mining activities has occurred[1]. Common canopy species include silver maple, red maple, sweetgum, river birch, and black willow. Understory species can include giant cane (*Arundinaria gigantea*), smallspike false nettle, lizard's tail, and carex sedges. Nepalese browntop and multiflora rose is aggressively spreading throughout this community in areas where flooding does not routinely occur.

4.4.3 DISTURBED HERBACEOUS WETLAND (PHRAGMITES)

Disturbed Herbaceous Wetland (Phragmites) community is characterized by areas heavily infested by common reed *(Phragmites australis)* and large enough to map (> 0.5 acre). This community is synonymous with Unstable Deposition- Phragmites of 2002.

4.5 NATURAL VEGETATION COMMUNITIES: UPLAND

4.5.1 ACIDIC MESOPHYTIC FOREST

Acidic Mesophytic Forest is a naturally occurring community, typically with soils that are rich and mesic and slightly to moderately acidic. On TA 8, characteristic canopy species include northern red oak, red hickory (*Carya ovalis*), sugar maple, and tuliptree. Pawpaw (*Asimina triloba*) and flowering dogwood (*Cornus florida*) are dominant in the mid-story. Common groundcover species include mayapple (*Podophyllum peltatum*), jack-in-the-pulpit (*Arisaema triphyllum*), great yellow woodsorrel (*Oxalis grandis*), and American hogpeanut (*Amphicarpaea bracteata*). This community is mainly influenced by acidic sandstone bedrock, but small, less acidic pockets within this community can influence the vegetation, allowing for species, such as chinkapin oak (*Quercus muehlenbergii*) and common hackberry (*Celtis occidentalis*), to be present in the canopy. The acidic mesophytic forest west of the large unconsolidated deposition north of the Cantonment Area is within the largest tract of land on the site that was not mined.

[1] The 2006 and 2002 surveys had varying descriptions and names for the disturbed lowland forest/shrubland community. The 2002 vegetation communities were matched to the 2006 disturbed lowland forest/shrubland community based on the descriptions of each community and the species that occurred within the corresponding vegetation communities. This community is synonymous with the disturbed forested wetland classification in the 2002 survey except that wet shrubland areas succeeding to lowland forests have been included.

Dominant tree species are American beech (*Fagus grandifolia*) and sugar maple. The oak species that are typical of this community type have mostly been removed. Understory, shrub, and ground cover are sparse under the full tree canopy. Dogwood is the most common understory tree. Acidic Mesophytic Forest (successional) is found within TA 7 and TA 8. Acidic Mesophytic Forest (successional) differs from the naturally occurring community in being a young forest (~20-50 years old) and typically invaded by weedy non-native and native species in the understory.

4.5.2 ACIDIC SUB-XERIC FOREST

Acidic Sub-Xeric Forest is a naturally occurring community with mostly sandstone bedrock and dry soils. The canopy is dominated by southern red oak (*Quercus falcata*), blackgum (*Nyssa sylvatica*), white oak (*Quercus alba*), and mockernut hickory (*Carya tomentosa*). Winged elm (*Ulmus alata*), devil's walkingstick (*Aralia spinosa*) and hickory saplings (*Carya* spp.) characterize the mid-story. The understory vegetation can be sparse to moderately developed with saw greenbrier (*Smilax bona-nox*), twoflower dwarfdandelion (*Krigia biflora*), wild comfrey (*Cynoglossum virginianum*), and licorice bedstraw (*Galium circaezans*) as typical components. Acidic Sub-Xeric Forest (successional) is found within TA 7 and TA 8. Acidic Sub-Xeric Forest (successional) differs from the naturally occurring community in being a young forest (~20-50 years old) and typically invaded by weedy non-native and native species in the understory.

4.6 ANTHROPOGENIC VEGETATION COMMUNITIES: UPLAND

4.6.1 NATIVE GRASSLAND (PLANTED)

This community consists mostly of grasses that have been introduced to convert Non-native Grassland to native warm-season grasses. Although not structurally or functionally similar to the original vegetation of the area, this vegetation supports flora and fauna that are part of the prairie ecosystem that existed in western Kentucky prior to settlement. The KYARNG has successfully planted switchgrass (*Panicum virgatum*) and big bluestem *(Andropogon gerardii).* Common weeds include purpletop tridens *(Tridens flavus),* Canada goldenrod *(Solidago canadensis*) and Chinese lespedeza (*Lespedeza cuneata*).

4.6.2 NON-NATIVE GRASSLAND

This community consists of grasses planted by coal companies as part of post-mine stabilization on newly contoured fields. Common grasses in these fields include tall fescue *(Lolium arundinaceum),* brome grasses *(Bromus inermis, B. japonicus,* and *B. racemosus)*, broomsedge *(Andropogon virginicus),* purpletop tridens and red fescue *(Lolium pratense).* Common weedy forb species are now also present, creating a mosaic within the community (typically dominated by grasses and less frequently by forbs). Common forb and semi-woody species include ragweeds *(Ambrosia artemisiifolia* and *A. trifida)*, Canada goldenrod, Chinese lespedeza, Japanese honeysuckle (*Lonicera japonica*), yellow sweetclover *(Melilotus officinalis)*, daisy fleabane *(Erigeron annuus),* hairy white oldfield aster *(Symphyotrichum pilosum var. pilosum*), and violet lespedeza *(Lespedeza violacea).*

4.6.3 NATIVE SHRUBLAND

Native Shrubland (successional) community is dominated by eastern redcedar *(Juniperus virginiana),* staghorn sumac (*Rhus typhina*), flameleaf sumac *(Rhus copallinum),* multiflora rose*,* Pennsylvania blackberry *(Rubus pensilvanicus)*, coralberry *(Symphoricarpos orbiculatus),* and winged elm. All but the multiflora rose are native species. Most of these shrublands are Non-native Grassland communities that have not been mowed and are succeeding back to forest, and thus have some woody component. Therefore, some areas are dominated more by grasses and forbs, others are dominated more by shrub and small tree species, and some are succeeding into a young forest community.

4.6.4 NON-NATIVE SHRUBLAND

Non-native shrubland describes an early successional cover type dominated by non-native invasive shrubs that may eventually be overtaken by native trees[2]. The key distinction between this community from the Native Shrubland is simply the presence of more non-native shrubs than native shrubs. The most dominant species in the Non-native Shrubland are Russian and autumn olives *(Elaeagnus angustifolia and E. umbellata)*. Multiflora rose and Chinese lespedeza can also be a distinctive component of this community. These non-native species have been planted and are aggressively spreading and suppressing native grasslands, shrublands, and woodlands. Because of their invasive nature, these shrubs are a threat to native communities. However, Bell's Vireo (*Vireo bellii*) frequent open patches of autumn and Russian olives and build their nests in shrubs that are over 4 to 5 feet tall (Hands, Drobney, and Ryan 1989).

4.6.5 HIGHLY–DISTURBED DECIDUOUS FOREST

The highly-disturbed deciduous forest cover type is a very broad description forest cover type that overlaps with some other plant communities[3]. In the 2006 plant survey, forested areas were classified as highly–disturbed deciduous that would have been classed as mixed mesophytic using 2002 nomenclature. This forest is most abundant throughout the property due to widespread soil disturbance from mining activities. Dominant canopy species include sweetgum, red maple, winged elm, and American sycamore (*Platanus occidentalis*). Dominant mid-story species can include multiflora rose, thickets of sweetgum and red maple, and greenbrier (*Smilax* spp.). In many areas, the groundcover can be dominated by Japanese honeysuckle or Nepalese browntop. Violets (*Viola* spp.), poison ivy, and Christmas fern can also be commonly found in the groundcover layer.

4.6.6 PINE COMMUNITY

Pine community occurs in all sections of WHFRTC[4]. The pines occurring at the WFRTC are yellow pine (*Pinus echinata*), Virginia pine (*Pinus virginiana*), and loblolly pine (*Pinus taeda*). Although not a natural part of the landscape in the region, these pines serve as important habitat for a variety of birds, including some that are very rare in the state, for example the Long-eared Owl (*Asio otus*). Because of the density of the pine canopy and the thick pine litter, few other plant species grow in these pine-dominated areas. Some of the pines were planted and others have invaded disturbed sites. Although not a natural part of the landscape in the region, these pines serve as important habitat for a variety of birds, including some that are very rare in the state, for example the Long-eared Owl. Because of the density of the pine canopy and the thick pine litter, few other plant species grow in these pine-dominated areas.

Pine management is planned for an area in the FLS Training Area surrounding the airstrip. This area needs to be cleared of woody vegetation for mission reasons, i.e., to return the airstrip to Federal Aviation Administration (FAA) compliance. Thinning of the pine stand in TA 4 may be programmed in the future, depending on the price of pine. If the price rises sufficiently to make the project economically attractive, the KYARNG will request a bid from contractors for harvesting.

4.7 FISH AND WILDLIFE

Fauna at WHFRTC are recorded as they are sighted by WHFRTC staff, in addition to surveys at WHFRTC concuded between 1993 and 2002 by KSNPC and KDFWR. A variety of techniques have

[2] This cover type was called Exotic Mixed Shrubland in the 2002 survey.

[3] This forest type has properties similar to the disturbed lowland forest/shrubland cover type in section 4.4.2. For the purposes of this plan, the various mixed mesophytic woodland cover types from the 2002 survey were assigned to either the 2006 highly-disturbed deciduous forest category or the 2006 disturbed lowland forest/shrubland category based on predominant species.

[4] The Pine community was present within both the 2006 and 2002 surveys. Species compositions were similar for each so they were easily combined into a single cover type for the WHFRTC.

been used, including overturning rocks, logs, and other debris; listening for calls; pitfall traps; mist-netting; seine or hand-picked; point-counts; and walking surveys (White et al. 1995; KDFWR 2001; Snyder and Sendlein 1997a; Houp 1997; Houp 1999). **Appendix D** lists species observed at WHFRTC and in Muhlenberg County.

4.7.1 MAMMALS

Twenty nine species of mammals have been recorded at WHFRTC (White et al.1995; KSNPC 2002, KYARNG, 2008). Many of the common mammal species found throughout Muhlenberg County were also found at WHFRTC, such as coyote (*Canis latrans*), white-tailed deer (*Odocoileus virginianus*), eastern cottontail rabbit (*Sylvilagus floridanus*), deer mouse (*Peromyscus maniculatus*), raccoon (*Procyon lotor*) and striped skunk (Mephitis mephitis) (KDFWR 2007). Four bat species were mist-netted at the training site, two of them are rare species.

4.7.2 BIRDS

Since 1993, a wide variety of birds have been identified by direct observation, point counts, or song identification during surveys of the WHFRTC (White et al.1995; KDFWR 2001). Many of these species hold priority conservation status. The WHFRTC falls within the Interior Low Plateaus Physiographic Region (Ford et al. 2000), where approximately 150 species of birds are known to nest. **Appendix D** contains a bird species list for WHFRTC.

The Partners in Flight Conservation Plan for the Interior Low Plateaus (Ford et al. 2000) has identified the Whip-poor-will (*Caprimulgus vociferous*) as a high priority hardwood forest-dependent bird. The Prairie Warbler (*Dendroica discolor*), Henslow's Sparrow (*Ammodramus henslowii*), and Dickcissel (*Spiza americana*) have been identified as high-priority grassland-dependent birds. All four species and their priority habitats have been documented at WHFRTC (White et al.1995; KDFWR 2001; Littlefield and Yahn 2006).

The following grassland-dependent species of regional concern or that are threatened throughout their range have also been identified at the training center: Northern harrier (*Circus cyaneus*), Northern bobwhite (*Colinus virginianus*), Short-eared Owl (*Asio flammeus*), Long-eared Owl (*Asio otus*), Savannah Sparrow (*Passerculus sandwichensis*), Song Sparrow (*Melospiza melodia)*, Bell's Vireo *(Vireo bellii)*, Bobolink (*Dolichonyx oryzivorus*), Lark Sparrow (*Chondestes grammacus*), and Grasshopper Sparrow (*Ammodramus savannarum*) (White and Yahn, 2006).

4.7.3 REPTILES AND AMPHIBIANS

Eighteen (18) reptiles and 13 amphibians have been recorded at WHFRTC (White et al. 1995; KDFWR 2001, KYARNG 2008). The Southern leopard frog (*Rana sphenocephala*) has been identified as a Kentucky amphibian species of greatest conservation need within the Kentucky Comprehensive Wildlife Strategic Action Plan (KCWCS 2005). WHFRTC has several of the habitat types (emergent and shrub-dominated wetlands, forested wetland, standing water and upland forest) required by this frog species (Littlefield and Yahn 2006).

4.7.4 FISH AND AQUATIC INVERTEBRATES

As part of the biological inventory, Laudermilk, Winters, McMurray, and Cicerello (1993) sampled six sites for aquatic fauna (mollusks, crayfishes, insects, and fish): 1) Cypress Creek at KY 601; 2) Cypress Creek at Cedar Grove Road; 3) Cypress Creek at KY 181; and 4) Cypress Creek at the wetland approximately 0.4 km north of KY 81; 5) Little Cypress Creek at the Western Kentucky Parkway crossing; and 6) Little Cypress Creek at KY 70. The aquatic survey identified 12 species of fish and 59 species of insects (**Appendix D**).

Adult and larval macroinvertebrates were collected from 10 sites in waters draining the WHFRTC in 1997 and 1999 (Snyder and Sendlein 1997a; Houp 1997; Houp 1999). Samples were collected from locations where the greatest number and diversity of invertebrates in the stream were most likely to occur; as

inferred by the substrate, depth, flow, and canopy cover. The sites were not suitable for quantitative analysis due to habitat restrictions; therefore, qualitative methods were used (select pickings and triangular kick-net), which insured that all available habitat/microhabitats for invertebrates were sampled.

Nine of the 10 sites sampled contained macroinvertebrates; with a total number of species at any one site ranging from 3 to 24 species (in 1997) and 2 to 14 species (in 1999). A total of 44 species were collected from all sites in 1997; and 26 species were collected in 1999. The difference in scarcity of aquatic macroinvertebrates in the 1999 may be accounted for by higher water levels during the sampling time (early April).

Odonates (damsel and dragonflies), Diptera (true flies), and Trichoptera (caddiflies) were the most diverse orders of macroinvertebrates found in sampled sites in 1997; whereas, in 1999, Odonates, Diptera, and Coleoptera (beetles) were the most speciose orders found in the same sample sites. The difference in occurrence and distribution of species may be accounted for by the earlier collection period (early April in 1999) versus the 1997 study, which was conducted in late May. Collections from all sites represented some of the most tolerant organisms to environmental disturbances, *sensu* Hart and Fuller (1974). This is not unexpected considering the highly disturbed conditions at the site, which resulted from the mining process. For comparison, a natural area in Cypress Creek had abundances of Coleoptera (beetles), Diptera (true flies), and Hemiptera (true bugs) (Harker et al. 1980).

4.8 RARE, THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

Eleven (11) state-listed animal species were identified at WHFRTC during the monitoring surveys (White et al.1995; KDFWR 2001; KDFWR 2007), including one bat species (*Myotis grisescens*) with dual status as a federally listed endangered species. In addition, the purple fringed orchid (*Platanthera peramoena*) has been observed at WHFRTC; this rare plant species does not currently have a special status designation in Kentucky. Forty-two other rare plant and animal species are found within Muhlenberg County (see **Appendix D**).

The training site includes a wide variety of representative habitat types found throughout the county; including grasslands, forests, and riparian, wetland, and aquatic ecosystems. Management of these areas will help to benefit listed species should they utilize habitats on the training site for foraging, roosting, breeding or wildlife corridors. Future plant and animal surveys are needed to determine if any of these species already exist at WHFRTC. Rare species documented at WHFRTC are listed in **Table 14**.

4.8.1 PLANTS

A survey for federally and state threatened, endangered, and rare plant species was performed during the biological inventory of the WHFRTC in 1993 (White et al. 1995) and updated in by the KYSNPC in 2002 and 2006 (KSNPC 2002; Littlefield and Yahn 2006). Many common plant species were identified during the biological inventory and are catalogued in **Appendix D**. No federally listed plants were identified during these inventories. One rare plant species, the purple fringeless orchid (*Platanthera peramoena*) has been identified at the training site. The orchid does not currently have special status in Kentucky, but does have state-listed designation in several nearby states: Arkansas, Pennsylvania, Maryland and New Jersey (USDA-NRCS 2007). Buffalo clover (*Trifolium reflexum*) was recognized as a state-listed endangered species that could potentially occur on the site, but was not located during the survey. Ten other state-listed plants could potentially occur at WHFRTC, but have not been located during surveys.

4.8.2 ANIMALS

During a biological inventory of WHFRTC between the years of 1993 and 1995 and again in 2002, KSNPC searched for federal and state listed animal species (White et al. 1995; KSNPC 2002). Researchers documented 11 species with federal and/or state designations at the training site. Specimens of amphibians, reptiles, and small mammals collected in traps were deposited at the United States National Museum at the Smithsonian Institution in Washington, D.C. (White et al. 1995). Muhlenberg County lists an additional 32 species with federal and/or state designations (KDFWR 2007).

4.8.2.1 MAMMALS

Only two mammals with priority conservation status were found at WHFRTC, the federally listed endangered gray bat (*Myotis grisescens*) and the state-listed "species of special concern" evening bat (*Nycticeius humeralis)*. Both bats were mist-netted at the same site over Cypress Creek, near Highway 601. The gray bat was netted in 1993 and the evening bat in 2002. Three additional mammal species with federal and/ or state-listed designations are documented within Muhlenberg County. While the USFWS does not have occurrence records for the federally endangered Indiana bat (*Myotis sodalis*) within Muhlenberg County, suitable habitat for the species is found at WHFRTC and surrounding areas.

4.8.2.2 BIRDS

Surveys in 1995 and 2002 at WHFRTC documented nine state-listed threatened, endangered or "species of special concern" birds (White et al. 1995; KDFWR 2001). Twenty-two additional birds with priority conservation status have been observed in Muhlenberg County (KDFWR 2007). Habitat for these birds is potentially available at WHFRTC and future avian surveys may also indicate their presence at the site.

4.8.2.3 FISH

Surveys at WHFRTC did not document any rare species. The training site does have potential aquatic areas that could provide habitat for state-listed threatened, endangered or "species of special concern" fish species.

4.8.2.4 REPTILES AND AMPHIBIANS

Although no rare species were documented at WHFRTC, there are five state-listed threatened, endangered or "species of special concern" reptile and amphibian species that are known to occur in Muhlenberg County (KDFWR 2007). One snake species, Copperbelly water snake (*Nerodia erythrogaster neglecta*), also carries dual status as a federally threatened species. WHFRTC fulfills the habitat requirements (forested wetlands, well-drained forested (oak/pine) upland habitats, wet meadows and slow moving waters) needed for many of these rare species. Further surveys will need to be conducted in order to confirm their presence at WHFRTC. Species are listed in **Table 13**.

TABLE 14. THREATENED, ENDANGERED AND STATE-LISTED SPECIES DOCUMENTED AT WHFRTC

SPECIES		ECOSYSTEM				STATUS/RANKING		
SCIENTIFIC NAME	COMMON NAME	G	F/C	R	W/A	FEDERAL	STATE	GLOBAL
Plant Species Documented at WHFRTC								
Platanthera peramoena	Purple fringeless orchid				X	--	--	G5/ S3S4
Animal Species Documented at WHFRTC								
BIRDS								
Ammodramus henslowii	Henslow's	X		-	--	--	S	G4/S3B
Ardea herodias	Sparrow	-	-	X	X	--	S	G4/S3B, S4N
Asio flammeus	Great Blue Heron	X	-	-	-	--	E	G5/S1B, S2N
Asio otus	Short-eared Owl	X	-	X	-	--	E	G5/S1B, S1S2N
Chondestes grammacus	Long-eared Owl	X	-	-	-	--	T	G5/S2S3B
Circus cyaneus	Lark Sparrow	X	-	-	-	--	T	G5/S1S2BS4N
Dolichonyx oryzivorus	Northern Harrier	X	-	-	X	--	S	G5/S2S3B
Passerculus sandwichensis	Bobolink	X	-	-	X	--	S	G5/S2S3BS2S3
Vireo bellii	Savannah sparrow Bell's Vireo	X		-	X	--	S	N G5/S2S3B
MAMMALS								
Myotis grisescens	Gray Bat	-	-	-	X	E	T	G3/S2
Nycticeius humeralis	Evening Bat	-	X	-	X	--	S	G5/S2S3

FEDERAL STATUS
E = Endangered = Endangered throughout range
T = Threatened = Threatened throughout range
PS = Partial status - indicating that the status applies only to a portion of the species' range.

GLOBAL RANK DEFINITIONS
Basic Rank:
G1 = Critically imperiled
G2 = Imperiled
G3 = Vulnerable
G4 = Apparently secure
G5 = Secure
? = Rank Uncertain
T# = Infraspecific Taxon rank

NATIONAL (N) AND SUBNATIONAL (S) CONSERVATION STATUS RANKS For full description visit:
http://www.natureserve.org/explorer/ranking.htm#interpret

KENTUCKY STATE NATURE PRESERVES COMMISSION STATUS
E = endangered
T = threatened
S = special concern
H = historic
X = extirpated
N = none
S1 = Critically Imperiled
S2 = Imperiled
S3 = Vulnerable
S4 = Apparently Secure
S5 = Secure

ECOSYSTEM
G = Grasslands
F/C = Forests/Clifflines
R = Riparian
W/A = Wetland/Aquatic

Source: Calibre Systems 2002, KSNPC 2006, KDFWR 2007, NatureServe 2006

4.9 INVASIVE/EXOTIC PEST SPECIES

4.9.1 PLANT SPECIES

One hundred and four (104) non-native plant species have been recorded on WHFRTC, representing approximately 17 percent of the total flora (Littlefield and Yahn 2006). The proportion of weeds and exotic plant species in the flora indicate a fairly high degree of disturbance. While this is below the average for percent of non-native plants in Kentucky, the abundance of these non-native species is generally very high (Littlefield and Yahn 2006). Many of these species were planted when the site was reclaimed after strip-mining and are important for soil formation and soil retention on the site.

The Kentucky Exotic Pest Plant Council (KY-EPPC), as part of the Southeast EPPC, considers numerous plant species in Kentucky to be invasive (KY-EPPC 2006). The KY-EPPC was established in 2000 to raise awareness and promote public understanding regarding the threat posed by invasive exotic pest plants to native plant communities in Kentucky. KY-EPPC maintains a list of invasive exotic pest plants for the state of Kentucky. Biological inventories (White et al., 1995, White and Yahn, 2006) identified 51 plant species at WHFRTC that are considered invasive exotic pest plants by the KY-EPPC (EPPC, 2006). These species are listed in **Table 15**. The most problematic species documented at the training site are: musk thistle (*Carduus nutans*), Chinese lespedeza (*Lespedeza cuneata)*, Common reed (*phragmites spp.)*, and Johnson grass (*Sorghum halepense).* These species are controlled to some extent at WHFRTC. Since 1996, the exotic musk thistle has been actively controlled with herbicide applications of Roundup, introduction of a native weevil, prescribed fire, and replanting of areas infested with the weed. Populations of musk thistle in TA 3 have been reduced due to the spread and proliferation of native grasses within areas that opened up after a wildfire in 1999.

TABLE 15. INVASIVE/ EXOTIC PEST PLANT SPECIES AT WHFRTC

KY-EPPC MANAGEMENT PRIORITY	COMMON NAME	SCIENTIFIC NAME	KY-EPPC RATING
Severe Threat	Asian bittersweet Common chickweed Common reed C* Chinese lespedeza C* Chinese silvergrass Johnson grass C* Multiflora rose Musk thistle C* Purple crownvetch P* Russian olive Tree of heaven	*Celastrus Orbiculata* *Stellaria media* *Phragmites australis* *Lespedeza cuneata* *Miscanthus sinensis* *Sorghum halepense* *Rosa multiflora* *Cardus nutans* *Coronilla varia* *Elaeagnus angustifolia* *Ailanthus altissima*	High-monitor, control, do not plant
	Amur (bush) honeysuckle Common chickweed Japanese honeysuckle Nepal grass/Japanese stilt grass Autumn olive White sweet clover Yellow sweet clover	*Lonicera maackii* *Stellaria media* *Lonicera japonica* *Microstegium vimineum* *Elaeagnus umbellata* *Melilotus alba* *Melilotus officinalis*	Medium-monitor, control if needed, do not plant

TABLE 15. INVASIVE/ EXOTIC PEST PLANT SPECIES AT WHFRTC

KY-EPPC MANAGEMENT PRIORITY	COMMON NAME	SCIENTIFIC NAME	KY-EPPC RATING
Significant Threat	Common periwinkle	*Vinca minor*	Medium-monitor, control if needed, do not plant
	Ground ivy	*Glechoma hederacea*	
	Ivy-leaved morning-glory	*Ipomoea hederacea*	
	Japanese bristlegrass	*Setaria faberi*	
	Kentucky bluegrass	*Poa pratensis*	
	Korean lespedeza P*	*Lespedeza stipulacea*	
	Oriental ladysthumb	*Polygonum caespitosum*	
	Queen Anne's lace	*Daucus carota*	
	Shrubby lespedeza	*Lespedeza bicolor*	
	Silktree	*Albizia julibrissin*	
	Smooth brome	*Bromus inermis*	
	Spotted ladysthumb	*Polygonum persicaria*	
Lesser Threat	Alsike clover P*	*Trifolium hybridium*	Low-monitor, do not plant
	Asiatic dayflower	*Commelina communis*	
	Barnyard grass	*Echinochloa crus-galli*	
	Black medic	*Medicago lupulina*	
	Chicory P*	*Cichorium intybus*	
	Common self-heal	*Prunella vulgaris*	
	Common yellow oxalis	*Oxalis stricta*	
	Deadnettle; henbit	*Lamium amplexicaule*	
	Deptford pink	*Dianthus armeria*	
	Garden yellow rocket	*Barbarea vulgaris*	
	Lamb's quarters	*Chenopodium album*	
	Orange daylily	*Hemerocallis fulva*	

Kentucky Exotic Pest Plant Council (KY-EPPC, 2000)

RANK 1. "SEVERE THREAT". Exotic plant species that possess characteristics of invasive species and spread easily into native plant communities and displace native vegetation; includes species that are or could become widespread in Kentucky.

RANK 2. "SIGNIFICANT THREAT". Exotic plant species that possess characteristics of invasive species but are not presently considered to spread as easily into native plant communities as those species listed as Rank 1.

RANK 3. "LESSER THREAT". Exotic plant species that spread in or near disturbed areas; and are not presently considered a threat to native plant communities.

C* = actively controlled at WHFRTC

P* = planted when necessary at WHFRTC for soil stabilization on previously mined lands

4.9.2 ANIMAL SPECIES

Two exotic bird species were also documented at the site; the Brown-headed cowbird (*Molothrus ater*) and the European starling (*Sturnus vulgaris*) (White et al. 1995). Cowbird parasitism apparently is contributing to the decline of some songbird populations by reducing the reproductive success of the host species (Natureserve 2006). In the eastern U.S., birds have only recently been exposed to brood parasitism (Mayfield 1977, Brittingham and Temple 1983), and many species lack appropriate responses to minimize the impact of cowbird parasitism. Starlings commonly usurp the nest sites of native cavity-nesting birds (e.g., bluebirds and woodpeckers) (Natureserve 2006). However, an examination of Christmas Bird Count and Breeding Bird Survey (BBS) data found that few, if any, native species have showed significant declines that could be attributed to starling competition (Natureserve 2006). Only sapsuckers exhibited declines potentially attributable to starlings that were not countered by other data (Koenig 2003).

SECTION 5: MISSION IMPACTS ON NATURAL RESOURCES

5.1 CURRENT POTENTIAL IMPACTS

5.1.1 MINIMUM IMPACT TRAINING

Types of training activities that generally have a minimal impact on natural resources at the WHFRTC include: small unit infantry tactics; reconnaissance; terrain and map analysis; escape and evasion tactics; infiltration tactics; land navigation; patrolling; and engineer maintenance, repair, and minor construction project training. Some of these types of training require undisturbed cover to conceal movements. Others utilize existing roads, hardened trails, and infrastructure. As such, the disturbance is no greater than walking through the woods or open areas or driving down a road, and would normally require no extraordinary precautions, limitations or restrictions. Aviation training (rotary wing only) is also considered minimum impact training. Aviation operations tend to be of short duration and relatively quick moving.

Aviation training (nap of the earth, hot and cold refueling, sling load, aerial drop, and simulated aerial spray training) is also considered minimum impact training. Aviation operations tend to be of short duration and relatively quick moving. Based on bird and other biological survey data, no negative impacts on wildlife populations are known. The dense vegetative cover throughout the WHFRTC generally prevents dust and soil erosion problems associated with rotor wind.

5.1.2 MAXIMUM IMPACT TRAINING

Training that disturbs the site's soil and/or vegetation has more potential to impact natural resources at the WHFRTC. Impacts to soil and water resources may have secondary impacts to water quality, fish populations and wildlife. Such disturbances may require corrective actions such as leveling ruts, adding soil, seeding, mulching, and/or installation of erosion control devices, sedimentation structures, or other management practices. Training activities at the WHFRTC that have potential to cause soil or vegetation disturbance include: tactical concealment/ bivouac; off-road cold or wet weather operations; certain cover and concealment training; field fortifications; obstacle training; breaching and clearing operations; mobility and counter mobility operations; and construction activities (military and contracted civilian).

5.2 FUTURE POTENTIAL IMPACTS

As the maneuver areas and TAs at the WHFRTC expand, this document and the expertise of the KYARNG Environmental Office may be used to identify the areas that are best suited for certain types of training. Future mission planning requirements can be determined through a multidisciplinary team approach that identifies resource management goals, establishes management objectives to meet those goals, and then determines specific practices that can be implemented to achieve the objectives and goals. Since the INRMP is a living document, specific natural resources in specific areas may be addressed, modifying or adding to existing goals and objectives of the INRMP, and the document updated as needed.

The ultimate goal of this INRMP, as well as its subsequent additions or revisions, is to ensure continuous military training capability for the KYARNG, while managing for the mutual sustainability of the natural resources at the WHFRTC. The development and implementation of an active ecosystem management program will accommodate the KYARNG's training mission, while emphasizing a holistic, adaptive management style that focuses on maintaining biological diversity. Future development of the WHFRTC to meet the training needs of the KYARNG is summarized in **Section 2.0**. The primary environmental impacts associated with training site development will be to soil arising from construction of buildings, tank trails and ranges. Associated with these is the potential for impacts to surface water and wetland resources. Specific impacts from training site development are reviewed in separate NEPA documents.

Natural resource management techniques, policies, and procedures identified in this plan will be used to facilitate development for military training while minimizing environmental impacts. With the exception of areas specifically marked as off-limits (area north of Training Area 4), the entire WHFRTC are available to support training of one type or another within the capability of the land. Jurisdictional wetland delineations and archeological surveys will be completed prior to any land disturbing development. These surveys, along with general natural resource management practices identified in this plan, will enable the KYARNG to successfully develop the training site to meet mission requirements. Adequate advance planning and design in support of training site development will minimize impacts from the military mission on natural resources and provide for long term sustainability of the land to support training.

Once the training site is fully developed, the ongoing training may result in some vegetation and soil disturbance. The training site will be managed in accordance with the land and ecosystem ability to support such disturbance. In TAs receiving high amounts of disturbance, erosion control measures, such as silt basins and vegetative filter strips, will be implemented. Soil disturbance will be monitored and land rehabilitation projects initiated to restore damaged areas. Disturbed areas will be leveled and vegetated and the areas rested until capable of supporting training again. Training also has the potential to impact wetlands and cultural sites. These areas will be delineated and designated as restricted access areas, or other training-related obstacles, as a way to keep them from being disturbed. Off road vehicle traffic is permitted in accordance with soil conditions. Tracked vehicle trails and roads are regularly used and off road traffic is permitted on a site-specific basis when the soil conditions are conducive to support such traffic. Disturbance to vegetation is expected to be minor. Hardened bivouac sites are used when possible, and troops are not permitted to cut standing trees for cover. Other techniques, such as covering tree root areas with mulch can be used to minimize soil compaction and root damage in heavily trafficked areas. Once the training site is fully developed and managed, the actual military training is anticipated to have minimal, if any, negative impacts on natural resources.

Non-training activities that disturb natural resources include facility maintenance and new construction. Maintenance consists of vegetation control (mostly mowing) around active fence lines, power lines, railroad tracks, roadside ditches, buildings, road surfaces, parking lots, ranges, ponds, and wildlife management areas. Herbicides are used to augment and support vegetation control efforts and in areas where mowing is not possible or appropriate. Controlled burning is used on ranges to maintain grassland habitat conducive to range operations and occasionally in other areas exclusively for grassland habitat management. Controlled burns are done in conjunction with KYARNG Fire and Rescue. New construction has a permanent impact on natural resources by totally modifying the landscape within the construction zone and where the structure or facility is constructed. Construction has the potential for temporary impacts to soil and surface water quality from erosion. Impacts are expected to be negligible because the KYARNG has such vast habitat; projects are sited in areas with the least potential for negative impact to the environment; and erosion control measures are implemented during construction. Occasionally, small amounts of timber must be salvaged as part of a demolition or construction project. All operations are done in accordance with the requirements of this plan and soil erosion control and stabilization practices are used. All bare earth areas are seeded with native grass seed mixes.

5.3 NATURAL RESOURCES NEEDED TO SUPPORT THE MILITARY MISSION

The KYARNG requires a mixture of open and forested land areas to support military training requirements. Realistic training is dependent upon an intact natural setting. Degraded training lands, soil erosion, degraded forests, and silted streams may limit or prevent sustainable long-term training. Degradation of natural resources results in inadequate training, impaired readiness, and wasted training dollars. Maintaining healthy ecosystems keeps the training land continuously available for use by soldiers. Healthy ecosystems are resilient and can support long term training needs. The KYARNG needs the land and its natural resources to function together in a healthy ecosystem, to support training.

5.4 NATURAL RESOURCES CONSIDERATIONS FOR MISSION PLANNING AND INITIATION

The primary goal of this INRMP is to manage natural resources ***to support the military mission*** in a manner consistent with sound conservation principles and in compliance with federal and state laws, army regulations and policies. Training success is only possible through a supportive, proactive natural resource management program. The KYARNG natural resource management program aims to minimize the impacts of normal training use on natural resources, and complements the doctrinally required military training conducted. Proper execution of the INRMP provides sustainable training lands, and provides adaptive means of dealing with normal training impacts, thereby protecting natural resources. Many features of this plan contribute to its ability to provide sustainable training lands. Some of these features are techniques, practices and procedures, which include immediate repair and restoration of terrain damage, "resting" repaired terrain while vegetation is re-established, minimizing off-road vehicle activity when soil is saturated, posting wetlands as no-go areas, and establishing rotational use of field bivouac sites. Other features provide for "hardening" of areas frequently used for training, to minimize impacts on natural resources within the surrounding areas. Permanent stream crossing sites are another example of these Best Management Practices (BMPs), which minimize damage to vegetation, soil loss, erosion, and sedimentation. Natural resources management will facilitate the accomplishment of the military mission.

Ideal times to schedule training from a climate perspective would be from May to October, when rainfall is at its lowest for the year. Maneuver damage (ruts, disturbed vegetation, and bare soils) caused during this training period would be exposed to minimal erosion factors (wind and rain) during these months. Areas needing rehabilitation can then be revegetated in the late fall, when rainfall increases and soils are trafficked less.

Training at the WHFRTC is conducted in accordance with KYARNG Regulation 350-7, “Training Site Regulation, Wendell H. Ford Regional Training Center” (KYARNG 1997). Chapter 10 of the Regulation includes environmental management protection and conservation policies and procedures (**Appendix E**). Refer to **Section 6.0** for additional information on how to properly manage natural resources limitations during mission planning. Laws and regulations that pertain to these natural resources are also incorporated into **Section 6.0**.

Unit Commanders who desire to train at WHFRTC are required to complete an Environmental Pre-Activity Survey for training activities. KYARNG is planning to update the survey in the near future. A sample survey form is provided in **Appendix F**. The survey must be sent through the Training Site Commander to the Environmental Program Manager before the planned training may be conducted. The Environmental Program Manager will evaluate the survey, determine ways to minimize the impacts of the training, and determine if permits are needed to conduct the described training. The survey is signed and sent to the unit with a list of requirements to conduct the training while minimizing impacts to the environment. If significant changes or additions are made to the training plans, an additional survey must be submitted describing the new training. This system emphasizes preventing rather than repairing damage to the training site.

SECTION 6: NATURAL RESOURCES PROGRAM MANAGEMENT

6.1 NATURAL RESOURCES PROGRAM MANAGEMENT

Per DoD Supplemental Guidance, the 2003 INRMP was reviewed "as to operation and effect," to determine whether it is developed per NGB and Army policy, meets the intent of the Sikes Act, and contributes to the conservation and rehabilitation of natural resources on military installations. Intra- and inter-agency cooperation, coordination, and communication at the Federal, State and local levels (for example, USFWS and KDFWR) are requisite to the success of the updated INRMP. The USFWS and KDFWR review the plan and concur with its contents. Concurrence from the USFWS on this updated INRMP is provided in a letter dated 10 June 2010. Concurrence from the KDFWR on this updated INRMP is provided in a letter dated 5 May 2010 (**Appendix B**).

6.1.1 ADMINISTRATIVE AND TECHNICAL SUPPORT

The Natural Resources Program at the WHFRTC is administered by the KYARNG Environmental Program Manager, located in Frankfort, Kentucky, whose responsibilities are listed in **Table 16.** The Environmental Program Manager also receives support from the Environmental Office staff, each of whom has significant duties in addition to natural resources support.

TABLE 1611. RESPONSIBILITIES OF THE KYARNG ENVIRONMENTAL PROGRAM MANAGER

RESPONSIBILITY	
1	Implement this updated INRMP.
2	Provide oversight and coordination with other agencies.
3	Coordinate with the SRP Coordinator to ensure sustainable management of training lands.
4	Develop and implement programs to ensure the inventory, delineation, classification, and management of wetlands, scenic areas, endangered and threatened species, sensitive and critical habitats, and other natural resource areas of special interest.
5	Provide for the training of natural resources personnel.
6	Maintain natural resources management records.
7	Review NEPA documents, remedial action plans, construction designs and proposals to ensure adequate natural resource protection and consideration of technical guidance presented in this updated INRMP.
8	Evaluate training mission impacts and provide guidance to trainers.
9	Coordinate the Cultural Resources program and Section 106 compliance.
10	Coordinate with local, State, and Federal governmental and civilian conservation organizations with respect to the WHFRTC natural resources management program.
11	Coordinate hunting and fishing programs.
12	Implement and execute AR 200-1.
13	Assist the Adjutant General in prioritizing natural resources and compliance funding.

Source: KYARNG

6.1.2 COOPERATIVE AGREEMENTS AND TECHNICAL ASSISTANCE

Specialized expertise is often required to adequately manage KYARNG natural resources. Technical assistance will be sought from Federal and State agencies, universities, and special interest groups. Intra- and inter-agency cooperation, coordination, and communication at the Federal, State and local levels are requisite to the success of the INRMP. The Environmental Program Management Office has a strong relationship with such groups. Additional labor resources may include Federal and State agencies, State agencies; Local and regional Universities; Scouting groups; and Special interest groups (for example, Audubon Society, Boy Scouts, and sportsmens' clubs).

6.1.2.1 FEDERAL AGREEMENTS

The DoD and subcommand entities have memorandums of agreement (MOA), MOUs and other cooperative agreements with other federal agencies, interest groups, and various state agencies in order to provide assistance with natural resources management at installations across the United States. Generally, these agreements allow installations and agencies or interest groups to obtain mutual conservation objectives. The DoD agreements applicable to the WHFRTC are listed in **Table 17.** A copy of these agreements is maintained by the Environmental Program Manager.

TABLE 17. DEPARTMENT OF DEFENSE COOPERATIVE AGREEMENTS APPLICABLE TO WHRTC

TYPE		COOPERATING AGENT	SUBJECT
1	MOU	USFWS	Ecosystem-based management of fish, wildlife, and plant resources on military lands
2	Cooperative Agreement	The Nature Conservancy	Assistance in natural resources inventory
3	MOA	National Biological Service of the Department of the Interior	Professional and Technical Assistance Conducting Biological Surveys, Research and Related Activities
4	MOU	USEPA	Integrated Pest Management (IPM)
5	MOA	Over 110 Federal and State agencies and non-governmental organizations	Federal Neotropical Migratory Bird Conservation Program (Agreement is among DoD, and through each of the Military Services)
6	MOU	U.S. Department of Agriculture, Natural Resources Conservation Service	Watershed and Environmental Enhancement of U.S. Army Installations (Agreement is with U.S. Army Environmental Center)
7	Interagency Agreement	U.S. Department of the Interior, USFS	Natural and Cultural Resources Support to ARNG Installations (Agreement is with ARNG)
8	MOU	Ducks Unlimited, Inc.	Cooperative development of selected wetlands and associated uplands to maintain and increase waterfowl populations and fulfill objectives of the North American Waterfowl Management Plan, within the context of DoD's environmental security and military missions
9	MOU	Bureau of Land Management, USFWS, National Park Service (NPS), Bureau of Reclamation, USFS, Defenders of Wildlife, Izaak Walton League, National Audubon Society, National Wildlife Federation.	Watchable Wildlife Programs

6.1.2.2 STATE AND LOCAL AGREEMENTS

The WHFRTC INRMP is reviewed and signed by the KDFWR and in a sense functions as a cooperative agreement. It is a cooperative plan that identifies how the KDFWR and the KYARNG will work together to meet mutual conservation objectives.

The coordination and regulation of hunting and fishing at the training site is through a joint effort of both WHFRTC and KDFWR. Persons eligible to hunt at WHFRTC must obtain both the Kentucky general state hunting and fishing licenses, as well as the WHFRTC site permits.

6.1.2.3 FEDERAL AGENCY COORDINATION AND TECHNICAL ASSISTANCE

***U.S. Army Corps of Engineers* -** The USACE issues Section 401 and 404 permits. The KYARNG works closely with the USACE-Louisville District in any permitting or planning efforts during FY 2003. The WES is headquarters for the U.S. Army Engineer Research and Development Center (ERDC). WES assists KYARNG with wetland management and mapping. The Station produced a comprehensive wetland PLS of WHFRTC, including values and functions of wetlands and recommendations for management. A supplement to the wetland PLS was conducted in 2005 for TA 7 and 8,

***U. S. Fish and Wildlife Service* -** The USFWS is the principal federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The agency also enforces federal wildlife laws, manages migratory bird populations, conserves and restores wildlife habitat such as wetlands, and administers the ESA. USFWS is a cooperating agency in development of this plan. The agency is responsible for reviewing the INRMP and providing guidance on federally listed species, species of management concern, and wetland management. **Appendix B** contains coordination with agencies for the protection and management of fish and wildlife at the WHFRTC.

***Natural Resources Conservation Service* -** The NRCS has been an active partner in assisting the KYARNG to manage the natural resources on the training site. In 1994, the NRCS developed a resource conservation plan for the site. After identifying problem areas, the NRCS then produced an engineering design, construction/material specifications and estimated costs for the highest priority erosion site on the WHFRTC. NRCS will continue to be a major partner in the LRAM program. This support is provided through the MOU listed in **Section 6.1.2.1**.

***U.S. Forest Service* -** The USFS can assist the KYARNG in conducting timber inventories and developing tree planting specifications through the Interagency Agreement between the ARNG and the USFS. The USFS can also assist the KYARNG in conducting a forest inventory for WHFRTC and providing guidance for forest management.

***National Weather Service* -** The National Weather Service provides federal and state land management agencies fire weather information for the prevention, suppression, and management of forest and rangeland fires. The National Weather Service Forecast Office in Jackson (http://www.crh.noaa.gov/pah/) provides year-round weather forecasts for eastern Kentucky. Routine fire weather forecasts are issued daily for Muhlenberg County, and are available at:
http://forecast.weather.gov/MapClick.php?zoneid=KYZ021.

6.1.2.4 STATE AGENCY COORDINATION AND TECHNICAL ASSISTANCE

Kentucky Environmental and Public Protection Cabinet - The Environmental and Public Protection Cabinet protects Kentucky's environment and manages natural resources through the programs of the Department for Environmental Protection (KDEP) and Department for Natural Resources (KDNR).

- ***Department for Environmental Protection*** - The Division of Water, Division for Air Quality, Division of Waste Management, and Division of Environmental Services make up the Kentucky Department of Environmental Protection. The Division of Water issues "Water Quality Certification Permits" for any activity that involves the alteration of Waters of the State. The Division for Air Quality issues air quality permits.

- ***Department of Natural Resources -*** Within the KDNR, the Division of Forestry can provide forest stewardship assistance to the KYARNG staff in case of wildfire on the property. The KDOF has assisted, and will continue to assist, the KYARNG in conducting timber inventories and developing tree planting specifications.

The Division raises native tree seedlings that may be suitable for KYARNG planting needs. Tree seedlings available in Kentucky include white oak, black oak (*Quercus velutina*), northern red oak, pin oak (*Quercus palustris*), cherrybark oak (*Quercus pagoda*), black walnut, white and green ash (*Fraxinus pennsylvanica*), sycamore, yellow poplar, black locust (*Robinia pseudoacacia*), bald cypress (*Taxodium distichum*), shortleaf pine (*Pinus echinata*), white pine, and Virginia pine. Also within the KDNR, the Division of Conservation provides assistance to implement sound soil and water management practices.

Kentucky Department of Fish and Wildlife Agency Resources - The KDFWR is within the Kentucky Tourism Cabinet. KDFWR and USFWS were both consulted during development of this plan. The KDFWR District Ranger assists the KYARNG in enforcing state game regulations, including the MOU discussed in **Section 6.1.2.2**. Appendix B contains coordination letters from both federal and state fish and game agencies for protection of fish and wildlife resources at WHFRTC.

Kentucky State Nature Preserves Commission – The KSNPC has a mission to protect Kentucky's natural heritage by (1) identifying, acquiring, and managing natural areas that represent the best known occurrences of rare native species, natural communities, and significant natural features in a statewide nature preserve system; (2) working with others to protect biological diversity; and (3) educating Kentuckians as to the value and purpose of nature preserves and biodiversity. The KSNPC will continue to assist KYARNG in performing rare species and natural community consultations. KSNPC provides necessary expertise to the RTLA program by assisting with plant and animal identification.

Kentucky Heritage Council - The Kentucky Heritage Council will ensure this plan is implemented in accordance with cultural resources management laws and regulations. This agency and the State Historic Preservation Officer (SHPO) have reviewed this plan, and will provide a letter of cooperation following the final review. **Appendix B** contains coordination with agencies for protection and management of cultural resources at the WHFRTC.

The University of Kentucky – Through the University of Kentucky, the Kentucky Geological Survey (KGS) assists the KYARNG in conducting surface and ground water quality and quantity monitoring at all Kentucky training sites. The KYARNG also coordinates closely with the State Archaeologist and staff at the Kentucky Archaeological Survey at the University of Kentucky.

6.2 GEOGRAPHIC INFORMATION SYSTEMS

6.2.1 BACKGROUND

GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information. Within the ITAM Program, GIS technology is used to create, analyze, display, and print information about training land in support of training (DA 1999).

GIS is most commonly used to create maps by overlaying multiple data layers, for example training area boundaries, roads, streams, wetlands, and so forth. However, a more valuable application of GIS software (ArcView, ArcInfo, or ArcGIS) is the ability to perform data analysis. Simple analyses on data layers have the ability to generate reports that might, for example, show the number of acres of wetlands within a training area. More detailed analyses can also involve use of multiple data layers and numeric functions to create new data layers. For example, in order to select the most appropriate location for a trail, a data layer could be produced showing all areas, excluding wetlands or areas within streamside management zones.

GIS is a tool that natural resource managers use to analyze and evaluate the condition and capabilities of training lands. GIS also allows the information collected by the environmental office to be communicated to the trainer via computer (and vice versa). This supports the planning and scheduling component of military training.

The data entered into the training site's database has many different uses. Of primary interest to the users of WHFRTC is the application of data to produce overlays of particular areas of the training site to get a snap-shot of what is happening within that portion of the site. Satellite imagery and aerial photography can be used to create a geo-referenced raster image and superimposed on a map of the site's training areas and training facilities using GIS. Trainers can use GIS-generated maps to plan maneuvers since terrain, topography, and vegetation can be portrayed on each map at or above the original scale of the input data.

6.2.2 KYARNG GIS

The KYARNG is in the process of developing its GIS facilities and skills at the Environmental Office in Frankfort and the WHFRTC, both of which will serve the KYARNG throughout the entire Commonwealth of Kentucky.

The KYARNG GIS program was implemented in 1997, when ArcView software and computer hardware for data management were acquired in the Environmental Office in Frankfort, Kentucky. To date, most core databases, or map layers, for WHFRTC have been completed [aerial photography, contour lines, grid scale, installation boundary, political boundary (county), roads, hydrology (rivers, streams, and ponds), wetlands inventory, soils, and vegetation cover]. Additional data layers needed include: erosion control structures, bivouac sites, constraints to training, crossing sites/ ford sites, LRAM projects, and sensitive species locations. Computer hardware and software have been acquired for statewide use.

6.3 FISH AND WILDLIFE MANAGEMENT

The KYARNG will maintain optimum and diverse fish and wildlife habitat by integrating fish and wildlife management strategies with other ecosystem management activities such as training area and forest management. Laws, regulations, and EOs pertaining to fish and wildlife management are listed in **Table 18.** These documents are described in **Appendix E.**

TABLE 18. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO FISH AND WILDLIFE MANAGEMENT AT WHFRTC

Requirement	Title
Law	Clean Water Act (33 USC §1341)
	Endangered Species Act, 7 U.S.C. 136;16 U.S.C. 460 et seq. (1973) as amended
	Fish and Wildlife Conservation Act (USC §2901 et seq.)
	Fish and Wildlife Coordination Act, as amended (16 USC §661 et seq.)
	The WHFRTC is a state-owned facility and is not directly subject to the Sikes Act "*Conservation Programs on Military Reservations*" (16 U.S. Code (USC) §670a et seq.), as amended. However, Army policy is to follow DoD and ARNG guidance on state-owned facilities.
	Migratory Bird Treaty Act, as amended (16 USC §703-712)
	National Environmental Policy Act (42 USC §4321 et seq.)
Code of Federal Regulations	50 CFR 21, Migratory Bird Permits
Executive Order	EO 11990, Protection of Wetlands
	EO 11988, Floodplain Management
	EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

TABLE 18. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO FISH AND WILDLIFE MANAGEMENT AT WHFRTC	
Requirement	**Title**
Kentucky Regulations	KRS 146 Natural Resources
	KRS 150 Fish and Wildlife Resources
	KRS 224 Environmental Protection

Fish and wildlife management at WHFRTC is coordinated through the KYARNG Environmental Office in Frankfort, KY. The training site has its own environmental staff including a fish and wildlife manager, an environmental site manager, and an ITAM coordinator. Prior to 2001, public access to WHFRTC was less restrictive than it is currently. Due to national security requirements, the site is not open to the general public for hunting and fishing.

6.3.1 GAME AND FISH POPULATIONS

General fish and wildlife management is accomplished in conjunction with the military mission and training activities. Inventory and monitoring of terrestrial habitats, wetlands and aquatic habitats, game populations, non-game populations, and threatened and endangered species are primarily conducted as Planning Level Surveys.

6.3.2 MIGRATORY AND BREEDING BIRDS AT WHFRTC

Considerations with regard to migratory bird management are: compliance with the Migratory Bird Treaty Act (MBTA); implementation of migratory bird management actions in accordance with EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*; and support, contribution and compatibility with the goals and efforts of numerous regional migratory and game bird conservation programs.

Virtually all birds that occupy the WHFRTC throughout the year are protected under the MBTA. The MBTA controls many actions that may negatively affect migratory birds, particularly collection and transportation of birds. Special purpose permits may be requested and issued that allow for the relocation or transport of migratory birds for management purposes.

Incidental taking of migratory birds is regulated in 50 CFR 21, Migratory Bird Permits. Part 21.15, Authorization of Take Incidental to Military Readiness Activities, effective 28 February 2007, allows incidental take by DoD in the course of military readiness activities under certain conditions specified in paragraph (a) (Take Authorization and Monitoring).. Except to the extent authorization is withdrawn or suspended pursuant to paragraph (b) of this section, the Armed Forces may take migratory birds incidental to military readiness activities provided that, for those ongoing or proposed activities that the Armed Forces determine may result in a significant adverse effect on a population of a migratory bird species, the Armed Forces must confer and cooperate with the USFWS to develop and implement appropriate conservation measures to minimize or mitigate such significant adverse effects. When conservation measures implemented under paragraph (a)(1) of this section require monitoring, the Armed Forces must retain records of any monitoring data for five years from the date the Armed Forces commence their action. During INRMP reviews, the Armed Forces will also report to the USFWS migratory bird conservation measures implemented and the effectiveness of the conservation measures in avoiding, minimizing, or mitigating take of migratory birds.

It is DoD policy to promote and support a partnership role in the protection and conservation of migratory birds and their habitat by protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems on DoD lands consistent with the military mission. The Partners in Flight (PIF) program is an umbrella network of which DoD's bird conservation program is a vital part. DoD works with the National Fish and Wildlife Foundation to develop cooperative programs and projects with other federal, state, and non-governmental organizations. Migratory birds include species with at least some

populations breeding in the United States and/or Canada, for example songbirds, shorebirds, waterbirds, and waterfowl. Attention has centered on migrants, since this group is experiencing steep rates of population declines. However, decreasing populations have also been observed in resident bird species, which do not migrate, and temperate-zone migrants, which only migrate within North America.

PIF encourages state and federal agencies and non-governmental organizations to participate in BBS, off-road point counts, Monitoring Avian Production Survivorship (MAPS), and migration monitoring stations. It is important to note that BBS record birds only seen during the nesting season, and do not account for birds in the area at other times of the year. Also, birds occurring in extremely low densities, or in cyclic years, may be missed.

The Kentucky Comprehensive Wildlife Strategic Action Plan lists 14 bird species that have been identified as Kentucky bird species of greatest conservation need within the state (KCWCS 2005). These bird species receive extra funding for habitat improvements, general research and funding towards the implementation of measures needed to monitor the status of a species and their habitats. These measures were developed along with research and survey needs, ongoing efforts, and future conservation plans. Priority Conservations Areas were also identified where many of these species can be found in relatively small regions.

Some waterfowl species may also require some management attention. In 1981, Peabody Coal Company relocated approximately 80 giant Canada geese (*Branta canadensis*) to the site from Chicago. More than 20 years later, the geese are still thriving and return to the site each year to nest. Canada geese respond well to the provision of artificial nest sites and to grazing habitat adjacent to waterbodies (Green and Salter 1987). Other species that may benefit from Canada geese habitat management include ducks and a variety of other waterfowl. Twenty-five (25) wood duck boxes have been installed along pond and lake sides, 30 bluebird boxes have been installed along powerline right-of-ways, and several hawk perches have been set up near planted tree seedlings to discourage small mammals from destroying the seedlings.

6.3.3 NUISANCE WILDLIFE AND WILDLIFE DISEASES

When an animal causes damage to government property, it can be a health or safety risk to humans or other animals, a disruption to normal ecosystem function, or considered a nuisance. Currently, WHFRTC has two species that are considered to be a nuisance at the training site: brown-headed cowbirds and European starlings. Nuisance control is implemented as needed to maintain the species population at acceptable levels. Other common nuisance animals in the region are feral cats (*Felis sylvestris catus*), pigeons (*Columba livia*), raccoons, muskrats (*Ondontra zibethicus*), coyotes, feral hogs (*Sus scrofa*), and beaver (*Castor canadensis*). With the exception of feral cats, these animals are not always considered a nuisance.

Diseases affecting fish and wildlife may periodically occur at the training site. As outlined in AR 200-1, personnel will consult with appropriate Army Veterinary Corps personnel regarding large-scale fish and wildlife deaths and unnatural behavior occurring at WHFRTC.

Mosquitoes and ticks can occur in large numbers from spring to fall at WHFRTC. The KYARNG Integrated Pest Management (IPM) Plan covers management of these pests.

6.4 MANAGEMENT OF THREATENED AND ENDANGERED SPECIES

This section presents information about the management of sensitive species that are located or may be potentially be located at WHFRTC, and the requirements and strategies for management. A complete description of the training site's federal and/or state threatened and endangered species is detailed in Section 4.8.

One federally listed endangered species has been identified at WHFRTC, the gray bat. No designated critical habitat is found within WHFRTC or Muhlenberg County for any of the federally listed species known to occur in Kentucky. Due to historical mining activities at WHFRTC, habitat has changed.

Potential suitable habitit could exist for some federally and state listed threatened and endangered species.

Laws and regulations pertaining to the management of threatened and endangered species are included in **Table 19**. These laws and regulations are further described in **Appendix E**.

TABLE 19. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO THREATENED AND ENDANGERED SPECIES MANAGEMENT AT WHFRTC

REQUIREMENT	TITLE
Law	Endangered Species Act, 7 U.S.C. 136;16 U.S.C. 460 et seq. (1973) as amended
	The WHFRTC is a state-owned facility and is not directly subject to the Sikes Act "*Conservation Programs on Military Reservations*" (16 U.S. Code (USC) §670a et seq.), as amended. However, Army policy is to follow DoD and ARNG guidance on state-owned facilities.
	Migratory Bird Treaty Act, as amended (16 USC §703-712)
	Bald Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250);
Code of Federal Regulations	50 CFR 21, Migratory Bird Permits
Executive Order	EO 11990, Protection of Wetlands
	EO 11988, Floodplain Management
Kentucky Regulations	KRS 146 Natural Resources
	KRS 150 Fish and Wildlife Resources
	KRS 224 Environmental Protection

The NDDA of 2004 made a significant revision to the ESA. NDAA stated that, "The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." Under the 2004 NDAA, a military installation may have its INRMP obviate the need for critical habitat designation if the INRMP provides a benefit to listed species, and manages for the long-term conservation of the species.

The KYARNG will manage threatened and endangered species and Kentucky Species of Conservation Concern primarily by avoiding sensitive areas during training, preventing damage to sensitive areas, and rehabilitating damaged areas. Informal consultation is completed with the USFWS on activities at WHFRTC as required. Neither a separate biological assessment nor a separate formal consultation is necessary for this updated INRMP.

In cases where endangered species management and mission activities conflict, consultation with the USFWS and the KDFWR (as appropriate) would be initiated to avoid jeopardizing any listed species. The KYARNG is required to manage federally listed threatened and endangered species. Failure to protect federally listed species could lead to an ESA violation, which could negatively impact training land availability.

6.4.1 FEDERALLY LISTED SPECIES

The endangered gray bat is the only federally listed species known to occur at WHFRTC. In 1993, the gray bat was captured during mist-netting surveys over Cypress Creek. Bat surveys conducted in 2002 did not result in capture of gray bats.

Federally listed fauna species with known occurrences in Muhlenberg County, Kentucky include: threatened piping plover (*Charadrius melodus*), the threatened copperbelly water snake (*Nerodia erythrogaster neglecta*), and three endangered species of bivalves: fanshell mussel (Cyprogenia stegaria) Purple cat's paw pearly mussel (*Epioblasma obliquata obliquata*), and rough pigtoe (*Pleurobema plenum*).. The bald eagle (*Haliaeetus leucocephalus*) was formerly a federally threatened species found in Muhlenberg County. The eagle was officially delisted 8 August 2007. While the bald eagle is no longer protected by the ESA, it remains protected by the Bald and Golden Eagle Protection Act and the MPTA. While the USFWS does not have occurrence records for the federally endangered Indiana bat (*Myotis sodalis*) within Muhlenberg County, suitable habitat for the species is found at WHFRTC and surrounding areas (USFWS, 2008).

At present, there are no federally listed plant species in Muhlenberg County. In the event that any of the species described above are identified within the WHFRTC property boundaries, the KYARNG will initiate consultation with the USFWS to identify appropriate conservation and management strategies. The need for additional flora and fauna surveys will be determined in consultation with the USFWS, KDFWR and other conservation-based agencies based upon planned site activity.

Descriptions of the federally listed species known to occur at WHFRC or in Muhlenberg County are dicussed greater detail in the following sections.

6.4.1.1 GRAY BAT

The gray bat is the only federally listed species known to occur at WHFRTC.

Information sources for this section include the Kentucky Bat Working Group (www.biology.eku.edu/bats/graybat.htm), USFWS (www.fws.gov/southwest/es/Oklahoma/graybat.htm), and the Arkansas Game and Fish Commission (www.agfc.com/wildlife-conservation/endangered/bat-gray.aspx).

The gray bat was listed by the USFWS as an endangered in 1976. At this time, critical habitat has not been designated for the bat species.

PHOTO SOURCE: KENTUCKY BAT WORKING GROUP

The gray bat is a medium-sized bat with a wingspan of 10 to 11 inches (25-28 cm). It has grayish-brown fur and is the only bat in its range with unicolored dorsal hairs. The dorsal hairs of other bats within its range are bi- or tricolored. The wing membrane of the gray bat connects at the ankle instead of the base of the first toe as in other members of the genus Myotis.

Gray bats migrate each year between winter and summer caves. Mating occurs at winter caves in September. After copulation, females enter hibernation - males and juveniles continue feeding for several weeks. By early November, most gray bats are in hibernation. Adult females begin to emerge in late March, followed by juveniles and adult males. Females store sperm during the winter and become pregnant after emerging in the spring. A single offspring is born in late May or early June. Young begin to fly 20 to 25 days after birth. Gray bats feed on flying insects over bodies of water. Mayflies make up the major part of their diet.

Gray bats almost always roost in caves year-round. Historically, hibernation caves could contain well over a million individuals. Summer colonies can reach 250,000 individuals. Gray bats have very specific cave requirements. As a result, fewer than five percent of available caves are suitable. Winter caves must be very cold with a range in temperature between 42° and 52°F (6-11°C). Winter caves are deep with vertical walls. Summer caves must be warm (57-77°F or 14-25°C) or with restricted rooms that can trap the body heat of roosting bats. Summer caves are located close to rivers or lakes where the bats feed. Bats are known to range at least 12 miles (20 km) from their colony to feed.

Gray bat distribution is limited to limestone cave areas of the southeastern United States. Major populations are found in Alabama, Arkansas, Kentucky, Missouri, and Tennessee. Smaller populations also occur in portions of Florida, Georgia, Kansas, Indiana, Illinois, Oklahoma, Mississippi, Virginia, and possibly North Carolina.

The population is estimated at more than 1.5 million; however, about 95 percent hibernate in only eight caves—two in Tennessee, three in Missouri, and one each in Kentucky, Alabama and Arkansas. This makes the population extremely vulnerable.

Gray bat numbers decreased significantly during recent decades—61 percent in Arkansas, 89 percent in Kentucky, 81 percent in Missouri and 76 percent in Tennessee and Alabama. The population is now on the upswing, though, as a result of improved breeding success due to better protection measures such as cave gates, fences and informational signs near caves.

The gray bat is extremely vulnerable to human disturbances at roosting caves. This is especially true at hibernation and maternity caves. The gray bat is also threatened by pesticides, loss of habitat due to flooding by man-made impoundments, commercializing of caves, and improper gating of caves. Human disturbance at winter caves is energetically costly for bats and can significantly decrease their chances of surviving the winter. Disturbance of maternity caves in the summer can cause large-scale mortality of flightless young. Gates, fences, and signs are often used to keep people out of active gray bat caves.

The top recovery tasks for the gray bat include: 1) acquiring and protecting caves; 2) controlling habitat destruction; and 3) educating the public about the danger human disturbance represents to the bat and about the ecological importance of the gray bat.

6.4.1.2 PIPING PLOVER

This species is known to occur in Muhlenberg County, but has not been observed at WHFRTC to date. Based on historical mining activities at WHFRTC and alterations to the lands, the potential for the piping plover to be present is low.

Information sources include USFWS (www.fws.gov/ northeast/pipingplover) and eNature.com (www. enature .com/ fieldguides).

The piping plover became a protected species under the ESA in January of 1986. It has dual classification as both a threatened and an endangered species throughout its range in the United States. It is considered a migrant species in Kentucky.

PHOTO SOURCE: NATURESERVE 2007

The piping plover is a small, stocky, sandy-colored bird resembling a sandpiper. The adult has yellow-orange legs, a black band across the forehead from eye to eye, and a black ring around the base of its neck. Like other plovers, it runs in short starts and stops. When still, the piping plover blends into the pale background of open, sandy habitat on outer beaches where it feeds and nests. The bird's name derives from its call notes, plaintive bell-like whistles which are often heard before the birds are seen.

Piping plovers return to their breeding grounds in late March or early April. With the rapid expansion of summer resorts and other development along the Atlantic Coast and the Great Lakes shorelines, many of the former nesting sites have been destroyed. Human-related activity on beaches has also proven detrimental to this species. In 1985, the Great Lakes breeding population had been reduced to just 17 pairs, and their only breeding grounds, once spread over eight states, were in northern Michigan. Currently their numbers are on the rise. Efforts are being made to protect both breeding habitat and wintering habitat (which is mainly along the Gulf coast) for this shorebird.

6.4.1.3 COPPERBELLY WATER SNAKE

This species is known to occur in Muhlenberg County, but has not been observed at WHFRTC to date. Although this snake has not been recorded at WHFRTC during faunal surveys, potential habitat for the snake is present.

General information for this species was adapted from USFWS (www.fws.gov/midwest/endangered/reptiles). The copperbelly water snake was listed as threatened by the USFWS in February of 1996. The population of copperbelly water snakes that live in southern Michigan, northeastern Indiana, and northwestern Ohio has been listed as threatened.

PHOTO SOURCE: JIM HARDING, MICHIGAN DEPT. OF NATURAL RESOURCES

Another population of the water snakes lives in southwestern Indiana and adjacent Illinois and Kentucky, and southeastern Indiana. This population is not listed as threatened, but is protected by conservation agreements with State Departments of Natural Resources, various other State agencies, and coal companies. Copperbelly water snakes have a solid dark (usually black) back with a bright orange-red belly. They grow to 3 to 5 feet in length. They are not poisonous. These snakes live in lowland swamps or other warm, quiet waters. Upland woods are used as winter hibernation. The snakes feed on frogs, tadpoles, crayfish, and small fish. During migration, snakes are vulnerable to predation, especially when their migration routes are interrupted by cleared areas, such as roads, mowed areas, and farmlands. Young snakes are born in the fall near or in the winter hibernation site. The average litter size is 18 young.

The snakes have declined mainly because of the drainage and filling of their lowland swamp habitat and clearing of adjacent upland woods where they spend the winter (hibernation sites). Copperbelly water snakes are collected fairly regularly because of their rarity, large size, unique color, and value in the pet trade. Under the ESA, collection is illegal without a USFWS permit.

The USFWS is preparing a recovery plan that describes actions needed to help the snake survive. Researchers are and will continue studying the copperbelly water snake to find the best way to manage for the snake and its habitat. Where possible, the snake's habitat (lowland swamps and adjacent upland woods) will be protected and improved. Conservation Agreements have been signed with the Illinois, Indiana, and Kentucky Departments of Natural Resources, other States agencies, and a number of coal companies as a means of protecting and enhancing habitat for the copperbelly in the southern portion of its range.

6.4.1.4 FANSHELL MUSSEL

This species is known to occur in Muhlenberg County, but has not been observed at WHFRTC to date. Based on historical mining activities at WHFRTC and alterations to the lands, the potential for the fanshell mussel to be present is low.

General information for this species was adapted from USFWS (www.fws.gov/endangered/i/f/saf14.html). The fanshell mussel became a protected species under the ESA in June of 1990. Since the turn of the century, the fanshell has undergone a substantial range reduction.

PHOTO SOURCE: USFWS 1990

Based on current literature and personal communications with knowledgeable individuals, reproducing fanshell populations are now present in only three rivers - the Clinch River, Hancock County, Tennessee, and Scott County, Virginia; the Green River, Hart and Edmonson Counties, Kentucky; and the Licking River, Kenton, Campbell, and Pendleton Counties, Kentucky. Additionally, small remnant, apparently non-reproducing, populations may still persist in the other rivers within its range, but none in Muhlenberg County. The USFWS recovery criterion calls for the establishment of at least 12 viable populations. This may be difficult to achieve because much of the species habitat has been destroyed.

The fanshell has a medium-sized, sub-circular shell which seldom exceeds 3.2 inches (80 millimeters) in length. The exterior of the shell has green rays on a light green or yellow surface ornamented with green mottling. Strong concentric ridges cover the shell's lower surface. The interior of the shell is usually silvery white, sometimes flesh-colored. The fanshell's specific food habits are unknown but likely to be similar to other freshwater mussels. Freshwater mussels are known to feed on detritus, diatoms, phytoplankton, and zooplankton which they filter out of the water.

6.4.1.5 PURPLE CAT'S PAW PEARLY MUSSEL

The WHFRTC contains no suitable habitat for this species.

General information for this species was adapted from USFWS (www.fws.gov/endangered/i/f/saf15.html). The purple cat's paw pearly mussel was listed by the USFWS as an endangered species in July of the 1990. Only two non-reproducing populations survive; the middle Cumberland River, Smith County, Tennessee, and the Green River, Warren and Butler Counties, Kentucky. The mussel inhabits large rivers with a sand and gravel substrate. It has been collected in water of shallow to moderate depth with moderate to swift currents. The species has also been reported to inhabit boulder to sand substrates.

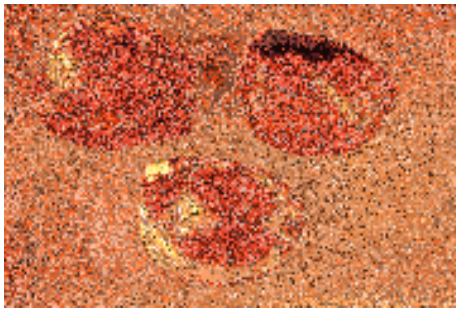


PHOTO SOURCE: ENDANGERED MOLLUSKS IMAGES (EELINK.NET/ENDSPP/ESIMAGES/ ESMOLLUSKS.HTML)

The mussel has a medium-sized shell that is subquadrate in outline. The shell's outside surface has numerous distinct growth lines. It is yellowish-green, yellow, or brownish in color and has fine, faint, wavy green rays with a smooth and shiny surface. The shells of the young often have a satin-like surface. The inside of the shell is purplish to deep purple.

The continued existence of even the two non-reproducing populations is questionable. Only one individual, an old but freshly dead specimen, has been collected in the Green River since 1971. Most of the purple cat's paw populations were apparently lost due to conversion of many sections of the bigger rivers to a series of large impoundments. This seriously reduced the availability of riverine habitat and likely affected the distribution and availability of the mussel's fish host. As a result, the species distribution has been substantially reduced. Water quality degradation is also endangering the species. Runoff from

oil and gas exploration and production is polluting the Green River, host of one of the species' last relict populations. At one time, 66 species of mussels inhabited this river; now, only about 40 species are known to survive.

6.4.1.6 ROUGH PIGTOE MUSSEL

The WHFRTC contains no suitable habitat for this species.

General information for this species was adapted from USFWS (www.fws.gov/midwest/Endangered/clams/rough_fc.html) and USEPA (www.epa.gov/oppfead1/endanger/effects/atrazine/2007/appendix-c.pdf). The rough pigtoe mussel was listed by the USFWS as an endangered species throughout its entire range in Alabama, Indiana, Kentucky, Pennsylvania, Tennessee, and Virginia in June of 1976. A recovery plan addressing the rough pigtoe was approved in August of 1984. Critical habitat has not been designated for the rough pigtoe.

PHOTO SOURCE: USFWS FILE PHOTO/ILLINOIS NATURAL HISTORY SURVEY

The rough pigtoe is a medium-sized (reaching up to approximately 100 mm in length) freshwater mussel with a yellowish brown or light brown shell (becoming dark brown in adults) with faint green rays. Its' shell is shaped like an equilateral triangle, with a brown, satin-like appearance.

In 1984, the rough pigtoe was reported in the Green River in Kentucky (below locks 4 and 5). The rough pigtoe is found in medium to large rivers with sand, gravel, and cobble. The species has also been reported from flats, and muddy sand in shallow waters. It has been collected in muddy sand on Green River. This species does not occur in the impounded sections of rivers and is apparently quite sedentary in the substrate. The rough pigtoe has been collected in the Green River.

Many of the historic populations of the rough pigtoe were apparently lost when the river sections they inhabited were impounded. It is believed that establishment of the Green River Dam, which was completed in 1969, has ultimately led to the loss of the rough pigtoe population within that river, if it still exists. A portion of the Green River below Greensburg, KY has been affected by oil brine pollution, which has eliminated nearly the entire mussel population that was once located there.

6.4.1.7 INDIANA BAT

General information for this species is from the Kentucky Bat Working Group. The Indiana bat is a small bat, less than two inches in length, with dark gray to brownish black fur. Characteristics that help distinguish it from similar species include a pinkish nose, small hind feet with sparse, short hairs that do not extend beyond the toes, and a calcar (the spur extending from the ankle) that has a slight keel. Its hair is less glossy in appearance than that of little brown bats. The Indiana bat is found throughout much of the eastern United States from Oklahoma, Iowa, and Wisconsin, east to Vermont and south to northwestern Florida.

INDIANA BAT
SOURCE: JOHN MACGREGOR, KENTUCKY BAT WORKING GROUP

For hibernation, Indiana bats prefer limestone caves with stable temperatures of 39 to 46 degrees F. As with the gray bat, few caves meet the specific roost requirements of the species. Subsequently, more than 85 percent of the population hibernates in only 9 sites. Summer habitat requirements are not completely known for the Indiana bat. Although floodplain and

riparian forests are important habitats for foraging and roosting, other habitats are used. Indiana bats typically roost under loose bark during the summer.

Indiana bats mate in the fall and begin entering hibernation in October. Males tend to be active longer in the fall, but are hibernating by late November. During hibernation, Indiana bats cluster tightly together and, as a result, are sometimes called the social bat. Having stored sperm over the winter, female bats become pregnant soon after emergence in late March and early April. Females emerge from hibernation and migrate to summer habitats before the males. During summer, maternity colonies can be found under loose tree bark and usually consist of fewer than 100 individuals. Some males to not migrate and spend the summer near the hibernacula; others roost in similar habitats as the females but in smaller numbers. Females bear a single pup in late June or early July. Young bats are able to fly within one month after birth. Small moths are a major part of the diet of Indiana bats, but many different kinds of flying insects are taken.

Decreases in Indiana bat populations have been caused by several factors. Unfortunately, most are the result of human activity. Indiana bats suffered losses in the past because humans altered cave entrances. Structures built to restrict human access to caves have also hindered the movement of bats. These structures also cause changes in air flow, temperatures, and humidity levels, and make caves less suitable for bats. Human disturbance is always a factor with hibernating bats, and because Indiana bats gather together in large numbers during the winter, they are even more vulnerable to disturbance. Thousands of Indiana bats have also died at the hands of vandals. The most important hibernacula are now protected. However, Indiana bat numbers continue to decline. Some bats are lost periodically to flooding caused by natural events or human activity. Loss of forest habitat may be affecting maternity and foraging areas. As with all bats that feed primarily on insects, Indiana bats have probably suffered declines due to use of pesticides (Kentucky Bat Working Group, 2007).

6.4.2 STATE LISTED SPECIES

Based on flora and fauna surveys conducted at WHFRTC, there are 11 state-listed known to occur at WHFRTC, which include 2 state-listed endangered species (short-eared owl and the long-eared owl), 3 state-listed threatened species (lark sparrow, the northern harrier, and the federally endangered gray bat), and 6 KSNPC species of special concern (Henslow's sparrow, great blue heron, bobolink, savannah sparrow, Bell's vireo and the evening bat). The 11 state-listed rare species observed at WHFRTC are described in greater detail below with the exception of the federally endangered gray bat, which is discussed in **Section 6.4.1.1**.

6.4.2.1 SHORT-EARED OWL

The short-eared owl is a medium-sized hunter, inhabiting open fields, meadows, marshes, prairies, and tundra. With its widespread range and diurnal habits, it is one of the most readily observed species of owl. However, serious declines across its range may place it in jeopardy (Audobon Society, 2008).

Often first seen in flight, low to the ground over a grassland, marsh, or agricultural area, short-eared owls, though relatively small (15 inches in length), appear quite large, with the broad wings typical of owls. The plumage is brown with buffy mottling and streaking on the breast. The short ear tufts are rarely visible. In flight, this bird shows an overall rich, buffy brown color with light and dark patches on the upper sides of its wings. Short-eared owls have a buoyant flight style and are noticeably large-headed in flight.

Until very recently, the short-eared owl was known as a rare to uncommon transient and winter resident in Kentucky (Palmer-Ball 1996). Although the species turned up in some part of the state nearly every winter, nesting was not considered a possibility until the late 1980s when a substantial wintering population was discovered in Ohio County. Currently, Kentucky's nesting population of owls is restricted to a few of the more extensive, recently reclaimed surface mines in Ohio and Muhlenberg Counties.

6.4.2.2 LONG-EARED OWL

Long-eared owls are found throughout the northern hemisphere. Their range extends throughout temperate North America, through Europe and the former Soviet Union and as far east as Japan. Isolated populations are also found North and East Africa, the Azores, and the Canary Islands (University of Michigan, 2008, Cornell University, 2008).

The long-eared owl is a medium-sized woodland owl with prominent ear tufts that appear to sit in the middle of the head and are usually held erect. Long-eared owls are brownish gray, with vertical streaks that distinguishing them from great horned owls, which have horizontal streaks. The owls have pale patches on their face that give the appearance of white eyebrows, and a white patch below the bill. They have a black bill, orange or yellow eyes, and their legs and toes are completely feathered. Plumage is brown and buff, with heavy mottling and barring over most of the body. Male plumage tends to be lighter than the female plumage (University of Michigan, 2008, Cornell University, 2008).

Long-eared owls breed between February and July, and raise one brood per season. The owls inhabit dense vegetation close to grasslands, as well as open forests shrub lands from sea level up to 2000 meters in elevation. They are common in tree belts along streams of plains and even desert oases. They can also be found in shelterbelts, small tree groves, thickets surrounded by wetlands, grasslands, marshes and farmlands (University of Michigan, 2008, Cornell University, 2008).

Long-eared owls hunt almost exclusively at night and in open habitats. During brood-rearing, they may begin hunting before sunset. Long-eared owls are active search-hunters. They most likely capture prey using their excellent low-light eyesight and their superb hearing. Most prey is captured on the ground or from low vegetation (University of Michigan, 2008, Cornell University, 2008).

Populations of long-eared owls are difficult to track. However, within the U.S., populations appear to be largely stable, with declines locally in some states, including New Jersey, Minnesota and California. Most deaths are probably due to starvation or predation, although destruction of vegetation and alteration of habitat are also potential causes of population declines. Adults are occasionally killed by cars or shot by hunters in the U.S., but this is not common (University of Michigan, 2008, Cornell University, 2008).

Long-eared owls are not federally endangered or threatened in the United States, but they are considered endangered in the Commonwealth of Kentucky.

6.4.2.3 LARK SPARROW

A conspicuous sparrow of farmlands and roadsides, the lark sparrow has a bold face and tail pattern. The sparrow's head is patterned with black, chestnut, and white; its body is streaked above and white below, with a black spot in the center of the breast; its tail is black with white edges (Cornell University, 2008).

The lark sparrow breeding territory ranges from British Columbia, Saskatchewan, and northern Minnesota, south to California, northern Mexico, Louisiana, and Alabama. Members of this species spend the winters from southern California to Florida and southward. The sparrow breeds in open habitats, where grass adjoins scattered trees and shrubs, especially in poor or sandy soils. It prefers park-like woodlands, mesquite grasslands, and fallow fields with brushy edges, sagebrush (Cornell University, 2008).

Lark sparrows feed heavily on seeds in the winter. During summer, they eat both arthropods and seeds, but appear to feed their young only arthropods. The bird is a widespread, but uncommon species, that has declined in some of its eastern range due in part to urbanization and reduction of grassland habitat and to reversion of agricultural area to forests. In the western United States, it is still fairly common and widespread. Eastern Washington is at the western edge of its range. Lark sparrows are common hosts for brown-headed cowbirds. Pesticides, especially those used to control grasshoppers, are also a potential threat. The tendency of lark sparrows to occupy disturbed sites and edges between two habitat types has helped their numbers remain stable throughout the West (Cornell University, 2008).

6.4.2.4 NORTHERN HARRIER

The northern harrier, formerly named the marsh hawk, breeds throughout much of Canada, the western and northwestern United States, and Kentucky, Virginia, and West Virginia. The northern harrier is a slender, medium-sized raptor with a long, barred tail and distinctive white rump. It has an owl-like facial disk that is visible at close range. Harriers are unusual in that there is a greater difference between male and female plumage than is typical of raptors. Females are brown above with varying degrees of brown and buff streaking below. Males are gray above with an unmarked lighter color below; they also have black wingtips. Juveniles are brown above and plain orange-brown below (Audobon Society, 2008).

Diet varies based on prey availability, but northern harriers feed mostly on small mammals and sometimes birds. In spring and winter, especially in the northern part of their range, they prey predominantly on voles. As with most species that prey heavily on voles, northern harriers are somewhat nomadic, and densities change with the abundance of prey (Audobon Society, 2008).

Harriers are open-country birds, often seen soaring low over grassland. They also occur in farmlands, parks, and steppe habitat. Northern harriers sometimes roost on the ground in groups. Harriers use their sense of hearing more than other hawks, flying low over open fields and listening for prey. In flight, they hold their wings up in a slight 'V' position. Throughout much of their range, they are long-distance migrants, wintering as far south as Panama, but they are resident in other areas, including Washington (Audobon Society, 2008).

During the middle of the 20th Century, Northern harriers experienced declines due to pesticide use. The regulation of DDT has helped the harrier population recover, although habitat loss is still a significant threat. Many wetlands and open spaces are in danger of development or conversion to less beneficial habitat. Overgrazing also affects their habitat. Numbers have severely declined in the East due to increasing numbers of ground predators and lack of habitat. Northern harriers are, however, fairly adaptable and generalized, and seem to be fairly stable in North America in spite of these threats. Numbers are, however, on the decline globally (Audobon Society, 2008).

6.4.2.5 HENSLOW'S SPARROW

The Henslow's sparrow was first discovered in Kentucky by John James Audubon. During the breeding season, this small grassland bird is often found perched atop of a bush, dead vegetation, or fence post, singing its simple song. It has a relatively large, flat head, large dark brown eyes with a thin, white eye-ring, and short tale. Its head is olive-green with dark lines on the face and its body plumage is chestnut on the back and a buffy, thinly black-streaked breast and flanks. Rather than flying, this shy bird often prefers to run on the ground, through the grass (Cornell Univeristy, 2008).

The Henslow's sparrow's breeding range occurs from northeastern Oklahoma east to Maryland, and north to southeastern Minnesota and south to Kentucky and northern Tennessee. It winters in the southeastern United States, from east Texas to Central Florida. These sparrows prefer grasslands that have some standing dead vegetation, fence posts, or a few bushes (which males use for perches), with tall grass and a dense litter layer. They feed mainly on insects during the breeding season and seeds during the winter months. The maintenance of these habitats requires frequent disturbances (every 2-4 years) to reduce the amount of woody vegetation. Land managers have used prescribed burns, mowing and grazing to attain the appropriate habitat (Cornell Univeristy, 2008).

The populations of this species have been in decline in the northeastern part of their breeding range, but have been increasing in some spots of the Midwest. In the United States, the Henslow's sparrow is a Bird of Conservation Concern. In Kentucky, this species can be found in various locations, including reclaimed strip mines, Fort Campbell, Fort Knox, and the WHFRTC. Fort Knox is managing for Henslow's sparrow habitat by using a three-year rotational prescribed burning plan (Cornell Univeristy, 2008).

6.4.2.6 GREAT BLUE HERON

The great blue heron is the largest heron in North America, standing almost two feet tall. It has a long "S"-shaped neck, a long thick bill and a white crown stripe. The plumage is bluish gray on the back, wings and belly, and it has a reddish or gray neck. Its long legs are green, with chestnut feathers on the thighs. The males have a plume of feathers at the back of their heads. This heron species feeds mainly on fish, but is also known to eat invertebrates, small mammals, birds, amphibians and reptiles. It feeds mainly at dawn and dusk, slowly wading through the water and spearing its prey (University of Michigan, 2008, Cornell University, 2008).

In the summer, the great blue heron is found throughout southern Canada to the southern United States, and parts of the Caribbean, along sea and freshwater coasts. Its wintering range includes a small part of southern Canada, into northern South America. It always lives near water, although it tends to avoid marine habitats, preferring calmer waters. These herons usually nest in colonies, in trees located near water. Population numbers for great blue herons remain relatively strong, although habitat destruction and predation of its eggs and chicks are a concern (University of Michigan, 2008, Cornell University, 2008).

6.4.2.7 BOBOLINK

The male bobolink's distinctive plumage and song make this bird species hard not to notice while walking through a grassy field. The male, in its breeding plumage, is the only bird in America with white plumage on its back, and black plumage on its belly. The female plumage (and male non-breeding plumage) is buffy, with dark stripes on the back, rump, sides, and head. The male has a gregarious, rolling, bubbling song that he sings during flight (Cornell University, 2008).

Male bobolinks may have more than one female nesting on their territories and have been observed to cooperatively breed (where more than two adults feed the young at a nest). After the nesting season, bobolinks congregate in marshes to undergo molt before migrating south (Cornell University, 2008).

Breeding bobolinks are found across southern Canada and northern United States. It is a long-distance migrant, with wintering grounds in Central and South America – as far south as Argentina. It uses open grasslands and hay fields for breeding and freshwater marshes, rice and sorghum fields during migration and the non-breeding season (Cornell University, 2008).

Before European settlement, bobolinks bred mainly in tallgrass and mixed-grass prairies in the Midwestern United States and southern-central Canada. With the conversion of forests into farmland, their range expanded both east and west in the U.S. and Canada. With the current reduction in farmland, bobolink populations are declining. In their breeding grounds, the populations suffer due to fewer hayfields and earlier mowing cycles that kill the offspring before they have fledged. In their wintering grounds, the bobolink are considered agricultural pests, for they feed upon valuable rice crops; hence, many bobolinks are killed by humans (Cornell University, 2008).

6.4.2.8 SAVANNAH SPARROW

The adults of this species often breed in the same location where they hatched (i.e., natal philopatry). This tendency is thought to have helped drive the evolution of the 17 subspecies of this sparrow. This small songbird is brown or gray-brown, with streaking on its back, front, and flanks, and a yellowish eyebrow. However, there is a lot of variation in its plumage due to the many subspecies. Its song starts with two or three chip notes and ends with two short trills, the first one higher than the second (Cornell University, 2008).

Savannah sparrows inhabit various open habitats, including grasslands, tundra, marshes, and bogs. They feed on grass seeds and arthropods. It breeds throughout Canada and the northern United States, as far south as southern California and the southern Appalachian mountains, with pockets of breeding populations in Baja California and central Mexico. This species winters in the southern United States, Mexico, Guatemala, and Belize (Cornell University, 2008).

This species has expanded its range, probably due to anthropogenic environmental changes, and many populations are thriving. However, there may be some conservation concern with subspecies that have limited ranges and population sizes (Cornell University, 2008).

6.4.2.9 BELL'S VIREO

The Bell's vireo is a small insectivorous bird that breeds in the southwestern United States and northern Mexico, up through the Plain States, with its eastern edge of its range in western Ohio and southwestern Kentucky. Its winter range is in southern Mexico. It is found in riparian habitat, thickets, and scrub oak, where it gleans insects and spiders from leaves and branches. This vireo has a drab appearance, with gray to greenish plumage on its back, a yellow to white belly, two wing bars, and a faint eye ring. It has a scolding, jerky, hurried song. It is active and secretive, but is known to be fearless around its nest, where it can be closely approached (Cornell University, 2008 and IUCN, 2008).

A subspecies of Bell's vireo found in California, the "Least" Bell's vireo, is listed as Endangered. The other subspecies are listed as birds of conservation concern. The populations are declining throughout its range. It is thought this decline is due to habitat loss and to cowbird parasitism. The exposure to cowbird parasitism is thought to be relatively recent, caused by forest fragmentation, which brings the grassland dwelling cowbirds in closer proximity to the shrubland dwelling Bell's vireo. In California, managers have been reducing cowbird brood parasitism by trapping cowbirds (Cornell University, 2008 and IUCN, 2008).

6.4.2.10 EVENING BAT

This bat is like a small version of the big brown bat, with glossy brown fur and blackish face, wings and feet. It is noticeably smaller, however, typically reaching 4 inches (102 mm) in length with a wingspan of nearly 11 inches (280 mm). This species also does not have a keeled calcar. A calcar is a bony or cartilaginous process on the heel bone of bats, which helps to support the portion of the wing membrane lying between the legs. When it is referred to as a keeled calcar, the protrusion from the calcar resembles a nautical ship's keel in shape (Kentucky Bat Working Group, 2008).

This species is relatively common only in the western one-third of Kentucky, but there are scattered records as far east as Breathitt County on the Cumberland Plateau. The evening bat is essentially a summer resident, migrating southward in fall; there are apparently no winter records for the state. During the 2002 bat surveys at WHFRTC, an evening bat was mist-netted over Cypress Creek, near Highway 601 (Kentucky Bat Working Group, 2008).

Evening bats are not typically found in caves and most or all probably winter to the south of Kentucky where they may remain active throughout the year. These bats likely return to Kentucky during the latter part of April, and form summer colonies in both natural and artificial sites. In many areas, hollow trees are used primarily, but many evening bats roost in buildings and barns. There are even a few records of them roosting under bridges. Evening bats remain in Kentucky into September or October, but there are few records later in the year. This species forages in a variety of semi-open habitats from wetlands and stream corridors to woodland edges and parks. They prey upon a great variety of flying insects from small beetles to flies and moths. Proper management of forested wetland habitats will benefit this species at WHFRTC (Kentucky Bat Working Group, 2008).

6.5 WATER RESOURCE MANAGEMENT

Laws and regulations that are associated with control and abatement of pollution in U.S. waters, erosion control and soil conservation are listed in **Table 20.** These laws and regulations are described in **Appendix E**.

TABLE 20. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO WATER RESOURCE MANAGEMENT AT WHFRTC	
REQUIREMENT	TITLE
Law	The WHFRTC is a state-owned facility and is not directly subject to the Sikes Act "*Conservation Programs on Military Reservations*" (16 U.S. Code (USC) §670a et seq.), as amended. However, Army policy is to follow DoD and ARNG guidance on state-owned facilities.
	Federal Water Pollution Control Act as amended by the CWA of 1977 (33 USC §1251);
	U.S. Fish and Wildlife Coordination Act (16 USC §661);
	NEPA (42 USC §4321);
	Soil Conservation Act (16 USC §590a et seq.);
Code of Federal Regulations	32 CFR 651, Environmental Analysis of Army Actions
Army Regulations	AR 200-1, Environmental Protection and Enhancement
Executive Order	EO 11989, Off-road vehicle use;
	EO 11990, Protection of Wetlands;
	EO 11752, Prevention, Control, and Abatement of Environmental Pollution;
	EO 12088, Federal Compliance with Pollution.
Kentucky Laws and Regulations	KRS 146 Natural Resources
	KRS 151 Geology and Water Resources
	KRS 224 Environmental Protection
	401 KAR 5, Water Quality

6.5.1 PERMITTING

For construction related projects at the WHFRTC, units should coordinate with the Training Site NCOIC and the Environmental Office 60 days in advance to review proposed activities for applicable permit requirements. Even when a permit is not required, KYARNG BMPs must be followed.

Under the CWA, Section 319 requires each state to prepare a Nonpoint Source Management Program. The KDOW is responsible for administering the state's stormwater management program. Kentucky's stormwater program is closely modeled after the federal National Pollution Discharge Elimination System (NPDES) program, which requires stormwater be treated to the maximum extent practicable. KDEP's stormwater program requires any construction or other land-disturbing activity of more than one acre of soil disturbance to obtain a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The KPDES permit establishes the required erosion control and revegetation standards. The construction general permit does not require runoff sampling, but there is a requirement for preparing and implementing a BMPs Plan prior to start of construction. This plan should be available for review by the KDOW upon site inspection, although it does not need to be submitted to or approved by the agency prior to permitting.

Physical disturbances to waters of the U.S. are regulated by the CWA under Sections 404 and 401 and are discussed in **Section 6.6.1**.

6.5.2 EROSION AND SOIL CONSERVATION

Erosion control and soil conservation are important water resource conservation issues. Accelerated erosion, continued compaction, or the removal of topsoil can drastically alter soils. Sediment resulting from erosion affects surface water quality and aquatic organisms. Two main types of soil erosion exist, wind erosion and water erosion. According to the soil survey, none of the soil components or mapping units has significant erosion potential from wind. However, many of them are susceptible to water erosion. Specific information regarding erosion potential of the soils at WHFRTC is provided in **Section 3.3.2.2**. Warning signs for trails or areas on site in need of maintenance include:

- Disturbed vegetation (i.e., trampled, crushed, or vegetation missing, "the soil is visible").
- Puddling of the trail surface.
- Gullies and deep wheel ruts in the trail or road.
- Accumulation of sediment into nearby areas (sides of trails, bases of slopes).

Soil conservation provisions include routine trail maintenance (e.g., backfill ruts and stabilize soils as needed), regular inspection and repair of disturbed areas. The Environmental Office staff will identify areas needing maintenance or repair annually in late spring, following heavy spring rains. Damaged areas will be evaluated and prioritized. Land rehabilitation projects, including revegetation, will be scheduled and performed as soon as possible following disturbance, allowing sufficient time for soils to recover. All necessary rehabilitation work, best management practices, and associated costs will be included in project proposals and construction contracts and specifications.

BMPs to be implemented during these activities to maintain soil and water quality are provided in **Section 6.5.3**. Soil management techniques that will be used at the WHFRTC are provided in **Section 6.5.4.**

6.5.3 BEST MANAGEMENT PRACTICES FOR EROSION CONTROL AND CONSTRUCTION

The KYARNG follows BMPs for erosion control developed by KDOW in the Kentucky Best Management Practices for Controlling Erosion, Sediment, and Pollutant Runoff from Construction Sites: Planning and Technical Specifications Manual (KDOW 2007) and the Kentucky Erosion Prevention and Sedimentation Control Field Guide (KDOW 2006). The KYARNG incorporates these BMPs into all construction and natural resources management activities. Units must contact the Environmental Office for planning and documenting BMPs to comply with permit requirements.

Land rehabilitation projects are scheduled and performed as soon as possible following disturbance, allowing sufficient time for soils to recover. Seeding made in fall for winter cover is mulched. Temporary erosion control methods (such as cover crops) are used during rainy periods to provide cover to soils. Native plants are used to re-vegetate disturbed soils when feasible, effective, and economical. Areas that fail to establish vegetative cover adequate to prevent rill erosion (caused by water running over the surface of the soil) are re-seeded as soon as such areas are identified and weather permits. General BMPs are listed in **Table 21**.

TABLE 21. GENERAL BEST MANAGEMENT PRACTICES FOR EROSION CONTROL DURING REVEGETATION AND CONSTRUCTION PROJECTS

TYPE	BEST MANAGEMENT PRACTICE
CONSTRUCTION	▪ Clearing and grubbing must be held to the minimum necessary for grading and equipment operation. ▪ Construction must be sequenced to minimize the exposure time of cleared surface area. Grading activities must be avoided during periods of highly erosive rainfall. ▪ Construction must be staged or phased for large projects. Areas of one phase must be stabilized before another phase can be initiated. Stabilization shall be accomplished by temporarily or permanently protecting the disturbed soil surface from rainfall impacts and runoff. ▪ Erosion and sediment control measures must be in place and functional before earth moving operations begin, and must be properly constructed and maintained throughout the construction period. ▪ Regular maintenance is vital to the success of an erosion and sediment control system. All control measures shall be checked weekly and after each rainfall. During prolonged rainfall, daily checking is necessary. ▪ Construction debris must be kept from entering any stream channel. ▪ Stockpiled soil shall be located far enough from streams or drainageways, so that runoff cannot carry sediment downstream. ▪ A specific individual shall be designated to be responsible for erosion and sediment controls on each project site.
VEGETATIVE EROSION CONTROL	▪ A buffer strip of vegetation at least as wide as the stream shall be left along any stream bank whenever possible. On streams less than 15 feet wide, the buffer zone shall extend at least 15 feet back from the water's edge. ▪ Temporary soil stabilization with appropriate annual vegetation (ex. annual ryegrass) shall be applied on areas on areas that will remain unfinished for more than 30 calendar days. ▪ Permanent soil stabilization with perennial vegetation shall be applied as soon as practicable after final grading.
STRUCTURAL EROSION CONTROL	▪ Sediment barriers, such as a silt fence, must be installed along the base of all fills and cuts, on the downhill sides of stockpiled soil, and along stream banks in cleared areas to prevent erosion into streams. Barriers may be removed at the beginning of the workday, but must be replaced at the end of the work day. ▪ All surface water flowing toward the construction area shall be diverted around the construction area to reduce its erosion potential, using dikes, berms, channels, or sediment traps, as necessary. Temporary diversion channels must be lined to the expected high water level and protected by non-erodible material to minimize erosion. Clean rock, log, sandbag or straw bale check dams shall be properly constructed to slow runoff and trap sediment. ▪ Sediment basins and traps shall be properly designed according to the size of disturbed or drainage areas. Water must be held in sediment basins until at least as clear as upstream water before it is discharged to surface waters. Water must be discharged through a pipe or lined channel so that the discharge does not cause erosion and sedimentation. ▪ Streams shall not be used as transportation routes for equipment. Crossings must be limited to one point. A stabilized pad of clean and properly sized shot rock must be used at the crossing point. ▪ All rocks shall be clean, hard rocks containing no sand, dust, or organic materials.
ROAD AND TRAIL MAINTENANCE	▪ Maintain access roads and trails in such a way as to prevent sediment from entering water bodies. Use methods such as: ▪ Water bars or other drainage structures should be constructed. ▪ Remove sediment and debris from dips, ditches and culverts; and revegetate

TABLE 21. GENERAL BEST MANAGEMENT PRACTICES FOR EROSION CONTROL DURING REVEGETATION AND CONSTRUCTION PROJECTS	
TYPE	BEST MANAGEMENT PRACTICE
	problem areas. ▪ Use lime, fertilizer, mulch, and/or seed when needed to prevent soil erosion. Amounts should be based on recommendations from the USDA-NRCS or the Kentucky Agricultural Extension Service.
STREAMSIDE MANAGEMENT ZONES (SMZ)	▪ Streamside management zones shall be designed and managed along perennial and intermittent streams, lakes, and impoundments to prevent sediment from entering waters of the State. Methods to prevent sedimentation to streams include, but are not limited to, the following: ▪ Establish SMZs along any stream or water body where the potential exists for the movement of sediment into stream or waterbody. The width of SMZs should be a minimum distance of 50 feet from the disturbed area to the stream for zero percent slope and 20 additional feet for each additional 10 percent of slope. This applies to both sides of the stream (total minimum width of 100 feet). In association with wetlands, establish SMZs at least 50 feet in width along all sides of wetlands and open water. ▪ Do not remove any trees within an SMZ if such removal would result in soil potentially getting into stream or wetland. If trees can be harvested without risk of soil loss, maintain 50 to 75 percent of the vegetation canopy shading a perennial stream. ▪ Avoid operating any vehicles within an SMZ.

6.5.4 SOIL MANAGEMENT TECHNIQUES

For more information on soil management techniques, consult KDOW guides mentioned above.

6.5.4.1 REVEGETATION

Native Species. The KYARNG uses native non-invasive seeds such as those recommended in **Table 22** when feasible, effective, and economical. Local, native species are the best species for revegetation. The KYARNG will coordinate with other agencies as necessary to choose the most appropriate seed mixtures for application at WHFRTC. Optimal seeding dates for warm season grasses is 15 April 15 to 1 June. When planting native grasses, non-persistent grasses are included to act as a cover crop for the first 2 or 3 years to minimize erosion before native species become established. Examples include red top grass (*Agrostis palustris*), timothy grass (*Phleum pratense*), winter wheat, and grain sorghum (*Sorghum bicolor*). Soil pH should be in the range of 5.8 to 6.4.

When seeding warm season species into areas that are dominated by exotic cool season grasses, all existing vegetation should be weakened or destroyed, if possible, with herbicide, or a combination of tillage and herbicide. In areas dominated by native species, use less damaging techniques to prepare the seedbed, such as prescribed fire.

TABLE 22 RECOMMENDED NATIVE VEGETATION FOR REVEGETATION PROJECTS

COMMON NAME	SCIENTIFIC NAME	FORM
GRASSES		
Big bluestem	*Andropogon gerardii*	Grass
River oats, Spangle grass	*Chasmanthium latifolium*	Grass
Wild rye	*Elymus virginicus*	Grass
Switch grass	*Panicum virgatum*	Grass
Little bluestem	*Schizachyrium scoparium*	Grass
Indian grass	*Sorghastrum nutans*	Grass
Gamma grass	*Tripsacum dactyloides*	Grass
MOSAIC FOR FULL SUN		
Big blue stem	*Andropogon gerardii*	Grass
New England aster	*Aster novae-angliae*	Forb
White wild indigo	*Baptisia alba*	Forb
Partridge pea	*Chamaecrista faciculata*	Forb
Tall coreopsis	*Coreopsis tripteris*	Forb
Joe Pye weed	*Eupatorium fistulosum*	Forb
Purple bee balm	*Monarda fistulosa*	Forb
Grey headed coneflower	*Ratibida pinnata*	Forb
Blackeyed susan	*Rudbeckia hirta and R. triloba*	Forb
Sedum, stonecrop	*Sedum ternatum*	Forb
Rose vervain	*Verbena Canadensis*	Forb
Ironweed	*Vernonia altissima*	Forb
MOSAIC FOR SHADE		
Thimbleweed	*Anemone virginiana*	Forb
Wild Ginger	*Asarum canadense*	Forb
Ebony Spleenwort	*Asplenium platyneuron*	Fern
Shooting Star	*Dedecatheon meadia*	Forb
Alumroot	*Heuchera Americana*	Forb
Pachysandra	*Pachysandra procumbens*	Forb
Christmas Fern	*Polystichum acrostichoides*	Fern
Broad Beech Fern	*Phegopteris hexagonaptera*	Fern
Golden ragwort	*Senecio glabellus*	Forb
Foam-flower	*Tiarella cordifolia*	Forb
Spiderwort	*Tradescantia virginiana*	Monocot
Violets	*Violet spp.*	Forb
Woodsia	*Woodsia obtuse*	Forb

Soil bed Preparation. Extreme acidity, very low phosphorus levels, and the need for nitrogen fertilization are commonly encountered problems on reclaimed mineland. Therefore, soil amendments (lime and fertilizer) are typically applied to rehabilitation sites before seeding. Proper application procedures include soil analysis to ensure proper nutrient application levels. Other factors to consider are soil moisture, effects on non-target species, weather patterns, and contribution of nitrates (nitrification) of streams, ponds, and lakes.

To control erosion on bare soil surfaces, plants must be able to germinate and grow. Seedbed preparation is essential. The following guidelines will be used for designing LRAM project specifications:

Liming: Lime is used to neutralize acidic mine spoils. The rate of lime application should be sufficient to raise soil pH to a value no lower than 6.4 for all land uses. Liming rates for mine soils as determined on the basis of buffer pH values appear in **Table 23** (KDOW 1996). Quality agricultural limestone is the liming agent of choice. If no soil test is available, apply 3 tons of ground agricultural limestone per acre. If lime has been applied within the last year, no soil test or lime application is necessary. Tractor-mounted lime spreaders or broadcast spinners spread the agricultural lime at an even rate. Lime should

be incorporated into the top six inches of soil; usually done by discing. Incorporation not only increases the affected zone to allow better rooting of plants, but it also minimizes lime loss via rainfall runoff. Lime should not be applied under wet soil conditions because it is difficult to incorporate uniformly into the soil.

TABLE 23. LIMESTONE RATES FOR SOIL-BUFFER PH READINGS

BUFFER PH READINGS	AGRICULTURAL LIMESTONE (TONS/ACRE) REQUIRED TO ADJUST SOIL TO PH 6.4
6.7 - 6.3	2 -4
6.3 - 5.9	4 - 6
5.9 - 5.3	6 - 8
5.3 - 5.0	8 - 11
5.0 - 4.5	11 - 15
4.5 - 4.0	15 - 25
below 4.0	25

Fertilizer: Fertilizers consist of three primary plant nutrients: nitrogen (N), available phosphorous (P2O5), and water-soluble potash (K2O). Mixtures of fertilizer materials are commercially available; their grade or content is expressed in weight percent as N:P:K. Fertilize according to the soil test. If no soil test is available, apply 60 pounds of nitrogen, 50 pounds of P2O5, and 100 pounds of K2O per acre at seeding time. Lime and fertilizer shall be incorporated into the top 2 to 4 inches of the soil. Nitrogen should be applied at a rate of 60 pounds of N/acre for fall or spring seedings, with a top dressing of 30 pounds/acre six months later. Additions should be applied as pounds of N and not pounds of fertilizer. For example, 100 pounds of 46-0-0 contains only 46 pounds of nitrogen. An additional 30 pounds/acre should be applied during the spring of the second growing season when ground cover is the only re-vegetation objective.

The rates at which available phosphate and potassium (potash) are applied are determined on the basis of soil tests and intended land use. Fertilizer recommendations for vegetative covers to achieve either erosion control or hay and pasture are listed in **Table 24**. Fertilizer is most simply spread in the dry, granular form from a tractor-mounted fertilizer spreader. Incorporation into the soil is desirable but not required. It should be applied when soils are dry; otherwise, a salt solution forms when water and fertilizer are mixed that can significantly reduce the percentage of seed germination, especially for grasses. The effectiveness of bacteria inoculated on legumes is also reduced. It is not recommended to apply fertilizers and seed in the same tank mix when hydroseeders are used.

A possible free source of N, P, and K may be available from nearby poultry production farms. The chicken litter could be disposed at the WHFRTC and used as a free source of fertilizer. An arrangement could be made with local chicken house operators and WHFRTC and would be mutually beneficial to both by providing a disposal site for the custom operator and needed nutrients for the WHFRTC.

TABLE 24. FERTILIZER REQUIREMENTS FOR NEW SEEDLINGS (FROM KENTUCKY DIVISION OF WATER 1996)

TEST LEVEL (LBS./ACRE)[A]	POUNDS P_2O_5 AND K_2O TO APPLY PER ACRE[B]			
	SURFACE COVER		HAY AND PASTURE	
	P_2O_5	K_2O	P_2O_5	K_2O
Very Low (below 10 P;75 K)	120-140	30-60	150-200	60-90
Low (10-30 P; 165 K)	100-120	0-30	100-150	30-60
Medium (31-60 P; 165-250 K)	50-100	0	50-100	0-30
High (above 60 P; 250 K)	0-50	0	0-50	0

a. If soil tests are very low, retesting is recommended prior to planting trees since additional P_2O_5 may be needed to maintain surface cover.

b. For alfalfa production, rates should be increased to 20-40 lbs. P_2O_5 and 20-40 lbs. of K_2O/acre.

Surface Roughening: If the area has been recently loosened or disturbed, no further roughening is required. When the area is compacted, crusted, or hardened, the soil surface shall be loosened by discing, raking, harrowing, chisel plowing, shallow ripping for compacted soils, or other acceptable means.

Tracking: Tracking with bulldozer cleats is most effective on sandy soils. This practice often causes undue compaction of the soil surface, especially in clayey soils and does not aid plant growth as effectively as other methods of surface roughening.

Seeding. Seed shall be evenly applied with a cyclone seeder, drill, cultipacker seeder or hydroseeder. Small grains shall be planted no more than one inch deep. Grasses and legumes shall be planted no more than ¼ inch deep. Seeding will be done during optimum seeding periods for individual species to the extent practicable.

Mulching. All seedings made in fall for winter cover shall be mulched. At other times of the year, seedings made on slopes in excess of 4:1, or on adverse soil conditions, or during excessively hot or dry weather, shall be mulched. For seedings made during optimum spring and summer seeding dates, with favorable soil and site conditions, mulching may be optional.

Re-seeding. Areas that fail to establish vegetative cover adequate to prevent rill erosion (caused by water running over the surface of the soil) will be re-seeded as soon as such areas are identified and weather permits.

Temporary Seeding Planting Dates. Use temporary erosion control methods (such as cover crops) during rainy periods to provide cover to soils. Temporary plants should be planted at the following rates and dates: rye at 3 bushels per acre from 15 August through 1 November; wheat at 2-3 bushels per acre from 1 September through 1 November; annual ryegrass at 30 pounds per acre from 15 August through 1 November.

6.5.4.2 SEDIMENT BARRIERS

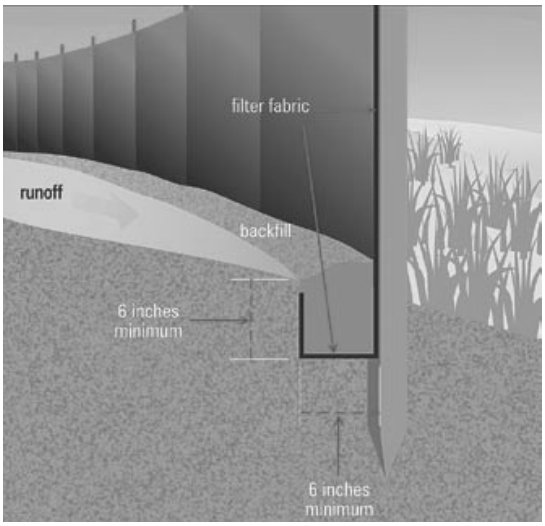
In addition to seeding and mulching areas greater than 150 square feet, use sediment barriers to prevent silt from leaving the site. Silt fences, rock filters, or other commercial sediment barriers are required below (downhill from) areas of bare soil. Hay or straw bales must not be used as sediment filters due to their inherent weakness and tendency to fall apart (KDOW, 2006).

Place filters on downhill edge of bare soil areas. Make sure the filter catches all the muddy runoff. The goal is to pond runoff, to filter and settle it out. Multiple units are needed for long slopes. Spacing on long slopes is every 60 to 110 feet. Put filters across slopes, on the contour (level).

Silt Fences. Silt fences should be installed on the contour below bare soil areas. Use multiple fences on long slopes 60 to 80 feet apart. Silt fencing should not be installed up and down hills, above (uphill from)

areas of bare soil, or in ditches, channels, or streams. Each 100-foot section of silt fence can filter runoff from about 1/4 acre (about 110 feet uphill). To install a silt fence correctly, follow these steps:

- Note the location & extent of the bare soil area.
- Mark silt fence location just below bare soil area.
- Make sure fence will catch all flows from area.
- Dig trench 6 inches deep across slope.
- Unroll silt fence along trench.
- Join fencing by rolling the end stakes together.
- Make sure stakes are on downhill side of fence
- Drive stakes in against downhill side of trench.
- Drive stakes until 8 to 10 inches of fabric is in trench.
- Push fabric into trench; spread along bottom.
- Fill trench with soil and tamp down.



Silt Fence
Source: KDOW

Inspect the silt fence frequently, and repair or replace promptly as needed. Sediment collecting behind silt fences must be removed before it is halfway up the fence. Move collected sediment to a vegetated area or other place where it will not wash into ditches, channels, or streams. Re-trench and tamp down fencing that is undercut by gullies. Remove the silt fence when it has served its usefulness to avoid blocking storm flow or drainage.

Other Sediment Barriers. Brush cleared from the site can make an excellent sediment filter if it is properly placed (see previous illustration) and built up well. Brush barriers are installed on the contour and are 2 to 5 feet high and 4 to 10 feet wide at the base. Walk them down slightly with a loader or dozer to compress the material in the brush barrier. Stuff additional brush on the uphill side where bypasses or undercutting are evident.

Fiber rolls and other commercial products made from coconut fiber, plastic, wood shavings, or other material can also be used as sediment barriers on slopes flatter than 10:1. Follow manufacturers' installation instructions and ensure that sediment filter spacing on slopes is correct. Make sure runoff does not bypass brush barrier, coconut rolls, or other barriers underneath or around the ends.

6.5.4.3 ROADWAYS AND DITCHES

Provide V-shaped side ditches as shown in Field Manual (FM) 5-35 Engineer Field Data (DA 1987). Size and shape the ditches according to this manual, generally with a 2:1 slope. Slopes should not be too steep to avoid bank sloughing. Provide properly sized and installed culverts according to FM 5-35 to protect roadways and prevent erosion. In erosive areas, use rip rap to stabilize the ditches. On steep erosive slopes, construct V-ditches with geotextile fabric and riprap to add stability. Shape and crown roads to drain water. Install culverts to improve drainage and minimize shrinking, swelling, and frost damage. Add crushed rock or gravel to prevent road damage caused by low strength. Use sediment barriers in sloping areas where road ditches have a tendency to wash.

6.6 WETLANDS, FLOODPLAINS AND OTHER AQUATIC HABITAT MANAGEMENT

Portions of the WHFRTC are within the FEMA 100-year floodplain of both Cypress Creek and Little Cypress Creek. Aquatic ecosystems on the site are comprised of intermittent streams, perennial

streams, ponds and lakes mostly created as a result of impoundments of the streams or isolated surface depressions that filled with water following the mining process; many function as sediment-retaining ponds. Cypress Creek does not support its designated uses of swimming and aquatic life (KDOW, 2000). Water quality is considered impacted by mining practices. Refer to **Section 3.4** for information pertaining to wetlands, floodplains, and other aquatic habitats existing at the WHFRTC. Laws, regulations, and EOs pertaining to wetlands and floodplain protection and policies are listed in **Table 25** and described in **Appendix E**.

TABLE 25. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO AQUATIC HABITAT MANAGEMENT AT WHFRTC

Requirement	Title
Law	Rivers and Harbors Act of 1899; Fish and Wildlife Coordination Act of 1967; Land and Water Conservation Fund Act of 1968; Federal Water Pollution Control Act as amended by the CWA of 1977 (33 USC §1251); The WHFRTC is a state-owned facility and is not directly subject to the Sikes Act "*Conservation Programs on Military Reservations*" (16 U.S. Code (USC) §670a et seq.), as amended. However, Army policy is to follow DoD and ARNG guidance on state-owned facilities.
Executive Order	EO11988, Floodplain Management; EO 11990, Protection of Wetlands;
Kentucky Laws and Regulations	200 KAR 6:040 and 401 KAR 4:060, Floodplain Management and Flood Control KRS Chapter 224; 401 KAR 5:031, Water Resources Protection 405 KAR 16:180 and 405 KAR 18:180, Wetland Protection

6.6.1 PERMITTING

Projects that involve the discharge of dredged or fill materials into waters of the United States, including wetlands, are regulated by the USACE under CWA Section 404 and require Section 401 WQC. Units should contact the Environmental Office regarding any activities that could potentially affect waterbodies. The Environmental Office will review proposed activities for applicable permit requirements and will coordinate regulatory permits. Even when a permit is not required, KYARNG BMPs must be followed. When a permit is required, a pre-application meeting with the USACE and KDOW is recommended, particularly for large-scale projects. The meeting should be held well in advance of the onset of a project (at least three months). Agencies should be notified by letter (KYARNG letterhead). A written meeting agenda is recommended. A sign-in sheet is required. After the meeting, a written meeting summary should be prepared and provided to attendees and placed in the appropriate Environmental Office file.

Examples of activities that may require a Section 404 permit and Section 401 WQC are stream relocations, road crossings, stream bank protection, construction of boat ramps, placing fill, grading, dredging, ditching, mechanically clearing a wetland, building in a wetland, constructing a dam or dike, and stream diversions. General or individual permits may be required for such activities.

General permits issued by the USACE authorize various types of development projects in waters of the U.S. Activities authorized under general permits are considered similar in nature, causing minimal adverse effects to the environment. The USACE uses general permits for certain activities to minimize regulatory burdens and administrative costs by allowing landowners to proceed without having to obtain individual permits in advance. One type of general permit is known as a Nationwide permit; there are currently 49 Nationwide permits covering a variety of issues that were issued by the USACE in March 2007. Nationwide permits authorize certain activities and are valid only if the conditions applicable to the permit are met. A summary table of these permits is included as **Appendix G**.

In general, individual permits are required for disturbances that exceed thresholds for disturbances covered by general permits. Permitting requirements vary depending on type, location, and extent of disturbance. A Section 404 individual permit, issued by the USACE, may be required prior to significant impacts.

The CWA Section 401 WQC is authorized by the CWA and KRS Chapter 224. The KDOW is responsible for implementing the Section 401 program. The WQC program ensures that activities involving a discharge into waters of the state and requiring a federal permit or license are consistent with Kentucky's water quality standards in 401 KAR 5. For both wetland and stream disturbances, the applicant must complete and submit the C*ombined Application for Permit to Construct Across or Along a Stream and/or Water Quality Certification* along with appropriate attachments. For stream-related impacts, detailed plan and profile drawings must be submitted along with the permit application. Impacts in streams or lakes designated as Special Use Waters always require an individual WQC and a detailed sediment and erosion control plan.

For wetland-related impacts involving greater than one acre of wetland loss, the KDOW Wetland Mitigation Guidelines must be followed. Wetland losses involving less than one acre may be regulated by the USACE. The USACE is responsible for making official jurisdictional wetland determinations.

The KDOW also has authority over and issues permits for the placement of debris (e.g., including logging during tree cutting) and/or construction activities within the floodplains of perennial streams that have a drainage area larger than one square mile. Activities that occur in a regulated floodplain may also require a Stream Construction Permit from the KDOW.

6.6.2 MANAGEMENT STRATEGIES

The KYARNG may not be able to significantly improve the quality of Cypress Creek but it can ensure that the WHFRTC does nothing to further degrade the condition of the stream. The KYARNG maintains riparian habitats along streams by implementing SMZ from the water's edge back on both sides of regulated streams and around regulated lakes and ponds. Regulated wetlands are protected by 50-foot wetland buffer zone around wetlands. Signs will be placed in areas where encroachment is likely or already occurring. Aquatic, riparian, and wetland areas need the protection of a permanent vegetative cover to reduce erosion into adjacent waterways. Maintaining connectivity between drainages facilitates wildlife migration, provides habitat cover for small and large mammals, shades stream banks, and ultimately allows for reduced erosion into Cypress and Little Cypress Creeks. The KYARNG uses the following habitat management techniques for maintenance of the riparian, wetland, and aquatic ecosystems on the WHFRTC

- Monitor and maintain wetland, floodplain and other aquatic ecoystems through periodic PLS, troop awareness, and the implementation of soil and water conservation management techniques (see **Section 6.5**).
- Follow the Guidelines for Management of Floodplains, Wetlands, and Aquatic Areas:
    - Caution should be taken within 100-feet of either side of a stream for the presence of small isolated wetlands (Gravatt et al., 1999).
    - Avoid the net loss of size, function, or value of wetlands. Avoid modification of flood plains and wetlands where there are practical alternatives. Where no practicable alternatives exist, obtain necessary permits from the USACOE, KDFWR, and KDOW, and implement mitigating measures to minimize potential harm to life, property, and the natural values of flood plains and wetlands.
    - Present all construction project plans to the Environmental Office for review as far in advance as possible; special permits are required when disturbing federal jurisdictional wetlands, perennial or intermittent streams.
    - Maintain wetland and floodplain riparian vegetation buffers to reduce build-up of sediments and the delivery of chemical pollutants to streams and wetlands.

- Monitor and direct the location and use of toxic substances, such as pesticides, petroleum products, and other hazardous substances to minimize the risk of water contamination.
- Monitor erosion along the intermittent streams within the training site boundaries. Walk the streambanks annually during the winter months when erosion is most visible. Mark erosion sites on a map and take appropriate corrective measures.

- Aquatic, Riparian, and Wetland Ecosystem Management Policies in **Table 26** will be implemented.

TABLE 26. AQUATIC HABITAT MANAGEMENT POLICIES AT WHFRTC

TOPIC	POLICY
Streamside Management Zones or Riparian Buffer Zones	Streamside management zones shall be designated and managed along perennial (Cypress Creek and Little Cypress Creek) and intermittent streams and ponds to prevent sediment from entering waters of the Commonwealth. Methods to prevent sedimentation to streams include, but are not limited to, the following: a. No digging for training purposes, mowing, or construction activities is allowed 100-feet on either side of streams without prior review and permission from the NCOIC and the Environmental Office. b. Trees will not be removed within an SMZ without prior approval from the Training Site Engineer and an inspection prior to removal operations to ensure that the tree is not being used as a bat roosting or maternity colony site. c. Avoid operating any vehicles within an SMZ, and cross intermittent streams only at established trail and road culvert crossings.
Wetland Buffer Zones	Tracked and wheeled vehicles shall not be driven within 50-feet of wetlands (marked with Siebert stakes or equivalent where necessary). Foot traffic in wetlands is permissible at any time of the year; however, excessive foot traffic can cause soil instability, which can increase sedimentation of Cypress and Little Cypress Creeks. No soil disturbance may occur within a 50-foot zone around wetlands without first notifying the KYARNG Environmental Office. Permits may be necessary for all soil disturbing activities within 50 feet of wetlands on the site.
Vehicle Movement and Training Activities	No tank traps, foxholes, hull downs, tent drainages, or similar excavations are permitted on dams or emergency spillways of any water impoundments. Vehicle traffic on the dams will be confined to existing roads. Movement of any soil must be approved. Digging/Excavation will have prior approval of the Training Site Engineer. No soil disturbance may occur within this 50-foot zone around wetlands without first notifying the KYARNG Environmental Office. Permits may be necessary for all soil disturbing activities within 50 feet of wetlands on the site. Cross intermittent streams only at established trail and road culvert crossings. Avoid operating any vehicles within an SMZ.
Vehicle Movement and Training Activities *Continued*	Tracked and wheeled vehicles shall not be driven within 50-feet of wetlands (marked with Siebert stakes or equivalent). Foot traffic in wetlands is permissible at any time of the year; however, excessive foot traffic can cause soil instability, which can increase sedimentation of Cypress and Little Cypress Creeks. Vehicle refueling on range firing lines or in training areas is prohibited. Units will clean up any petroleum, oil spills and lubricant contamination before clearing the training area Report all hazardous materials/petroleum spills to the Training Site Engineer through Range Control immediately. Reportable quantity spills must be reported to KDEP immediately. Manage spills in accordance with the KYARNG Hazardous Materials/Waste Management Plan.

TABLE 26. AQUATIC HABITAT MANAGEMENT POLICIES AT WHFRTC	
TOPIC	POLICY
Wildlife and Natural Resources Protection	Should potential rare, threatened or endangered species listed be encountered on the training area at any time, contact the KYARNG Environmental Program Manager, who will contact the KSNPC, KDFWR, and USFWS, depending on jurisdiction.

6.7 TERRESTRIAL HABITAT MANAGEMENT

Terrestrial habitat at WHFRTC includes forests and grassland. **Section 4.2** provides a complete summary and description of the community types found on the installation. According to White and Yahn (2006), invasion of non-native species is currently the most detrimental factor affecting the health of the natural vegetation communities on WHFRTC. Invasive/exotic species management is addressed in **Section 6.8**. Laws, regulations, and EOs pertaining to terrestrial habitat management are listed in **Table 27** and described in **Appendix E**.

TABLE 27. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO WETLANDS MANAGEMENT AT WHFRTC	
REQUIREMENT	TITLE
Law	Federal Insecticide, Fungicide, and Rodenticide Act (6 USC §136) Forest and Rangeland Renewable Resources Planning Act (16 USC §1601 *et seq.*) Sale of Certain Interests in Land, Logs (10 USC §2665) Migratory Bird Treaty Act, as amended (16 USC §703-712) The WHFRTC is a state-owned facility and is not directly subject to the Sikes Act "*Conservation Programs on Military Reservations*" (16 U.S. Code (USC) §670a et seq.), as amended. However, Army policy is to follow DoD and ARNG guidance on state-owned facilities.
Army Regulation	AR 200-1, *Environmental Protection and Enhancement*

6.7.1 FOREST MANAGEMENT

Approximately 61 percent (6,545 acres) of the WHFRTC is forested. Because a forest inventory has not been conducted, forest management strategies have focused on providing habitat for troop concealment purposes and avoiding impacts to wildlife habitat. As part of this INRMP update, a Forest Management Plan (FMP) was developed for the WHFRTC and is provided in **Appendix H**. This plan outlines specific goals, objectives management policies, and projects to manage forest land at the WHFRTC.

6.7.2 GRASSLAND MANAGEMENT

The grassland ecosystem includes mixed grasses/forbs and native/exotic shrublands. Maintenance of a healthy grassland ecosystem will provide vital maneuver opportunities for field training exercises at the training site and vital habitat for ground-nesting birds and other grassland dependent species. Grasslands (open treeless areas) are especially important to the military mission for tracked and wheeled maneuver exercises. Grasslands and shrub-dominated areas at WHFRTC also provide cover for wildlife as well. Bird species listed in **Section 5.4.2** will also benefit from grassland habitat management on the training site. Without some type of human intervention (e.g., mowing or the introduction of fire), over time open grassy areas will close in with shrubs and trees and become less than ideal for military purposes and grassland-dependent species. The KYARNG utilizes the following habitat management techniques for maintenance of the grassland ecosystem on the WHFRTC:

- Mow and bushhog grasslands as needed. In areas where open grassland is maintained by mowing, mow in strips or a mosaic pattern to increase habitat diversity for small mammals and birds. Remove hay when cut to simulate grazing by large mammals. The accumulation of litter gradually diminishes grassland vigor.
- Conduct PLS (floristic, faunal, migratory bird, and erosion surveys).
- Continue using prescribed fire (see **Section 6.7.3**) to maintain maneuver areas and habitat for northern harriers, Henslow's sparrow, lark sparrow, Bell's vireo, short-eared owl, long-eared owl and their principal small rodent prey (Dechant et al. 2001a, 2001b).
- The Simulated Urban Area in TA 3 is prime Bell's vireo habitat. The birds nest from approximately April 15 through August 15 in the thick, brushy areas, and any disturbances to this area (such as mowing, bushhogging, vehicle maneuver, or burning) during this critical time period should be avoided. Dismounted troop movement will have little or no effect on the habitat.
- Manage riparian areas and wetlands adjacent to grasslands. Allow SMZ that are currently in mixed grass/forbs to succeed to shrub communities and then to riparian forest by ceasing mowing within 100 feet of Cypress and Little Cypress Creek, within 50 feet of intermittent streams, and within 50 feet of wetlands. Mark areas with Sieber stakes as needed.
- Monitor grasslands regularly for areas needing rehabilitation and after implementing management practices. Rehabilitate any loss of soils or vegetation in areas where vegetation does not recover naturally and/or soils have been disturbed during military training exercises.
- Discontinue mowing of vegetation in the floodplain and within 100 feet of streams and wetlands, so that riparian vegetation remains established around wetlands and stream banks.
- Delay mowing practices during the breeding season for grassland birds to enhance brood survival. Recommended time to exclude mowing within the grasslands is from April to September. Late March or November is the best time to mow. Vegetation management during these times allows for sufficient plant growth, which provides nesting for bird species and winter cover for other wildlife.
- Minimize pesticide use in the grasslands. Pesticides can affect insect species and the birds that rely on them for food. Pesticide use on grasslands is also expensive because of the large areas that must be treated. Do not use chemical pesticides in habitats used for nesting, breeding, or foraging by northern harriers, Henslow's sparrow, lark sparrow, Bell's vireo, short-eared owl, long-eared owl. Pesticides can affect insect species and the birds that rely on them for food.
- Do not plant KY 31 Fescue (*Festuca arundinacea*), Chinese, Korean, or Kobe lespedezas (*Lespedeza bicolor*, *L. cuneata*, and *L. stipulacea*), as these species provide very little benefit to wildlife and may even be detrimental. Instead, use other locally grown (or developed) native grasses and native lespedezas. An exception may be needed as part of mine reclamation activities.

- Maintain large, non-fragmented tracts of quality habitat for the survival and maintenance of neotropical migratory bird and large mammal populations. Configuration of protected habitats should conform to shapes that minimize edge-to-area ratios (Reese and Ratti, 1988). Circular shapes are preferable in achieving this goal. Narrow, linear, or small protected habitats should be avoided if possible.
- Educate all military personnel about species dependent on grasslands and their habitats. Ensure that any sensitive species discovered on the training site in the next five years are included in Environmental Awareness training materials and monitored (especially ground-nesting birds).
- Plant stands of native prairie grasses for hay production on prime farmland plots.
- Maintain the sod farm on prime farmland soils for erosion control vegetation.
- Continue to implement ITAM Program and Natural Resources projects that will benefit grasslands. Monitor the grassland ecosystem through RTLA monitoring. The SRP process within the LRAM portion of the ITAM program identifies areas needing rehabilitation, and LRAM projects rehabilitate loss of soils or vegetation in areas where vegetation does not recover naturally and/or soils have been disturbed during military training exercises. The SRA portion of the ITAM program and the TRI portion of the ITAM program contain policies and procedures for educating and informing troops about protection of natural resources.
- Continue with the completion of Environmental Pre-Activity Surveys prior to digging emplacements (e.g., foxholes and individual fighting positions, etc.) in accordance with KYARNG Regulation 350-7. The Training Site NCOIC and the Environmental Office will use the Environmental Pre-Activity Survey to determine if further environmental review is needed.

6.7.3 FIRE MANAGEMENT

Wildfire has the potential to severely damage property, natural resources and to endanger human life. The effects of wildfire on the military mission are twofold: primarily the destruction of natural vegetative communities, training structures, and equipment, and secondarily, exposing sensitive areas to weather events, which could result in soil erosion.

A state-wide Integrated Wildland Fire Management Plan (IWFMP) has been prepared for the KYARNG training sites, including the WHFRTC. Army policy requires that IWFMP be developed for installations with unimproved grounds that present a wildfire hazard and/or installations that utilize prescribed burns as a land management tool. The IWFMP must be compliant and integral with INRMP, the installation's existing fire and emergency services program plan, and the Integrated Cultural Resources Management Plan (ICRMP). The purpose of the IWFMP is to reduce wildfire potential, effectively protect and enhance valuable natural resources, integrate applicable state and local permit and reporting requirements, and implement ecosystem management goals and objectives on Army installations (DA 2002). Responsibility for implementation of the IWFMP falls on TAG, who designates a Wildland Fire Program Manager (WFPM) to administer the plan.

The goals of the IWFMP reflect the KYARNG's commitment to safety and the sustainable use of training land, as well as its long-term vision for the WHFRTC terrestrial habitat.

- **GOAL 1: SAFETY** - Provide first and foremost for firefighter, military personnel and public safety. Ensure that all fire management activities implement suppression and control practices and technologies, which minimize resource damage and unnecessary suppression and rehabilitation costs.
- **GOAL 2: MILITARY MISSION** - Support the military training mission at the WHFRTC by managing wildland fire to sustain military training areas.
- **GOAL 3: ECOSYSTEM MANAGEMENT** - Maintain, protect, and improve ecological integrity at WHFRTC.

Major components of the IWFMP include: a general description of the installation; information pertaining to the causes and management of wildfires that occur on site; and WHFRTC's prescribed burning program. In general, wildfires rarely occur at WHFRTC and one has never escaped the training center's boundary. In circumstances where wildfires have occurred, the KYARNG has had the manpower and equipment to bring them under control. The KYARNG routinely uses prescribed fire to maintain grassland ecosystems, enhance rare species habitat, and control undesired exotic vegetation by reduction of vegetative litter. Site specific burn plans are completed prior to all prescribed burns.

The WHFRTC has defined 20 burn units (**Figure 7**). These areas are burned on a rotation basis, which is discussed in the IWFMP.

6.7.4 AGRICULTURAL OUTLEASING

The KYARNG has allowed limited haying by private entities at the WHFRTC to help maintain grasslands. Although a variety of agricultural interests are feasible at the WHFRTC, hay production is most conducive to training activities. Currently, no formal agricultural outleases are in effect at WHFRTC. Any future leases would be established and managed by KDMA.

6.8 INTEGRATED PEST MANAGEMENT

IPM is "a comprehensive approach to pest control or prevention that considers various chemical, physical, and biological suppression techniques; the habitat of the pest; and the interrelationship between pest populations and the ecosystem" (AR 200-1). Laws, regulations, and executive orders pertaining to integrated pest management are listed in **Table 28** and discussed in **Appendix E**.

TABLE 28. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO INTEGRATED PEST MANAGEMENT AT WHFRTC

REQUIREMENT	TITLE
Federal Law	Federal Noxious Weed Act of 1974 (7 USC §2801 et seq.) Federal Insecticide, Fungicide, and Rodenticide Act (7 USC §136) Federal Pest Plant Act (7 USC §150a et seq.) National Aquatic Invasive Species Act of 2003 (NAISA)
Executive Order	EO 12865, Reduction of Pesticide Application by 50 percent by Fiscal Year (FY) 2000 EO 13112, Invasive Species
Kentucky Laws and Regulations	KRS Chapter 224; 401 KAR 5:031, Water Resources Protection Laws KRS Chapters 217.541 et seq., 249; 250: Noxious Weed Control 405 KAR 16:180 and 405 KAR 18:180, Wetland Protection

6.8.1 STATEWIDE PEST MANAGEMENT PLAN

The KYARNG Statewide IPM Plan governs pest management operations at KYARNG facilities. It describes the KYARNG's pest management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the program.

The KYARNG Pest Management Coordinator is responsible for overall program administration, oversight, quality assurance, scope of work reviews, record keeping, and reporting. The Coordinator annually evaluates ongoing pest control operations and evaluates all new pest management operations to ensure compliance with the ESA and MBTA. A copy of the Statewide IPM Plan and other pest management files are kept in the KYARNG Environmental Office in Frankfort.

6.8.2 KYARNG PEST MANAGEMENT APPROACH

The Statewide IPM Plan sets forth a three-step approach to controlling an unwanted plant or animal, as shown in **Table 29.**

TABLE 29. KYARNG APPROACH TO PEST SPECIES MANAGEMENT

STEP		DESCRIPTION
1	**Assess Species Level**	Assess species abundance before using any control approach. In most cases, periodic visual inspections should be sufficient to determine population levels of invasive species. Maps, permanent plots, or photographs can be used to help determine levels of specific plant or animal species. A determination of how much a plant is spreading will be made before control is attempted.
2	**Attempt Control ***	**Cultural Control:** Manipulate environmental conditions to suppress or eliminate pests. For example, removing trash from the training areas will eliminate a source of food for predators and, through good sanitary practices, may prevent pest populations from becoming established. ***Cultural controls should always be the first attempt at controlling pests at the training site.***
		Mechanical/Physical Control: Alter the environment in which a pest lives by mechanically removing or trapping pests from where they are not wanted or preventing their entrance. Another type of cultural control for weedy vegetation is the use of hot water treatment using a steam unit to eliminate weeds and seed production. Perennial weeds may need subsequent treatment to provide complete control.
		Biological Control: Use predators, parasites or disease organisms to control pest populations. Biological control may be effective by itself, but is often used in conjunction with other types of control.
		Chemical Control: Chemicals were once considered to be the most effective control available, but pest resistance rendered many pesticides ineffective. In recent years, the trend has been to use pesticides that have limited residual action. While this has reduced human exposure and lessened environmental impact, the cost of chemical control has risen due to requirements for more frequent application. Since personal protection and special handling and storage requirements are necessary with the use of chemicals, the overall cost of using chemicals as a sole means of control can be quite costly when compared with nonchemical control methods. ***Whenever possible, chemical control will be considered the last option when performing control operations and most likely will be used in conjunction with other control methods.***
3	**Monitor Results**	Monitor control method efficiency after control methods have been undertaken. Periodic visual inspections, interpretation of aerial photos, and photo point monitoring should be sufficient to monitor most invasive plant and animal species. Populations of invasive exotic plant or animal species will be resurveyed and compared to the baseline determination of a species level after control efforts are implemented. This can be accomplished during routine site inspections. Units should report suspected rabid or injured animals to their field commander, who will report the occurrence to the KDFWR District Biologist at (606) 864-9358.

* Attempt control using these general means. Specific control prescriptions are contained in the Kentucky IPM Plan.
Source: KYARNG Statewide IPM Plan

6.8.3 PEST SPECIES MANAGEMENT

The Statewide IPM Plan provides detailed management information on the following topics, which will not be duplicated in this plan, with the exception of noxious and invasive plants identified at WHFRTC, which are discussed in **Sections 6.8.5 through 6.8.7**. Forest pest management is discussed in **Appendix H.**

- Disease Vectors and Public Health Pests
- Pest of Real Property
- Stored Food Product Pests
- Noxious and Invasive Plants
- Ornamental Plant and Turf Pests
- Other Undesirable Vegetation
- Animal Pests
- Household and Nuisance Pests
- Other Pest Management Requirements

6.8.4 USE OF CHEMICALS AT WHRTC

Herbicides can be used to control unwanted vegetation in areas where mechanical mowing is difficult or not cost effective. A wide range of USEPA-registered herbicides are available for use at the WHFRTC, but only those herbicides pre-approved by the KYARNG Pesticide Coordinator and included in the KYARNG IPM Plan may be used. Herbicides can also be used to conduct Timber Stand Improvement (TSI) and to control invasive plants and noxious weeds through subcontracted projects. Aquatic weed control, if necessary, would be done by KYARNG or subcontracted. Treatment is typically done to control non-native invading species, and to control weeds in designated fishing ponds. The Kentucky Department of Agriculture is available for technical support.

6.8.5 NOXIOUS WEEDS

Noxious weeds are defined as “any living stage (including but not limited to, seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation or the fish and wildlife resources of the United States or the public health (*Federal Noxious Weed Act of 1974*).”

The Federal Noxious Weed Act of 1974 and EO 13112 require Federal agencies to control exotic species on Federal lands. The USDA has designated 104 species as Federally-listed Noxious Weeds; none have been identified at WHFRTC to date. The Kentucky Department of Agriculture is authorized to prevent the importation and spread of pests that are injurious to the public interest and for the protection of the agricultural industry. Of the eight Kentucky-listed Noxious Weeds species, five have been identified at WHFRTC (see **Table 30)**. Recommendations for these five species are presented in the following sections.

TABLE 30. KENTUCKY STATE-LISTED NOXIOUS WEEDS

COMMON NAME	SCIENTIFIC NAME	CODE	U.S. NATIVITY
Musk thistle*+	*Carduus nutans*	CANU4	Invasive
Canada thistle	*Cirsium arvense*	CIAR4	Invasive
Kudzu	*Puereria lobata*	PULO	Invasive
Multiflora rose*	*Rosa multiflora*	ROMU	Invasive
Giant foxtail*	*Setaria faberi*	SEFA	Invasive
Burr cucumber*	*Sicyos angulatus*	SIAN	Native
Black nightshade	*Solanum ptycanthum*	SOPT7	Native
Johnsongrass* +	*Sorghum halepense*	SOHA	Invasive

* designates species which have been identified at WHFRTC (White and Yahn, 2006).

+ designates species actively controlled at WHFRTC

6.8.5.1 MUSK THISTLE

MUSK THISTLE

Source: Elaine Haug, Smithsonian Institute of Systematic Biology-Botany Woodbridge Occoquan National Wildlife Refuge

Musk (or nodding) thistle (*Carduus nutans*) is a large plant, growing up to 6 feet tall and flowering from June through October. Plants typically overwinter as rosettes and send up flowering stalks the following spring. Seeds mature and can begin dispersing within 7 to 10 days of flowering. Each thistle produces many seeds, often in excess of 10,000 seeds per plant. The fine filaments or pappus (thistle down) of the seed coat permit windborne dispersal over long distances to suitable habitats.

Musk thistle has been formally designated as a noxious weed by Kentucky state law (KRS Chapter 249). As such, all landowners are required to control the plant if it is growing on their property. Control is considered to be prevention of seed production. The spread of musk thistles has become a significant problem at the WHFRTC. In most cases, periodic visual inspections should be sufficient to monitor thistle populations. This can be accomplished by the use of maps, permanent plots, and photographs.

Control Methods**:** Biological control methods include two exotic weevils that can reduce population numbers of the musk thistle: the flower head weevil (*Rhinocyllus conicus*), a European weevil that feeds on developing thistle seed heads; and the rosette weevil (*Trichosirocalus horridus*) another European weevil that feeds on thistle rosettes. In May of 1996, 600 flower head weevils were introduced to three of four high-density musk thistle sites on the WHFRTC. Larvae of this species feed beneath developing seeds, destroying them, and pupate in the flowers; adults emerge in mid-summer and hibernate in overwintering floral rosettes. There is one generation of thistle-head weevils per year.

Mechanical control methods include cutting and removing, or mowing thistles within 2-3 days after terminal blooms flower in late April or early May. This results in plants that will not produce seed or regenerate significantly. Time of mowing is important; for example, if mowing is delayed to only four days after the terminal bloom flowers, significant amounts of seed are produced. Since thistle stands mature at different times, careful monitoring and proper timing are necessary for mowing to be a viable IPM option. However, even if mowing is done late and seed is produced, mowing the stalks will reduce seed dispersal and seed production, keeping infestations from spreading widely.

Biological controls can be combined with cultural controls such as timely mowing or reseeding with competitive desirable plants. Mechanical controls should be used early in the season to stress the plants, and natural enemies allowed to enter the system to further weaken and eliminate thistles. Controlled burning may only damage the above ground portion of the thistle allowing rapid regrowth from the root section or from seed. Fire should be used only in combination with other control measures.

6.8.5.2 MULTIFLORA ROSE

Multiflora rose is an introduced, thorny shrub that can form impenetrable thickets in successional fields, pastures, roadsides, and in dense forests, particularly near natural disturbances such as treefall gaps and along streambanks. A single mature plant can produce up to half a million seeds annually. If well established, a huge seed bank develops that can continue to produce seedlings for at least 20 years after removal of mature plants. Control is difficult in areas where steep slopes prevent mowing access (KYDOF, 2007). Control can be obtained through cut stump application of glyphosate, piclorum, or triclopyr herbicides.

MULTIFLORA ROSE

Source: James H. Miller,
USDA Forest Service, Bugwood.org

Such applications are most effective late in the growing season (July-September), and also during the dormant season. Alternatively, repeated cutting or mowing (i.e., three to six times during the growing season), in more than one growing season, can result in high plant mortality. Removal of individual plants by pulling or grubbing is generally not effective as new plants will readily sprout from remaining roots. The routine use of prescribed fire has been shown to hinder expansion (MDC, 2006; White and Yahn, 2006).

6.8.5.3 GIANT FOXTAIL

Giant Foxtail

Source: Robert H. Mohlenbrock,
USDA-NRCS PLANTS Database

Giant foxtail (*Setaria faberi*), also called Japanese bristlegrass, is a common annual grassy weed. It arrived in North America in the 1930s from Asia. Stems can grow 6 to 12 feet, the leaf blades can be 20 inches long. The inflorescence, or support system for the flowers, looks like a bushy tail. Giant foxtail is a weed in gardens or field crops, but to wildlife the large seeds are a food source (MU Extension, 2007).

A number of herbicides are effective on giant foxtail; however, repeated use has led to resistance (CDFA, 2007).

It is often spread by poorly composted manure and "dirty" hay or straw. The seeds have an approximate 2 year lifespan in the soil. To avoid new infestations, use only certified seed, always clean equipment after working in infested areas. Remove plants by hand, dig up, or till before seeds are produced. Fire is not recommended as it seems to promote the spread of this plant (USFS 2006). Giant foxtail can be effectively controlled with a number of herbicides such as metolacholar and nicosulfuron. This plant is known to be resistant to some herbicides, such as clethodim, fenoxaprop-p-ethyl,fluazifop-p-butyl, quizalofop-p-ethyl, and sethoxydim (USFS 2006).

6.8.5.4 BURR CUCUMBER

Burr cucumber (*Sicyos angulatus*) is a climbing weed found in forests and shady, damp places, and along streams and roads. Vines are slightly fuzzy and can reach lengths of 15-25 feet. Leaves are relatively circular in shape and resemble cultivated cucumber leaves with three to five shallow lobes. Its flowers range from white to green. Fruits are borne in clusters of three to ten. Each fuzzy, yellow fruit is only about 1/2 to 3/4 inches long and about 1/4 inch thick, and covered with prickly bristles. Inside each fruit is a single, flat, egg-shaped seed (UMN Extension 2007).

BURR CUCUMBER

Source: Robert H. Mohlenbrock, USDA-NRCS PLANTS Database

Repeatedly pulling or cultivation of young plants before they have set seed will reduce the number of seeds in the area over time.

Dicamba, the active ingredient in some post-emergent herbicides, will control burr cucumber, but it should not be used under the canopy of trees and shrubs because rain or irrigation water can wash it into the root zone where it will be a problem (UMN Extension 2007). Glyphosate, the active ingredient in post-emergent herbicides such as Round-Up, can be sprayed or painted onto young plants early in the season. This product may be used around trees as it will not be absorbed by the roots or bark.

6.8.5.5 JOHNSON GRASS

JOHNSONGRASS

Source: Lowell Usbatsch USDA-NRCS PLANTS Database

Johnson grass is a tall, coarse, perennial grass with stout (up to ¾ inches in diameter) rhizomes. It grows in dense clumps or nearly solid stands and can reach 8 feet in height. Leaves are smooth, 6 to 20 inches long, and have a white or light green mid-vein. Stems are pink to rusty red near the base. Seeds are reddish-brown and nearly 1/8 inch long. This species was originally native to the Mediterranean and now occurs in all warm-temperate regions of the world. It occurs in crop fields, pastures, abandoned fields, rights-of-way, forest edges, and along stream banks. It thrives in open, disturbed, rich, bottom ground, particularly in cultivated fields.

The thick rhizomes live over winter and in the spring send out new, white, spur-like shoots. The grass leaves emerge late in spring and the plant forms seed by July 1. A single plant may produce over 80,000 seeds per year. Stems and leaves die back after the first frost, but the dead litter often covers the ground all winter. Rhizome cuttings commonly form new plants, making it very difficult to eradicate. It spreads rapidly and is not affected by many of the agricultural herbicides.

Control Methods

Mechanical Controls

- Mowing/Cutting: For areas of heavy infestation, repeated and close mowing kills Johnson grass seedlings, prevents seed production, and reduces rhizome growth and regrowth of shoots. In areas of light infestation, cutting and removal of seed heads during early July and then spot application of 2% Roundup to the foliage usually will be effective if continued for 3-4 years.
- Hand Pulling/Grubbing: Clumps and individual plants may be hand pulled during June just after a rain when the ground is soft. All plant parts should be removed from the area. Broken stems and roots left in the ground should be dug up if only a small area is involved. It may be necessary to hand pull a population several times to obtain control. Surrounding seed sources should be eliminated, where possible, to prevent continual reinvasion.

Herbicidal Controls

- Foliar spray Method: Dense patches can be controlled by spraying the foliage with 2% glyphosate (tradename Roundup) using a hand sprayer or backpack sprayer. Best results are obtained when glyphosate is applied to plants that are 18 inches tall to early flowering stage. During this period, the herbicide will be most effectively translocated to the roots and rhizomes. Since Roundup is a nonselective herbicide, care should be taken to avoid contacting non-target plants. Do no spray so heavily that herbicide drips off the target species. The herbicide should be sprayed while backing away from the area to avoid walking through wet herbicide. By law, herbicides may only be applied as per label instructions. Herbicide treatment may need to be repeated for several years to ensure good control.

6.8.6 NON-NATIVE INVASIVE PLANTS AT WHFRTC

Invasive and exotic species may include plants, insects, or animals. An **invasive** species is defined as "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." An alien (or **exotic**) species is defined as a "species including its seeds, eggs, spores, or other biological material capable of propagating that species that is not native to that ecosystem (*EO 13112*)". Because of their invasive capacity, many exotic species have the ability to spread rapidly through ecosystems since their natural predators are often not present. Such species often retard natural succession and reforestation and generally cause a reduction of biological diversity in natural ecosystems. Management action is needed to keep them under control.

Control is only legally required for species found on the USDA federal noxious weed list, none of which have been identified at WHFRTC. However, the KY-EPPC recommends that Rank 1 (severe threat) and Rank 2 (significant threat) species be controlled and managed in the early stages of detection when possible. The "Lesser Threat" and "Watch List" species may become problems in the future and should be monitored. This approach is consistent with EO 13112.

The KYARNG's primary approach to control undesirable vegetation is by mowing in areas where vegetation growth is unwanted or would interfere with military operations. The following section provides specific management strategies for the invasive/exotic pest plants listed as a "severe threat" by KEPPC and documented at WHFRTC during the most recent botanical survey (Littlefield and Yahn 2006).

Additional management recommendations to control or eradicate invasive pest plants on the WHFRTC are available from the Plant Conservation Alliance Alien Plant Working Group's internet-based project "Alien Plant Invaders of Natural Areas: Weeds Gone Wild" (http://www.nps.gov/plants/alien/).

6.8.7 SEVERE THREAT INVASIVE/EXOTIC PLANT SPECIES

6.8.7.1 PURPLE CROWN VETCH

PURPLE CROWN VETCH

Source: Jim Stasz
USDA-NRCS PLANTS Database

Purple crown vetch (*Coronilla varia*) is a perennial, herbaceous legume that flowers from May to August. Flowers are in clusters and range from pinkish lavender to white. This plant spreads rapidly by seed and by its creeping root system. Purple crown vetch is distinguished by its compound leaves with an odd number of leaflets (15 to 25), the presence of leaves and flower stalks arising from the main stem, and the occurrence of flowers in an umbel. The preferred habitat of this plant is open, sunny areas. It occurs along roadsides and in open fields (INPC 2007). For small infestations of mature plants, hand pulling can be effective. Mowing during the flower bud stage for 2 to 3 years may reduce vigor and control spread. Be sure to cut plants low to the ground before they seed. Application of triclopyr and glyphosphate subsequent to mowing can also be effective. Repeat treatments are necessary to control this species effectively (White and Yahn 2006).

6.8.7.2 AUTUMN AND RUSSIAN OLIVE

AUTUMN OLIVE

Source: Herman, D.E. et al.
USDA-NRCS PLANTS Database

Autumn olive (*Elaeagnus umbellata*) and Russian olive (*Elaeagnus angustifolia*) are medium to large shrubs which often reach heights of 20 feet. These exotic (non-native) species were planted on the site during mine reclamation to provide cover for wildlife and serve as soil stabilizers and enrichers. Both species have nitrogen-fixing root nodules, which allow them to thrive in poor soils. Autumn and Russian olive have silvery white scales covering the lower leaf surface. Autumn olive has oval-shaped leaves; whereas, Russian olive has narrower leaves that are lance-shaped. Plants flower and develop fruit annually after reaching three years of age. An individual plant can produce up to eight pounds of fruit. Once established, the species are highly invasive and difficult to control. They can create heavy shade which suppresses plants that require direct sunlight, such as grasses. Burned, mowed, or cut plants will resprout vigorously.

Eradication of these noxious weeds is desired because they will serve as a concentrated seed source for the entire region around the training site. However, these shrubby plants serve as troop concealment in the Simulated Urban Area near the Northern

Lake and also provide nesting cover for Bell's vireo in the grassland/shrub ecosystem of the training site. For this reason, control of existing areas can only be undertaken after suitable Bell's vireo habitat and concealment areas are created using non-aggressive native shrub species (See **Chapter 5.3** for recommended species).

Approximately 370 acres are planted in Autumn and Russian olive shrubs. At this time a determination of how much the plant is spreading should be made before control is attempted. These units should not be burned, mowed, or cut without some kind of herbicide treatment.

Control Methods

Young seedlings and sprouts can be hand-pulled in early spring when adequate ground moisture is present to allow removal of the root system along with above-ground growth. The olives are easily seen in early spring because their leaves appear while most native vegetation is still dormant.

A combination of mechanical and chemical treatment appears to be the most successful. Cutting the plant off at the main stem and applying herbicide to the stump has been effective in killing root systems and preventing resprouting. Recommended herbicides include a 10-20% solution of glyphosate (tradename Roundup) applied to the cut stump or a narrow band of undiluted triclopyr (tradename Garlon 4) can be applied around the base of the plant 6-12 inches above the ground. Cut stump treatment is particularly effective late in the growing season (July to September), but is also effective during the dormant season (October to March). Treatment of cut stumps should occur within minutes of cutting (Missouri Department of Conservation 1993). None of the recommended herbicides are restricted use pesticides.

6.8.7.3 CHINESE LESPEDEZA

CHINESE LESPEDEZA

Source: G.A. Cooper, USDA-NRCS PLANTS

Chinese lespedeza is a warm season, perennial herb in the pea family, or Fabaceae. Chinese lespedeza is native to eastern Asia and was first introduced in the southern United States. Widespread use of lespedeza by federal and state agencies for bank stabilization, soil improvement, wildlife and forage and cover, and hay facilitated its spread throughout the eastern United States.

It has an erect growth form, ranging from about 3 to 5½ feet in height, and leaves that alternate along the stem. Each leaf is divided into three smaller leaflets, about ½ to 1 inch long, which are narrowly oblong and pointed, with awl-shaped spines. Leaflets are covered with densely flattened hairs, giving a grayish-green or silvery appearance. Mature stems are somewhat woody and fibrous with sharp, stiff, flattened bristles. Violet to purple flowers emerge either singly or in clusters of 2-4, from the axils of the upper and median leaves.

Chinese lespedeza, sometimes called sericea lespedeza, is primarily a threat to open areas, such as meadows, prairies, open woodlands, wetland borders and fields. Chinese lespedeza can grow in a variety of habitats including severely eroded sterile soils. It will invade open woodlands, fields, prairies, borders of ponds and swamps, meadows, and open disturbed ground, but is intolerant of shade. Once it gains a foothold, it can crowd out native plants and develop an extensive seed bank in the soil, ensuring its long residence at a site. Established dense stands of lespedeza suppress native flora and its high tannin content makes it unpalatable to native wildlife as well as livestock.

Chinese lespedeza begins growth from root crown buds at the base of last year's stem. The flowers begin to develop in late July and continue through October. Within the Lespedeza genus there are no specialized structures for seed dispersal. Dispersal is aided by animals consuming the fruits and passing the seeds. A study on natural populations found that several species of Lespedeza comprise 1.5% to 86.8% of the annual diet of bobwhite quail in the southeastern U.S. Autumn dispersal is aided by the haying of infested fields. Mature seeds of this genus remain viable for up to twenty years.

Control Methods

Mechanical control includes mowing of plants in the flower bud stage for 2 or 3 consecutive years may reduce the vigor of lespedeza stands and control further spread. Plants should be cut as low to the ground as possible and impact to adjacent native plants should be minimized as much as possible.

Herbicidal controls include the foliar spray method. Because root reserves increase up to the flower bud stage, all herbicide treatments should be completed in early to mid summer. The addition of a non-ionic surfactant at a concentration of 0.5% improves the effectiveness of foliar treatments. Triclopyr and clopyralid have been shown to be effective in controlling Chinese lespedeza. A 2% solution Triclopyr or 0.5% solution of clopyralid thoroughly mixed with water is effective during the vegetative stage prior to branching or during flowering. Treatments should cover the leaves and stems of plants to the point of runoff. These herbicides are not labeled for use in wet areas or adjacent to streams. On wet sites, a

foliar treatment with a 2% glyphosphate herbicide mixture has proven effective from late June until seed set (White and Yahn 2006).

6.8.7.4 JAPANESE HONEYSUCKLE

Japanese honeysuckle (*Lonicera japonica*) is a perennial climbing or trailing woody vine in the Caprifoliaceae (Honeysuckle) family, introduced from Japan for its value as an ornamental, for erosion control, and for wildlife cover. It became established throughout the United States by the early 1900s and has now spread over the eastern and midwestern U.S. Japanese honeysuckle is still propagated and promoted as a ground cover in areas where it has not yet become a pest. This plant can reach a total height of 30-40 feet, depending on surrounding vegetation. Annual growth may reach 30 feet. The leaves are evergreen, and the vines are woody and range from very hairy to smooth. Flowers are very fragrant and are born in pairs in the axils, blooming from April to June. Fruits are small in diameter, black, containing 2-3 seeds each. Fruits mature from August to October.

JAPANESE HONEYSUCKLE
Source: Jil M. Swearingen
National Park Service,
Washington D.C

Japanese honeysuckle starts its growing season in early spring when temperatures reach 34 to 48 ℉. Plants reproduce by vegetative reproduction, in which stolons develop new roots. Seeds, dispersed widely by birds, may germinate in a variety of light conditions.

Control Methods

Mechanical control includes grubbing. This method works for small initial populations or environmentally sensitive areas where herbicides cannot be used. Using a pulaski or similar digging tool, remove the entire plant, including all roots and runners. Juvenile plants can be hand pulled depending on soil conditions and root development; but must be completely removed so that the root system will not resprout. All plant parts, including mature fruit, should be bagged and disposed of in a trash dumpster to prevent reestablishment.

Prescribed burns or a combination of prescribed burns and herbicide spraying appears to be the best way to eradicate this vine. In fire-adapted communities, spring prescribed burns greatly reduce Japanese honeysuckle coverage and crown volume. Repeated fires reduce honeysuckle by as much as 50% over a single burn. A previously burned population of honeysuckle will recover after several years if fire is excluded during this time. By reducing honeysuckle coverage with fire, refined herbicide treatments may be applied, if considered necessary, using less chemical.

Herbicidal Controls include the foliar spray method. This method should be considered for large thickets of populations where risk to non-target species is minimal. Air temperature should be above 65℉ to ensure absorption of herbicides.

- Glyphosate (tradename Roundup): Apply a 2% solution of glyphosate and water plus a 0.5% non-ionic surfactant thoroughly wetting all leaves after surrounding vegetation has become dormant (October-November). Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species. Glyphosate is a non-selective systemic herbicide that may kill non-target partially-sprayed plants.
- Triclopyr (tradename Garlon 4): Apply a 2% solution of triclopyr and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray-drift damage to non-target species. Triclopyr is a selective herbicide for broadleaf species. In areas where desirable grasses are growing under or around multiflora rose, triclopyr can be used without non-target damage.

The cut stump method is another herbicidal control type. This control method should be considered where vines are established within or around non-target plants, or where they have grown into the canopy. This treatment remains effective at low temperatures as long as the ground is not frozen.

- Glyphosate (tradename Roundup): Cut the stem two inches above ground level. Immediately apply a 25% solution of glyphosate and water to the cross-section of the stem.
- Triclopyr (tradename Garlon 4): Cut the stem two inches above ground level. Immediately apply a 25% solution of triclopyr and water to the cross-section of the stem.

6.8.7.5 AMUR (BUSH) HONEYSUCKLE

AMUR HONEYSUCKLE

Source: Herman, D.E. et al.
USDA-NRCS PLANTS Database

Amur (bush) honeysuckle (*Lonicera maackii*) is an upright, deciduous shrub that grows to be 6 to 15 feet tall and has dark green leaves that end in a sharp point at the tip and the underside of the leaf has hair along the veins. Bush honeysuckles have a broad tolerance to a variety of moisture regimes and habitats including lake and stream banks, wetlands, prairie, and upland forest communities. Fruits are usually red to yellow. Birds are the main contributors of the spread of this species. Bush honeysuckle competes with native species by shading them. These shrubs have a longer leaf out period than most native species. In addition, they appear to produce an allelopathic chemical that enters the surrounding soil and inhibits native plant growth (INPC 2007).

Control Methods

For small infestations, hand removal of seedlings or small plants may be used for small populations; however, it is important to remove all portions of the root to avoid resprouting. For chemical control, use a foliar spray with a 2% glyphosphate or triclopyr mixture where risk to non-target species is minimal and when air temperatures are above 65 °F. Treatment of a 25% solution of glyphosphate or triclopyr immediately after cutting stumps is also effective (White and Yahn 2006).

6.8.7.6 SWEET CLOVER

White and yellow sweet clover (*Melilotus alba,* and *M. officinalis*), native to Europe and Asia, were used as a forage crop and soil builder during their initial introduction, and are now used as a wildlife cover crop and in production of honey. These biennial herbs have adapted to a variety of temperatures and light levels. In the first year, they put all energy reserves toward developing a strong root system, and in the second season they flower, set seeds and die. Thus, seed production is essential in proliferation. The leaves of both sweet clovers are alternate and trifoliate. Leaflets are finely-toothed and oblong. Mature plants (second-year) may appear bushy and have small pea-like flowers that are yellow or white, which produce one or two seeds each. Areas most likely to contain sweet clover include roadsides, abandoned fields, railroad ballasts, pastures and any unflooded, open natural community such as a prairie (INPC 2007).

YELLOW SWEET CLOVER

Source: Patrick J. Alexander
USDA-NRCS PLANTS Database

Control Methods

For small infestations, hand pulling of first year stems in late summer/early fall is a feasible method that can be utilized to control white and yellow sweet clover. Mowing in late spring/early summer may reduce,

but not prevent seeds from setting. Burning two years in a row has also been found to reduce the size of sweet clover populations. If chemical control is required, use a foliar application of 2,4-D on young seedlings.

6.8.7.7 JAPANESE STILT GRASS

JAPANESE STILT GRASS

Source: Ted Bodner,
USDA-NRCS PLANTS Database

Japanese stiltgrass (*Microstegium vimineum*), is an annual colonial grass that spreads rapidly into disturbed lowland areas. Microstegium is native to Japan, Korea, China, Malaysia, and India. It was first identified in the U.S. in Knoxville, Tennessee in 1919, and in 1933 was collected in western North Carolina. By 1964, the grass had spread to 35 counties in North Carolina. By 1972, it had been identified in 14 eastern states, and in 1978, it was collected in Arkansas. Microstegium can be found throughout the state of Kentucky, primarily in previously disturbed mesic areas.

Inconspicuous at first, populations may go unnoticed until they have displaced native communities. It is a C-4 shade tolerant plant that can survive and reproduce under a closed forest canopy. It reaches a height of 24 to 39 inches. Plants bloom in August and September. Seeds mature over a period of about two weeks in September and October. Reproduction is exclusively from seed. Each plant may produce from 100 to 1,000 seeds that remain viable in the soil for five or more years. Seed dispersal is primarily by animals, flooding, and deposition with fill dirt.

This plant spreads rapidly into disturbed areas but can invade undisturbed areas by forming satellite populations brought in by animals or flooding. On fertile mesic sites, Japanese grass can replace competing ground vegetation within 3-5 years. Microstegium is adapted to low light conditions. It will grow and produce seed in light levels as low as 5% of full sunlight.

Control Methods

Mechanical Controls include mowing and cutting: Mow plants as close to the ground as possible using a weedeater or similar grass cutting tool. Treatments should be made when plants are in flower and before seeds are produced. Treatments made earlier may result in plants producing new seed heads in the axils of lower leaves.

Herbicidal Control includes herbicidal treatments that are made late in the growing season, but before the plants set seed. Treatments made earlier in the growing season may allow a second cohort of plants to produce seeds.

- Glyphosate (tradename Roundup): Apply a 2% solution of glyphosate and water plus a 0.5% non-ionic surfactant to thoroughly wet all foliage. Do not spray to the point of runoff. Ambient air temperature should be above 65°F to ensure translocation of the herbicide to the roots. Do not apply if rainfall is expected within two hours following application.
- Sethoxydin (tradename Poast): Apply a 1.5% solution of sethoxydin and water plus 1% nonphytotoxic vegetable-based oil to all foliage on a spray-to-wet basis. Do not spray to the point of runoff. Ambient air temperature should be above 65°F. Do not apply if rainfall is expected within one hour following application.

6.8.7.8 TREE OF HEAVEN

Tree-of-heaven (*Ailanthus altissima*) is a rapidly growing, deciduous tree in the mostly tropical quassia family (Simaroubaceae). Mature trees can reach 80 feet or more in height. It has smooth stems with pale gray bark, twigs which are light chestnut brown and large compound leaves. Small yellow-green flowers

have 5-6 petals and are borne in dense clusters near ends of upper stems. Pink to tan fruit is winged with a single seed in the middle. Roots have aggressive rhizomes. All parts of the tree, especially the flowers, have a strong, offensive odor similar to peanuts or cashews. Tree-of-heaven reproduces both sexually (seeds) and asexually (vegetative sprouts). Established trees also produce numerous suckers from the roots and re-sprout vigorously from cut stumps and root fragments.

TREE OF HEAVEN

Source: Ginger Webb
SW School of Botanical Medicine

This tree is found in disturbed soils, fields, roadsides, fencerows, woodland edges, forest openings, and rocky areas. It thrives in poor soils and tolerates pollution. It is not found in wetlands or shaded areas. Tree-of-heaven is a prolific seed producer, grows rapidly, forms thickets, dense stands, and can overrun native vegetation. It colonizes by root sprouts and spreads by prolific wind- and water-dispersed seeds. Once established, it can quickly take over a site and form an impenetrable thicket. They produce toxins that prevent the establishment of other plant species.

Control Methods

Manual: Young seedlings may be pulled or dug up, preferably when soil is moist. Care must be taken to remove the entire plant including all roots and fragments. Cutting large seed producing female trees would at least temporarily reduce spread by this method.

Chemical: It can be effectively controlled using any of several readily available general use herbicides such as triclopyr or imazapyr (USFS 2006). The herbicides may be applied as a foliar (to the leaves), basal bark, cut stump, or hack and squirt treatment. Basal bark application is one of the easiest methods and does not require any cutting. It works best during late winter/early spring and in summer. The cut stump method is useful in areas where the trees need to be removed from the site and will be cut as part of the process. The hack-and-squirt or injection method is very effective and minimizes sprouting and suckering when applied during the summer.

Biocontrol: A potential biological control for tree-of-heaven may lie in several fungal pathogens, (*Verticillium dahliae* and *Fusarium oxysporum*) that have been isolated from dead and dying tree-of-heaven trees in New York and in southern and western Virginia (USFS 2006).

6.8.7.9 ASIAN BITTERSWEET

Asian Bittersweet (*Celastrus orbiculatus*) is native to Eastern Asia, Korea, China and Japan. It is a deciduous, woody, perennial vine or trailing shrub. The plant has light brown stems that may reach 2 – 4 inches in diameter and up to 59 feet in length. Leaves (2-5 inch) are glossy, rounded, finely toothed and arranged alternately along the stem. Clusters of small whitish-greenish flowers emerge in May – June from leaf axils allowing each plant to produce large numbers of seeds. At maturity, globular, green to yellow fruits split open to reveal three red-orange, fleshy arils that contain the seeds. These showy fruits have made oriental bittersweet popular for use in floral arrangements. They reproduce by seed and vegetatively by root suckering.

ASIAN BITTERSWEET

Source: J. Miller
Invasive & Exotic Spp. of N. America

Asian bittersweet infests forest edges, woodlands, early succession fields, hedgerows, coastal areas and salt marsh edges, particularly those suffering some form of land disturbance. While often found in more open, sunny sites, its tolerance for shade allows oriental bittersweet to invade

forested areas. The plant is currently found from New York to North Carolina, and westward to Illinois (USFS 2005).

Asian bittersweet is an aggressive invader that threatens all vegetation levels of forested and open areas. It grows over other vegetation, completely covering it, and kills other plants by preventing photosynthesis, girdling, and uprooting by force of its massive weight. In the northeastern U.S., exotic Asian bittersweet appears to be displacing the native climbing bittersweet (*Celastrus scandens*), which occurs in similar habitats, through competition and hybridization (USFS 2005).

Control Methods

Mechanical: Hand pull by the roots and remove from the site, preferably before fruiting. If fruits are present, vines should be bagged and disposed of in a landfill, or left in the bags and allowed to bake in the sun long enough to kill the seeds.

Chemical: Herbicides, such as glyphosate (e.g., Roundup) or triclopyr (e.g., Garlon) are successful (USFS 2005). These herbicides are taken into the roots and kill the entire plant.

6.8.7.10 COMMON REED

COMMON REED

Source: B. Blossey
Invasive and Exotic Species of North America

The common reed is native to Europe. It is a tall perennial wetland grass in the Grass family (Poaceae) ranging in height from 3 to 20 feet. Strong leathery horizontal shoots, called rhizomes, growing on or beneath the ground surface give rise to roots and tough vertical stalks. Cane-like stems, 1 inch in diameter, support broad sheath-type leaves that are .5 to 2 inches wide near the base, tapering to a point at the ends. Large dense, featherlike, grayish purple plumes, 5 to 16 inches long, are produced in late June to September. The plant turns tan in the fall and most leaves drop off, leaving only the plume-topped shoot. The root system is comprised of rhizomes that can reach to 6 feet deep with roots emerging at the nodes. Common reed reproduces by spreading rhizomes that form large colonies.

The common reed thrives in sunny wetland habitats. It grows along drier borders and elevated areas of brackish and freshwater marshes and along riverbanks and lakeshores. The species is particularly prevalent in disturbed or polluted soils with alkaline and brackish waters, but will tolerate highly acidic conditions. It can grow in water up to 6 feet deep and also in somewhat dry sites. It can be found along roadsides, ditches, open wetlands, riverbanks, lake shores, dredged area, and disturbed or undisturbed plant communities (USFS 2005).

Common reed has become a destructive weed, quickly displacing desirable plants species such as wild rice (*Zizania* spp.), cattails (*Typha* spp.), and native wetland orchids (*Orchis* spp.). Invasive stands of common reed eliminate diverse wetland plant communities, and provide little food or shelter for wildlife (USFS 2005). Its high biomass blocks light to other plants and occupies all the growing space below ground so plant communities can turn into a Phragmites monoculture very quickly.

Control Methods

Manual: Common reed can be cut and the rhizomes can be dug up, but physical control is difficult because this species can reestablish from seed or remaining rhizomes. Frequent mowing is sometimes effective on controlling common reed.

Chemical: It can be effectively controlled using any of several readily available general use herbicides such as glyphosate (USFS 2005)

Biocontrol: There is no known biological control for common reed, although goats are known to forage on many types of emergent vegetation.

6.8.7.11 COMMON CHICKWEED

Common chickweed (Stellaria media), a winter annual, is a native to Europe. Chickweed is a mat-forming plant in the pink family (Caryophyllaceae) growing up to 12 inches tall. Stems are light green in color and with hairs in vertical rows. Stems usually run prostrate along the ground, rooting at the nodes, with the upper portion erect or ascending and freely branching. Small oval to elliptic leaves are arranged oppositely, 1/2 to 1 1/2 inches in length, light green in color and smooth or hairy toward base and petioles. Small star-shaped flowers consist of 5 white petals that are deeply lobed, giving the appearance of 10 petals and grow alone or in small clusters at the ends of the stems. The fruit is an oval, straw-colored capsule that contains many tiny reddish brown seeds. Seed output can be from 600 to 15,000 per plant. It reproduces vegetatively through a fibrous root system and by seeds.

COMMON CHICKWEED

Source: Michael Moore
SW School of Botanical Medicine

Common chickweed found in a wide variety of habitats and soil textures. Soil pH ranges from 4.8 to 7.3 (USFS 2006). It prefers soil with high level of nitrogen supply. It can readily tolerate very low temperatures, and can even flower and fruit under a snow cover at temperatures as low as -16°F. It is sensitive to drought. It is found along disturbed lands, cultivated fields, waste places, trails, roadsides, forest, and gardens (USFS 2006).

Common chickweed is able to create dense mats of shoots up to 12 inches long, shading young seedlings of other plants. It invades, spreads, and out-competes other spring annuals. Common chickweed is reported to contain poisonous glycosides and high nitrate levels (USFS 2006).

Control Methods

Manual: Hand pull or dig; remove entire plant and root; dispose of all plant parts because plant shoots have the ability to re-root.

Chemical: It can be effectively controlled using any of several readily available general use herbicides, such as glyphosate or triclopyr. It is resistant to some herbicides - acetolactate synthase (ALS) inhibitors: chlorsulfuron, metsulfuron, tribenuron, triasulfuron, rimsulfuron, sulfometuron, flumetsulam and imazapyr (USFS 2006).

6.9 OUTDOOR RECREATION MANAGEMENT

AR 200-1 provides guidance for access to military lands and waters by recreational users by stating that "such access will be within manageable quotas, subject to safety, military security, threatened or endangered species restrictions, and the capability of the natural resources to support such use; and at times as such can be granted without bona fide impairment of the military mission, as determined by the installation commander." This section provides details on public access and enforcement at the WHFRTC. Laws and regulations pertaining to site access and use are listed in **Table 31** and discussed in **Appendix E**.

TABLE 31. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO OUTDOOR RECREATION AT WHFRTC

REQUIREMENT	TITLE
Law	The WHFRTC is a state-owned facility and is not directly subject to the Sikes Act "*Conservation Programs on Military Reservations*" (16 U.S. Code (USC) §670a et seq.), as amended. However, Army policy is to follow DoD and ARNG guidance on state-owned facilities.
Executive Order	EO 12960, Recreational Fisheries;
Army Regulation	AR 200-1, *Environmental Protection and Enhancement*
Kentucky Laws and Regulations	KRS Chapter 56:010, Action for Trespass or Injury to State Property KRS Chapter 149, Forest Protection Laws of Kentucky KRS Chapter 150, Fish and Wildlife Protection KRS Chapter 235.00, Boating Statutes KAR Title 301, Tourism Development Cabinet Department Of Fish And Wildlife Resources

6.9.1 PUBLIC ACCESS

Access to WHFRTC must be controlled during training exercises for military troop and public safety. Limitations on public access will be enforced during training exercises due to the presence of hazards related to training activities. Some possible threats to public safety related to training activities include: training residue (for example, concertina wire) and training mechanisms (for example, vehicles, smoke, and live-firing on ranges). Potential hazards related to previously strip-mined lands include: steep slopes (some greater than 2:1) adjacent to ponds and lakes, deep water, and protruding cables left from mining activities. All of these are potential hazards to outdoor recreationists on foot or in a vehicle.

Public access to the training site is controlled by secured gates; with only one gate open to the public during daylight hours to provide access to Coleman Cemetery. Illegal use of or entry to the site is subject to state trespass regulations (KRS 511, 512, 513, 514). Any person entering the training site for any purpose prohibited by law or lawful regulation is trespassing. According to KRS Chapter 56.010, the Finance and Administration Cabinet shall institute civil proceedings in the name of the Commonwealth for any trespass or injury to any state property under its control. Trespassing is a serious matter in that it may endanger the life of the person entering the training site as well as potentially endangering lives of Kentucky Army National Guardsmen and interfering with military training.

6.9.1.1 HUNTING AND FISHING

The WHFRTC deer hunting program began in 1996 and continued until 2000 through an agreement with the KDFWR. KDFWR handled the lottery drawings for the hunts conducted on the training site and operated check stations during the hunts. In 2001, WHFRTC began the administration of its own hunting program for turkey, deer, small game, and quail. The KYARNG Wildlife Management Fund Committee meets on a quarterly basis to ensure timely resolution of hunting and fishing issues and ensures proper disposition and expenditure of funds derived from hunting and fishing permit fees.

Hunting and fishing are the primary natural resources-based outdoor recreation programs at WHFRTC. Hunting seasons and bag limits follow those published in each year's KDFWR Kentucky Hunting and Trapping Guide. All hunting dates will correspond with KYFWR assigned hunting dates. Any quota hunting or draw hunts conducted by the site, which may be outside these assigned dates, will be posted for public information two weeks prior the draw date. In the past, more civilians than military personnel have participated in hunting activities.

The WHFRTC hunting program is limited to military personnel, dependents, civilian employees, federal and state law enforcement personnel, and guests of military personnel. Hunting and fishing regulations at the site including hunting seasons, bag limits and size limits will be in accordance with all applicable state and federal laws.

In addition to Kentucky State hunting and fishing licenses, permits and stamps, hunters and fishermen on the WHFRTC are require to purchase a training site hunting or fishing permit. WHFRTC permits are issued by the WHFRTC Security Office. All checks for fees must be made payable to the WHFRTC Wildlife Management Fund. These moneys will be used to support recreational site maintenance, troop morale, welfare and recreational activities, and wildlife programs established by the training site.

Hunters and fishermen are responsible for (1) becoming familiar with the Hunting and Fishing SOP (**Appendix I**);(2) purchasing all hunting and fishing permits issued by the training site prior to hunting or fishing on WHFRTC; (3) having in their possession all State hunting and fishing licenses and tags prior to hunting on the installation; and (4) the behavior and actions of any and all guests. See **Figure 8** for designated hunting and fishing areas at WHFRTC.

Hunting – the training site is divided into 26 hunting areas. All areas not designated as hunting areas are considered off-limits and will not be used for outdoor recreational activities. Training and hunting areas are clearly marked on the training center map available at range control and the security office. Hunting opportunities at WHFRTC include: small game, deer and turkey bow hunting, deer and turkey gun hunting and waterfowl hunting.

Fishing – authorized in all lakes and ponds at WHFRTC except for the lake adjacent to the main entrance to the training center. Creel and size limits will be enforced on fish taken from WHFRTC waters. All baits and tackles are authorized on lakes and ponds owned and maintained by the training site. Persons will not seine or set fish traps in any lake or pond on the facility.

6.9.1.2 ALL-TERRAIN VEHICLE USE

All-terrain vehicles (ATVs) have great potential for damage to natural resources. No off-road driving for recreational purposes is permitted on WHFRTC. The only exception to this policy is the use of these vehicles by severely handicapped hunters whose physical disability makes it impossible to hunt by conventional methods.

6.10 CULTURAL RESOURCES PROTECTION

Prior to any new projects, building alterations, or ground disturbing activities at the WHFRTC, the Cultural Resource Manager in the Environmental Office must be contacted. The Cultural Resource Manager will assess whether an architectural or archaeological survey is required and what permits need to be obtained to comply with all federal and state regulations pertaining to cultural resources.

Cultural resources include sites, buildings, structures, or objects that may have significant archeological and historic values, or properties that may play a significant traditional role in a community's history, beliefs, customs, and practices. Cultural resources, thus, encompass a wide range of sites and buildings from prehistoric Native American campsites to Military buildings constructed during the Cold War, as well as traditional cultural properties still used today.

Sections 106 and 110 of the National Historic Preservation Act (NHPA, Public Law (PL) 89-655) provide the framework for federal review and protection of cultural resources, and to ensure that they are considered during federal project planning and execution. The implementing regulations for the Section 106 process (36 CFR Part 800) have been developed by the Advisory Council on Historic Preservation (ACHP). The Secretary of Interior maintains a National Register of Historic Places (NRHP) and sets forth significance criteria (36 CFR Part 60) for inclusion in the register. Cultural resources may be considered "historic properties" for the purpose of consideration by a federal undertaking if they meet NRHP criteria. Historic properties may be those that are formally placed in the National Register by the Secretary of the Interior, those that meet the criteria and are determined eligible for inclusion, and historic properties that are yet undiscovered but may meet eligibility criteria.

The DoDI 4710.02 (DoD Interactions with Federally Recognized Tribes) provides guidance for interacting and working with federally recognized American Indian and Alaska Native governments or tribes. This Instruction implements Annotated DoD American Indian and Alaska Native Policy (27 Oct 99), which governs compliance with EO 13175 (Consultation and Coordination with Indian Tribal Governments) and Presidential Memoranda for Heads of Executive Departments and Agencies on Government-to-Government Relations with Native American Tribal Governments (29 April 1994). The DoD policy assigns responsibilities and provides procedures for DoD interactions with federally recognized tribes. The policy requires that government agencies communicate with tribes on a government-to-government basis in recognition of their sovereignty. Addressing tribal concerns between tribes and military installations requires communication at both the tribal leadership-to-installation commander and the tribal staff-to-installation staff levels. The effect of a proposed DoD action that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands must be assessed before decisions are made.

The laws, regulations, executive orders and policies governing the protection of cultural resources are are listed in **Table 32** and discussed in **Appendix E**.

TABLE 32. LAWS, REGULATIONS, AND EXECUTIVE ORDERS APPLICABLE TO CULTURAL RESOURCES MANAGEMENT AT WHFRTC

REQUIREMENT	TITLE
Law	Archaeological and Historic Preservation Act of 1974 (AHPA) American Indian Religious Freedom Act of 1978 (AIRFA) National Historic Preservation Act (NHPA, PL 89-655) National Historic Preservation Act (NHPA, PL 89-655)
Army Regulation	Army Regulation 200-1
Federal Regulation	Section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended, its implementing regulation (36 CFR 800)
Executive Order	EO 13007 *Indian Sacred Sites* EO 11593 *Protection and Enhancement of the Cultural Environment* EO 13175 *Consultation and Coordination with Indian Tribal Governments*
DoD Instruction	DoD Interactions with Federally Recognized Tribes (DoDI 4710.02)
Kentucky Regulations	KRS Chapter 164.705-.735, Archaeology KRS Chapter 381.765, Human Burials KRS Chapter 525.115, Violating Graves

6.10.1.1 CULTURAL RESOURCES MANAGEMENT

The KYARNG maintains a state-wide ICRMP for all property managed by the KDMA, including the WHFRTC. An ICRMP is a five-year plan required by AR 200-1 and DoDI 4715.3 for compliance with applicable federal laws and regulations concerning cultural resources. The ICRMP is a component of the installation master plan and functions as a decision document for cultural resources management actions and specific compliance procedures. The plan's purpose is to integrate cultural resources requirements with ongoing mission activities so that the availability of mission essential properties and acreage is maintained and compliance with requirements is achieved.

In 2006, the Kentucky Archaeological Survey (KAS) documented two historic cemeteries at the WHFRTC. One of these cemeteries is within TA 7 and is known as the Cedar Grove Cemetery. Interments range from the early-nineteenth to the twenty-first century. Because the cemetery is active, no site numbers were assigned and no additional work was recommended for either cemetery. However, it was recommended that the Kentucky Heritage Council be contacted if any ground disturbing activities should

take place withiin an area identified as a possible unmarked African-American graveyard at the Cedar Grove Cemetery (KAS 2007a).

The KAS conducted a Phase I archaeological reconnaissance of TA 7 and 8 in 2007. One historic archaeological site (15Mu255), one historic cemetery (15Mu256), and three non-site localities were identified during the course of this survey. Due to their recent age and significant soil disturbance caused by strip-mining and/or logging activities, the historic archaeological site (15Mu255) and Non-Site Localities 1-3 are not eligible for listing on the National Register of Historic Places (NRHP) (KAS 2007b). The Eades Cemetery (15Mu256) contains nineteenth century burials of descendents of some of the earliest settlers in Muhlenberg County. It is potentially eligible for listing in the NRHP. Although no depressions were observed in the vicinity of the Eades Cemetery, the possibility exists that additional unmarked graves may be present (KAS 2007b). The KAS recommended that the Kentucky Heritage Council be contacted prior to ground disturbing activity near this cemetery, and recommended that a geophysical survey, including the use of ground penetrating radar (GPR), be conducted by professional archeologists to determine the presence and extent of any additional burials in this area.

To date, no Native American sacred plant, animal, and mineral gathering localities or Traditional Cultural Properties (TCPs) have been identified at WHFRTC. Because of the intensive disturbance caused to the natural environment by surface and underground mining, there is little potential for Native American sacred sites on TA 7 and TA 8.

Cultural resources management policies are described in **Table 33.** SOP 4 and 6 in the Kentucky statewide ICRMP apply to natural resources management at WHFRTC.

TABLE 33. KYARNG CULTURAL RESOURCES STANDARD OPERATING PROCEDURES APPLICABLE TO NATURAL RESOURCES MANAGEMENT AT WHFRTC

Topic		Policy
1	**SOP #4: Inadvertent Discovery**	In the event that archaeological deposits are encountered during any construction or excavation activities, the activity must stop and the Environmental Program Manager/Cultural Resources Manager (EPM/CRM) must be notified. If bone is present within the deposit, the EPM/CRM will ensure that a qualified professional accompanies him/her to the work site to assist in identification of the materials as human remains. Because of the potential for archaeological deposits to contain Native American human remains or cultural materials, failure to report discovery of archaeological deposits may result in violation of NAGPRA, ARPA and other related federal and state laws resulting in fines and penalties against the KYARNG/DMA. **Follow Procedures in the ICRMP for:** a. Situation #2: Construction and maintenance activities, including but not limited to digging, bulldozing, clearing-and-grubbing, maintaining earth berms, and roadwork conducted by KYARNG troops. b. Situation #3: Construction and maintenance activities, including, but not limited to digging, bulldozing, clearing-and-grubbing, maintaining earth berms, and roadwork conducted by contractors. c. Situation #4: Artifacts found in eroded areas, gullies, dirt trails, or road cuts on DMA property.
2	**SOP #6: New Construction**	a. Ensure no disturbance or destruction of significant archaeological resources. Known archeological sites should be managed as avoidance areas (no digging). b. Follow Procedures in the ICRMP.

6.10.1.2 NATIVE AMERICAN CONSULTATION

Consultation proceedings have been conducted in accordance with the NHPA, Native American Graves Protection and Repatriation Act (NAGPRA), EO 13175, EO 13007, 36 CFR 800, and DoDI 4710.02, which implements the 27 Oct 99 Annotated Department of Defense American Indian and Alaska Native Policy. The KYARNG ICRMP describes in detail how and when the KYARNG will consult with Native American Tribes. Federally recognized tribes were invited to comment on the NEPA public review process, which will facilitate future consultations. A Memorandum for Record is included in **Appendix B** documenting this effort.

No federally recognized Native American Indian tribes currently reside in Kentucky, but seven tribes have been determined to have historic ties to the Commonwealth. At this time, it is unknown whether any of the seven tribes have specific ties to the area now occupied by the WHFRTC. These tribes were contacted in April 2010 to determine whether they have ties to the area now occupied by the WHFRTC: Eastern Band of the Cherokee Indians; Cherokee Nation of Oklahoma; United Keetoowah Band of Cherokee Indians in Oklahoma; The Chickasaw Nation; Absentee Shawnee Tribe of Oklahoma; Eastern Shawnee Tribe of Oklahoma; and Shawnee Tribe. A copy of this correspondence is provided in **Appendix B.** One Native American Tribe, the United Keetoowah Band of Cherokee Indians in Oklahoma, has responded. They stated that they have no objections to the INRMP. However, they did state that if any remains, artifacts, or other items are inadvertently discovered, they asked that all construction cease and immediately contact the Tribe by phone or letter. This response is provided in **Appendix B**.

To date, no Native American sacred plant, animal, and mineral gathering localities or Traditional Cultural Properties (TCPs) have been identified at WHFRTC. Because of the intensive disturbance caused to the natural environment by surface and underground mining, there is little potential for Native American sacred sites on TA 7 and TA 8.

If the existence of Traditional Cultural Properties (TCP) becomes known, the KYARNG will comply with EO 13175 (*Consultation and Coordination with Indian Tribal Governments*), EO 13007 (*Indian Sacred Sites*), and the NHPA of 1996 as amended.

6.11 NATURAL RESOURCES LAW ENFORCEMENT

Many aspects of integrating the training mission with natural resources management require effective enforcement if they are to be successful. Such programs as hunting/fishing access controls, protection of wetlands, water pollution prevention, rare species protection, and others are very dependent on law enforcement.

The WHFRTC is within the jurisdiction of TAG of Kentucky. The Criminal Laws of the Commonwealth of Kentucky are in effect within the boundaries of the training site. The WHFRTC TSC has jurisdiction and responsibility over the training site. All of the WHFRTC, local state, and federal laws and regulations, discussed in previous sections will be enforced. KYARNG personnel may call upon KDFWR or the Kentucky State Police to issue hunting and fishing citations.

6.12 ENVIRONMENTAL STEWARDSHIP

Environmental Stewardship at WHFTRC is a moral and legal obligation for all users to carefully and responsibly use and manage the land and resources of the training site. When leaders and soldiers alike can adopt an attitude of ownership and environmental stewardship of the training site, the natural resources will be more effectively conserved and sustained for future training use. True environmental stewardship and awareness must trickle down from TAG through the Training Directorate to each Commander and soldier within the KYARNG. Command emphasis is necessary to convey the seriousness of environmental stewardship.

6.13 ENVIRONMENTAL AWARENESS

Environmental awareness, through the distribution of educational materials, is a useful natural resources management tool as it educates land users on the sound environmental stewardship of natural and cultural resources and reduces the potential for inflicting avoidable impacts and/or incurring legal violations. Environmental awareness applies to soldiers, other services using Army lands, installation staff, other land users, and the public. It also encompasses efforts to inform environmental professionals of Army and installation mission and training activities (DA 1999). These efforts are designed to improve their understanding of the effects of their mission, training, or activity on natural resources and environmental sensitive areas.

Environmental awareness also serves to educate the public and garner their support by effectively communicating the nature of the military mission at WHFRTC and the level of success of natural resources management at the site. When military users and the public are informed and educated about "easily understood" management practices (such as reseeding) as well as "misunderstood" management practices (such as restrictions on field operations or access), they tend to lend more support than opposition to the practice.

Environmental swareness will be employed at the WHFRTC by promoting troop awareness, through the distribution of educational materials, maintaining and/or developing strong community relations, and by encouraging public involvement

6.13.1 TROOP AWARENESS

The policies and guidelines set forth throughout this INRMP as well as any of the established KYARNG SOPs were designed to educate troops training at WHFRTC about natural resources on the training site, including water, air, noise, and plant and animal life. The TSC conducts advance party environmental briefings and post-training reviews to ensure that troops training at WHFRTC adhere to the appropriate policies and guidelines. Each unit environmental compliance officer will be involved in incorporating the information in this INRMP into training plans to minimize effects of troop activities on natural resources.

6.13.2 EDUCATIONAL TRAINING TOOLS

A *Leader and Soldier Field Card* has been developed and maintained for WHFRTC for use by trainers in the field. The field card will consist of condensed information contained in other environmental awareness materials, such as the INRMP or any other applicable KYARNG SOPs. The field card should include a brief description of the installation and a list of "Dos and Don'ts" with particular emphasis on training area protection, erosion control, and cultural resources protection.

During the planning period, state and federal agencies (e.g,, the NRCS, USFWS, KDFWR, and KSNPC) will be a valuable source of information for the Environmental Office and Training Site Personnel through fact sheets, site visits, and regular workshops offered throughout Kentucky. Annual updates from these agencies can be a source of new technology and management techniques to aid in implementing a successful natural resources management program.

6.13.3 COMMUNITY RELATIONS AND PUBLIC INVOLVEMENT

There are many different ways to educate the public about activities at WHFRTC and promote good community relations at the same time. The local newspaper and local radio stations are excellent means of sharing information and promoting new programs.

Newspaper articles and public service announcements can reach a diverse audience, and can be specifically designed to impress one or more categories of receivers. Awards presented to KYARNG personnel are a good topic for such articles/announcements. Newspaper picture features can enhance understanding of the natural resources and be easily understood by most people. Specific examples of article topics include: natural communities on the training site; use of native species for revegetation and habitat enhancement; working with other agencies, etc. All contact with media staff should be coordinated with the PAO in Frankfort.

SECTION 7: MANAGEMENT GOALS AND OBJECTIVES

Per DoD Supplemental Guidance, the 2003 INRMP was reviewed "as to operation and effect," to determine whether it meets the requirements of the Sikes Act and if it contributes to the conservation and rehabilitation of natural resources on military installations. Goals and objectives presented within this section for future natural resources management were updated in accordance with this review. Previous sections that presented important background information on resources, current conditions, and management issues were used to formulate natural resources management goals. Goals listed in **Table 34** below express the KYARNG's vision of the desired condition of the natural resources. These goals are supported by objectives and projects, which provide management strategies and specific actions to achieve these goals. **Table 36** in **Section 8.0** presents a list of planned projects and how they relate to following goals and objectives. All projects are subject to funding availability.

TABLE 34. MANAGEMENT GOALS AND OBJECTIVES FOR WHFRTC

MANAGEMENT GOAL		OBJECTIVES
1	Manage natural resources to ***support the military mission*** in a manner consistent with the KYARNG Environmental Management System and in compliance with Federal and State laws, Army regulations and policies.	OBJECTIVE 1.1: Initiate programs and projects that enhance the training land and training opportunities and/or do not unnecessarily limit training land availability. OBJECTIVE 1.2: Continue to educate WHFRTC users regarding the natural resources and their part in ensuring sustainable use of the site. OBJECTIVE 1.3: Maintain sustainable, realistic terrain for military training and identify environmental constraints to land use so that military training can be matched to ecosystem carrying capacity. OBJECTIVE 1.4: Ensure that KYARNG activities at the WHFRTC remain in compliance with environmental, cultural, and historic regulations as well as INRMP policies. OBJECTIVE 1.5: Implement this INRMP within the framework of Army policies and regulations using the NEPA process to make informed decisions regarding natural resources. OBJECTIVE 1.6: Ensure feedback from training officers is incorporated into natural resource planning and management.
2	***Coordinate mission requirements and land maintenance activities*** to minimize land impacts from training,	OBJECTIVE 2.1: Evaluate potential impacts of proposed training, and modify training if necessary to prevent impacts to natural resources. OBJECTIVE 2.2: Maintain records of the type of training that occurs in various areas to correlate site conditions and training site use.
3	Manage ***fish and wildlife resources*** in a manner compatible with the military mission and within the limits of the natural habitat.	OBJECTIVE 3.1: Maintain natural ecosystems favorable for indigenous fish and wildlife populations. OBJECTIVE 3.2: Conduct planning level surveys to monitor flora and fauna species at the WHFRTC. OBJECTIVE 3.3: Provide small game (rabbit and squirrel) and turkey and deer (bow and gun) hunting and recreational fishing opportunities to guardsmen and their families within the constraints of the military mission regulations. OBJECTIVE 3.4: Continue to manage waterfowl, such a wood ducks and geese, to improve their populations. OBJECTIVE 3.5: Survey for neotropical migratory birds in coordination with Partners in Flight and KDFWR. OBJECTIVE 3.6: Maintain stable populations of game species (e.g., deer, turkey, quail) through sound population management strategies in cooperation with Quail and Turkey Unlimited.

TABLE 34. MANAGEMENT GOALS AND OBJECTIVES FOR WHFRTC

MANAGEMENT GOAL		OBJECTIVES
4	Protect, restore, and maintain populations of ***rare plant and animal species*** in compliance with Federal and State laws and regulations.	OBJECTIVE 4.1: Coordinate and conduct threatened and endangered species surveys and survey methodologies with appropriate state and federal agencies through master cooperative agreements. OBJECTIVE 4.2: Maintain updated records and maps of rare, threatened, and endangered plant and animal species locations at the WHFRTC. OBJECTIVE 4.3: Schedule only compatible training activities in areas known to contain federally threatened and endangered species, if any. OBJECTIVE 4.4: When appropriate, identify site-specific habitat requirements and develop short and long-range management strategies for threatened and endangered species. OBJECTIVE 4.5: Maintain viable populations of grassland-dependent state-listed bird species (i.e., Henslow's sparrow, short-eared owl, long-eared owl, lark-sparrow, and northern harrier)
5	Protect, maintain, and improve ***soil and water quality*** in accordance with State and Federal laws and regulations to sustain the overall condition of the WHFRTC training lands.	OBJECTIVE 5.1: Plan, design, and implement activities in cooperation with federal, state, and local regulatory authorities to minimize soil loss and site degradation. OBJECTIVE 5.2: Implement BMPs when conducting land management activities. OBJECTIVE 5.3: Control or eliminate runoff and erosion, and rehabilitate eroded areas through sound vegetative and land management practices. OBJECTIVE 5.4: Monitor groundwater quality and water levels in the mine spoil during the spring and fall (i.e., wet and dry seasons).
6	***Protect and maintain riparian, wetland and aquatic habitats*** in accordance with state and federal laws and regulations while adhering to ecosystem principles management for water quality enhancement, wildlife food and cover, and aquatic habitat.	OBJECTIVE 6.1: Proactively manage for wetlands during the environmental planning process, avoiding potential impacts to the maximum extent possible. OBJECTIVE 6.2: Protect riparian forests and wetlands from disturbance during routine land management projects and military training activities on the site by maintaining SMZs and buffer zones. OBJECTIVE 6.3: Monitor effects of military training on wetlands through annual visual site reconnaissance of Siber stakes and signs to ensure compliance with SMZs and buffer zones. OBJECTIVE 6.4: Maintain current maps of wetlands at the WHFRTC. OBJECTIVE 6.5: Conduct planning level surveys and jurisdictional wetland delineations as needed. OBJECTIVE 6.6: Foster compliance with Federal, state and local laws and DA regulations and policies, including "no net loss" of wetlands. OBJECTIVE 6.7: Monitor effects of military training on surface water quality through long-term water and macroinvertebrate sampling at selected monitoring sites.

TABLE 34. MANAGEMENT GOALS AND OBJECTIVES FOR WHFRTC

MANAGEMENT GOAL		OBJECTIVES
7	Maintain the ***grassland habitats*** for the purposes of military training, wildlife food and cover, and soil stabilization.	OBJECTIVE 7.1: Conduct flora and vegetation community planning level surveys as needed. OJECTIVE 7.2: Use prescribed fire, mowing and LRAM to maintain open training land and manage grassland habitat at the WHFRTC. OBJECTIVE 7.3: Monitor and rehabilitate, as needed, grassland communities at the WHFRTC periodically for training impacts. Objective 7.4: Protect existing breeding or forage habitat for Henslow's sparrow, short-eared owl, long-eared owl, lark-sparrow, northern harrier, and bell's vireo in grassland areas within Training Areas 1 and 4. OBJECTIVE 7.5: Control invasive exotic species using IPM methods and strategies for the purpose of improving and sustaining training area lands and eradication of exotic species. Objective 7.6: Use environmental awareness and training site SOPs to educate troops about sustaining grassland ecosystems.
8	Maintain the ***forest resources*** for the purposes of military training, wildlife food and cover, noise buffers, and watershed protection.	OBJECTIVE 8.1: Maintain forests in a condition that minimizes threat to safety and human health. Objective 8.2: Maintain current stand conditions in forest ecosystems along and around waterways with SMZs currently meeting state standards for BMPs. Objective 8.3: Monitor animal and plant populations dependent on the forest resources in cooperation with KSNPC, KDFWR, and Partners in Flight to ensure management goals are being met. Objective 8.4: Protect potential bat roosting and foraging habitat by enforcing existing policies. OBJECTIVE: 8.5: Manage and monitor for non-native and invasive insect species that pose a threat to forest resources. OBJECTIVE 8.6: Complete a forest inventory to determine present stocking levels of trees within the Forest Ecosystem. OBJECTIVE 8.7: Protect existing populations of Long-eared owls and their preferred habitat, which is Virginia pine-dominated forest adjacent to grassland or shrublands. OBJECTIVE 8.8: Provide areas within WHFRTC forests for military training purposes and wildlife foraging and roosting habitat.
9	***Provide cost-effective and compatible landscaping*** for the Cantonment Area to reduce maintenance costs and provide wildlife habitat.	OBJECTIVE 9.1: Use native tree species, shrubs, and perennial plants when landscaping OBJECTIVE 9.2: Plant wind and sunbreaks around buildings and parking areas. OBJECTIVE 9.3: Establish forest, prairie, or wildflower areas to reduce mowing.

TABLE 34. MANAGEMENT GOALS AND OBJECTIVES FOR WHFRTC

MANAGEMENT GOAL		OBJECTIVES
10	***Use prescribed fire*** to reduce risk of wildfires, to enhance ecological process and functions, maintain rare species habitat, to control undesired exotic vegetation, and to sustain the military mission.	OBJECTIVE 10.1: Develop individual burn prescriptions for burn units to be burned each year. OBJECTIVE 10.2: Reduce shrub cover in patchy areas from 50 percent to less 10 percent cover. OBJECTIVE 10.3: Improve the density of planted grass cover to 90 percent. OBJECTIVE 10.4: Burn up to 30 percent of the total burn unit acreage on an annual rotation cycle, and burn each unit at least every five years. OBJECTIVE 10.5: Attempt to minimize unintentional impacts of prescribed burning to invertebrate populations. OBJECTIVE 10.6: Reduce vegetative litter with prescribed fire in areas where musk thistle will be sprayed with herbicide. OBJECTIVE 10.7: Use fire on a 5 year rotational basis to maintain open shrub stands that are optimal nesting habitat for Bell's vireo. OBJECTIVE 10.8: Create and maintain firebreaks in an ecologically sound manner. OBJECTIVE 10.9: Ensure all personnel assigned to those positions are trained to a level appropriate for their expected duties per NWCG guidelines.
11	***Use IPM practices*** that maximize safety and minimize pesticide use and potential hazards to humans, wildlife and their environments.	OBJECTIVE 11.1: Comply with all federal, state, and local laws and regulations pertaining to pest management and pesticide use on the training site. OBJECTIVE 11.2: Support and adhere to the KYARNG Pest Management Plan. OBJECTIVE 11.3: Apply the most effective management strategies when populations of invasive exotic species exceed defined levels. Pest management will be achieved by non-chemical control (e.g., using mechanical or biological methods) whenever feasible and economical. OBJECTIVE 11.4: Prevent the further introduction of noxious plant and animal species to the training site to the greatest extent possible.
12	Continue to ***develop and maintain a GIS system*** providing efficient data storage, retrieval, and presentation to facilitate fully informed management decisions.	OBJECTIVE 12.1: Continue to collect GIS data throughout the training site, and revise existing files within the GIS database as more current data becomes available. OBJECTIVE 12.2: Update GIS hardware/software as technology advances and performance demands necessitate. OBJECTIVE 12.3: Ensure adequate technical staff is available and trained in new methods to maintain current GIS databases and manage information needs.
13	***Protect and preserve cultural resources*** in Accordance with State and Federal Laws and Regulations.	OBJECTIVE 13.1: Comply with federal, state, and local laws and regulations pertaining to cultural resources found on the training site. OBJECTIVE 13.2: Adhere to guidelines presented in the KYARNG ICRMP and in particular SOPs 4 and 6.

TABLE 34. MANAGEMENT GOALS AND OBJECTIVES FOR WHFRTC

MANAGEMENT GOAL		OBJECTIVES
14	***Form communication links*** with other agencies, organizations, and the public to share information and aid in decision-making.	OBJECTIVE 14.1: Involve the surrounding community in the WHFRTC natural resources program. OBJECTIVE 14.2: Ensure that the WHFRTC natural resources program is coordinated with other agencies and conservation organizations with similar interests. OBJECTIVE 14.3: Establish and maintain credibility with the public by publishing at least quarterly in local newspapers the training schedule (include dates and types of training). OBJECTIVE 14.4: Promote quick and accurate responses to public questions and concerns. OBJECTIVE 14.5: Provide support to the PAO in producing public service announcements to inform the public of events occurring on WHFRTC. OBJECTIVE 14.6: Use media effectively to convey natural resources management efforts on WHFRTC.
15	***By implementing the SRA program***, educate site users about environmental concerns and responsibilities to minimize resource damage and to instill a sense of pride and stewardship responsibility by implementing the SRA program.	OBJECTIVE 15.1: Brief decision-makers about WHFRTC natural resources program. OBJECTIVE 15.2: Develop and distribute information to units, leaders, soldiers, civilian employees, and other installation users to improve their understanding of impacts of their activities on the environment. OBJECTIVE 15.3: Conduct advance party briefings and post-training reviews to ensure that troops training at WHFRTC adhere to the appropriate policies and guidelines.
16	***By implementing the RTLA program***, identify and evaluate land impacts from training, and identify training activities compatible with WHFRTC topography, soils, land cover, and ecosystems.	OBJECTIVE 16.1: Ensure that physical and biological resources are georeferenced and recorded using global positioning system (GPS) technology to ensure data collection consistency from year to year. OBJECTIVE 16.2: Conduct RTLA monitoring every five years using a systematic, qualitative approach focusing on general site parameters such as vegetation, presence and severity of soil erosion, presence of specific animal species, and specific evidence of training related impacts. OBJECTIVE 16.3: Record the type of training that occurs in various areas so that correlations among site conditions and training may later be established. OBJECTIVE 16.4: Record natural events (for example, weather events) that could affect land condition. OBJECTIVE 16.5: Incorporate remote sensing, where appropriate, to supplement monitoring procedures and facilitate trend and change detection analysis. OBJECTIVE 16.6: Use RTLA data to facilitate land management decisions by installation management staff.
17	***By implementing the TRI program***, minimize training impacts, prevent excessive or irreversible land damage, and minimize training-related land rehabilitation costs.	OBJECTIVE 17.1: Evaluate potential impacts of proposed training events, and modify training if necessary to prevent impacts to natural resources. OBJECTIVE 17.2: Maintain a record of types and locations of training that occur in WHFRTC training areas. OBJECTIVE 17.3: Rotate use of training areas (e.g., bivouac areas) to prevent overuse of any one site if necessary.

TABLE 34. MANAGEMENT GOALS AND OBJECTIVES FOR WHFRTC

MANAGEMENT GOAL		OBJECTIVES
18	**By implementing the LRAM program**, apply BMPs to ensure rehabilitation, repair and maintenance results are commensurate with the applied resources and to ensure long-term sustainability of installation lands, training and testing missions.	OBJECTIVE 18.1: Schedule and perform land rehabilitation projects during optimum seeding periods. If projects cannot be performed within the optimum seeding period, then stabilize the soil immediately and complete seeding as soon as possible. OBJECTIVE 18.2: After heavy training exercises are conducted on the site, identify damaged areas and schedule appropriate rehabilitation. OBJECTIVE 18.3: Use temporary erosion control methods (such as silt fences or hay bale diversions) as needed during periods of heavy troop training and inclement weather to avoid silt migration to water bodies and other sensitive areas. OBJECTIVE 18.4: Include water management, landscaping, erosion control and natural resource conservation in all site feasibility studies and in project planning, design, and construction. OBJECTIVE 18.4: Coordinate long-term land maintenance plans with other real property management programs on the WHFRTC (e.g., master planning, range development, etc.)

SECTION 8: NATURAL RESOURCES PROGRAM IMPLEMENTATION

The KYARNG depends on natural resources for the sustainability of many training programs and will manage natural resources to ensure sustainable use. The updated INRMP is not intended to impair the ability of the KYARNG to perform its mission. However, the updated INRMP does identify usage restrictions on sensitive attributes such as wetlands and T&E species.

Implementation of this updated INRMP will be realized through the accomplishment of specific goals and objectives as measured by the completion of projects described within this INRMP. An INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for "must fund" projects and activities;
- Ensures that sufficient numbers of professionally trained natural resources management staff are available to perform the tasks required by the INRMP;
- Coordinates annually with cooperating agencies;
- Documents specific INRMP action accomplishments undertaken each year.

8.1 ANNUAL WORK PLANS

8.1.1 WORK PLANS

Natural resources management includes recurring activities and special projects. KYARNG Environmental staff generally performs recurring activities. Projects can be done by Environmental staff, agencies such as KSNPC, or contracted. The implementation schedule and planned projects to be funded during this planning period (2010-2015) are detailed in **Table 35.**

TABLE 35. PLANNED IMPLEMENTATION PROJECTS (2010 – 2015)

(Subject to Funding Availability)

PROJECT		LOCATION	OBJECTIVE # (CHAPTER 7)	DESCRIPTION	LEGAL DRIVERS	FUNDING TYPE	PROGRAM DATE
1	Recurring Maneuver Damage Costs	Throughout	1.1, 1.3, 1.4, 3.1, 5.1, 5.2, 5.4	Funds will be used as necessary to restore disturbed or eroding areas as a result of training activities. Efforts will include replanting vegetation to include native grasses and other species recommended by KDFWR and NRCS. Funds will also be used to purchase fertilizer, lime, seed and mulch for proactive and continuous maintenance of areas damaged by military maneuvers.	CWA, AR 200-1	ITAM	2010-2015
2	Environmental Awareness	Throughout	1.1, 1.2, 1.6 4.2, 13.1, 13.2, 13.3	Funds will be used to update Leader and/or Soldier Field Card and other environmental awareness related materials for WHFRTC as needed. Prepare/purchase posters, booklets, displays, films and training materials for troop environmental awareness training. Prepare training site environmental awareness video. Assemble Environmental Information Packets to be handed out to Officers-In-Charge (OIC) at Yearly Training Coordination Conferences.	Army Policy, AR 200-1, ESA, CWA	VENQ /ITAM	2010-2015
3	Vegetation Control	See Figure 6 for grassland areas	1.1, 1.3, 3.1, 5.2, 7.4, 7.5, 9.3	Funds will be used for mowing and brush plowing to maintain areas used for maneuver training and other areas inhibited and/or restricted by vegetation.	Federal Noxious Weed Act, Noxious Weed Control (KRS 217.541 et seq. 249; 25), Army Policy, AR 200-1	VENQ /ITAM	2010-2015
4	Agricultural Outlease	See Figure 6 for grassland areas	1.1, 1.3, 3.1, 5.2, 7.4, 7.5, 9.3, 13,1	KYARNG will evaluate the feasibility of an agricultural outlease with a local farmer for hay production. Agricultural outleasing would provide a mechanism by which the KYARNG could maintain open areas as training lands without incurring the expense of labor or equipment costs (i.e., reduce costs associated with Project 3).		VENQ	2010-2015
5	Planning Level Surveys	Throughout	1.1, 3.2, 4.1, 4.2, 7.1	Funds will be used to conduct biological inventories (small mammals, herptiles, insects, fish) and update rare species lists. The KYARNG plans to undertake periodic mist net surveys at WHFRTC to help determine presence/absence of these bat species. The KYARNG will coordinate with USFWS on these surveys.	ESA, AR 200-1	VENQ	2010-2015
6	Forest Inventory and Management Plan Update	See Figure 6	1.1, 3.1, 5.1, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 14.1	Conduct a Forest Inventory. The inventory will be used to aid in the development of specific forest management prescriptions and identify areas needing rehabilitation or restoration.	Army Policy, AR 200-1	VENQ	2010-2015

TABLE 35. PLANNED IMPLEMENTATION PROJECTS (2010 – 2015)

(Subject to Funding Availability)

PROJECT		LOCATION	OBJECTIVE # (CHAPTER 7)	DESCRIPTION	LEGAL DRIVERS	FUNDING TYPE	PROGRAM DATE
7	ITAM Program Administration Recurring Costs	Throughout		Costs associated with upgrades to facilities to support ITAM staff and technical functions (All ITAM components). Lease and maintain GSA vehicles for ITAM support Purchase miscellaneous supplies to support the ITAM function Identify ITAM requirements at WHFRTC in the Integrated Workplan Analysis Module (IWAM) Purchase LRAM equipment for maintenance of training site lands Hire one or more student interns to assist with projects as needed at WHFRTC.		ITAM	2010-2015
8	Prescribed Fire	Throughout		Construct and maintain fire breaks or other fuels modifications, directly associated with ranges/training areas fire management resulting from training activities. Construct firebreaks for fires not resulting from training activities (e.g., prescribed burn program) as needed. GPS firebreaks and include in future versions of the INRMP. Monitor effects of prescribed fire through post burn evaluations. Train WHFRTC employees in prescribed burn methods as needed.		VENQ	2010-2015
9	Reclamation of Abandoned Mine Lands	Throughout		Continue to work with Division of Abandoned Lands for reclamation of pre-law abandoned mine land areas and implement as funding allows.		VENQ	2010-2015
10	Water Quality Monitoring	Throughout		Conduct water quality monitoring of long-term water quality monitoring sites (included in project 5.14). Conduct surveys for macroinvertebrates at long term monitoring sites to determine jurisdictional status when projects require.	Need to evaluate the need for this.	VENQ	2010-2015
11	Pest Management	Throughout		Update pest management plan as needed.		VENQ	2010-2015
12	Hunting	Throughout		Coordinate annual hunts with KDFWR. Determine annual hunting quotas in advance of hunting season with KDFWR.		VENQ	2010-2015

8.1.2 FUNDING

Implementation of this updated INRMP is subject to availability of annual funding. Where projects identified in the plan are not implemented due to lack of funding, or other compelling circumstances, the installation will review the goals and objectives of this updated INRMP to determine whether adjustments are necessary.

The following discussion of funding options is not all-inclusive of funding sources. Since many funding sources rely on a variety of grant programs, award criteria and amounts can change considerably from one year to another. Funding through grant programs can occur on a one-time award, annually, or in multiples of years.

8.1.2.1 FEDERAL NGB FUNDS

The NGB is the primary source of funding to support management of natural resources at the WHFRTC through a master cooperative agreement with the KYARNG.

For some projects, the installation requests project validation and funding through the NGB-ARE STEP program, with requests completed by the KYARNG Environmental Office in Frankfort, KY. The NGB provides funding for natural resource surveys, environmental monitoring projects, and compliance-related projects.

The NGB Army Installations Division (NGB – ARI) provides funding for the personnel, equipment, and supplies in support of the KYARNG CFMO. This office is involved in planning, scheduling, and oversight of training; maintenance of roads and trails, vegetation management and pest management; facilities infrastructure; and military construction planning; all of which are critical to the natural resources management program.

A five-year ITAM Work Plan is used to channel ITAM funding requests from the KYARNG, through NGB, to the U.S. Army's Office of the Deputy Chief of Staff for Operations (ODCSOPS). In addition to maintaining key personnel and natural resources data collection efforts, the ITAM work plan budget will fund a number of projects of major importance to maintaining, preserving, and protecting the natural resources at WHFRTC. The annual ITAM Work Plan is the basis for identifying installation ITAM resource requirements and for allocating funding to support installation core capabilities. ITAM funds cannot be used for:

- correcting environmental statutory compliance requirements;
- performing routine range maintenance, modifications, or Sustainment, Restoration, and Maintenance (SRM) responsibilities;
- performing Army Conservation Program requirements, such as PLSs; and;
- adding additional GIS data layers that are not a part of the ITAM requirement (DA, 2005).

8.1.2.2 OTHER FEDERAL FUNDS

The NRCS manages the Federal Domestic Assistance Program (Plant Materials for Conservation) that assembles, evaluates, selects, releases, and introduces into commerce and promotes the use of new and improved plant materials for soil, water, and related resource conservation and environmental improvement programs.

Program initiatives under the CWA provide funding through several sources. The USEPA's Office of Water sponsors those projects related to the CWA. Available funding may support programs such as cost-sharing for overall water-quality management (e.g., monitoring, permitting, and enforcement), lake water quality assessments and mitigation measures, and implementation of non-point source pollution control measures. Refer to the USEPA's Office of Water funding website for potential sources of funding: http://www.epa.gov/ ater/funding.html.

The Abandoned Mine Land Reclamation (AMLR) Program, authorized by the Surface Mining Control and Reclamation Act of 1977, Public Law 95-87, 91 Stat. 445-532, is administered by the U.S. Office of Surface Mining Reclamation and Enforcement, Department Of The Interior. Its purpose is to protect the public, health, safety and general welfare, and restore land, water and environmental resources affected by coal and noncoal mining practices that occurred prior to August 3, 1977. Grants support the operation of an approved State or Tribal Abandoned Mine Land (AML) reclamation program. Approved programs use grant funds for mine site reclamation projects on eligible lands, which are lands and waters mined or affected by coal mining processes that occurred prior to August 3, 1977 (as well as certain post-1977 and noncoal mining activities). Grants also support project administration. Grants may also include funding for AML-related activities including: the Emergency program, to abate sudden mining-related dangers to public health and safety; the Appalachian Clean Streams program, to treat water affected by acid mine drainage; Set-Aside funds, to establish special accounts to fund future acid mine drainage treatment or coal mining reclamation; and the Subsidence Insurance program, to develop a self-sustaining State subsidence insurance program.

8.1.3 PRIORITIES AND SCHEDULING

The STEP database will be used to validate projects and determine funding priority. Projects need to be funded consistent with timely execution to meet future deadlines. Projects are generally prioritized with respect to compliance. Highest priority projects are projects related to recurring or current compliance, and these are generally scheduled earliest.

Recurring requirements include projects and activities needed to cover the recurring administrative, personnel, and other costs necessary to meet applicable compliance requirements (Federal and State laws, regulations, Presidential EOs, and DoD policies), or that are in direct support of the military mission. Recurring costs include manpower, training, and supplies; hazardous waste disposal; operating recycling activities; permits and fees; testing, monitoring, and/or sampling, and analysis; reporting and record keeping; maintenance of environmental conservation equipment; and, compliance self-assessments.

Current compliance includes projects and activities needed because an installation is currently or will be out of compliance if projects or activities are not implemented in the current program year. Examples include:

- Environmental analyses, monitoring, and studies required to assess and mitigate potential effects of the military mission on conservation resources;
- Planning documents;
- Baseline inventories and surveys of natural and cultural resources (historical and archaeological sites);
- Biological assessments, surveys, or habitat protection for a specific listed species;
- Mitigation to meet existing regulatory permit conditions or written agreements;
- Wetland delineations in support of subsequent jurisdictional determinations and consequent permitting;
- Efforts to achieve compliance with requirements with deadlines that have already passed;
- Initial documenting and cataloging of archaeological materials.

Maintenance requirements include those needed projects and activities that are not currently out of compliance but would be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year. Examples include:

- Compliance with future requirements that have deadlines;
- Conservation and GIS mapping to be in compliance;

- Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives;
- Wetlands enhancement to achieve the EO for "no net loss" or enhancement of existing degraded wetlands;
- Public education programs on the importance of protecting archaeological and natural resources;
- Lower priority projects include those that enhance conservation resources of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature. These projects are generally funded after those of higher priority.
- Examples of lower priority projects include:
- Community outreach activities, such as "Earth Day" and "Historic Preservation Week" activities;
- Educational and public awareness projects, such as interpretive displays, oral histories, "Watchable Wildlife" areas, nature trails, wildlife checklists, and conservation teaching materials;
- Biological assessments, surveys, or habitat protection for a species;
- Restoration or enhancement of cultural or natural resources when no specific compliance requirement dictates a course or timing of action;
- Re-interment of Native American remains on DoD managed or controlled land;
- Management and execution of volunteer and partnership programs.

8.2 NATURAL RESOURCES MANAGEMENT STAFFING

Natural resources program oversight and INRMP implementation is conducted through the KYARNG Environmental Office. Training for KYARNG personnel, as well as others participating in the management of natural resources, will be practical and job-related. All training programs will involve at minimum a review of legal compliance requirements, applicable DoD/DA regulations, pertinent State and local laws, and current scientific and professional standards as related to the conservation of natural resources. The following annual workshops, professional conferences, and classes are excellent means of obtaining interdisciplinary training for natural resources managers:

- North American Wildlife and Natural Resources Conference http://www.wildlifemanagementinstitute.org/pages/main.html
- Defense Environmental Network Information Exchange (DENIX) http://www.denix.mil/;
- Army Training Support Center – http://www.atsc.army.mil/;
- National Military Fish and Wildlife Association – http://www.nmfwa.org/;
- USACE Wetland Delineation Courses – http://www.hnd.usace.army.mil/to/pindex.html;
- Locally available training through the Cooperative Extension Service, universities, professional and trade organizations, State government, and commercial businesses.

Conferences and workshops will be evaluated for their usefulness, and decisions will be made based on appropriateness to ongoing projects and funding availability. Personnel will be trained in related environmental fields, as appropriate. NEPA training will be required of all supervisory personnel and those who review or prepare NEPA documents.

8.3 INRMP REVIEWS

8.3.1 REVIEW FOR OPERATION AND EFFECT

Not less than every five years, the INRMP will be reviewed for operation and effect to determine if the INRMP is being implemented to meet the intent of the Sikes Act and contributing to the conservation and rehabilitation of natural resources at the WHFRTC. The review will be conducted by the three cooperating parties to include the commander responsible for the INRMP, the Regional Director of the USFWS, and Director of the KDFWR. These agencies all have technical representatives who actually do the review.

The review for operation and effect will either conclude that the INRMP is meeting the intent of the Sikes Act and it can be updated and implementation can continue, or that it is not effective in meeting the intent of the Sikes Act to conserve natural resources while providing for no net loss in training capability and it must be revised. Mutual agreement of the review for operation and effect must be obtained from both the Regional Director of the USFWS, and Director of the KDFWR. This may be achieved via a signed letter, a jointly executed memorandum, or in some other way that reflects mutual agreement.

If only minor updates are needed, they will be done in a manner agreed to by all parties. The updated INRMP will be reviewed by USFWS and KDFWR. A new NEPA review is not necessary for an update and the continued implementation of an existing INRMP that has previously undergone NEPA review. In this case, an Environmental Checklist and Record of Environmental Consideration (REC) citing the previous NEPA document is needed.

If a review of operation and effect concludes that an INRMP must be revised, there is no set time to complete the revision. The existing INRMP remains in effect until the revision is complete and USFWS and KDFWR concurrence on the revised INRMP is received. The KYARNG will endeavor to complete such revisions within 18 months depending upon funding availability. Revisions to the INRMP will go through a more detailed review process similar to development of the initial INRMP to ensure KYARNG military mission, USFWS, and KDFWR concerns are adequately addressed and the plan meets the intention of the Sikes Act. Per DoD guidance an INRMP update only need to be available for public review if proposed actions “are expected to result in biophysical consequences materially different from those anticipated in the existing INRMP and are analyzed in an existing NEPA document”. The KYARNG may make this decision and provide public availability as deemed necessary.

8.3.2 ANNUAL REVIEWS AND COORDINATION

Per DoD policy, the KYARNG reviews the INRMP annually in cooperation with the USFWS and KDFWR. The KYARNG will converse with the agencies annually to determine if changes or issues indicate the need for a meeting. If warranted, a meeting will be held with the USFWS and the KDFWR and documented by meeting minutes. If a meeting is not necessary, the conversation will be documented via email correspondence or record of conversation.

At this annual review, the need for updates or revisions will be discussed. If minor updates are needed, the requesting party will initiate the updates and after agreement of all three parties they will be added to the INRMP. If it is determined that major changes are needed, all three parties will provide input and an INRMP revision and associated NEPA review will be initiated with the KYARNG acting as the lead coordinating agency. The annual meeting will be used to help expedite the more formal review for operation and effect and if all parties agree and document their mutual agreement, it can fulfill the requirement to review the INRMP for operation and effect.

If not already determined in previous annual reviews, by the fourth year annual review a determination will be jointly made to continue implementation of the existing INRMP with minor updates or to proceed with a revision. If the parties feel that the annual reviews have not been sufficient to evaluate operation and effect and they cannot determine if the INRMP implementation should continue or be revised, a formal review for operation and effect will be initiated. The determination on how to proceed with INRMP implementation or revision will be made after the parties have had time to complete this review.

In accordance with the Army Guidance for Implementation of the SAIA, dated May 25, 2006, annual reviews shall at minimum verify that:

- Current information on INRMP conservation metrics as described in Army Environmental Database Environmental Quality (AEDB-EQ) is available.
- All "must fund" projects and activities have been budgeted for and implementation is on schedule.
- All required trained natural resources positions are filled or are in the process of being filled.
- Projects and activities for the upcoming year have been identified and included in the INRMP. An updated project list does not necessitate revising the INRMP.
- All required coordination has occurred.
- All significant changes to the installation's mission requirements or its natural resources have been identified.
- The INRMP goals and objectives are still valid.
- No net loss of training capability has occurred due to implementation of the INRMP in accordance with the Sikes Act.

As part of the annual review the KYARNG will specifically:

- Invite feedback from the USFWS and KDFWR on the effectiveness of the INRMP;
- Inform the USFWS and KDFWR which INRMP projects and activities are required to meet current natural resources compliance needs; and
- Document specific INRMP action accomplishments from the previous year.

Information for the annual reviews comes from the KYARNG environmental staff, KYARNG military leadership, cooperating agencies, project files, and AEDB-EQ as applicable. Natural resources data and program and project information are available to cooperating agencies. They may request to see project folders or to have a site visit to view natural resources projects in progress at any time.

8.4 MONITORING INRMP IMPLEMENTATION

The DUSD *Updated Guidance for Implementation of the Sikes Act Improvement Act* updated Conservation Metrics for Preparing and Implementing INRMPs. Progress toward meeting these measures of merit is reported in the annual EQR to Congress. Reporting requirements include:

- The installation name and state.
- The year the most recent INRMP was completed or revised.
- Date planned for the next revision.
- Was the INRMP coordinated with appropriate military trainers and operators?
- Were projects added to the INRMP as a result of comments from military trainers and operators?
- Were segments of the INRMP concerning the conservation, protection and management of fish and wildlife resources agreed to by the USFWS Regional Director? (FWS coordination)
- Were projects added to the INRMP as a result of FWS comments?
- Has annual feedback been requested from the FWS?
- Has annual feedback been received from the FWS?
- Were segments of the INRMP concerning the conservation, protection and management of fish and wildlife resources agreed to by the State fish and wildlife agency Director? (State coordination)

- Were projects added to the INRMP as a result of State comments?
- Has annual feedback been requested from the State fish and wildlife agency?
- Has annual feedback been received from the State fish and wildlife agency?
- Does the INRMP contain a list of projects necessary to meet plan goals and objectives, as well as timeframes for implementation of any such projects?
- Amount of money spent in reporting FY to implement the INRMP.
- Did the installation seek public comment on the draft INRMP?
- Were projects added to the INRMP as a result of public comments?

SECTION 9: BIBLIOGRAPHY

ABC, 2000 — American Bird Conservancy. 2000. Partners in Flight Bird Conservation Plan for The Interior Low Plateaus (Physiographic Area 14).

ABC, unpublished report — American Bird Conservancy. Unpublished. Partners in Flight Bird Conservation Plan for The Northern Cumberland Plateau (Physiographic Area 21).

Audubon Society, 2008 — website:http://www.audubon2.org/watchlist/viewSpecies.jsp?id=187

Bailey, 1995 — Bailey, RG. 1995. Descriptions of the Ecoregions of the United States. United States Department of Agriculture, Forest Service. Fort Collins, Colorado. http://www.fs.fed.us/land/ecosysmgmt/ecoreg1_home.html

Bailey, 1996 — Bailey, RG. 1996. Ecosystem Geography. Springer. New York, New York.

Barbour et al., 1987 — Babour M.G., J.H. Burk, and W.D. Pitts, 1987, Terrestrial Plant Ecology, The Benjamin/Cummings Publishing Company, Inc., Menlo Park, California.

Bower and Jackson, 1981 — Bower, DE and WH Jackson. 1981. Drainage Areas of Streams at Selected Locations in Kentucky. Open File Report 81-61. Geological Survey, United States Department of the Interior, Louisville, Kentucky.

Brent, 2001 — Brent, JE. 2001. Draft Integrated Cultural Resources Management Plan, Kentucky Army National Guard, Frankfort, Kentucky (draft July 2001). Kentucky Archaeological Survey, jointly administered by the University of Kentucky Department of Anthropology and the Kentucky Heritage Council. Report No. 43. Versailles, Kentucky.

Calibre Systems, 2002 — Calibre Systems, Inc. 2002. Integrated Natural Resources Management Plan and Environmental Assesment; Wendell H. Ford Regional Training Center, Muhlenberg County, Kentucky. Submitted to Kentucky Department of Military Affairs, Environmental Office.

CDFA, 2007 — California Department of Food and Agriculture. Accessed 13 February, 2007. Noxious Weed Index. Last updated 25 February, 2005. http://www.cdfa.ca.gov/phpps/ipc/weedinfo/winfo_table-commname.htm

CES, 1994 — Center for Earthquake Studies. 1994. Major Earthquake Motion Intensity Map for Use with CUSEIS—Richter Magnitudes, Ms=7.0 to 7.9 Originating in the New Madrid Seismic Zone. Southeast Missouri State University, One University Plaza, Cape Girardeau, Missouri.

Cornell University, 2008 — http://www.birds.cornell.edu/All AboutBirds/BirdGuide/Long-eared_Owl_dtl.html.

Cowardin et al., 1979	Cowardin, LM, V Carter, FC Golet, and ET LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, U.S. Fish and Wildlife Service, Washington, DC.
DA, 1987	Department of the Army. 1987. FM (35) Engineer Field Data.
DA, 1999	Department of the Army. 1999. Integrated Training Area Management Procedural Manual Implementing Draft. U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland.
EL, 1987	U.S. Army Corps of Engineers Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi.
Fenneman, 1938	Fenneman, NM. 1938. Physiography of the Eastern United States. McGraw-Hill Company, New York, New York.
Gravatt et al., 1999	Gravatt, D, D Martel, M Bishop, A Bishop, S McAnally, S Sutton, M Mauney. 1999. Delineation of Wetlands and Other Regulated Waters, Eastern Kentucky (Hidden Valley) Training Site, KY. U.S. Army Engineer Research and Development Center, Waterways Experiment Station, CEERD-ER-W.
Harker et al., 1993	Harker, D, S Evans, M Evans, and K Harker. 1993. Landscape Restoration Handbook. Lewis Publishers, Boca Raton, Florida.
Harvey et al., 1999	Harvey, MJ, JS Altenbach, and TL Best. 1999. Bats of the United States. Arkansas Game and Fish Commission in Cooperation with the Asheville Field Office, U.S. Fish and Wildlife Service.
Hoffard et al., 1995.	Hoffard, WH, DH Marx, and HD Brown. 1995. The Health of Southern Forests. United States Department of Agriculture Forest Service Southern Region Publication R-8 PR 27. Atlanta, Georgia.
IUCN, 2008	Red List of Threatened Species website: http://www.iucnredlist.org/search/details.php/ 50988/all.
INPC, 2007	Illinois Nature Preserve Commission (INPC). 2007. Vegetation Management Guidelines (No. 6, No. 10 and No. 23) *revised* from original 1990 version. http://www.inhs.uiuc.edu/chf/outreach/VMG/VMG.html
Johnston and Nava, 1984	Johnston, AC and SJ Nava. 1984. Recurrence Rates and Probability Estimates for the New Madrid Seismic Zone, in Proceedings of the Symposium on "The New Madrid Seismic Zone," U.S. Geol. Survey Open File Report 84-770, 279-329.
Kentucky Bat	Kentucky Bat Working Group, Eastern Kentucky University. Working Group, 2007 accessed 18 May 2007, http://www.biology.eku.edu/bats/vabigearbat.htm
KDFWR, 2007	Kentucky Department of Fish and Wildlife Resources. Species Information, Accessed 4 March, 2007. http://www.kdfwr.state.ky.us/kfwis/speciesInfo/speciesInfo.asp

KDFWR, 2006 Kentucky Department of Fish and Wildlife Resources. Accessed 6 Dec., 2006. Kentucky 2006-2007 Hunting and KDMA, 2001 Kentucky Department of Military Affairs. 2001. Bi-Annual Report for Fiscal Years 1999 and 2000. Frankfort, Kentucky.

KDOF, 1984 Kentucky Division of Forestry. 1984. Preliminary Woodland Examination of the Eastern Kentucky Training Site. Kentucky

KDOW, 1993 Kentucky Division of Water. 1993. Methods for Assessing Biological Integrity of Surface Waters. Commonwealth of Kentucky, Natural Resources and Environmental Protection Cabinet, Department for Environmental Protection, Water Quality Branch, Ecological Support Section. Frankfort, Kentucky. Trapping Guide. http://www.kdfwr.state.ky.us/ navigation.asp?cid=527&NavPath=C151.

KDOW 1998 303d Report

KDMA, 2001 Kentucky Department of Military Affairs. 2001. Bi-annual Report for Fiscal Years 1999 and 2000. Frankfort, Kentucky.

Kentucky Bat Working Group, 2008 website:http://www.biology.eku.edu/bats/eveningbat.html.

KY-EPPC, 2006 Kentucky Exotic Pest Plant Council. Accessed 27 Nov., 2006. Invasive Exotic Plant List. http://www.se-eppc.org/ky/list.htm.

Keystone Center, 1996 Keystone Center, The, 1996, Keystone Center policy dialogue on a Department of Defense biodiversity management strategy: final report. The Keystone Center, Keystone, Colorado.

KSNPC, 2002 Kentucky State Nature Preserves Commission. 2002. Biological Inventory. Wendell H. Ford Regional Training center, Muhlenberg County, Kentucky. Kentucky State Nature Preserves Commission, Frankfort, KY.

Laudermilk et al., 1993 Laudermilk, E.L., B.A. Winters, S McMurray, and R.R. Cicerello. 1993. Field Notes/Sorting Sheets from Lulbegrud Creek at Eastern Kentucky Training Site. Kentucky State Nature Preserves Commission. Frankfort, Kentucky.

McClure, 1995 McClure, MS 1995. Managing Hemlock Woolly Adelgid in Ornamental Landscapes. Connecticut Agricultural Experiment Station Bulletin 925. Windsor, Connecticut.

McDowell, 1978 McDowell, RC. 1978. Geologic Map of the Levee Quadrangle, East-central Kentucky. Map GQ-1478. United States Geological Survey, Reston, Virginia.

MDC, 2006 Missouri Department of Conservation. Accessed 11 Dec., 2006. Missouri Vegetation Management Manual. Edited by T.E. Smith, Natural History Division, Missouri Department of Conservation, Jefferson City, Missouri. [updated 18 Sept., 2004]. http://mdc.mo.gov/nathis/exotic/vegman/

Meffe & Caroll, 1994 Meffe, G.K. and C.R. Carroll, 1994, Principles of Conservation Biology, Sinauer Associates, Inc., Sunderland, MA.

Michigan University, 2008 http://animaldiversity.ummz.umich.edu/site/accounts/information/Asio_otus.html

MU Extension, 2007 — University of Missouri Extension. Accessed 13 Feb., 2007. Giant foxtail. Last updated 24 May, 2006. http://muextension.missouri.edu/explore/wildthing/giantfoxtail.htm

Nakata Planning Gorup, 2002 — Nakata Planning Group. 2002. Real Property Development Plan, Kentucky Army National Guard, Submittal #2 (February 2002). Colorado Springs, Colorado.

NGB, 1996a — National Guard Bureau. 1996. Memorandum of Understanding Between Director Environmental Programs (NGB-ARE), Director Engineering (NGB-AEN), and Operations, Training and Readiness Directorate (NGB-ARO) to implement the Integrated Training Area Management (ITAM) Program.

NGB, 1996b — National Guard Bureau. 1996. Integrated Training Area Management (ITAM) Policy and Implementation Guidance.

NGB, 2000 — National Guard Bureau. 2000. All States (Log Number P00-0039) Integrated Natural Resources Management Plans. 15 June 2000. Arlington, Virginia.

NatureServe, 2007 — NatureServe, website accessed 04 March 2007. http://www.natureserve.org/explorer/.

Palmer-Ball, 1996. — Palmer-Ball, Brainard L. , Jr. The Kentucky breeding bird atlas. The University Press of Kentucky, Lexington. 1996

PCA, 2007 — Plant Conservation Alliance. Alien Plant Working Group. Alien Plant Invader Fact Sheets. Accessed 10 August 2007. http://www.nps.gov/plants/alien/factmain.htm

Quarterman and Powell, 1978 — Quarterman E. and R.L. Powell. 1978. Potential ecological/geological natural landmarks on the Interior Low Plateaus. National Park Service, United States Department of the Interior, Washington, District of Columbia.

Reese and Ratti, 1988 — Reese, K.P. and J.T. Ratti. 1988. Edge Effect: A Concept Under Scrutiny. Transactions of the North American Wildlife and Natural Resources Conference 53: 127-136.

SERCC, 2007 — Southeast Regional Climate Center (SERCC). Historical Climate Summaries For Kentucky: Madisonville, KY (155067) – 6/1/1948 to 12/31/2005. Accessed 03 March 2007. http://www.dnr.sc.gov/climate/sercc/climateinfo/historical/historical_ky.html

UMN Extension, 2007 — University of Minnesota Extension. Accessed 13 Feb., 2007. Wild cucumber and bur cucumber. Last updated October, 1998. http://www.extension.umn.edu/yardandgarden/ygbriefs/h524cuke-wild-bur.html

USA-CERL, no date — U.S. Army Corps of Engineers Research Laboratory. V.E. Diersing, R.B. Shaw, S.D. Warren, and D.J. Tazik. No date. Criteria for Siting an Army Maneuver Installation: Natural Resource Considerations for Optimum Use. Champaign, Illinois.

USCHPPM, 1999 — U.S. Army Center for Health Promotion and Preventive Medicine-North. 1999. Integrated Pest Management Plan for Kentucky Army National Guard. Entomological Sciences Division. USCHPPM, Fort George G. Meade, Maryland.

USDA-NRCS, 1994	USDA-Natural Resources Conservation Service. 1994. Resource Inventory and Conservation Plan, Kentucky Army National Guard, Wendell H. Ford Regional Training center, Muhlenberg, Kentucky. U.S. Department of Agriculture, Lexington, Kentucky.
USEPA, 1994	U.S. Environmental Protection Agency. 1994. Integrated ecosystem protection research program: A conceptual plan, Working Draft, Washington, D.C.
USFS, 2007	Hemlock Woolly Adelgid. Accessed 2 Jan., 2006. USDA Forest Service, Northeastern Area [updated 1 Dec., 2006]. http://www.na.fs.fed.us/fhp/hwa/.
USFS, 2006	U.S. Forest Service. 2006. Weed of the week: Japanese Bristlegrass. USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 06-05-06.
USFWS, 2008	United States Fish and Wildlife Service, Kentucky Ecological Services Field Office, Federally Threatened and Endangered Species by County, Muhlenberg County, Kentucky. Updated July, 30, 2008.
UK, 2006	Townsend, L. and L. Rieske-Kinney. Accessed 7 Dec., 2006. Southern Pine Beetle. University of Kentucky Department of Entomology. http://www.uky.edu/Agriculture/Entomology/ entfacts/trees/ef443.htm.
Weedscience.org, 1999	Weedscience.org. Accessed 13 Feb., 2007. Group B/2 Resistant Eastern Black Nightshade (*Solanum ptycanthum*). Published 1999. http://www.weedscience.org/Case/Case.asp?ResistID= 5184
White and Yahn, 2006	White, D. L., and B. D. Yahn. 2006. Biological Inventory: Wendell H. Ford Regional Training center, Muhlenberg County, Kentucky - 2006 update. Kentucky State Nature Preserves Commission.
White et al., 1995	White, D, B Palmer-Ball, Jr., and E.L. Laudermilk. 1995. Biological Inventory: Wendell H. Ford Regional Training center, Muhlenberg County, Kentucky. Kentucky State Nature Preserves Commission. Frankfort, Kentucky.