FORT DRUM, NEW YORK

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

2001-2005

Final

Natural/Cultural Resources Branch
Environmental Division
Public Works

November 2001

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FORT DRUM, NEW YORK

APPROVAL

This Integrated Natural Resources Management Plan meets the requirements of Public Law 105-85, the Sikes Act Improvement Act of 1997 (16 U.S.C. 670 *et seq.*) as amended.

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FORT DRUM, NEW YORK

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PREFACE

Fort Drum…The Army's and the Soldier's First Choice

Fort Drum has been officially used as a military training site since 1908; however, the Army's presence in the North Country of New York can be traced back to the early 1800s. From the early days when the first regulars and militia came to Fort Drum… to the World War II expansion of the installation… to the arrival of the Combat Heavy Engineers… to the home of the 10th Light Infantry Division, Fort Drum has provided quality military training in unique terrain and climatic conditions.

Training soldiers in skills needed to rapidly deploy anywhere in the world and to fight and win upon arrival…

Conserving natural resources entrusted to the care of the Army…

Fort Drum is proving that these missions are compatible and even complement each other.

This Integrated Natural Resources Management Plan is Fort Drum's plan of action for the conservation of natural resources entrusted to the U.S. Army. The plan is for a five-year period, but the philosophy behind it is for a much longer period of time. Fort Drum will conserve its biological diversity and make sound decisions regarding the use of natural resources to support both the military mission and needs of the region and the nation.

Lands on Fort Drum have been used to serve this nation's defense for almost 100 years. As the installation enters the 21st Century, this legacy is not taken lightly by those who use Fort Drum today. This Integrated Natural Resources Management Plan is dedicated to the next generation of America's warriors, their families, and other Americans who will use these lands and their natural resources.

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FORT DRUM, NEW YORK

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"We do not own this land; we are caretakers of the land and the plant and animal species that inhabit it. The American people entrust the land to our care, and we shall fulfill their trust. We shall conserve and protect these resources for the future."[1]

Purpose

This Integrated Natural Resources Management Plan (INRMP) guides implementation of the natural resources program on Fort Drum from 2001 through 2005. The program conserves Fort Drum land and natural resources and helps ensure compliance with environmental laws and regulations. The Plan helps ensure the maintenance of quality training lands to accomplish Fort Drum's critical military mission on a sustained basis and to ensure that natural resources conservation measures and Army activities on mission land are integrated and consistent with federal stewardship requirements.

Environmental Compliance

Preparation and implementation of this INRMP are required by the Sikes Act (16 U.S.C. 670 *et seq.*), Department of Defense Instruction 4715.3 (*Environmental Conservation Program*), Army Regulation 200-3 (Natural Resources – Land, Forest, and Wildlife Management), and Army Memorandum (21 March 1997), *Army Goals and Implementing Guidance for Natural Resources Planning Level Survey (PLS) and Integrated Natural Resources Management Plans (INRMP)*. This INRMP was prepared using *Guidelines to Prepare Integrated Natural Resources Management Plans for Army Installations and Activities* (U.S. Army Environmental Center, 1997), as modified by Forces Command[2]. This INRMP helps Fort Drum comply with other federal and state laws, most notably laws associated with environmental documentation, wetlands, endangered species, and wildlife management in general. This plan describes how Fort Drum will implement provisions of AR 200-3 and local regulations, principally Fort Drum Reg. 420-3 (*Hunting, Fishing, Trapping, and Camping)*, and portions of Fort Drum Reg. 350-4 (*Range Regulation*).

This INRMP has the signatory approval of the U.S. Fish and Wildlife Service (USFWS). This signature approval includes agreement that the INRMP complies with the Endangered Species Act. Review of the INRMP is informal consultation with regard to the Endangered Species Act.

The Sikes Act, as amended in November 1997, requires that INRMPs include:

- fish and wildlife management, land management, forest management, and wildlife-oriented recreation;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration where necessary for support of fish, wildlife, or plants;
- integration of, and consistency among, the various activities conducted under the Plan;

[1] Robert M. Walker, Assistant Secretary of the Army, Testimony before Congress, July 11, 1995.
[2] FORSCOM Memorandum. 26 June 97. Guidelines to Prepare Integrated Natural Resource Management Plans (INRMPs) for Army Installations and Activities.

- establishment of specific natural resources management goals and objectives and time frames for proposed action;
- 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;
- public access to the military installation that is necessary or appropriate for 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, subject to requirements necessary to ensure safety and military security;
- enforcement of applicable natural resource laws;
- no net loss in the capability of military installation lands to support the military mission of the installation;
- regular review of this INRMP and its effects, not less often than every five years;
- provisions for spending hunting and fishing permit fees exclusively for the protection, conservation, and management of fish and wildlife, including habitat improvement, and related activities in accordance with the INRMP;
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish and wildlife.

This INRMP includes these items if they are applicable to natural resources management and land use at Fort Drum. Other compliance requirements at least partially affecting implementation of the INRMP are listed in Section 1.4.

Scope

The INRMP will provide the basis and criteria for protecting and enhancing natural resources using watershed, landscape, and ecosystem perspectives, consistent with the military mission. Provisions of the INRMP apply to each directorate, command, and tenant unit (including the Active Army, Army National Guard, Army Reserve Component, contractors (government and private), private groups, spouses and dependents, and individuals who either directly or indirectly use installation natural resources) as well as rotational commands, units, and outlying detachments of personnel assigned or attached to the installation. This INRMP is an integral part of the Fort Drum Master Plan. Implementation of this INRMP is subject to the availability of annual funding, availability of manpower and subject to mission requirements. Fort Drum will make best efforts to request funding through appropriate channels. Where projects identified in the plan are not implemented due to lack of funding, availability of manpower, mission requirements or other compelling circumstances, Fort Drum will review the plan's goals and objectives to determine whether adjustments are necessary.

Relationship to the Military Mission

Fort Drum is home to the 10th Mountain Division Light Infantry and supports diverse military operations. The mission of the 10th Mountain Division Light Infantry is to deploy rapidly anywhere in the world and be prepared to fight and win upon arrival. The primary mission of the Fort Drum garrison is to provide facilities and service to U.S. Armed Forces that require land and airspace to practice combat skills and operations on a year-round basis. To accomplish this mission, realistic and quality training opportunities

are necessary. The mosaic of natural communities found on Fort Drum and climate extremes ranging from warm summers to cold winters provides U.S. Armed Forces with a variety of realistic training scenarios.

This INRMP supports the military mission by protecting and enhancing training lands upon which the mission is critically dependent. The INRMP also describes recreational opportunities associated with natural resources that are available to the Fort Drum, local, and regional communities.

The INRMP describes impacts of the military mission upon natural resources and means to mitigate these impacts. However, this INRMP does not evaluate Fort Drum's military mission, nor does it replace any requirement for environmental documentation of the military mission at Fort Drum. Nothing in this INRMP will result in any net loss of land available for military training.

Partnerships

This document was prepared in partnership and cooperation with the U.S. Fish and Wildlife Service and the New York State Department of Environmental Conservation, representing the federal and State Sikes Act cooperating agencies, respectively. Other partners in this effort include universities, in addition to other federal and State agencies.

Planned Major Initiatives

This INRMP includes a description of ongoing and planned natural resources programs and projects at Fort Drum. Most of these will either be continued or completed. The most significant projects within this INRMP include:

- rehabilitating and protecting lands to support military training;
- implementing an ecosystem management philosophy that provides biodiversity conservation;
- working cooperatively with the Integrated Training Area Management (ITAM) program in their mission to monitor, restore, rehabilitate, and maintain lands for military training;
- monitoring flora, fauna, soils, and surface water quality;
- implementing a geographic information system to allow better decisions regarding use and management of Fort Drum natural resources;
- protection of unique natural resources areas;
- implementing a forest management program to support military training and provide improved wildlife habitat;
- managing habitat for all species of wildlife;
- managing fish and wildlife species, including game and nongame, particularly species of special concern and neotropical migrant birds;
- managing resources to ensure compliance with the Endangered Species Act;
- restoring eroded lands and affected habitats to protect wetlands and water quality;
- providing an effective integrated pest management program;
- protecting and conserving wetlands;
- conducting effective natural resources law enforcement;
- informing military and civilian personnel and other members of the Fort Drum and surrounding

communities of the value of installation natural resources and means to conserve those resources;
- implementing a comprehensive outdoor recreation program;
- protecting cultural resources while conducting natural resources management; and
- using the National Environmental Policy Act process to conserve natural resources.

INRMP Organization

This INRMP is organized in distinct categories.

- Chapter 1 describes general relationships between natural resources management and the overall Fort Drum mission. It lists compliance requirements, describes the natural resources management philosophy as a whole, and describes the Integrated Training Area Management program as a whole.
- Chapter 2 identifies responsible parties and their roles in implementation of this INRMP.
- Chapters 3-5 describe the affected environment at Fort Drum, including a description of the military mission.
- Chapter 6 describes land management units at Fort Drum.
- Chapters 7-13 describe natural resources programs, using specific project descriptions.
- Chapter 14 describes means used for implementing this INRMP, including organization, personnel, external assistance, data analysis, project summary, funding, and command support.

For those who are primarily interested in natural resources projects planned for 2001-2005, they are described in chapters 7-14, summarized for budget purposes in Section 14.5.1.4, and summarized by project with abbreviated goals and objectives in Appendix 14.4.

Monitoring INRMP Implementation

The INRMP will be evaluated through monitoring programs, including the Environmental Compliance Assessment System, Army Compliance Testing System, and reviews by Forces Command (FORSCOM). The list of INRMP goals and objectives in Appendix 14.4 can provide a basis for evaluating plan implementation.

The success of individual programs included in the INRMP will be evaluated by the effectiveness of programs in question. For example, beaver control will be evaluated by the reduction in numbers of beavers on the installation as well as the reduction in the number of active beaver lodges and dams.

Costs and Benefits

- **Costs:** This INRMP will cost about $36,330,400.00 for FY 01 - FY 05 to implement. Funding will be primarily from revenues generated from the sale of hunting, trapping, and fishing permits; forestry funds; environmental funds; agricultural funds; and training funds designated for implementation of the ITAM program.
- **Military Mission Benefits:** Implementation of this INRMP will improve the quality of training land. It will enhance mission realism through the perpetuation of more realistic training lands. It will reduce maintenance costs and improve health and safety and the ability for long range planning at Fort Drum. Nothing in this INRMP will result in any net loss of land available for

military training.

- **Environmental Benefits:** The INRMP provides the basis for the conservation and protection of natural resources. It will help reduce vegetation loss and soil erosion due to military activities. It will reduce the potential for environmental pollution. It will provide biodiversity conservation. Plan implementation will increase overall knowledge of the operation of Fort Drum ecosystems through surveys and research.
- **Other Benefits:** Troop environmental awareness will be enhanced while training at Fort Drum. Both community relations and Fort Drum's environmental image, internal and external to the Department of Defense, will be enhanced. Quality of life for the Fort Drum community and its neighbors will be improved. INRMP implementation will decrease long-term environmental costs and reduce personal and installation liabilities from environmental noncompliance.

Summary

The INRMP outlines steps required to meet Department of Defense, U.S. Army, and Fort Drum legal obligations to provide for the stewardship of the natural resources on Fort Drum, while enabling the accomplishment of the military mission. The INRMP has been developed through cooperation with appropriate regulatory agencies. This Plan will not resolve all existing and/or future environmental issues. It does, however, provide the guiding strategy, personnel requirements, and means to minimize and work toward resolution of such issues. Implementation of this INRMP is subject to the availability of annual funding, availability of manpower and subject to mission requirements. Fort Drum will make best efforts to request funding through appropriate channels. Where projects identified in the plan are not implemented due to lack of funding, availability of manpower, mission requirements or other compelling circumstances, Fort Drum will review the plan's goals and objectives to determine whether adjustments are necessary.

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1.0 GOALS AND POLICIES

Army Environmental Vision Statement

The Army will be a national leader in environmental and natural resource stewardship for present and future generations as an integral part of our mission[3].

The Army's commitment to natural resources management is reflected in the U.S. Army Environmental Strategy into the 21st Century, which focuses on responsibly managing Army lands to ensure long-term natural resource productivity so the Army can achieve its mission. This Army commitment to natural resources management is emphasized in Army Regulation 200-3 (*Natural Resources - Land, Forest, and Wildlife Management*), which requires that Integrated Natural Resources Management Plans be developed and maintained for all Army installations.

The Command and staff of Fort Drum are committed to environmental stewardship as an integral part of the mission at Fort Drum. This commitment is evidenced by support of past environmental programs and their full support of this Integrated Natural Resources Management Plan.

It is important to understand the relationship between the natural resources program and Fort Drum as a whole. A comparison of the Fort Drum mission, vision, values, and strategic performance objectives with the mission, goals, and objectives of the natural resources program helps identify this relationship.

1.1 Fort Drum Mission, Vision, Values, and Strategic Performance Objectives

Mission

Train, mobilize, deploy, and sustain combat ready forces from the Active and Reserve Component while caring for people.

Vision

Fort Drum, a great place to live and work; a home to world-class trained and ready forces; and a committed neighbor to the North Country. The Army's and the soldier's first choice.

Values

Loyalty, Duty, Respect, Selfless Service, Honor, Integrity, and Personal Courage

Strategic Performance Objectives

[3] Army Environmental Policy Institute. 1992. *U.S. Army Environmental Strategy into the 21st Century*. U.S. Government Printing Office 1993-747-677, 38 p.

- Continually improve Fort Drum's capability as a FORSCOM Power Projection Platform to train, mobilize, deploy, and sustain forces.
- Improve Fort Drum's quality of life so that we are the soldier's first choice.
- Maximize the use of resources to improve results.
- Develop and sustain a high quality work force to meet current and future needs.
- Provide a safe and secure living, working, and training environment.
- Preserve our natural resources through environment.
- Preserve human and materiel resources through risk management.

1.2 Fort Drum Natural Resources Mission and Goals

Mission

Provide professional management and stewardship of natural resources at Fort Drum to achieve optimum, sustainable use of training lands while providing opportunities for multiple compatible uses of natural resources and complying with environmental laws.

1.2.1 General Goals and Objectives

Below are general Fort Drum natural resources goals and objectives used to attain them. These objectives, and those more specific in chapters 7-13, serve as a checklist to monitor the success of the INRMP. Some objectives fit more than one category. When this occurs, the most-fitting category was chosen.

Goal 1. Provide quality natural resources as a critical training asset upon which to accomplish the military mission of Fort Drum.

Objective 1. Ensure no net loss in the capability of installation lands to support existing and projected military training and operations on Fort Drum.

Objective 2. Sustainment of training lands through monitoring and rehabilitation (*i.e.*, implementation of the Integrated Training Area Management program).

Goal 2. Comply with laws and regulations that pertain to management of Fort Drum natural resources.

Objective 1. Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this INRMP is predicated.

Objective 2. Protect, restore, and manage sensitive species and wetlands.

Objective 3. Use procedures within the National Environmental Policy Act (NEPA) to make informed decisions that include natural resources considerations and mitigation.

Objective 4. Ensure Fort Drum's natural resources program is consistent with the protection of cultural and historic resources.

Objective 5. Implement this INRMP within the framework of Army policies and regulations.

Objective 6. Protect and manage threatened and endangered species and critical habitat in accordance with the Endangered Species Act, NEPA, AR 200-3, DoD Directive 4715.3, USFWS regulations and agreements, and other applicable laws or guidance from higher headquarters. Consider species listed by the State of New York in the natural resources management program.

Goal 3. Manage natural resources on Fort Drum to assure good stewardship of public lands entrusted to the care of the Army.

Objective 1. Use adaptive ecosystem management strategies to protect, conserve, and enhance native fauna and flora.

Objective 2. Monitor and manage soils, water, vegetation, and wildlife on Fort Drum with a consideration for all biological communities and human values associated with these resources.

Objective 3. Provide human-valued products of renewable natural resources when such products can be produced in a sustainable fashion without significant negative impacts on the military mission or other natural resources.

Objective 4. Provide professional enforcement of natural resources-related laws.

Objective 5. Ensure the Fort Drum natural resources program is coordinated with installation organizations, other agencies, and conservation organizations with similar interests.

Goal 4. Improve the quality of life of the Fort Drum and surrounding communities through quality natural resources-based recreation opportunities.

Objective 1. Provide high quality opportunities for hunting, fishing, trapping, and other recreational activities within biological and recreational carrying capacities of the resources.

Objective 2. Provide opportunities for outdoor recreation, such as picnicking, camping, nature study, etc.

Objective 3. Provide conservation education opportunities.

1.2.2 Natural Resources Drivers

A "driver" identifies a need to be satisfied in order for the mission to continue without disruption. Drivers are defined by the mission, land uses, and natural resources affected by the mission.

The following general drivers have been identified at Fort Drum:

X compliance with federal laws, such as the Sikes Act, Endangered Species Act, Clean Water Act, Clean Air Act, and National Environmental Policy Act;
X maintaining the capability of Fort Drum to support its military mission (Sikes Act);
X managing Fort Drum natural resources consistent with Department of Defense and Fort Drum policies; and

X providing stewardship for public lands.

These drivers were used to develop goals and their supporting objectives in chapters 7-14.

1.3 Support of Installation Goals

Implementation of this INRMP will support the mission, vision, values, and strategic performance objectives of Fort Drum. The natural/cultural resources staff at Fort Drum is committed to supporting the military mission, providing stewardship of resources entrusted to the Army, enhancing the quality of life of the Fort Drum and surrounding communities, and being a valued member of the overall Fort Drum team. Implementation of this INRMP will demonstrate those qualities.

1.4 Compliance Requirements

The Sikes Act, DoD Instruction 4715.3, and AR 200-3 require that integrated natural resource management plans be developed and maintained for DoD and Army lands. Some other pertinent regulations and legislation relevant to natural resources management are listed below.

American Indian Religious Freedom Act (42 United States Code (USC)
Archaeological Resources Protection Act of 1979 (PL 96-95:16 USC 470aa-11)
Bald Eagle Protection Act (PL 86-70, as amended)
Clean Air Act (as amended through 1990)
Clean Water Act of 1978
Conservation and Rehabilitation Program on Military and Public Lands (PL 93-452)
Conservation Programs on Military Reservations (PL 90-465)
DoD Instruction 5000.13 Natural Resources
Endangered Species Act of 1973 (PL 95-632, as amended)
Executive Order 11991 Protection and Enhancement of Environmental Quality: Amends Executive Order 11514
Executive Order 12608 Protection of Wetlands: Amends Executive Order 11990
Executive Order 12962 Recreational Fisheries
Executive Order 13112 Invasive Species, 1999
Federal Insecticide, Fungicide and Rodenticide Act (7 USC 136 *et seq*.)
Federal Noxious Weed Act of 1973 (PL 93-629)
Federal Water Pollution Control Act Amendments of 1972 (PL 92-522)
Fish and Wildlife Coordination Act (PL 85-624)
Fish and Wildlife Conservation Act of 1980 (PL 96-366; 16 USC 2901)
Fish and Wildlife Conservation and Natural Resource Management Programs on Military Reservation (Amends Public Law 86-797 (Sikes Act) (PL 96-561)
Migratory Bird Treaty Act (PL 65-186; 16 USC 703 *et seq*.)
Native American Graves Protection and Repatriation Act (25 USC, Section 3001 *et seq*.)
National Environmental Policy Act of 1969 (as amended, PL 91-190; 42 USC 4321 *et seq*.)
National Historic Preservation Act of 1966 (as amended, PL 89-665; 16 USC 470 *et seq*.)
Non-game Act (PL 93-366)
Noxious Plant Control Act (PL 90-583)
Timber Sales on Military Lands [An update of the Military Construction Authorization Act] (10 USC

2665)
Watershed Protection and Flood Prevention Act (PL 92419;68 Stat 666, as amended & 86 Stat 667; 16 USC 1001)

1.5 Biodiversity Conservation and Ecosystem Management

Biological diversity (biodiversity) refers to the variety and variability among living organisms and the environment in which they occur. Biodiversity has meaning at various levels including ecosystem diversity, species diversity, and genetic diversity. The Department of Defense has developed *A Department of Defense (DoD) Biodiversity Management Strategy* (The Keystone Center, 1996). This Strategy identifies five reasons to conserve biodiversity on military lands:

(1) ***sustain natural landscapes*** required for the training and testing necessary to maintain military readiness;
(2) ***provide the greatest return on the Defense investment*** to preserve and protect the environment;
(3) ***expedite the compliance process*** and help avoid conflicts;
(4) ***engender public support*** for the military mission; and
(5) ***improve the quality of life*** for military personnel.

The Keystone Center report (1996) notes that the challenge is "*to manage for biodiversity in a way that supports the military mission"*. This strategy identifies the INRMP as the primary vehicle to implement biodiversity protection on military installations. The model process developed within the strategy includes the following principles:

- support the military mission;
- use joint planning between natural resources managers and military operations personnel;
- integrate biodiversity conservation into INRMP and other planning protocols;
- involve internal and external stakeholders up front;
- emphasize the regional (ecosystem) context;
- use adaptive management;
- involve scientists and use the best science available; and
- concentrate on results.

The Department of Defense (DoD Instruction 4715.3, *Environmental Conservation Program*) describes ecosystem management as, "*a process that considers the environment as a complex system functioning as a whole, not a collection of parts, and recognizes that people and their social and economic needs are a part of the whole*". The Department of Defense goal with regard to ecosystem management is, *"To ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations*."

U.S. Army Forces Command (FORSCOM) has published an ecosystem management policy[4], which

[4] FORSCOM Policy Memorandum 200-97-1, 1997, *Implementation of Ecosystem Management*.

expands on Department of Defense principles and guidelines. Some important policies applicable to Fort Drum include:

- Emphasize native plants, especially indicator species.
- Planning should be at the land association or land type scale, while management should be at the training area or watershed scale. Care should be taken to prevent creation of island populations, which deplete gene pools.
- Commodity production shall be a tertiary consideration. Primary goals are to support the military mission while protecting endangered species and their habitat.
- Adaptive management is a critical aspect of ecosystem management.
- The installation Master Plan must serve as the umbrella plan for integration of all other installation plans, including the INRMP.
- None of the current conservation management tools are to be categorically excluded from use.

Fort Drum will use ecosystem management to guide its program in the next five years and beyond. This management strategy enables the installation to conduct military training while conserving natural resources upon which the quality of training ultimately depends. Adaptive management is an important component of ecosystem management. Adaptive management involves implementing the best option, testing that option's results, and modifying implementation accordingly.

1.6 Integrated Training Area Management

Integrated Training Area Management (ITAM) is an Army-wide program to provide quality training environments to support the Army's military mission. The ITAM program was initiated with the realization that Army training lands were being degraded to the point where their capabilities to sustain military missions were in jeopardy. Proper management to support both the military mission and other multiple-use activities is a challenge unique among other managers of public lands.

The ITAM program includes the following four component areas (modified from *Integrated Training Area Management (ITAM) Program Strategy* (Office of the Deputy Chief of Staff for Operations and Plans, 1995)):

- The Land Condition Trend Analysis (LCTA) component is used to inventory and monitor physical and biological resources to meet the multiple-use demands of Fort Drum. It incorporates a GIS to support planning decision processes to effectively manage land use and natural resources.
- The Training Requirements Integration (TRI) component integrates Fort Drum military training requirements for land use with natural resources conditions and capabilities to support these requirements.
- The Environmental Awareness (EA) component improves land user understanding of the impacts of their activities on the environment.
- The Land Rehabilitation and Maintenance (LRAM) component includes programming, planning, designing, and executing land rehabilitation and maintenance to support and sustain the military mission.

The ITAM program at Fort Drum began in 1990 and was the responsibility of Public Works. In 1995,

proponency of this program changed from Public Works to the Readiness Business Center, consistent with Army-wide changes.

A geographic information system (GIS) was fielded at Fort Drum by the ITAM program in 1991. A GIS is an organized collection of computer hardware, software, spatial data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information. The ITAM GIS has extensive data layers regarding Fort Drum soils, hydrology, wildlife, vegetation, transportation system, topography, cultural resources, and special features involving natural resources management programs.

As part of the ITAM budgetary and planning process, Fort Drum has been designated a Category I installation. Category I installations are the largest installations, with most critical training missions, and with greatest environmental sensitivities to missions.

Goals and objectives specific to ITAM are found in the ITAM Program Strategy, Section 2.1 (Office of the Deputy Chief of Staff for Operations and Plans, 1995). These are incorporated into objectives within this INRMP. ITAM program components are described in sections 7.1 - *Training Land Monitoring*, 8.7 - *Land Rehabilitation and Maintenance*, 8.11 - *Training Requirements Integration*, 10.1 - *Environmental Awareness*, and 14.3.2 - *Geographic Information System*. The Fort Drum ITAM 5 - Year Plan includes ITAM projects for FY 01 through FY 03.

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2.0 RESPONSIBLE AND INTERESTED PARTIES

2.1 Fort Drum

2.1.1 Commanding General

The Commanding General commands Fort Drum and implements policies and directives of the Department of the Army and the U.S. Army Forces Command (FORSCOM). The Commanding General bears ultimate responsibility for management of natural resources on Fort Drum, including its land and wildlife. Acting through the Command Group, personal and special staff, directors, and separate commanders, the Commanding General is responsible for (Department of the Army, 1995):

- providing for funding and staffing of natural resources management professionals and other resources required to effectively manage natural resources on the installation;
- planning land utilization to avoid or minimize adverse effects on environmental quality and provide for sustained accomplishment of the mission;
- entering into appropriate cooperative plans (16 USC 670a) with State and Federal conservation agencies for the conservation and development of fish and wildlife, soil, outdoor recreation, and other resources;
- ensuring the functioning of an Installation Environmental Quality Control Committee (which is personally chaired by the Commanding General and meets quarterly);
- ensuring ongoing and timely coordination of current and planned land uses between mission, natural resources, environmental, legal, and master planning;
- inspecting and reviewing mitigation measures that have been implemented or recommended for the protection of natural resources as prescribed in environmental documentation in accordance with AR 200-2;
- ensuring all installation land users are aware of and comply with procedures and requirements necessary to accomplish objectives of this INRMP together with laws, regulations, and other measures designed to comply with environmental quality objectives; and
- appointing a natural resources management professional as the Installation Natural Resources Coordinator, typically the Chief, Natural/Cultural Resources Branch.

2.1.2 Garrison Commander

The Garrison Commander serves as the principal assistant to the Commanding General for the management of Fort Drum. The Garrison Commander directs and is responsible for all aspects of base operations at Fort Drum, including natural resources management. As such, the Garrison Commander is responsible for most of the implementation of this INRMP.

2.1.3 Public Works

The Public Works Director will maintain an organization with the resources available to accomplish the INRMP and, acting through the Environmental Division, is responsible for (Department of the Army, 1995):

- developing and implementing programs to ensure the inventory, delineation, classification, and management of all applicable natural resources to include: wetlands, scenic areas, threatened and endangered species, sensitive and critical habitats, and other natural resource areas of special interest;
- providing for the training of natural resources personnel;
- implementing this INRMP;
- reviewing all environmental documents (*e.g*. environmental impact assessments and statements and remedial action plans) and construction designs and proposals to ensure adequate protection of natural resources, ensuring that technical guidance as presented in this INRMP is adequately considered;
- coordinating with local, state, and federal governmental and civilian conservation organizations relative to natural resources management for Fort Drum; and
- managing all phases of the natural resources program for Fort Drum with appropriate natural resources management personnel.

The Environmental Division, acting through its Natural/Cultural Resources Branch, is responsible for preparation and implementation of this INRMP. This is the direct "vehicle" for accomplishment of the above responsibilities and those of the Commanding General. The Natural/Cultural Resources Branch carries out Public Works responsibilities for the integrated management of natural resources on Fort Drum addressed in this INRMP. Each program manager (forestry, wildlife, wetlands, etc) is responsible for implementing activities in his/her area.

The Grounds Maintenance Shop, under the Public Works Operations and Maintenance Division, is responsible for installation grounds improvement and landscaping and administering all aspects of the installation pest control program. They conduct operations to maintain and landscape the improved, semi-improved, and unimproved areas on Fort Drum. The Design Branch, under the Public Works Engineering Division, is responsible for project design on grounds improvement and landscaping. The Natural/Cultural Resources Branch provides professional advice on these projects, recommends plant species for landscaping, and suggests proper fertilizer for lawn or grassland maintenance.

2.1.4 Readiness Business Center

The Readiness Business Center, particularly its Combat Readiness Training Division, is the interface between the Public Works Natural/Cultural Resources Branch and troops training in the field. The Readiness Business Center is responsible for managing the ITAM program; managing range complexes; coordinating military training; and releasing range areas for forestry, land rehabilitation, and recreational use.

The Combat Readiness Training Division provides access to ranges to accomplish provisions of this plan, assists in enforcing considerations within range regulations, and is directly responsible for implementation and/or support of portions of this INRMP, which directly affect or interact with training responsibilities including:

- operating and maintaining Fort Drum ranges, associated training facilities, field training sites, and range equipment;
- preparing, maintaining, and enforcing the Range Regulation;

- providing ITAM program management and funding, as available, for Fort Drum;
- providing input to FORSCOM for ITAM program users requirements;
- supporting the GIS database to ensure good customer service for all installation programs that rely on GIS data layers; and
- coordinating with Public Works on training activities that may affect fish and wildlife, wetlands, or cultural resources.

2.1.5 Directorate of Community Activities

Outdoor recreation opportunities are promoted by the Directorate of Community Activities and the Natural/Cultural Resources Branch.

The Directorate of Community Activities establishes procedures and governs various aspects of installation morale, welfare, and recreation activities, except hunting, fishing, and trapping. Programs that particularly affect Fort Drum natural resources include boating, camping, and snowmobiling (snowmobiling is only authorized in one designated area south of state route 3A). Responsibilities include:

- planning and implementing the installation Outdoor Recreation Program;
- supervising and maintaining outdoor recreation activities, exclusive of hunting, fishing, and trapping; and
- collecting fees and charges for various outdoor recreation activities.

2.1.6 Directorate of Emergency Services

The Director, Emergency Services is responsible for fire, safety, and police activities on Fort Drum. The Law Enforcement Command commander serves as the Fort Drum Provost Marshal and is responsible for natural resources law enforcement in coordination with the Natural/Cultural Resources Branch.

2.1.7 Public Affairs Office

The Public Affairs Office is responsible for promoting an understanding of Fort Drum among its various publics and providing professional public affairs advice and support to installation leaders and activities. The Public Affairs Office is an important component of the natural resources program for Fort Drum, especially in disseminating information critical to the success of the program.

2.1.8 Staff Judge Advocate

The Staff Judge Advocate provides legal advice, counsel, and services to Command, Staff, and subordinate elements of Fort Drum. Specific Staff Judge Advocate responsibilities with regard to integrated natural resources management include:

- conducting legal research and preparing legal opinions pertaining to interpretation and application of laws, regulations, statutes, and other directives;
- coordinating with the Department of Justice, Litigation Division of the Office of the Judge Advocate General, and other Governmental agencies on matters pertaining to litigation for the

Federal Government;
- advising Public Works on compliance with NEPA, especially with regard to management of endangered species on Fort Drum; and
- advising the Readiness Business Center on laws and regulations that affect training land use, management, and compliance.

2.1.9 Inspector General

The installation Inspector General will determine whether the provisions of DoD Instruction 4715.3 are being adequately accomplished on Fort Drum in accordance with this Plan and appropriate Army regulations.

2.1.10 Other Installation Organizations

Implementation of this Plan will require assistance from other directorates and organizations. Such organizations include the Directorate of Contracting (procurement), commanders of major subordinate organizations, and commanders of tenant units and activities.

2.2 Other Defense Organizations

2.2.1 U.S. Army Forces Command

The U.S. Army Forces Command (FORSCOM), located at Fort McPherson, Georgia, is responsible for providing command and technical guidance of Fort Drum's natural resources program by (Department of the Army, 1995):

- assisting with program implementation and conducting staff visits to Fort Drum,
- reviewing outdoor recreation plans for compatibility with the Installation Master Plan and natural resources management plans and programs,
- ensuring that effective natural resources stewardship is an identifiable and accountable function of management, and
- reviewing and approving this INRMP as the Final Approving Authority.

FORSCOM will conduct an onsite evaluation of this natural resources program at least once every three years and will act as trustee over the overall natural resources program.

2.2.2 Army Environmental Center

The Army Environmental Center, located at Aberdeen Proving Ground, Maryland, provides oversight, centralized management, and execution of Army environmental programs and projects. It has support capabilities in the areas of NEPA, endangered species, cultural resources, ITAM, environmental compliance, and related areas.

2.2.3 U.S. Army Corps of Engineers

U.S. Army Corps of Engineers laboratories and the New York District provide research, technical,

administrative, and logistical support to Fort Drum. The Norfolk District provides administrative and logistical support of timber sales, as well as some contracting support.

2.3 Other Federal Agencies

2.3.1 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS), Region 5, has a regional headquarters in Hadley, Massachusetts that provides technical advice for management of fish and wildlife resources on Fort Drum, particularly involving endangered and threatened species. Department of Army Regulation 200-3, Chapter 11, provides guidance to be followed by Fort Drum when dealing with the USFWS for endangered species management. Significant cooperative efforts with the USFWS, New York Field Office (NYFO) involve Fort Drum wetlands. The Great Lakes Office in Amherst, NY, provides technical fisheries support, and cooperative agreements with the USFWS Lower Great Lakes Fishery Resources Office have been used to survey aquatic habitats and species communities from several waters on Fort Drum.

The USFWS is a signatory cooperator in implementation of this INRMP in accordance with the Sikes Act. Appendix 2.3.1 contains specific items of agreement among the USFWS, New York State Department of Environmental Conservation, and Fort Drum, as required by the Sikes Act. This INRMP replaces the 1998 *Cooperative Plan for Conservation, Development and Management of Fish and Wildlife Resources on the Fort Drum Military Installation* (Fort Drum, 1998).

2.3.2 U.S. Natural Resources Conservation Service

The Natural Resources Conservation Service provides technical planning and assistance upon request as personnel and resources allow. A Memorandum of Agreement with the U.S. Natural Resources Conservation Service provides for technical support primarily in land rehabilitation activities.

2.3.3 U.S. Forest Service

Fort Drum has ongoing coordination with the U.S. Forest Service for training and support in the prescribed burning program.

2.3.4 U.S. National Park Service

The U.S. National Park Service provides continuing technical support to Fort Drum in cultural resources management, which could affect natural resources management.

2.3.5 Environmental Protection Agency

The Environmental Protection Agency is involved in a host of federal programs related to natural resources management, particularly in the wetlands permitting process.

2.4 State Agencies

2.4.1 New York State Department of Environmental Conservation

The New York State Department of Environmental Conservation (NYSDEC) is responsible for management of all fish and wildlife within the State, including those on federal lands, as well as the protection of air quality, water, wetlands, and solid waste. The NYSDEC provides oversight for hunting, fishing, and trapping on the installation and assists in managing nongame fish and wildlife.

Fort Drum cooperates with the NYSDEC Natural Heritage Program in providing data on state-listed rare species and species of concern found on the installation.

The NYSDEC is a signatory cooperator in implementation of this INRMP. Appendix 2.3.1 contains specific items of agreement among the USFWS, NYSDEC, and Fort Drum, as required by the Sikes Act.

2.4.2 New York State Office of Parks, Recreation, and Historic Preservation

The New York State Office of Parks, Recreation, and Historic Preservation administers the State historic preservation program and is responsible for overseeing the implementation of the National Historic Preservation Act in New York. The New York State Office of Parks, Recreation, and Historic Preservation serves as a repository for the location of archeological sites within the installation. The New York State Office of Parks, Recreation, and Historic Preservation works closely with the installation Cultural Resources Coordinator in recording site information and providing consultation for site protection and mitigation.

2.5 Universities

Formal and informal agreements with several universities support, inventory, and monitor natural resources at Fort Drum. A cooperative agreement with Colorado State University supports implementation activities in the natural and cultural resources program. Formal written agreements with Cornell University, Jefferson Community College, and the State University of New York College at Brockport support various projects on Fort Drum. A cooperative agreement has been established with the Biological Resources Division, U.S. Geological Survey at Pennsylvania State University, Northeast Wetlands Research Center, for long-term monitoring of compensatory wetlands on the installation. Fort Drum also has a tradition of cooperation with the State University of New York, College of Environmental Science and Forestry.

2.6 Municipalities

Communities adjacent to or in proximity of Fort Drum are positively affected by natural resources management on the installation. Fort Drum provides opportunities for general public hunting, fishing, trapping, and other recreation. In addition, surrounding counties are impacted positively by distributions of funds from timber sales on the installation. There are no significant conflicts between natural resources management on Fort Drum and surrounding communities. Fort Drum management enhances surrounding wildlife populations with animals moving off-installation, which offers more consumptive and nonconsumptive opportunities.

2.7 Other Interested Parties

The National Audubon Society has shown interest in grassland bird management on Fort Drum. Local outdoor sports associations are interested in recreation opportunities on Fort Drum associated with consumptive game use.

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3.0 LOCATION, ACREAGE, HISTORY, AND FACILITIES

3.1 Location

Fort Drum is located in northwestern New York State in Jefferson and Lewis counties (Figure 3.1a). About 83% of Fort Drum is in the northeastern corner of Jefferson County with the remainder in the northwestern corner of Lewis County. St. Lawrence County borders the installation to the north. The cantonment area is about 6 miles east of Interstate Highway 81 and about 10 miles northeast of the City of Watertown. Fort Drum is served by several state roads and has an extensive local road network (Figure 3.1b). Most of the installation extends northeastward from the cantonment area, forming a rectangle averaging about 10 miles wide and 20 miles long. Lake Ontario is about 20 miles west of the installation, and the St. Lawrence River is about 20 miles to the north.

3.2 Neighbors

The towns of Wilna, Antwerp, Philadelphia, Leray, Champion, and Rutland in Jefferson County; the town of Diana in Lewis County; and the towns of Fowler and Rossie in St. Lawrence County have land within or adjoining Fort Drum. Land use surrounding the installation is rural and agricultural with small concentrations of residential, commercial, and industrial uses in the villages. Land use in Jefferson County is about 40 percent agricultural; Lewis and St. Lawrence counties are about 20 percent agricultural. The percentage of agricultural land has been decreasing in the three counties surrounding the installation since 1978, while commercial and residential land uses have been increasing. The predominant agricultural use in the area is dairy farming. Forested land dominates to the east of Fort Drum, and agricultural lands dominate to the north and west. South of Fort Drum, agricultural lands extend in two strips, one along Lake Ontario and the other along the Black River Valley.

The existing character of land use in the surrounding communities is expected to continue. Future development will likely be limited to commercial strip and residential developments.

3.3 Satellite Installations

Fort Drum has no satellite installations.

3.4 Acreage and Acquisition

Fort Drum encompasses 107,265 contiguous acres (167.6 square miles). Land use/land cover classes for the installation are discussed in Chapter 6. The initial acquisition of land for Fort Drum occurred in 1909. In the mid-1930s another 9,000 acres were purchased. The most significant acreage, 75,000 acres, was purchased with the advent of World War II. Fort Drum's current acreage was realized with later smaller purchases.

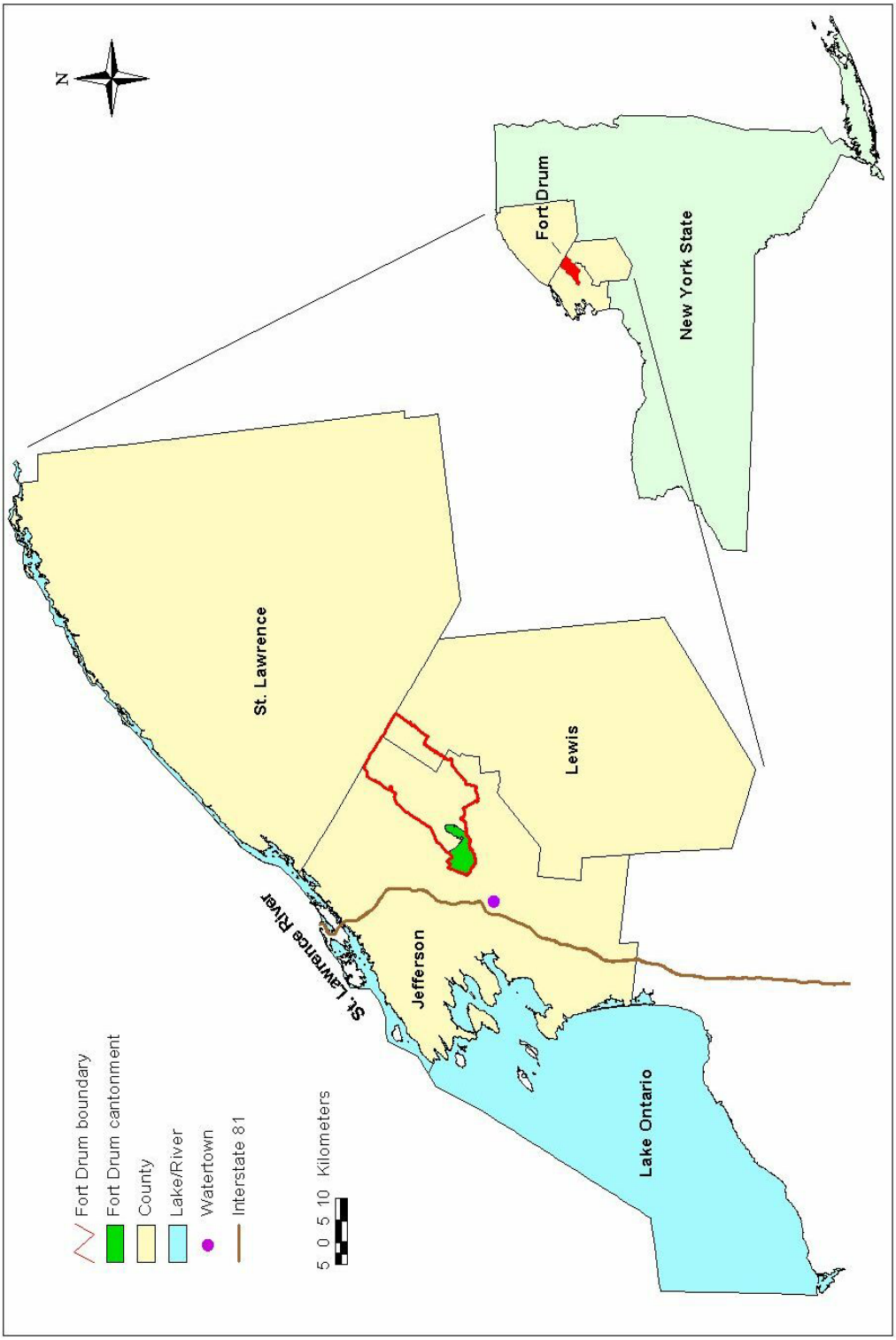

Figure 3.1a. Location of Fort Drum.

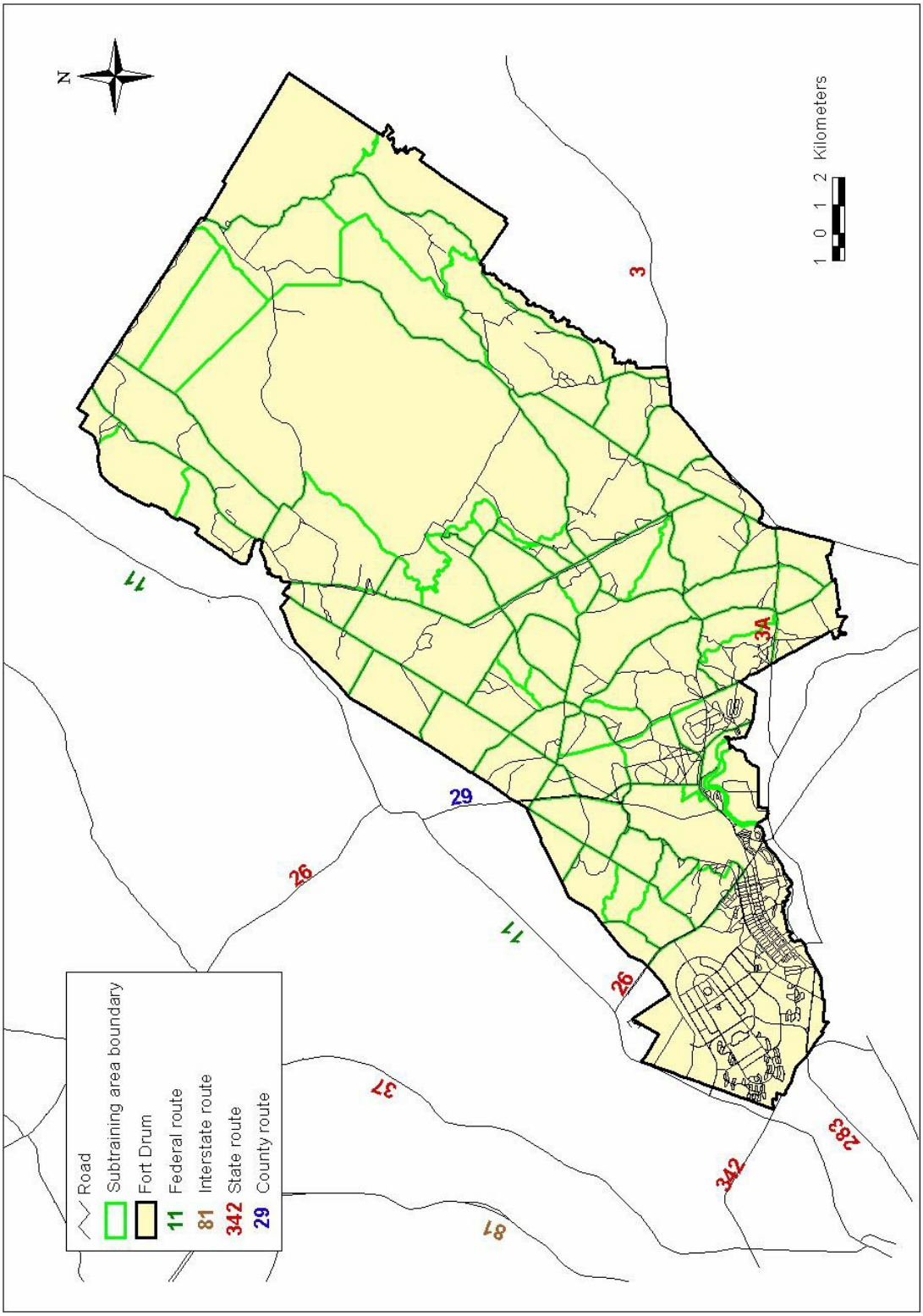

Figure 3.1b. Fort Drum and vicinity road network.

3.5 Installation History

In 1900 the area surrounding present day Fort Drum was characterized by rural agricultural communities, dispersed farmsteads, and small, but locally significant industries. In 1906 the War Department began to search for places to locate training installations for National Guard and Regular Army units. Pine Plains, a site on the Black River near Watertown, New York, was chosen. It has been used as a training facility by the U.S. Army since 1908 when Brigadier General Frederick Dent Grant, son of General Ulysses S. Grant, arrived with 2,000 regulars and 8,000 militia for summer training. He found the area so satisfactory that in the following year additional acres were purchased, and training has continued there since. In 1935 extensive peacetime maneuvers were held on Pine Plains and the surrounding farmland. These maneuvers were so successful that the War Department purchased 9,000 additional acres.

With the advent of World War II, larger areas were needed to train the nation's military forces. Pine Camp, as it was called then, was chosen for expansion, and an additional 75,000 acres were purchased. This purchase displaced 525 families and eliminated 3,000 buildings and five entire villages. Other villages were significantly reduced in size. Within 10 months of purchase, contractors had erected an entire city to serve the needs of the divisions that were to train there.

The three divisions deployed to Pine Camp for training were General George C. Patton's 4th Armored Division, the 45th Infantry Division, and the 5th Armored Division. Italian and German prisoners of war were detained at the camp during World War II. In 1951 Pine Camp became Camp Drum, named after General Hugh A. Drum, commander of the First Army during World War II. The installation was designated Fort Drum in 1974, and a permanent garrison was assigned. In 1980 the 76th Engineer Battalion was moved to Fort Drum from Fort Meade, Maryland to enhance the post as a training area. The 76th Engineer Battalion was inactivated in 1985.

On September 11, 1984 the Department of the Army announced that it had selected Fort Drum to house the 10th Mountain Division Light Infantry. In preparation, a new post was constructed. The 10th Mountain Division dates from 1943 when it was activated at Camp Hale, Colorado. The "mountaineers" saw extensive fighting in Italy during the final months of World War II. After the war, the division trained at Camp Carson, Colorado until it was inactivated on November 30, 1945. The division was reactivated in 1948 and saw combat during the Korean War. In the mid-1950s the unit served with NATO forces in Germany. It was inactivated in 1958. It was not reactivated until February 13, 1985. In 1985 a Roundout Brigade composed of New York Army National Guard battalions from central and northern New York under the 27th Infantry Brigade joined other Fort Drum units on the installation.

Today, Fort Drum's mission includes command of active component units and individuals assigned to the post. It also provides administrative and logistical support to tenant units, provides support to all training units including active and reserve units of all services, and planning and support of the mobilization and training of almost 80,000 troops annually (Parsons Engineering Science, 1995).

3.6 Facilities

3.6.1 Overview

Fort Drum is divided into a cantonment area, an impact area, an airfield, and 18 training areas (See Chapter 6). The cantonment area and Wheeler-Sack Army Airfield (WSAAF) occupy nearly 11,296 acres in the southwestern corner of the installation. Much of the cantonment area is used for housing, buildings, and parking lots. An ammunition supply point in Training Area 5E has 366 acres adjacent to the southern border of Fort Drum. Areas used for construction and development have increased, particularly when the Mountain View Area was built to house the Division in 1985. Development of certain areas will continue in the future, as detailed in the Installation Master Plan.

3.6.2 Transportation System

3.6.2.1 Road System

Fort Drum is served by a number of State and local roads (Figure 3.1a and 3.1b). Interstate 81 (I-81) lies about 5 miles west of the installation. State Route 342 connects I-81 with Fort Drum. US 11 is a two-lane road that parallels the northwestern boundary of Fort Drum. State Route 26 separates the Cantonment Area from the Training Areas. Route 29 transects Fort Drum from north to south. State Route 3 is a two-lane road that parallels the southern boundary of the installation. State Route 283 is a two-lane road that connects Fort Drum and the City of Watertown.

Fort Drum has an extensive internal network of roads. The cantonment area contains a dense network of two-, four-, and six-lane roads. The range/training areas contain mainly gravel and unpaved roads except for State routes 3A and 26 and Jefferson County routes 29 and 37. State Route 3A provides a shortcut across the range for State Route 3. County Route 29 provides access to WSAAF from U.S. 11, and County Route 37 provides access to the airfield from State Route 26.

3.6.2.2 Railway System

CSX provides freight train service to Fort Drum. Fort Drum has its own switching engine to move rail cars within the installation. The rail line (Figure 3.1b) accesses the installation from the west near State Route 342 and provides service to industrial and warehousing areas, including the heat plant. The Fort Drum rail line accesses the Montreal Secondary line, which is owned by Conrail. This line connects Montreal, Canada with Syracuse, New York. In Syracuse, the Chicago line can be accessed, which provides access to the entire national rail system. A second CSX line runs through the Fort Drum range but does not provide service to the installation. The closest Amtrak passenger service is in Syracuse.

3.6.2.3 Aircraft Facilities

Watertown International Airport is the only commercial or general aviation airport in the region. The airport is located on State Route 12F about 5 miles west of downtown Watertown. The airport provides commercial and charter air service and commercial airfreight service. The airport also supports military operations, including instrument flight training operations.

WSAAF is immediately east of the cantonment area and contains 1,234 acres. The airfield supports all aircraft sizes and capabilities. In 1996 WSAAF extended one runway to 10,000 feet for increased aircraft

capability.

3.6.3 Water

The City of Watertown water plant supplies potable water to Fort Drum by means of a transmission system operated by the Development Authority of the North Country. In addition, the installation operates a well field consisting of 11 wells near the airfield.

The Watertown plant was expanded to a capacity of 15 million gallons per day (mgd) when the 10th Mountain Division Light Infantry was posted at Fort Drum. Prior to this, the installation used the well field exclusively for water supply. Area demand on the Watertown plant is about 7.5 mgd with Fort Drum averaging 1.37 mgd from the plant during FY 00. Contractually, Fort Drum is required to purchase at least 1.5 mgd from the Development Authority of the North Country. The Development Authority of the North Country can supply up to 4 mgd through its 20-inch transmission main to the installation (Parsons Engineering Science, 1995).

Groundwater is drawn from three different aquifers. The two primary aquifers are the Pleistocene Pine Plains and the Postdam Sandstone. The Pleistocene Pine Plains aquifer has a saturated thickness of up to 85 feet. This aquifer is recharged by rain and snowmelt. The general direction of groundwater movement in the Pleistocene Pine Plains aquifer is outward from a groundwater divide that approximately parallels the north side of the Black River. The Potsdam Sandstone bedrock aquifer has top depths ranging from 130 to 180 feet below ground surface. The Potsdam Sandstone is up to 210 feet thick. The third aquifer is located in the Pamelia and Lowville Formations. In parts of the installation, these formations range in depths of 100 to 200 feet below ground surface.

Groundwater supply wells at Fort Drum are located generally north of the cantonment area and Wheeler Sack Airfield. Nominal well capacities range from 53 gallons per minute (gpm) to 440 gpm, with a total combined well capacity of up to 2,314 gpm. This equates to a flow of about 3.3 million gallons per day (mgd). The chlorination plant at the well field is limited to a maximum throughput of 2.3 mgd. Fort Drum used an average of 0.34 mgd from the well field in FY 00.

Including water purchased from Development Authority of the North Country, the total average water use was 1.7 mgd in FY 00. The operating storage tank capacity at Fort Drum is 2.75 million gallons.

There are two sites within training areas that produce potable water supply. A reservoir for the Village of Philadelphia covers one acre in Training Area 5 and may not be used for training (Fort Drum, 1996). A series of springs for the Village of Antwerp are located in Training Area 16 (STV Group, 1994). The Village of Antwerp will no longer be taking water from Fort Drum after 2002. A 500-foot diameter, no-training area is designated around the spring site to protect equipment from damage. A discussion of surface water and groundwater on Fort Drum, to include water quality, is contained in sections 5.5.1 and 5.5.2 of this INRMP.

3.6.4 Waste Water System

Approximately 99 percent of the sewer lines on post are separate sanitary or storm sewers. All sanitary

wastewater collected on Fort Drum is sent to the wastewater treatment plant owned and operated by the City of Watertown. The transmission lines are owned and operated by the Development Authority of the North Country in Watertown. The installation's sanitary wastewater is routed through three connections: the North Gate pump station (8 mgd capacity), the former Fort Drum wastewater treatment plant (now used only as a wet well for pumping to a gravity sewer), and a gravity connection at State Route 283.

In FY 2000 wastewater flow from the post averaged 1.6 mgd and rarely exceeded 2.5 mgd. The capacity of the existing collection system and off-post connections is ample. The rated capacity of the Watertown wastewater treatment plant is 13.4 mgd, and usage averages 9.5 mgd (Parsons Engineering Science, 1995).

3.6.5 Range Facilities

Fort Drum occupies in excess of 107,000 acres, providing maneuver and training facilities for U.S. Army active forces and Reserve Components. Maneuver areas occupy just over 60,000 acres in 14 major training areas that are sub-divided into 84 management units. The range supporting direct fire weapons, from pistol through M1A1, is in excess of 12,000 acres. These fixed facilities satisfy all stated weapons sustainment and qualification standards. The main impact area's 16,951 acres support indirect firing of mortar and artillery munitions. Air to ground fixed and rotary wing gunnery is supported by Ranges 23, 35, 48, and the main impact area. Hellfire, Stinger, and Redeye missile fire are supportable. Other training facilities include a 32 building urban city, confidence course, rappel tower, bayonet assault course, assault flight landing strip, and four drop zones.

3.6.6 Projected Changes to Facilities

Facilities proposed for construction in the Installation Master Plan should not significantly affect natural resources or management activities. Lands designated for new building construction will be inventoried for natural resources impacts. Project review through NEPA will assure that projects creating new footprints or possibly affecting natural resources get complete review for environmental concerns.

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4.0 MILITARY MISSION

4.1 Overview

Fort Drum is under the command of the U.S. Army Forces Command (FORSCOM). The primary mission of the Fort Drum garrison is to provide facilities and services to U.S. Armed Forces that require land and airspace to practice combat skills and operations on a year-round basis. Other missions at Fort Drum include:

- command active U.S. Army component units and individuals assigned to the installation;
- provide administrative and logistical support to tenant units;
- provide support to all units and activities in the upstate New York area;
- provide support to units training at Fort Drum, including active and reserve components of all services; and
- plan and support the mobilization and training of almost 80,000 additional troops.

4.1.1 Mission of Fort Drum

Mission Statement

Train, mobilize, deploy, and sustain combat ready forces from the Active and Reserve Component while caring for people.

Fort Drum is home to the 10th Mountain Division (Light Infantry). The mission of the 10th Mountain Division Light Infantry is to deploy rapidly anywhere in the world and be prepared to fight and win upon arrival. The 10th Mountain Division Light Infantry consists of two light infantry brigades, an aviation brigade, a division artillery brigade, a division support command brigade, an engineer battalion, a signal battalion, an intelligence battalion, an air defense battalion, a military police battalion (provisional), a division band, and a headquarters company.

The *Range and Training Land Program Development Plan (RTLP) for Fort Drum* (Harland Bartholomew and Associates, 1999) assumes that training missions of units using Fort Drum will not significantly change in the future. One military exercise, Mountain Peak, requires more land than is currently on Fort Drum if done in a "flowing" scenario. Therefore, the exercise is conducted in an "isolated" scenario that requires units to reposition after each operation. Fort Drum has been able to successfully conduct Mountain Peak for several years with available training land. An updated Range Development Plan (RDP) is in preparation. Upon its completion, the RDP will replace the existing RTLP.

The total available land on which light maneuver training requirements can be conducted is 39,596 acres (Harland Bartholomew and Associates, 1997). About 190,000 acres are required to train a brigade effectively. However, light maneuver training for a brigade can be conducted at Fort Drum but with the loss of some key training components and event realism. The total number of heavy maneuver training area acres available at Fort Drum is 21,685, which is sufficient to meet current needs. Range areas include basic weapons marksmanship ranges, collective live fire ranges, direct fire gunnery ranges, and the impact area.

4.1.2 Installation Population and Military Units

There are eight tenants actively involved in training exercises at Fort Drum. The mission of ***Company B, 342nd Forward Support Battalion*** is to provide division-level logistics support for a heavy division brigade and other divisional units within the brigade support area. The ***New Jersey Army National Guard Mobilization and Annual Training Equipment Site*** is responsible to sign for, issue, warehouse, inventory, and repair combat vehicles belonging to the 42 Infantry Division and the 28th Infantry Division elements of the NJARNG. The ***New York Army National Guard Consolidated Maintenance Facility*** is responsible to sign for, issue, warehouse, inventory, and repair combat vehicles belonging to the 42 Infantry Division elements of the NYARNG. The ***20th Air Support Operations Squadron*** advises the 10th Mountain Division Light Infantry on all aspects of battlefield air operations, provides terminal control of close air support on selected training areas, and 24-hour weather support to the garrison and Wheeler-Sack Army Airfield. The ***725th Ordnance Company*** is housed at Fort Drum and conducts explosive ordnance disposal force protection operations for military and civilian authorities. The ***62nd Military Police*** provide criminal investigative support for the installation. The ***77th Regional Support Command*** provides various organizational and maintenance support for selected U.S. Army Reserve units. The mission of the ***174th Fighter Wing, Detachment I*** is to operate the Air to Ground Gunnery Range (Range 35).

Other tenants at Fort Drum include the American Red Cross, Defense Accounting Office, Defense Commissary Agency, Defense Investigative Service, Defense Logistics Agency Readiness Support Office, Defense Printing Service, Defense Reutilization and Marketing Office, Logistics Assistance Office, Post Exchange, Readiness Group Drum, Trail Defense Service, U.S. Army Corps of Engineers Fort Drum Resident Office, U.S. Army Dental Activity, U.S. Army Medical Department Activity, 1st Infantry Regional Training Battalion, 27th Public Affairs Detachment, 33rd Finance Battalion, and 95th Maintenance Company (TMDE), Detachment 10. Fort Drum also houses two training facilities: the Light Fighters School and the Non-Commissioned Officers Academy.

As many as 270 reserve component units train at Fort Drum annually. Peak training occurs during summer, when nearly 50,000 reserve component soldiers use installation facilities for Annual Training. Fort Drum also supports about 20,000 reservists from all services for weekend training, and about 9,000 active Army, Marine, and Canadian troops for winter training.

4.2 Natural Resources Needed to Support the Military Mission

Quality training opportunities necessitate quality natural resources. The mosaic of natural communities found on Fort Drum provides the U.S. Armed Forces with a variety of realistic training scenarios. Forested areas are used for infantry training and as bivouac sites. Forest clearings serve as artillery firing points and helicopter landing zones. Open grass and shrublands provide space necessary for tracked and wheeled vehicle maneuvers.

4.3 Effects of the Military Mission on Natural Resources

4.3.1 Current and/or Potential Military Mission Impacts on Natural Resources

There are a variety of land uses on Fort Drum with military missions having the highest priority for land use. Some military training activities, such as maneuvering and range firing, may increase the potential of soil erosion and the danger of wildfire. Improper field maintenance on vehicles or weapons and bivouac activity may contribute to natural resources degradation (U.S. Army Corps of Engineers, 1990).

There are 40 live fire training ranges (See Section 6.2.1) on Fort Drum (STV Group, 1994a). Different terrain features may be created on firing ranges, including berms and slopes behind targets and trenches along target lines. Firing ranges require maintenance, such as controlling vegetation, to provide direct fire capability between firing points and targets.

The main impact area covers 16,951 acres and supports indirect firing of mortar and artillery. Mortars are normally fired from the eight Observation Posts. Artillery is not restricted to the 195 surveyed firing points, but utilize the 84 training area management units, in conjunction with Position Azimuth Determining System (PADS) to survey firing points. Soil erosion and vegetation degradation may occur on these firing points depending on the intensity of use.

Bivouac sites are located throughout Fort Drum. The amount of ground vegetation at these sites may be reduced or eliminated due to vehicular and foot traffic causing trampling. Bivouac and support activities may also produce litter on site. Materials and/or litter must be recycled or disposed of according to Fort Drum environmental regulations. Slit trenches are prohibited on bivouac sites, and fixed or portable latrines are used by troops during training.

Tactical maneuvers involve wheeled, tracked, and foot traffic on vegetated or bare ground. These military training activities reduce vegetative ground cover and may increase bare ground area (Shaw and Diersing, 1989; 1990). As a result, the potential for soil erosion increases due to the loss of vegetation and soil compaction. This may result in degradation to streams and other bodies of water due to streambank erosion and other sedimentation impacts. Field maintenance of vehicles and weapons during tactical maneuvers may cause problems if regulations and guidelines are not followed. Tactical vehicle accidents and damage to roads, trails, ditches, and off-limits areas occur most frequently during administrative times and in areas not directly related to training missions (U.S. Army Corps of Engineers, 1990; U.S. Army Construction Engineer Research Laboratory, 1987).

Helicopters fly almost daily and may land on any suitable location on the installation. Fixed-wing aircraft, (*e.g.*, A-10, C-130, F-16, and F-18), fly periodically. The Wheeler-Sack Army Airfield runway expansion has led to increased air maneuver activities. Noise from air activities may adversely affect wildlife especially during nesting and migrating seasons (Coastal Environmental Services, Inc., 1993; Claypoole *et al*., 1994). Aircraft noise may irritate humans; therefore, aviation exercises are generally not allowed within and above the cantonment area.

Different military training activities have the potential to damage wetlands and/or disturb breeding and migrating waterfowl. Examples of these are troop and tank movements, active artillery ranges, and low

altitude helicopter flights, including flying through wetland corridors to avoid radar. Waterfowl are essentially intolerant to human disturbance, especially during breeding and brood-rearing periods (Coulter and Miller, 1968). Human disturbance can reduce foraging efficiency and the time available for feeding, possibly reducing reproductive success (Drobney, 1990). Disturbances, such as the downdraft from helicopter rotors may flush ducks off nests, leaving eggs unprotected and susceptible to predators. Repeatedly flushing ducks from nests may lead to nest abandonment. During migration, waterfowl need to forage intensively and rest to replenish energy reserves. Disturbances can minimize the time spent feeding and resting.

Some training activities may provide potential benefits to certain wildlife communities. Periodic, large-scale terrain disturbance and occasional fires caused by military training retard the growth of trees and shrubs. Thus, military maneuvers help maintain vegetation in the early successional stages required by many wildlife species, including several species of management concern. However, the impact of training activities on the reproductive success of species in these disturbed habitats is unknown.

Fort Drum's implementation of this INRMP, particularly the ITAM program, provides the catalyst for minimization and mitigation of many of the impacts discussed above. The LRAM component of ITAM is particularly important as it strives to achieve a proactive approach to minimizing military impacts on training lands. The environmental awareness component acts to improve land user understanding of the impacts of activities on the environment, and thus, ultimately reducing the amount and/or degree of those impacts. The TRI component also minimizes and mitigates military impacts on the environment by integrating military training requirements for land use with natural resources conditions and capabilities. LCTA monitors land conditions. Results of LCTA monitoring on Fort Drum are discussed in Section 5.7.2.

4.3.2 Future Military Mission Impacts on Natural Resources

Although the *Range and Training Land Program Development Plan (RTLP) for Fort Drum* (Harland Bartholomew and Associates, 1999) assumed that training missions of units using Fort Drum will not significantly change in the future, several recommendations were suggested that affect natural resources. The RTLP (Harland Bartholomew and Associates, 1999), based on Land Condition Trend Analysis data, recommended that the amount of mechanized maneuver training conducted on areas that contain sandy soils be limited since sandy soils that are subjected to excessive disturbance may become barren, requiring expensive rehabilitation. Harland Bartholomew and Associates (1999) also recommended that large contiguous areas of shrublands and forests be cleared to increase the usability of training land, since these areas inhibit wheel, track, and foot traffic. The trampling activity from tracked vehicles may be a cost effective way of retarding shrublands that have been increasing due to natural succession. In addition, Harland Bartholomew and Associates (1999) recommended that new bivouac areas be used on a rotating basis to prevent excessive vegetation loss, and thus, reduce the erosion potential.

Several forested areas in Training Areas 16 and 17 have been identified for clearing in the RTLP. These forested areas tend to funnel tracked vehicles into narrow, overused maneuver lanes. By clearing the identified forested areas, tracked and wheeled vehicles will be less constrained and more dispersed, allowing for quicker regeneration.

It is difficult to quantify effects of future military missions on natural resources at Fort Drum. If basic mission, land area, and intensity of missions remain unchanged, mission impacts on natural resources will

remain similar to those today. Fort Drum's primary mission is not likely to change, nor in this era of declining resources, is the size of its land area. However, this may not be true for mission intensity.

The Department of Defense is being forced to make do with less in terms of both quantity and quality of training lands. Effective training resources must be managed to not exceed the optimum training carrying capacity of sites to ensure the long-term use of the resource can be guaranteed. Now that Base Realignment and Closure is reality, other military missions may look toward Fort Drum to fulfill their future training needs. New missions are a coordinated effort between the installation staff, MACOM and DA in determining the capability and resources of Fort Drum to support the newly proposed mission.

There are numerous positive effects of the military mission on natural resources. The most general and most significant on Fort Drum is commitment to natural resources management, including minimizing and mitigation of military mission damage. This natural resources commitment is beneficial for both natural resources in general and people who use natural resources products.

The presence of Fort Drum continues to preserve native ecosystems by preventing development and ensuring that land uses are conducted in a manner that protects the environment. Natural resources considerations and military training demands limit the extent of other potentially damaging land uses.

4.4 Effects of Natural Resources or Their Management on the Military Mission

Fort Drum command and staff are determined to complete the military training mission successfully, and an integral part of that mission is good environmental stewardship. However, there are some negative aspects of natural resources or their management on military training.

There may be time delays due to coordination with Natural/Cultural Resources staff or to obtain permits. A small portion of the installation is off-limits to training due to archeological or environmental constraints. Off-limits areas include sensitive archeological sites, the historic Villages of Alpina, LeRaysville, Sterlingville, and Lewisburg, the Antwerp Water Supply, and a landfill. In-holdings such as the Philadelphia Water Supply and cemeteries are also off-limits. There are no restrictions to foot or wheel traffic in wetland areas.

Overall the effect of natural resources management on the military mission of Fort Drum is positive. The ITAM program in particular has a positive effect both on military training and the environment. Other programs, such as forestry and fish and wildlife management have positive effects on military mission requirements. Many forestry projects open up areas to military use that otherwise would be difficult to utilize, and fish and wildlife management provides resources for more realistic training while also providing another element to support soldiers quality of life.

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5.0 NATURAL RESOURCES AND CLIMATE

Bailey's Ecological Units of the Eastern United States places the area in and around Fort Drum in two subsections: the St. Lawrence Glacial Lake Plain subsection (212Ee) and the Black River Valley subsection (222Ob) (Keys, Jr. *et al*., 1995). The land within these subsections is mainly forested or in agriculture with less than 10% of the region under urban development.

Upstate New York is a mixture of croplands and woodlands. Forests in the region are composed predominantly of maple (*Acer* spp.), hemlock (*Tsuga* spp.), eastern white pine (*Pinus strobus*), and beech (*Fagus* spp.). A hemlock, white pine, northern hardwoods forest originally occupied the Fort Drum physiographic area. Logging operations cleared the land, and farming was established adjacent to access routes and on suitable terrain. The area also contains numerous inactive limestone quarries. The region had a very active quarry business as evidenced by the many limestone buildings in the vicinity.

5.1 Physiography and Topography

Fort Drum encompasses two major physiographic provinces, the Lake Erie-Ontario Lowlands and the Adirondack Uplands (U.S. Army Engineer Topographic Laboratories, 1977). The southwestern two-thirds of the installation are part of the Lake Erie-Ontario Lowlands division. In this area, surface geological features are recessional moraines, small sand plains, drumlins, swamps, and drainage patterns resulting from Pleistocene glaciation. The northeastern third of the installation lies in the western Adirondack Hills, a physiographic subdivision of the larger Adirondack Uplands division, and is characterized by a wide zone of foothills partially covered by lacustrine deposits laid down in post-glacial lakes. This part of Fort Drum has several lakes, rock outcrops, and many steep-sided, northeast to southwest hillocks.

Most (98%) land on Fort Drum is classified as low plains, with elevations between 490 and 690 feet above mean sea level. Surface topography is predominantly flat to moderately rolling (Figure 5.1). Slopes are generally 8% or less. Relief of areas between streams is generally from 60 to 130 feet above adjacent valley bottoms. High plains (2% of Fort Drum) are predominantly gently rolling to hillock surfaces, covering two small areas, one on the south-central edge and the other on the northeastern edge of the installation (U.S. Army Engineer Topographic Laboratories, 1977). Elevation in the high plains varies between 740 and 850 feet above mean sea level. Most slopes are between 3% and 15% on the south-central high plains and between 3% and 8% in the northeastern area. In both low and high plains, slopes may reach 30% to 45%.

Most of Fort Drum is located in the St. Lawrence River Basin. A small portion of the southern installation drains into the Black River Basin.

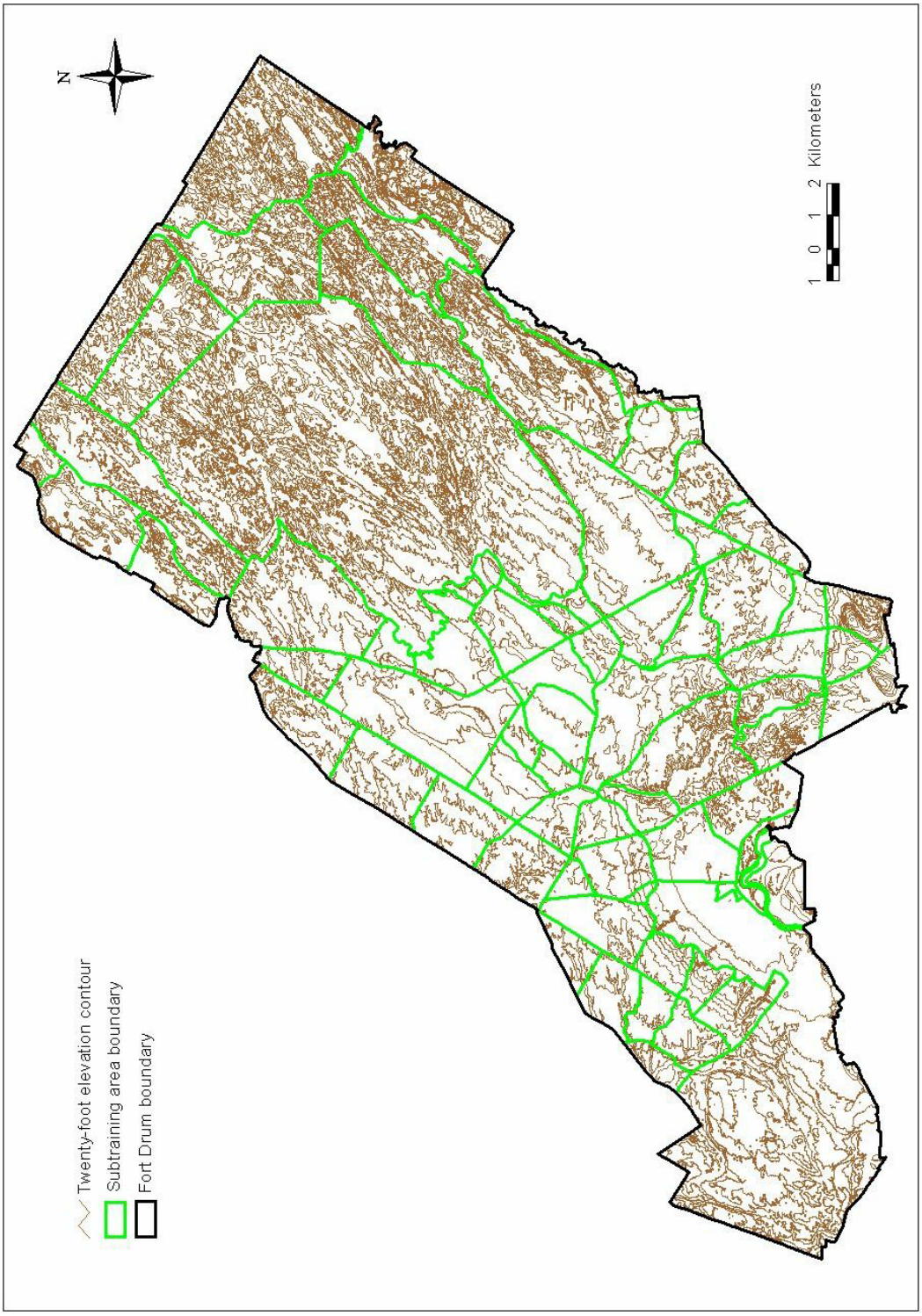

Figure 5.1. Fort Drum topography.

5.2 Geology

Fort Drum is underlain by a variety of metamorphic, igneous, and sedimentary bedrock ranging from Precambrian to Middle Ordovician. The oldest metamorphic rocks belong to the Grenville Complex and consist mainly of metamorphosed Precambrian quartzite, gneiss, schist, and marble. These rocks stretch in a wide northeast-southwest band across Fort Drum and border the igneous Adirondack massif and associated foothills to the east.

The igneous complex in the eastern part of the installation consists mainly of two series of intrusive rocks. The older series includes gabbros, diorite, and quartz diorite; the younger series includes syenite, quartz syenite, and granite.

The next youngest rock units in the area are the sedimentary Potsdam Sandstone and the overlying Theresa Formation, both of Cambrian age. They are found in the central and west-central parts of Fort Drum, lying on Precambrian rocks and underlying limestone units of the Black River Group to the southwest. The Potsdam Sandstone and Theresa formations have been eroded away in some places; their absence is also due, in part, to the irregularity of the Precambrian bedrock surface on which they were deposited. Potsdam Sandstone generally consists of tan to white, even-grained quartz sand with siliceous and calcareous cementation. Locally, some basal sandstones can be red (from hematite) or green (from chloritic cementation). The Theresa Formation consists primarily of hard, bluish-gray, thinly bedded sandy dolomite with calcareous sandstone layers dominant in the basal portion. Upper beds of the Theresa Formation vary in composition and range from calcareous and dolomitic sandstones to sandy dolomite.

Overlying the Potsdam and Theresa formations are limestone units of the Black River Group of Ordovician age. This group consists of (from lower to upper deposition) the Pamelia, Lowville, and Chaumont formations. The Pamelia Formation includes dolomitic limestone, limestone, and dolomitic sandstone. The Lowville Formation consists of medium gray fossiliferous, thick to thinly bedded limestone with shale partings. The Chaumont Formation consists of massive gray, finely textured, cherty limestone containing abundant fossils.

The youngest bedrock on Fort Drum, which overlies the Black River Group, is the Trenton Group of Ordovician age. This group consists of thin to thick bedded, gray, fine to coarse textured limestones with shale interbeds. The Trenton Group is found in a small area of the southern portion of the cantonment area and extends southward to the town of Felts Mills.

Fort Drum is covered mainly by deltaic and lacustrine clay/silt deposits resulting from glacial and post glacial events. An important hydrogeologic feature in the south-central portion of Fort Drum is a sand plain known as “Pine Plains”. This sand plain is a delta of fine sand that was deposited by the Black River into glacial Lake Iroquois during the last Wisconsin glaciation. It forms a large surficial aquifer. In the northern portion of Fort Drum, much of the metamorphic (or Precambrian) bedrock is overlain by thin lacustrine deposits of clay or silty clay. In some locations a thin layer of till may be present beneath the lake clay. The low permeability of the till and lacustrine clay causes poor drainage, although poor drainage may also be related to shallow bedrock in some places. Where these units occur, the water table is close to or at the surface. This has resulted in the formation of many swamps, especially in the northeastern part of the installation. There are many small to very small and irregular areas that are

covered by glacial deposits, such as tills, kame gravel, and ground moraine. These areas are often interlocked within larger areas of deltaic or lacustrine depositions.

5.3 Soils

Soils of Fort Drum are generally developed from deltaic/lacustrine or glacial deposits. They have been mapped at the soil sub-series level in Jefferson County (Soil Conservation Service, 1989), and at the soil association level in Lewis County (Soil Conservation Service, 1960). Soil sub-series within Fort Drum were grouped at the soil series level as the sub-series unit was considered too fine. Soils on Fort Drum are shown in Figure 5.3.

Soils at Fort Drum vary from sandy gravels to loams to clays to mucks. Soils in the region are generally shallow and poorly drained; soil permeability is slow to moderate. Rhinebeck Series soils (having slopes of 3% or less in areas not considered urban or built up) located on the northwestern one-third of the installation are considered prime farmland (Soil Conservation Service, 1989).

Soils of the southern and southeastern parts of the installation are sandy and dry, supporting white pine, white oak (*Quercus alba*), and northern red oak (*Q. rubra*). Major soil series in the south and southeastern areas are Plainfield sand, Plainfield and Windsor soils, Windsor loamy fine sand, Deerfield loamy fine sand, Bice fine sandy loam, and Bice very stony fine sandy loam.

Soils of the northern and northeastern areas of the installation range from sandy to silty loam. Major soil series include Quetico-Rock Outcrop Complex, Muskellunge Silt Loam, Millsite-Rock Outcrop Complex, and Heuvelton-Millsite-Rock Outcrop Complex. Soil associations include Adams-Colton, Podunk-Ondawa-Saco, Croghan-Adams, Peat and Muck, and a large area of Rockland, Gneiss, and Granite. These soils are usually shallow and intermingled with rock outcrops. Predominant tree species found in these areas are eastern white pine, eastern hemlock (*Tsuga canadensis*), quaking aspen (*Populus tremuloides*), big-tooth aspen (*P. grandifolia*), red maple (*Acer rubrum*), sugar maple (*A. saccharum*), black cherry (*Prunus serotina*), gray birch (*Betula populifolia*), and other hardwood species.

Silty/clayey soils, developed from glacio-lacustrine sediments, dominate along the western border of Fort Drum and include some central areas of the installation. Major soil series include Collamer Silt Loam, Galen Fine Sandy Loam, Heuvelton Silt Loam, Hudson Silt Loam, and Kingsbury Silty Clay. These soils were previously used for farming and now support herbaceous and shrub plants.

Soils of the central and southwestern portion of Fort Drum and part of the cantonment area include Benson-Galoo Complex, Carlisle Muck, Collamer Silt Loam with bedrock substratum, Newstead Silt Loam, Niagara Silt Loam, Galway Very Stony Silt Loam, and Amenia Loam. These soils are mostly poorly drained, silty, and clayey. They support red maple, striped maple (*A. pennsylvanicum*), yellow birch (*B. allegheniensis*), gray birch, American beech (*Fagus grandifolia*), northern white cedar (*Thuja occidentalis*), and eastern hemlock.

In general, soils of Fort Drum can be grouped under the Gray Brown Podzolic Soils and the Podzols, with the Vergennes Association, Adams Croghan Association, and Panton-Vergennes Rockland Association

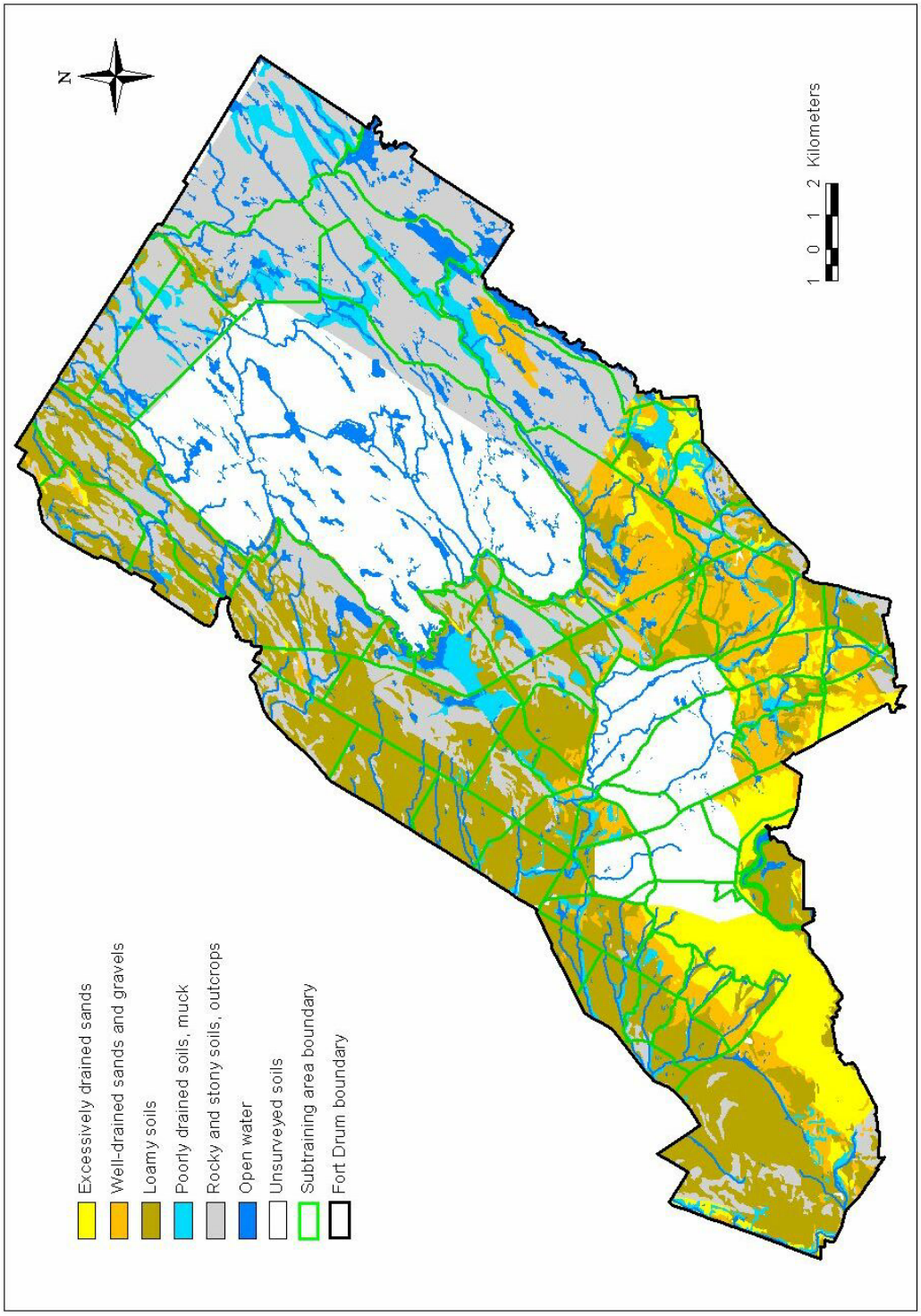

Figure 5.3. Soils of Fort Drum.

being most prominent. Natural fertility of most soils on Fort Drum is low, and organic soils are rare.

The Plainfield-Windsor-Deerfield soil consists of very deep, excessively drained to moderately well drained sandy soils on terraces and plains and occurs primarily in the southern and southwestern portions of the installation. Communities growing on these sites show a higher average military land use than corresponding communities and seem to have sustained the greatest damage due to land use, with bare ground and visual erosion strikingly higher than in similar communities on other soil types. LRAM activities on Fort Drum have historically been concentrated within this soil type.

5.4 Minerals

Fort Drum has several locations that provide sand and gravel for installation use. A former limestone quarry, just west of Route 26, is used as a storage area for stone for roadway work and subsurface engineering applications.

5.5 Water Resources

5.5.1 Surface Water

5.5.1.1 Lakes and Ponds

There are 11 lakes and/or ponds on Fort Drum (Figure 5.5.1) totaling more than 400 acres of surface area. Dority Pond lies within the main impact area, and Marsh and Burnt ponds have remote access in Training Area 19C. In addition, 25 acres of Lake Bonaparte is within the Fort Drum boundary.

Remington Pond is a 21-acre, elongated impoundment on Pleasant Creek in the cantonment area. Located near military housing, the primary use of this pond is recreation, including fishing and swimming. Fishing pressure is heavy. The Remington Pond picnic and camping area is on the east side of Remington Pond.

Quarry Pond is the smallest (three acres) but it is the deepest (49 feet) water body on Fort Drum (Parsons Engineering Science, 1995). Quarry Pond is located in Training Area 14B.

Conservation Pond is a 4-acre, shallow impoundment on Buck Creek in Training Area 8C. It has a 15-foot long concrete dam, is surrounded by forests, and is accessed by Lake School Road.

Mud Lake is a 127-acre shallow lake in the northeastern portion of Fort Drum in Training Area 19C. Mud Lake is a bay of Lake Bonaparte and supports good warm and cold water fisheries. Alpina Dam is at the northwestern end of the lake and spills into Bonaparte Creek. Mud Lake is accessed by Fusa Boulevard.

Indian Lake (186 acres) is the largest lake on the installation. It is located in the northeastern portion of Fort Drum in Training Area 19D and is surrounded by forests. It is connected to Narrow Lake (45 acres) by a 50-foot wide channel. Indian River enters Indian Lake from the southwest and exits Narrow Lake on the northwestern side. Indian Lake is accessed via FUSA Boulevard from the north or by Alpina Road on its western shore.

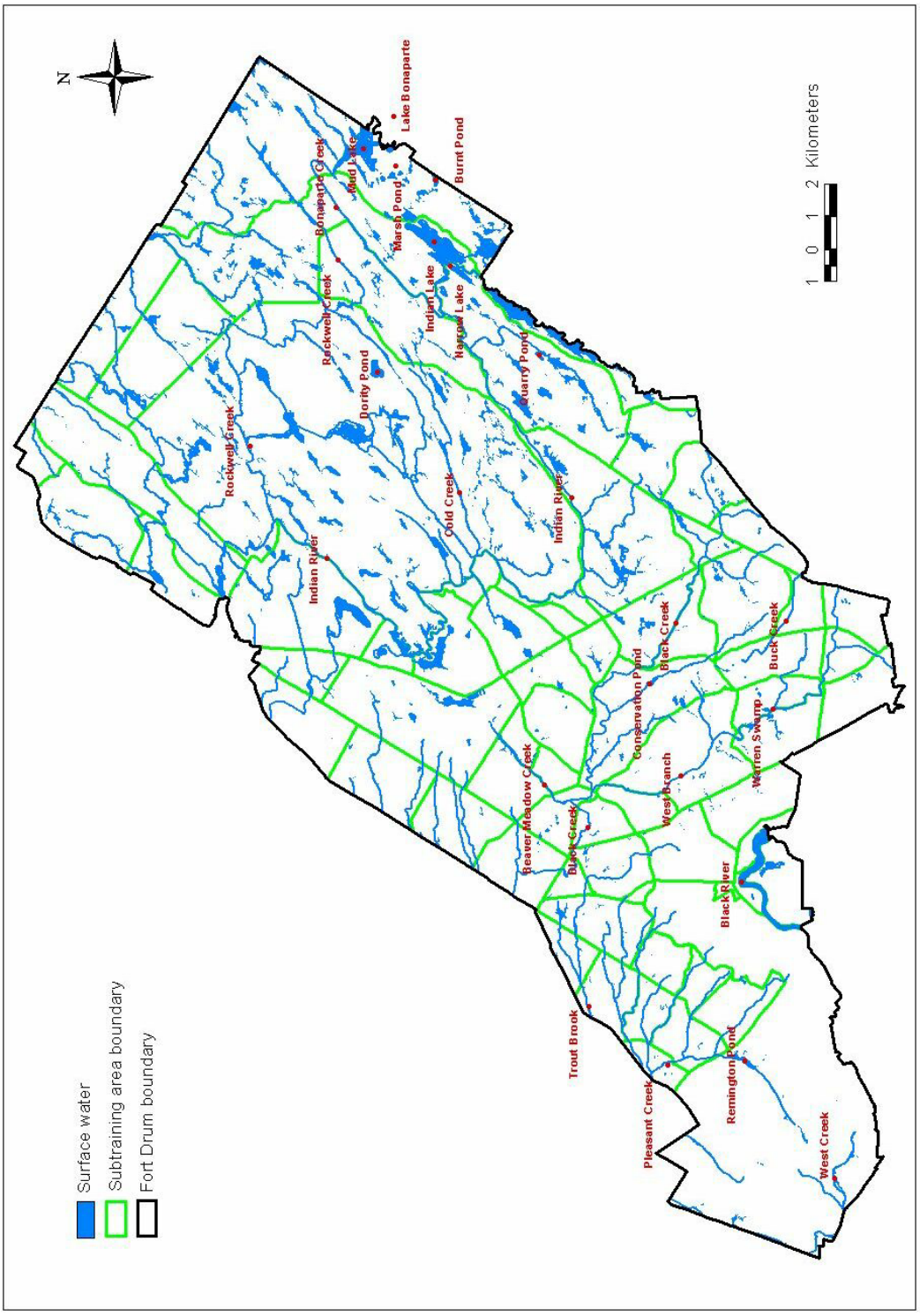

Figure 5.5.1. Fort Drum surface water.

About 50 acres of Indian Pond is within Fort Drum in Training Area 19C. Remotely located in the northeastern corner of the installation, this pond is basically inaccessible from installation property, although one could gain access through streams from Fusa Boulevard. All shorelines are forested. Deer camps are located on private land at the southern end of the pond, and most recreational users gain access via private land. An outlet stream from Crooked Pond, just outside the installation, enters Indian Pond on its southeastern side. Indian Pond's outlet drains into Indian Lake.

5.5.1.2 Streams

There are nine major streams on Fort Drum, totaling about 80 miles; seven minor streams, totaling about 50 miles; and many tributaries to both (Figure 5.5.1). Two major streams, Cold and Rockwell creeks, lie primarily within the main impact area. Most creeks on Fort Drum are classified by the State of New York as Class D or Class C surface water bodies. Class D water bodies are suitable for fishing and fish survival. Water quality is suitable for primary and secondary contact recreation. Class C water bodies are suitable for fish propagation and survival, as well as sport fishing.

Most surface drainage features on Fort Drum flow into the Indian River. This river eventually joins the Oswegatchie and St. Lawrence rivers north of Fort Drum. One exception to this pattern is the Black River, which flows westward into Lake Ontario. The Black River crosses a small area on the southern edge of the installation and has no perennial streams entering it from Fort Drum.

The Indian River is the longest drainage on Fort Drum (27 miles), winding generally from southeast to northwest and serves as the boundary of the main impact area for much of its length. This river enters Indian Lake at the lake's south end and exits to Narrow Lake. Stream width varies from 10 feet at the southeastern boundary of the installation to about 200 feet where the river exits Fort Drum.

About three miles of the Black River are on Fort Drum; an additional five miles passes along or near the southern edge of the installation. Black River is used by the Niagara Mohawk Corporation for hydroelectric power generation.

Black Creek flows from the southeastern corner of Fort Drum to the western boundary, converging with Indian River in Philadelphia, New York. Nearly 16 miles of this creek are on Fort Drum with several rapids prior to its convergence with Beaver Meadow Creek. There are many road crossings for recreational users to gain access.

The West Branch of Black Creek (five miles) enters Fort Drum from the south and converges with Black Creek near Reedville Road. It is a small and shallow stream. A relatively large swamp (Warren Swamp) lies along the middle of the West Branch.

About six miles of West Creek are within or near the southwestern corner of the installation. Headwaters of this creek are on Fort Drum. The creek flows through the town of Evans Mills and converges with Indian River.

About 1.5 miles of Pleasant Creek lie within Fort Drum including its headwaters. The creek eventually flows into Evans Mills. A section of this creek was impounded by an earthen dam and concrete water control structure, creating Remington Pond.

Trout Brook, Rockwell Creek, and Bonaparte Creek are minor streams that have limited fishery potential. Trout Brook stretches about three miles in the southwestern portion of Fort Drum. The headwaters of Trout Brook are a large spring used for the Philadelphia Water Supply.

About 14 miles of Rockwell Creek is on Fort Drum, mostly within the main impact area. Therefore, most sections of this creek are not accessible for recreation. Its headwaters are located in the northeastern portion of Fort Drum, and the creek converges with Indian River to the northwest.

Bonaparte Creek is in the northeastern portion of Fort Drum, stretching about six miles along the eastern boundary of Training Area 20 (limited use area) and converging with Indian River.

5.5.1.3 Surface Water Quality

Fort Drum's major streams have been surveyed, and water quality is generally good. The Fort Drum fish and wildlife program monitors water quality in lakes and streams using several survey techniques. Stream water quality is assessed using a measure of macroinvertebrate community compositions that was established by the NYSDEC. Water quality of lakes and ponds is monitored by collecting information on parameters, such as dissolved oxygen, pH, hardness, alkalinity, conductivity, total nutrients, and zooplankton abundance.

There is concern about contamination to Remington Pond from "gasoline alley", an area of old gasoline dispensing units. The progression of the contaminant front is being monitored, via ground wells, by Fort Drum and an associated contracting agency. No effects to Remington Pond and its tributaries have been found.

Water quality of lake and ponds on Fort Drum is generally good, although increased levels of mercury have been documented in Indian Lake. In addition, existing mercury levels may be great enough to impair fish and wildlife resources, especially young fish, aquatic invertebrates, and fish-eating birds (Claypoole *et al*., 1994).

In 1982 a survey by the New York State Department of Environmental Conservation (NYSDEC) detected elevated levels of mercury in Indian Lake. A health advisory to eat no more than eight ounces of fish flesh from Indian Lake per month was instituted. Another study by the Army Environmental Hygiene Agency reconfirmed elevated mercury levels in Indian Lake. In 1994 NYSDEC again tested Indian Lake for mercury levels. Mercury was present; however, it was believed to be naturally occurring.

The presence of mercury in living organisms represents contamination from natural and anthropogenic sources and must be regarded as undesirable and potentially hazardous (National Academy of Science and National Academy of Engineering, 1973). Mercury is one of the few metals that has no useful physiological function when present in fish and wildlife (Eisler, 1987). Animals take up mercury from contaminated water and contaminated food (Jenkins, 1981).

In addition to surveys of major streams on the installation, Trout Brook was surveyed in 1931 and 1972 by NYSDEC; Rockwell Creek was surveyed in 1931 by the New York State Biological Survey; and Bonaparte Creek was surveyed in 1931. (Also see Section 8.4.5)

5.5.2 Groundwater

An evaluation of Solid Waste Management Units at Fort Drum was conducted by the U.S. Army Environmental Hygiene Agency in 1986. Under this evaluation 72 acres of concern were considered. Currently, there are 11 active Installation Restoration Program sites. Groundwater is monitored at all 11 active sites.

5.6 Climate

Fort Drum has a primarily humid, continental climate with relatively long, cold winters and short, warm and often humid summers. The mean annual temperature at Fort Drum, averaged over the past ten years at Wheeler-Sack Army Airfield (WSAAF), is 48 °F. January is the coldest month, closely followed by February and December. Temperatures fall below 0 °F on about 20 days during these three months; below-freezing temperatures occur on about 104 days from December to March. With slightly higher elevations and a greater distance from Lake Ontario, the northeastern part of the installation has winter temperatures 2-4 °F lower than those recorded at WSAAF.

Winter temperatures constitute a severe hazard to personnel exposed outdoors. With a wind chill, the temperature may fall below the record low temperature of -32°F, and exposed flesh may freeze within one minute of exposure. Cold fronts moving in from the west can last three days, while more bitter fronts from the Hudson Bay area usually last less than a day.

The warmest months are June, July, and August, with mean monthly maximum temperatures of 74, 79, and 77°F, respectively. The extreme maximum temperature in the past 15 years, measured at WSAAF, was 97 °F, on August 3, 1988. Temperatures fall rapidly in the evenings, making for cool and comfortable nights during summer.

The average length of the growing season in the Fort Drum area ranges from 155 days in the cantonment area to 128 days in the higher northeastern part of the installation (U.S. Army Engineer Topographic Laboratories, 1977). The average date for the first killing frost is October 1, and the last killing frost is May 12. Variations of such dates can be as much as a month earlier or later.

The mean annual precipitation on Fort Drum is about 41 inches, and precipitation is well distributed throughout the year. The record-high annual precipitation was 55.4 inches in 1972, and the record-low annual precipitation was 26.96 inches in 1908 (U.S. Army Engineer Topographic Laboratories, 1977). According to a 73-year period of record at Syracuse, which is 70 miles south of the cantonment area, there has not been a single month in which there was no precipitation.

Although precipitation is fairly uniform throughout the year, stream discharges vary considerably. April is the highest discharge month, when spring snow melts on the still-frozen, nearly impermeable ground resulting in high runoff (U.S. Army Engineer Topographic Laboratories, 1977). Snow and ice cover generally thaws from late March to mid-May.

Snowfall is fairly heavy, with an annual average of 109 inches at Fort Drum. However, snowfall is quite variable, not only from year to year but also from place to place as a result of slope, elevation, and other factors. Snow cover is rather deep from December through March. Unofficial measurements on Fort Drum recorded over 51 inches of snow accumulation during the severe winter of 1976-77 (U.S. Army

Engineer Topographic Laboratories, 1977).

Cloudiness and snow squalls are a characteristic feature of winter weather in the Fort Drum area. The amount of sunshine is low during winter with about two-thirds of the days being mostly cloudy to overcast. However, in summer about two-thirds of the days are partly cloudy to clear (U.S. Army Engineer Topographic Laboratories, 1977).

Lying on the route of the St. Lawrence Valley storm tracks, Fort Drum has prevailing westerly winds and is affected by nearly all cyclonic storms moving from the interior of the country through the St. Lawrence Valley. Wind velocities on Fort Drum are moderate, averaging 7 knots over the past 10 years. The most violent winds are those that may accompany thunderstorms in late spring, and severe winds of 40-50 knots or more occur once or twice annually on average (U.S. Army Engineer Topographic Laboratories, 1977). In winter there are numerous days with sufficient wind to cause blowing and drifting snow.

5.7 Flora

5.7.1 Vegetation Types

Land cover/vegetation types were classified into Anderson land use classes by Geonex Corporation (1996) and into different natural/ecological communities by Coastal Environmental Services, Inc. (1993), based on Reschke (1990). Appendix 5.7.1a lists ecological communities in which Land Condition Trend Analysis (LCTA) plots are located along with their global and state rank (this list does not include all communities found on Fort Drum). In 2000 Fort Drum GIS Analysts delineated vegetative types from recent aerial photographs to produce a vegetation type/land cover overlay of Fort Drum (Figure 5.7.1). A composite list of species found on Fort Drum from various surveys, primarily LCTA, is in Appendix 5.7.1b. A list of bryophyte species is available at the Natural/Cultural Resources Branch office.

Grasslands and Shrublands

Grasslands, meadows, and shrublands are open areas with less than 25% tree canopy cover. Grasslands are communities that are dominated by grasses and sedges and may include scattered shrubs. Meadows are communities with forbs, grasses, sedges, and shrubs co-dominating and may include scattered trees. Shrublands are communities that are dominated by shrubs and may also include scattered trees. Grasslands and meadows on sandy soils are dominated by common hairgrass, stiff-leaved aster, poverty oat grass, and the sedge *Carex lucorum*. Grasslands on sandy soils are visually distinct from corresponding communities on less sandy soils, showing a relatively species poor vegetative diversity with a predominance of native species. Grasslands and meadows not on sandy soils are dominated by timothy, Canada bluegrass, old-field cinquefoil, and vetch. Shrublands tend to be dominated by timothy, old-field cinquefoil, rough-leaved goldenrod, and meadowsweet.

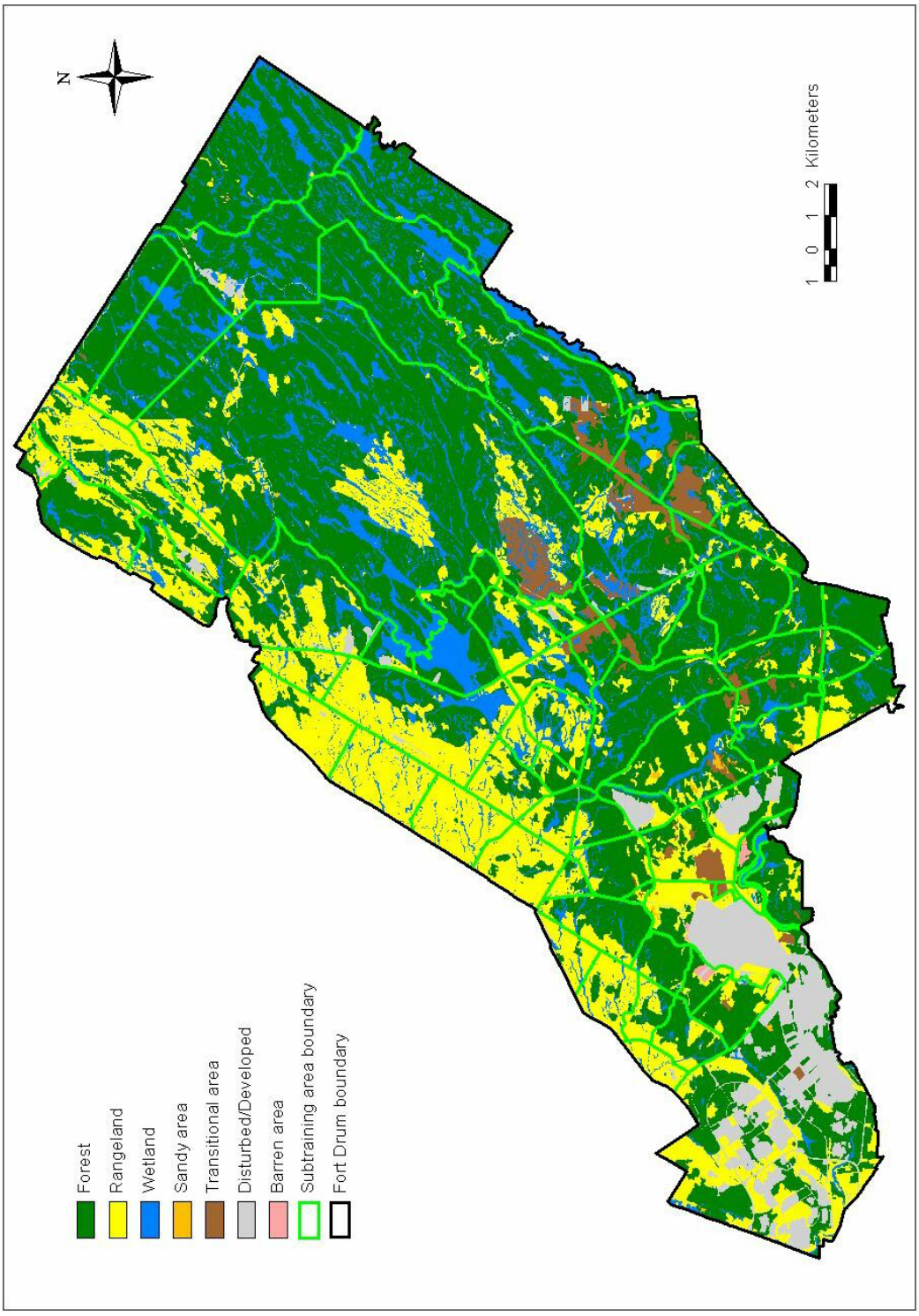

Figure 5.7.1. Fort Drum vegetation types/landcover.

Forests and Woodlands

The amount of area on Fort Drum in woodlands and forests has doubled in the last 50 years. Woodlands are defined as plant communities with 25% to 60% tree cover; forests have more than 60% tree cover (Reschke, 1990). Woodlands and forests on Fort Drum have three major canopy types: coniferous, deciduous, and mixed coniferous and deciduous.

Coniferous forests and/or woodlands are stands with more than 80% of the canopy cover consisting of conifer species. White pine is the primary conifer species with hemlock being the second most abundant. Other coniferous species, such as spruces (*Picea* spp.), are also found on Fort Drum.

Deciduous woodlands and forests on Fort Drum are primarily successional northern hardwood stands, occurring on formerly cleared (for farming, logging, etc.) or otherwise disturbed sites. Diverse tree species are found in these hardwood stands. Dominant species include aspen (*Populus* spp.), black cherry, red maple, sugar maple, and red oak. Sugar maple and American beech often dominate on moist and well-drained soils. Beech is found more often as an associate species in sugar maple-dominated stands on Fort Drum.

Mixed forests are primarily white pine-northern red oak-red maple forest communities that occur on gravely outwash plains, delta sands, eskers, and dry lake sands. Dominant or codominant species usually include white pine, hemlock, red maple, red and white oak, sugar maple, aspen, and black cherry. Yellow birch, American basswood (*Tilia americana*), white ash (*Fraxinus americana*), and red spruce (*Picea rubrens*) may also occur in some stands.

Tree plantations were established in some areas on Fort Drum. Tree species in these plantations primarily consist of pines. Some conifer plantations are mixed with shrubs and grasses. There are also several revegetated areas of pure herbaceous plants. The primary purpose of establishing plantations was to minimize soil erosion.

Palustrine Systems

Palustrine systems consist of non-tidal, perennial wetlands characterized by emergent vegetation. This system includes wetlands permanently saturated by seepage, permanently flooded wetlands, and wetlands that are seasonally or intermittently flooded (two weeks or more during the growing season; April 19 through October 23) if vegetative cover is predominantly hydrophytic and soils are hydric (Reschke, 1990). Wetland communities are distinguished by their composition, substrate, and hydrologic regimes. Wetland communities have been identified on Fort Drum primarily based on vegetation composition. Red maple, alder (*Alnus* sp.), and American elm (*Ulmus americana*) are tree species normally occurring in forested wetlands.

5.7.2 Land Condition and Vegetation Trends

Fort Drum implemented the ITAM program, including the LCTA component, in 1990. Prior to implementation of the LCTA program, little floral inventory work was performed on Fort Drum. Section 7.1 describes techniques used by LCTA since its inception at Fort Drum.

The 1996 results of LCTA data collection and analysis indicated that military activity has a measurable effect on forests and grasslands, where it leads to significantly lower canopy cover, lower litter, and higher bare ground values, all factors that indicate vegetation loss and an increased wind and water erosion potential. Forests and grasslands on sandy soils show significantly higher bare ground values and lower canopy cover and litter values with military activity than do forest and grasslands on non-sandy soils, illustrating the even greater vulnerability to vegetation loss and subsequent erosion on sandy soils (Johnson, 1996). LCTA data analysis has indicated about a 25% to 30% loss of grasslands on non-sandy soils due to natural succession since 1991.

Results of 1999 LCTA vegetative sampling (Johnson, 1999 (draft)) present no statistically significant trends between years within barren areas indicating that landscape conditions in this covertype have remained stable since inception of the program. Grasslands on sandy soil showed small, but statistically significant, decreases in the amount of litter and increases in bare ground. Shrublands showed no significant changes, and forested areas continued to show a decline in the amount of aerial cover and an increase in the amount of litter and dead wood on the ground.

A short-term study relating pre-settlement vegetation to present day vegetation occurred in 1996. Pre-settlement vegetation information was obtained from late 1700s to early 1800s land survey field notes, and original lot locations were digitized from tax maps. This information has been used primarily for archeological site information.

5.7.3 Floral Inventory

As of 1999, there were 885 species of plants recorded for Fort Drum, primarily through LCTA surveys (LCTA GIS database, 1999). Continuing LCTA and other future research projects on Fort Drum may add more species to the list of plants known to occur on the installation. Appendix 5.7.1b contains a list of floral species known to occur on Fort Drum.

5.7.4 Special Status Flora

Fort Drum performed a rare fish, wildlife, and plant species survey during 1991 and 1992, *Endangered and Threatened Species Survey, Fort Drum, New York* (Coastal Environmental Services, Inc., 1993). No federally-listed species of flora are known to occur on Fort Drum.

Coastal Environmental Services, Inc. (1993) identified, mapped, and described three exemplary natural communities on Fort Drum. These communities are medium fens in Training Area 19, a northern white cedar swamp in Training Area 16, and northern sandplain grasslands in Training Area 7 and in the vicinity of Wheeler-Sack Army Airfield. The medium fens do not appear to be threatened by military training activities. The white cedar swamp and the sandplain grasslands are monitored through the LCTA program.

Fort Drum has 23 known State-listed rare plant species as determined by the New York Natural Heritage Program. These species include *Arethusa bulbosa, Armoracia lacustris, Aster borealis, A. firmus, A. ontarionis, Bidens beckii, Carex argyrantha, C. cryptolepis, C. houghtonii, C. lupuliformis, Ceratophyllum echinatum, Cynoglossum virginianum, Cyperus houghtonii, C. schweinitzii, Hippuris vulgaris, Lycopodium complanatum, Panicum boreale, Podostemum ceratophyllum, Potamogeton hillii, Salix pyrifolia, Sparganium natans, Ulmus thomasii*, and *Utricularia geminiscapa*. Special status flora

known to occur on Fort Drum are included in the list of floral species in Appendix 5.7.1b.

5.7.5 Wetlands

The U.S. Congress enacted the Clean Water Act in 1972 to *restore and maintain the chemical, physical, and biological integrity of the Nation's waters*. Section 404 of the Clean Water Act delegates jurisdictional authority over wetlands to the Corps of Engineers and the Environmental Protection Agency. Waters of the United States protected by the Clean Water Act include rivers, streams, estuaries, and most ponds, lakes, and wetlands. The Corps of Engineers and the Environmental Protection Agency jointly define wetlands as .. *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*.

The USFWS defines wetlands to include a variety of areas that fall into one of five categories:

- areas with hydrophytes and hydric soils, such as those commonly known as marshes, swamps, and bogs;
- areas without hydrophytes but with hydric soils, such as flats where drastic fluctuation in water levels, wave action, turbidity, or high concentration of salts may prevent the growth of hydrophytes;
- areas with hydrophytes but nonhydric soils, such as margins of impoundments or excavations where hydrophytes have become established but hydric soils have not yet developed;
- areas without soils but with hydrophytes, such as the seaweed-covered portion of rocky shores; and
- wetlands without soils and without hydrophytes, such as gravel beaches or rocky shores without vegetation.

Wetland functions and values include, but are not limited to the following: ground water recharge, ground water discharge, flood flow alteration, sediment stabilization, sediment or toxicant retention, nutrient removal or transformation, production export, wildlife diversity/abundance, aquatic diversity/abundance, uniqueness/heritage, and recreation. Executive Order 11990, *Protection of Wetlands* (1977) and the Clean Water Act (1977) require no net wetland losses on federal lands in the United States.

Wetlands on Fort Drum, including the main impact area, have been identified by four sources, the National Wetland Inventory in 1981 (14,089 acres including open waters), New York State Wetland Survey in 1986 (6,036 acres, did not include any wetlands below 12.5 acres), vegetation/land cover mapping by Coastal Environmental Services in 1992 (12,711 acres), and the Geonex Corporation in 1996 (15,772 acres).

Despite differences in sources of data on wetland distribution and areas, it is clear that wetlands occupy a relatively large amount of acreage on Fort Drum (about 20%). Wetland types include forested wetlands, freshwater marshes, riparian areas, scrub-shrub wetlands, and wet meadows, and are found in all areas of the installation. Wetland boundaries change frequently due to changing hydrology brought on by natural succession and beaver activity. Furthermore, it is evident that increased beaver activity in recent years has increased total wetland area on the installation.

The Clean Water Act (1977), Section 404, requires that a permit be obtained for any activity that may affect "waters of the United States, including wetlands". The U.S. Army Corps of Engineers has the primary responsibility for administering the Section 404 permitting process. Permits are obtained based on individual projects on Fort Drum, with consideration of wetland types and areas, and jurisdictional status.

Fort Drum has constructed just over 70 acres of compensatory wetlands to mitigate wetland impacts associated with the construction of ranges and the Wheeler Sack Army Airfield expansion. Mitigation acreage for compensation of construction of Ranges 20 and 22 has been created in training areas 3E and 14G. Mitigation acreage for the construction of Ranges 23 and 37 has been created in Training Area 14G. Mitigation for expansion activities of Wheeler-Sack Army Airfield was constructed in Training Area 14F. Additional wetland mitigation acres required for Range 48 constitute an additional 25 acres of creation and/or enhancement of existing wetlands to mitigate other than fill impacts during these range construction projects. Success of compensatory wetland sites appears promising. These sites are now under a long-term monitoring program (as required by Section 404, Special Conditions) by the Pennsylvania State University Cooperative Wetlands Center.

5.8 Fauna

Fort Drum has a diversity of habitats that support a rich and diverse array of fauna. Various inventories have confirmed the occurrence of 42 mammals, 199 birds, 46 fish, 11 reptiles, and 19 amphibian species on the installation. The following sections summarize the biological diversity on Fort Drum. Each vertebrate taxonomic group is addressed. A list of wildlife species known to occur on the installation is included in Appendix 5.8.

5.8.1 Mammals

About a third of the mammal species occurring on Fort Drum use open upland habitats for food sources and/or shelter at some point in their life cycle. Typical upland habitat-associated mammals include the red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), white-tailed deer (*Odocoileus virginianus*), eastern cottontail (*Sylvilagus floridanus*), meadow vole (*Microtus pennsylvanicus*), white-footed mouse (*Peromyscus leucopus*), deer mouse (*P. maniculatus*), and woodchuck (*Marmota monax*).

Since woodland/forests occupy more than half of the installation, they are very important to wildlife populations. Most mammals found on Fort Drum use woodlands or forests to some extent. Some mammals typically found in forests include the coyote (*Canis latrans*), red fox, bobcat (*Lynx rufus*), striped skunk, short-tailed weasel (*Mustela erminea*), long-tailed weasel (*M. frenata*), black bear (*Ursus americanus*), white-tailed deer, little brown bat (*Myotis lucifugus*), smokey shrew (*Sorex fumeus*), hairy-tailed mole (*Parascalops breweri*), opossum (*Didelphis virginiana*), porcupine (*Erethizon dorsatum*), white-footed mouse, deer mouse, northern flying squirrel (*Glaucomys sabrinus*), southern flying squirrel (*G. volans*), gray squirrel (*Sciurus carolinensis*), and eastern chipmunk (*Tamias striatus*). Mammals known to occur on Fort Drum are listed in Appendix 5.8.

White-tailed deer mortality was monitored annually from 1980 to 1991 using deer yard surveys. The cause of deer deaths was estimated, but no conclusive diagnosis was made. Known deer-vehicle collisions that result in deer death or injury have been recorded annually since the early 1980s.

Small mammals were surveyed on a subset of LCTA plots between 1991 and 1996 using snap-traps, and a comparison of live and snap-trapping was conducted in 1996. Evidence of larger mammals was recorded from observations of individuals or signs (*e.g*. tracks, droppings, browse). Snap trapping provided an inventory of species and general populations within each vegetative community type but did not provide adequate information to make inferences about land condition trends. The sampling comparison between live and snap traps indicated that the time and effort involved to provide an adequate sampling for each management unit using live traps was prohibitive and would not provide the data necessary to infer land condition trends. LCTA mammal surveys were discontinued following the 1996 field season. Species data from these surveys are included in Appendix 5.8.

5.8.2 Birds

Birds typically found in open uplands of Fort Drum include the Upland Sandpiper (*Bartramia longicauda*), Northern Harrier (*Circus cyaneus*), Savannah Sparrow (*Passerculus sandwichensis*), Bobolink (*Dolichonyx oryzivorus*), Nighthawk (*Chordeiles minor*), Horned Lark (*Eremophila alpestris*), Bluebird (*Sialia silalis*), Vesper Sparrow (*Pooecetes gramineus*), and Grasshopper Sparrow (*Ammodramus savannarum*).

Woodland/forests are very important to bird populations on Fort Drum. Most birds found on Fort Drum use woodlands or forests to some extent. Birds typically found in installation forests include nesting accipiters, Hermit Thrush (*Catharus guttatus*), Red-breasted Nuthatch (*Sitta canadensis*), Blackburnian Warbler (*Dendroica fusca*), Wood Thrush (*Hylocichla mustelina*), Red-eyed Vireo (*Vireo olivaceus*), Ovenbird (*Seiurus aurocapillus*), and Purple Finch (*Carpodacus purpureus*).

Surface waters and wetlands of Fort Drum and the surrounding area are important resting and feeding areas for migrating waterfowl. It is estimated that at least 14 species, or 41% of all species migrating in the Atlantic Flyway, use Fort Drum as a stopping place (Jorde *et al*., 1989). Avian species known to occur on Fort Drum are listed in Appendix 5.8.

Fort Drum has been a cooperating member of the Monitoring Avian Productivity and Survivorship (MAPS) program since 1992. MAPS is a nationwide project designed to generate regional and national trends in survival and reproductive output of many common bird species. Two MAPS banding stations are located on Fort Drum, one at a woodland-shrubland ecotone in Training Area 3B and the other in a mature deciduous woodland in Training Area 7E. Data collected between 1991 and 1999 reveal stable survivorship and relatively high productivity at the 3B site, but estimates of both declined steadily at 7E through 1997 (Cady and Bolsinger, 1999), apparently due to natural succession of the woodland habitat. The 1998 and 1999 results indicated an increase in survivorship and productivity at the 7E site. This may have been due to the 1998 ice storm, which set back succession by opening much of the canopy in the area. In addition to providing data useful to the nationwide effort to identify the health of bird populations, MAPS data collected on Fort Drum, in conjunction with bird census data, may be used to evaluate the potential causes of any population trends that might be detected in the future. Fort Drum MAPS efforts indicate that changes in species encountered is directly related to habitat changes.

A Masters thesis project on the Henslow's Sparrow (*Ammodramus henslowii*) was initiated in 1998 and is expected to be complete by 2001. The project's focus is the breeding biology of the Henslow's Sparrow, revolving primarily around site fidelity.

Fort Drum completed a Grassland Bird project in 1998. The project collected breeding biology data and evaluated successional changes to grassland habitats by using historical records and aerial photography. The goal of this project was to examine training effects on Fort Drum grasslands. The project indicated a negative correlation between heavy vehicle use and nesting success of grassland birds, but it was not conclusive (Bolsinger *et al*., 1999). Bluebirds have also been surveyed in relation to impacts of invasive upland plant species, such as spotted knapweed and leafy spurge on nesting success.

In the past, the Fort Drum natural resources staff provided the Cornell Laboratory of Ornithology the bird point-count locations on Fort Drum where Cerulean Warblers (*Dendroica cerulea*) were detected.

American Woodcock (*Scolopax minor*) populations on Fort Drum were surveyed by the USFWS in 1992 and 1993. However, no conclusions were made on woodcock population dynamics due to limited survey data.

Waterfowl populations and habitats have been surveyed by Fort Drum personnel and the USFWS (Claypoole *et al*., 1994). Thirteen waterfowl species were found during the 1992-1993 aerial migration surveys conducted by the USFWS. A number of other waterfowl were observed in the survey, but could not be identified. Four additional species, not identified in the survey, were noted by Fort Drum personnel.

Combined aerial and terrestrial surveys have been used on Fort Drum to determine population trends in waterfowl species. The Black Duck is a North American Waterfowl Management Plan target species for protection. Although no Black Duck breeding pairs or broods have been observed during waterfowl surveys, the installation appears to contain suitable habitats for Black Ducks (Claypoole *et al*., 1994). Black Ducks and hybrids have been detected during other survey activities on Fort Drum. Special attention has been given to black duck nesting in the waterfowl monitoring program. Results of various bird surveys are included in Appendix 5.8.

5.8.3 Fish

Fort Drum has identified 46 fish species in riverine and lacustrine systems. Fish species commonly found on Fort Drum include pickerel (*Esox niger*), largemouth bass (*Micropterus salmoides*), brown bullhead (*Ictalurus nebulosus*), yellow perch (*Perca flavescens*), pumpkinseed (*Lepomis gibbosus*), northern pike (*Esox lucius*), etc. Fish known to occur on Fort Drum are listed in Appendix 5.8.

Waterbody-specific inventory information and results are on file at the Natural/Cultural Resources Branch. Below is a list of fish surveys performed on Fort Drum.

- Fish populations have been intermittently surveyed by NYSDEC in most waters on Fort Drum since 1931.
- Information on fish populations in the Black River was gathered from several consulting firms that conducted biological surveys on Fort Drum during 1982, 1989, and NYSDEC in 1992.
- The USFWS performed surveys of Indian and Narrow lakes in 1970, 1974, 1982, and 1986, and

NYSDEC surveyed these lakes in 1931, 1983, 1993, and 1997.

- Surveys of Indian River were conducted by NYSDEC in 1931, 1955, 1956, and 1981 and by Coastal Environmental Services in 1992.
- Black Creek was surveyed by NYSDEC in 1931, 1950, 1955, 1962, 1964, 1966, 1972, 1990, 1991, 1994, 1996, and 2001.
- The West Branch of Black Creek was surveyed in 1931, 1994, and 2001 by NYSDEC.
- West Creek was surveyed by NYSDEC in 1931, 1949, 1955, 1980, 1981, 1989, and 1995.
- Pleasant Creek was surveyed by NYSDEC in 1931, 1950, 1959, 1960, 1972, 1995, and 1996.
- Quarry Pond was surveyed by NYSDEC in 1950, 1966, 1980, 1984, 1985, and 1986.
- Remington Pond was surveyed by NYSDEC in 1957, 1960, 1963, 1966, 1969, 1970, 1980, and 1990.
- LeRay Pond was surveyed by NYSDEC in 1996.
- In 1997 Fort Drum performed a rainbow trout (*Oncorhynchus mykiss*) and habitat survey of Quarry Pond.
- In 1998 a walleye (*Stizostedion vitreum*) study in Indian and Narrow lakes focused on the adult walleye population, and a spawning inventory was completed.
- Black and West Creeks' brook trout (*Salvelinus fontinalis*) population and habitat were assessed in 1999.
- In 2001, USF&WS initiated a recreational fisheries survey in Indian Lake, with a component for enhanced angler participation in monitoring these populations.

Perhaps the most comprehensive fisheries survey of Fort Drum was performed by the USFWS Lower Great Lakes Fishery Resources Office during 1994-1995. The *Report on the Results of 1994-1995 Fishery Resource Surveys, Fort Drum, New York (Part I)* (McCosh and Lowie, 1996a) presents survey results. The survey identified specific waterbodies as priority areas for assessment and management, and proceeded with assessing and evaluating fish habitat including water quality. The survey included measurements of relative transparencies; water column measurements of temperatures and oxygen, including bottom and surface measurements to compare for oxygen depletion determinations; qualitative measurements of physical habitats; and when possible, the amount and type of cover and substrate were estimated visually. In addition, physical habitat for streams was measured qualitatively and quantitatively. Recommendations for future fishery surveys and monitoring are included in Section 7.3.1. The *Aquatic Resources Management Plan Fort Drum, New York (Part II)* (McCosh and Lowie, 1996b) provides fishery management recommendations, which are included in Section 8.3.2.

5.8.4 Reptiles and Amphibians

Eleven reptile species and eighteen amphibian species are known to occur on Fort Drum. These species are listed in Appendix 5.8.

The first systematic reptile and amphibian survey on Fort Drum was in 1994 when the Natural/Cultural Resources staff performed a qualitative, subjective survey of the installation. In 1996 a reptile and amphibian survey was conducted by the LCTA program to provide a checklist of species occurring in each management unit and to assess the suitability of such sampling to monitor land condition and environmental trends on Fort Drum. Fifteen reptile and amphibian species were recorded from pitfall traps and drift fences, and 11 species were identified from visual encounter surveys. Although it provided a species inventory within community types, the survey did not indicate that future sampling would

provide land condition monitoring information. Since vegetation data provides an efficient and accurate assessment of land condition trends, and since reptile and amphibian habitats are composed of those vegetation variables, the LCTA program discontinued reptile and amphibian sampling following the 1996 survey.

In 1997 an amphibian night call survey was initiated on Fort Drum using protocol established by The Marsh Monitoring Program. These surveys enable the collection of baseline data of *Anuran* populations in marsh habitats and are intended to be long-term monitoring programs. Night call surveys are performed three times annually. Also in 1997, Fort Drum natural resources staff, in cooperation with the USFWS, initiated an amphibian deformities survey to identify amphibian breeding locations and sites with abnormally formed, post-metamorphic amphibians. Data from these surveys were used to assess which locations may require further investigation to determine causes of amphibian deformities.

In 1998 visual encounter surveys were conducted by Fort Drum to monitor amphibian populations in forested habitats to identify the effects of prescribed burning.

5.8.5 Invertebrates

During 1996 and 1997 F.E. Kurczewski from SUNY College of Environmental Science and Forestry (ESF), Syracuse, New York observed and collected insect species on Fort Drum. This effort resulted in 135 species of insects, representing 30 families, collected and/or observed on the installation. These species are listed in Appendix 5.8.

5.8.6 Threatened, Endangered, or Special Concern Fauna

A survey of federal and State rare species was conducted on Fort Drum during 1991 and 1992. The survey located and identified rare species of fish, wildlife, and plants on the installation with assistance from Fort Drum natural resources personnel. The *Endangered and Threatened Species Survey, Fort Drum, New York* (Coastal Environmental Services, Inc., 1993) presents results of that survey.

Twenty-eight State-listed rare animal species occur on Fort Drum. The Bald Eagle (*Halieatus leucocephalus*) and the Peregrine Falcon (*Falco peregrinus*) were the only federally-listed animals documented on the installation. Documented sightings of these birds are believed to be of migrating individuals and not of breeding or resident populations. The Peregrine Falcon has been federally-delisted, and the Bald Eagle is proposed for removal from the list of federal threatened species. The Peregrine Falcon remains State-listed as endangered, and the Bald Eagle remains State-listed as threatened. The Short-eared Owl (*Asio flammeus*) is the only other State-listed endangered animal known on the installation. State-threatened species include the Henslow's Sparrow, Sedge Wren (*Cistothayus platensis*), Upland Sandpiper, Northern Harrier, Least Bittern (*Ixobrychus exilis*), Pied-billed Grebe (*Podilymbus podiceps*), and Blanding's turtle (*Emydoidea blandingii*). Eighteen species are State-listed as special concern and include one amphibian, one reptile, and 16 birds. Surveys specifically for State-listed species have not been performed on Fort Drum. Federal and State-listed species occurring on Fort Drum are included in Appendix 5.8.

In 1999 Fort Drum was surveyed to determine the presence/absence of the federally-endangered Indiana bat (*Myotis sodalis*) and other bat species during the summer foraging period. Seventy-one bats were mist netted, consisting of five species. No Indiana bats were captured. However, the Glen Parks Caves, located

8 miles southwest of Fort Drum, are known as Indiana bat Priority II hibernaculum, and bats hibernating there may utilize Fort Drum during fall swarming and spring staging (BHE Environmental, Inc., 1999). Further investigation regarding temporal use is recommended.

The black tern (*Chlidonias niger*), northern goshawk (*Accipiter gentillis*), cerulean warbler (*Dendroica cerulea*), and Blanding's turtle are considered species of concern by the U. S. Fish and Wildlife Service and their status is being monitored throughout most of their range by the U. S. Fish and Wildlife Service. Species of concern do not receive substantive or procedural protection under the Endangered Species Act of 1973, (16 U.S.C. Section 1531, et. seq.), however, the U. S. Fish and Wildlife Service does encourage federal agencies and other appropriate parties to consider these species when carrying out projects.

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6.0 LAND USE AND MANAGEMENT UNITS

6.1 Land Uses

Land within Fort Drum boundaries is owned by the Army with exception of the 10 cemeteries and Philadelphia Water Works properties that are on private inholdings. Land outside of the cantonment area is used to train, mobilize, and deploy combat-ready forces to meet operational commitments. Land is used for activities such as field training exercises, live fire training ranges, and airborne operations. The main impact area serves as an area dedicated for the delivery of high explosives munitions and is off-limits.

Land use within the cantonment area includes assigned local training areas used to reinforce basic soldier skills. Other uses within the cantonment area include troop support and administration, family housing, recreation, community services, industrial, administrative support, airfield, and buffer areas.

Many overlapping land uses occur on Fort Drum. The installation is open to hunting, fishing, and other outdoor recreation activities except for the main impact area, cantonment area (limited hunting, fishing, and trapping), airfield, and munitions storage area. Many training areas include forests that are managed for commercial forest products as are the forests in the cantonment area. Only forests within the main impact area are not commercially managed. Because of overlapping uses, coordination between the Command, Combat Readiness Training Division, and Natural/Cultural Resources Branch on Fort Drum is extremely important.

Fort Drum has been delineated into Anderson land use/land cover classes (Geonex Corporation, 1996). The table below lists land use/land cover classes of Fort Drum.

Land use/land cover acreage on Fort Drum

Land use	Acres*
Urban or built up land	6,099
Rangeland/grassland	25,364
Forest land	56,833
Water/wetland	15,772
Barren land	3,197
Total	107,265

* Acreage from NCRB

6.2 Management Units

Fort Drum is divided into a cantonment area, an airfield, an impact area, and 18 training areas. The range and training areas are east of State Route 26 and comprise almost 94,000 acres. About 68% of the range and training areas are suitable for light and heavy maneuver training. Areas typically considered unsuitable for maneuver training are the impact area, cemeteries, surface danger zones, water bodies, and areas related to environmental (such as village water supply areas) and cultural resources considerations.

Of the area that is suitable for training, 60% supports light maneuver training, and the remainder supports heavy maneuver training.

6.2.1 Training Areas

Managing lands according to ecosystem units is difficult to apply on Fort Drum since ecosystem boundaries are not easily recognized by most users. Fort Drum has been divided into 18 training areas (TA), which are further sub-divided into 84 sub-training areas (Figure 6.2.1). Sub-training areas have proven to be the best management units for natural resources purposes. Sub-training areas range from about 133 acres (TA 6B) to about 4,213 acres (TA 19A). Appendix 6.2.1 lists the number of acres in each sub-training area, along with its predominant cover type.

Training area and sub-training area boundaries are used for management purposes for most natural resource programs. Some timber sales use sub-training area boundaries to delineate the sale area. For recreation purposes, particularly hunting, the division between the cantonment area and range area is the primary boundary. However, training areas are opened and closed to access and are used to identify locations where big game animals were harvested. Training areas are managed to support the military mission while sustaining their resource capabilities. Local Training Areas (LTAs) are assigned to the 10th Mountain Division (LI) and Fort Drum units for company level, individual and collective training. Most of the LTAs are located in the Mountain View area, bordering North and South Memorial Drive and within a short distance of their respective unit facilities. In addition, the cantonment area is divided into hunting areas for cantonment archery deer hunting. A cantonment archery hunting areas map is attached to Fort Drum Regulation 420-3.

6.2.2 Fort Drum Natural Resources Management Units

In 2000, multi-disciplinary teams from the Natural Resources Branch began classifying Natural Resource Management Units (NRMU) in upland areas using aerial photography acquired in 1999. Each NRMU consists of a relatively uniform vegetation type and structure based on the Vegetation Classification Standard developed by the Federal Geographic Data Committee (FGDC Vegetation Subcommittee, 1997). The NRMU's were digitized and a random sample of units ground checked. In 2001, the results of ground checking will be used to finalize the upland NRMUs, and then Natural Resources Branch personnel will begin a similar classification of Fort Drum's wetlands. NRMUs form the standard management unit to ensure integration during the ecosystem management process.

6.2.3 Special Management Areas

Areas with cultural resources are considered under special management due to the degree of protection received. Thirteen cemeteries are protected, and 703 acres of Fort Drum are designated off-limits due to the presence of cultural resources. Boundaries of many off-limits areas containing cultural resources, historic buildings and prehistoric and historic archeological sites, are marked with "OFF LIMITS" signs and/or Seibert stakes. Other areas that may be considered special management areas and may be similarly marked include bird banding stations, wetlands mitigation sites, sensitive habitats, and areas of suspected or known contamination. Seibert stakes are located in the following training areas: TA4A,B; TA5D,E; TA6A,B,C; TA8C; TA14B; and TA17A.

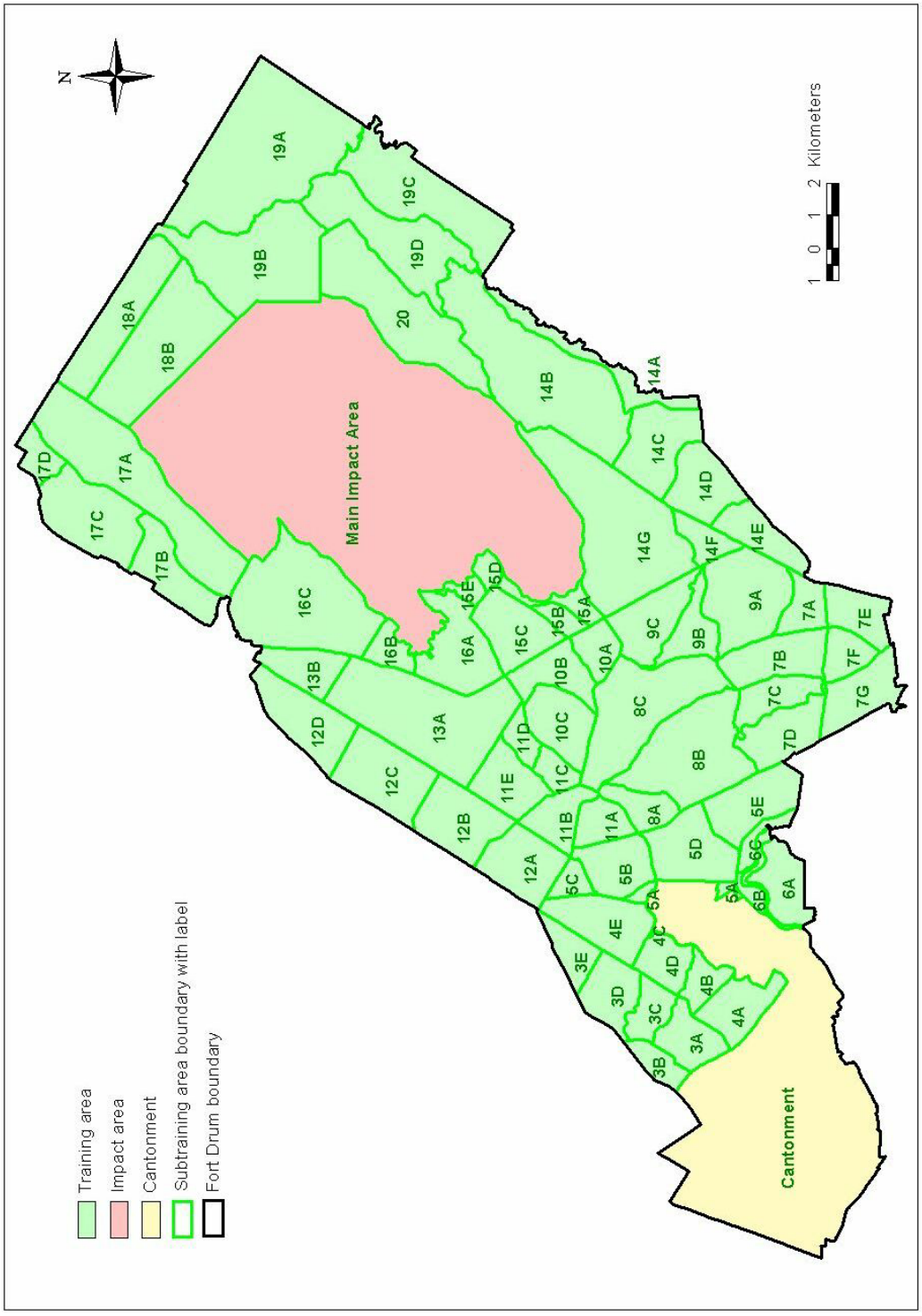

Figure 6.2.1. Fort Drum training areas.

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7.0 INVENTORY AND MONITORING

"*The time has arrived for us as a people to stop and take an inventory of our natural resources; to observe their rapid consumption and to devise means to prevent the unnecessary and wasteful use of the past and present. In no other way can the duty we owe to ourselves and to posterity be discharged*."
Governor Edwin L. Norris, Montana, 1909

The first step in biodiversity protection is to prepare an inventory. Inventory, as used here, is developing an itemized list or catalogue of components of an ecosystem. This process has been ongoing for many years at Fort Drum, primarily driven during early years by game species and then by implementation of the ITAM program and an emphasis on rare species and general biodiversity. This INRMP continues the process of conducting basic inventories of installation natural resources. In general, these have been termed Planning Level Surveys, and they are high-priority projects in the budgeting system.

Monitoring indicates trends (or absolute numbers if needed) of individual species or higher associations of species, such as vegetation cover types or plant communities. Monitoring is generally performed on a regular basis and often targets species with high economic or human-use values, endangered or sensitive species, and indicator species of overall ecosystem health. This INRMP continues Fort Drum monitoring programs and describes the initiation of additional monitoring.

7.1 Training Land Monitoring

Project - Land Condition Trend Analysis
Driver: AR-350-4; Complying with Defense policies; Stewardship
Project Timing: Objectives 1 and 3 - 2001-2005; Objective 7 - 2001; Objective 8 - 2002; Objectives 2 and 4-6 - as needed
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and external support

Goal. Provide land managers and trainers with long-term assessments of changes in the condition of training lands at Fort Drum.

The LCTA program collects data to evaluate the capability and capacity of training lands to meet multiple-use demands on a sustainable basis. The LCTA program further evaluates existing conditions of Fort Drum landscapes, monitors changes in its conditions, and makes recommendations on management measures for both military and non-military uses of the land.

LCTA uses a wide array of natural resources data, such as soils, canopy cover, disturbance levels, etc., to determine the condition of land and trends in that condition, emphasizing effects of conducting the military mission. Tazik *et al.* (1992) describe procedures for the standard LCTA plot inventory.

During 1991, 152 permanent and four special use plots were established using a stratified random sample of soil data and satellite imagery. In 1992, 16 additional special use plots were established and measured

along with core plots. In 1993 and 1994 core plots and special use plots were monitored, and three additional special use plots were established and measured at a wetland mitigation site. In 1995 Fort Drum revised the vegetation and bird sampling techniques and conducted a side-by-side comparison of methods on permanent plots. Four special use plots were also measured, and five additional special use plots were established.

In 1996 a new plot allocation, based on soils, vegetation type, and amount of military use, was initiated. The LCTA program established and sampled 415 new permanent plots using revised methods. Johnson (1996) provided a complete description of sampling methods. These plots provide the basis for the long-term monitoring portion of the LCTA program. Four special use plots were also measured in 1996.

Site Rehabilitation Prioritization (SRP) methods were initiated in 1996. SRP forms are filled out by LCTA crew members if an area shows evidence of ground disturbance. SRP provides qualitative assessments of maneuver damage using before and after event evaluations. Information collected is used to provide priorities for LRAM projects to repair damaged training lands.

Record of Environmental Consideration (REC) site damage assessments were performed in 1996 on about 200 sites. All training units are required to submit a REC to the Environmental Division before training activity can begin. REC forms are checked periodically by the LCTA coordinator, and any that involve digging operations are visited and evaluated for damage. Thus, evaluation of areas submitted through the REC process initiates the SRP process, which initiates many Land Rehabilitation and Maintenance projects.

In 1997 the original 152 core plots were combined with the 415 new plots, and a subset of the 567 total plots (about 230 plots) were sampled. A bivouac area survey was initiated (about 60 bivouac sites sampled) that resulted in geographically referenced descriptions of each site; permanent plots were established and measured in a forested burn area; and 300 REC sites were assessed for damage. All forested plots were sampled in 1998 to assess the extent of damage from a severe ice storm that occurred in January 1998. Monitoring of bivouac areas surveyed in 1997 was repeated in 1998 to assess crown damage associated with the ice storm, and REC surveys continued.

During 1999 and 2000 the LCTA program remeasured a subset of core permanent plots (about 300 plots to include all forested plots for ice storm damage assessment), remeasured established special use plots as needed, surveyed special use burn plots, established and surveyed additional special use plots as situations demanded, surveyed REC sites, monitored bivouac areas to assess crown damage, and assisted in completion of a new and better cover type map of Fort Drum.

The application of LCTA data will:

- X reduce the need for expensive land rehabilitation programs,
- X reduce some subjectivity from land management decisions,
- X help ensure the sustained availability and productivity of Army lands, and
- X provide input for implementing this INRMP and preparing NEPA and other environmental documents.

Results of past LCTA surveys are discussed in Section 5.7.2. Continued monitoring through the LCTA program will quantify the effects of training over time, including recovery rates, rehabilitation costs, and

rehabilitation success on each management unit.

Objective 1. Annually remeasure a subset of the core permanent plots during 2001-2005.

Objective 2. Remeasure established special use plots as needed.

Objective 3. Annually remeasure special use burn plots during 2001-2005.

Objective 4. Establish and survey additional special use plots as special situations demand.

Objective 5. Prepare Site Rehabilitation Prioritization forms for areas with evidence of ground disturbance.

Objective 6. Survey Record of Environmental Consideration sites.

Objective 7. In 2001 monitor bivouac areas surveyed in 1997 to assess crown damage.

Objective 8. Inventory all core plots in 2002.

7.2 Flora

Project - Flora Inventory and Monitoring
Drivers: Maintaining the capability of training lands to support the military mission (Sikes Act); Complying with Defense policies; Stewardship; Potential Endangered Species Act compliance
Project Timing: Objectives 1-5, 7, and 9-14 - ongoing indefinitely; Objectives 6, 8, 15, and 16 - as needed
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and external support

Goal. Inventory Fort Drum floral resources and monitor species or communities that are indicators of ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

7.2.1 Flora Surveys

Floral surveys in general were lacking on Fort Drum prior to implementation of the LCTA component of the ITAM program, with exception of some forest inventories. Annual LCTA summary reports and associated GIS databases contain considerable information on flora of Fort Drum. This information is useful both as benchmarks for future comparisons and as basic references for current and future management and studies. Results of floral inventories are discussed in Section 5.7.3.

Inventories performed through the LCTA program and floral data associated with other research and projects performed on Fort Drum, such as the *Wetlands Mapping Report for United States Army, Fort Drum* (Geonex Corporation, 1996) and the *Endangered and Threatened Species Survey on Fort Drum, New York* (Coastal Environmental Services, Inc, 1993) are adequate for Fort Drum needs. No general vascular plant inventories are planned for Fort Drum during 2001-05. Existing data are generally adequate

for implementation of this INRMP.

A reference plant collection is useful for both in-house Natural/Cultural Resources Branch personnel and for use by others doing studies at Fort Drum. The LCTA program has developed a herbarium collection, which includes a laminated sample of each plant species. Continued LCTA and other surveys may discover additional plant species on the installation.

Objective 1. Update the flora inventory (including herbarium mounts) as new species are found during LCTA surveys, site-specific surveys, and other projects.

Objective 2. Maintain the computerized plant checklist.

7.2.2 Forest Inventory

There are about 51,623 acres of forestland on which forest management activities can occur. Forest inventory provides data useful for training, silvicultural, and wildlife habitat information. Forest inventories on Fort Drum have been sporadic and disjunct with few records existing today. Fort Drum forestry personnel assisted by Oak Ridge Institute for Science and Education interns and Colorado State University personnel performed the most recent installation-wide forest inventory in 1998-99. Army Regulation 200-3 requires forest inventories be conducted and maintained every 10 years. Inventories of harvested areas are also performed to ensure that the goal of the specific harvest was accomplished.

During 1998 a complete inventory of cantonment area forests was performed. Inventory data from the cantonment area was utilized to develop the *2000 Urban Forest Inventory Analysis of Mountain View and Pine Plains Area, Fort Drum* (Zehr *et al*., 2000). This plan present inventory results, identifies problem areas, and recommends corrective actions and other maintenance options for urban forestry management on Fort Drum.

Objective 3. Maintain an updated inventory of Fort Drum forest resources in accordance with AR 200-3 and to meet adaptive management needs.

Objective 4. Perform post-harvest inventories on applicable forest areas.

Objective 5. Monitor forest parameters, such as stem density and canopy closure, as part of continued development of unit-specific management.

7.2.3 Rare or Endangered Plant Monitoring

No federally-listed plant species are known to occur on Fort Drum (Section 5.7.3). Twenty-three State-listed rare plant species are known on Fort Drum. These species are monitored as part of the LCTA program. LCTA survey efforts are discussed in sections 5.7.3 and 7.1.

Objective 6. If plants that are federally-listed are found on Fort Drum or if plants already known on Fort Drum become federally-listed, develop an inventory/monitoring program for these species.

Objective 7. Continue to monitor State-listed plant species through the LCTA program.

Objective 8. Continue to survey for federally-listed flora as determined to be necessary based on the professional recommendations of the natural resources management staff.

7.2.4 Wetlands

Fort Drum has had several wetlands surveys completed, including the National Wetland Inventory in 1981, New York State Wetland Survey in 1986, Coastal Environmental Services survey in 1992, and the Geonex Corporation survey in 1996. Surface water resources and wetlands are discussed in sections 5.5.1 and 5.7.6 respectively.

Fort Drum has no particular need for general wetland surveys since adequate wetlands information for the installation is readily available.
Objective 9. Maintain a database on wetland resources at Fort Drum.

Objective 10. Perform a functional assessment of created, restored, and enhanced mitigation areas by the Highway Methodology (1995).

Objective 11. Perform vegetation surveys on created, restored, and enhanced mitigation areas.

Objective 12. Monitor hydrological parameters on created, restored, and enhanced mitigation areas.

Objective 13. Delineate jurisdictional wetland boundaries on created, restored, and enhanced mitigation areas using criterion in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987).

Objective 14. Take representative photographs of all mitigation areas.

Objective 15. Use site-specific surveys to evaluate wetland resources if potential wetland impacts are proposed.

7.2.5 Vegetative Mapping

Fort Drum vegetation has been delineated into land use classes by Geonex Corporation (1996) and into natural/ecological communities by Coastal Environmental Services, Inc. (1993). Most recently, a GIS vegetation overlay was delineated from recent aerial photography (Figure 5.7.1). Section 5.7.1 discusses vegetation mapping efforts on Fort Drum. Fort Drum has no particular need for further vegetative mapping beyond routine updating since adequate information for the installation is readily available.

Objective 16. Update the vegetation map as needed during 2001-05.

7.3 Fauna

Information on species occurrence has been collected through many projects on Fort Drum. Most recently, the LCTA program has added a substantial amount of information related to wildlife of Fort Drum. Other projects, such as the MAPS study and the Henslow's Sparrow research project have added valuable information. Section 5.8 discusses faunal species found on Fort Drum, and Appendix 5.8 lists

wildlife species known to occur on the installation. Section 5.8 also discusses past faunal survey, census, and special projects performed on the installation.

7.3.1 General Wildlife Species

Project - General Wildlife Inventory and Monitoring
Drivers: Stewardship; Potential Endangered Species Act compliance; Compliance with Defense policies
Project Timing: Objectives 1, 2, 4-9, 22, 34 and 35 - ongoing indefinitely; Objective 3, 10-21, and 23-33 - uncertain.
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Inventory Fort Drum faunal resources and regularly monitor species that are indicators of ecosystem integrity and other special interests.

General fauna inventory and monitoring on Fort Drum are accomplished primarily as part of either a search for indicators of the effects of military activities on installation ecosystems (LCTA program) or sustaining renewable resources by monitoring the numbers of white-tailed deer, turkeys, and other species harvested.

Mammals

The installation fish and wildlife biologist has monitored deer populations since 1991 using spot light surveys, primarily in the cantonment area, to determine population trends. In addition, the Natural/Cultural Resources Branch collects deer and black bear harvest data from a check station during the hunting season to record the number and condition of harvested animals. Ticks taken from harvested deer have been collected and submitted for analysis in the past for public health evaluations.

Beaver density/activity is monitored annually using aerial surveys. Surveys are flown over 2-3 days in the late fall for 2-3 hours per day, and locations of lodges, dams, and beaver activity are recorded. Survey data is entered into a GIS database, active locations are identified, and are made available to trappers for control purposes. Periodically, telephone-solicited trapping surveys are performed by the Fish and Wildlife Office, and Outdoor Recreation distributes harvest forms to trappers, which should be filled out and returned to the Fish and Wildlife Office.

Small mammals were surveyed through the LCTA program until 1996. Section 5.8.1 further discusses mammal surveys on Fort Drum.

Objective 1. Investigate continued deer and bear harvest data collection at big game check stations.

Objective 2. Perform aerial beaver density/activity surveys.

Objective 3. Perform periodic telephone surveys of trappers.

Objective 4. Distribute trapper harvest forms through Outdoor Recreation.

Objective 5. Continue with baseline wildlife population monitoring.

Birds

Bird populations were monitored annually on a subset of 64 LCTA plots from 1991 through 1995. In 1996 the number of bird census plots was increased to 212 to provide sufficient data for long-term trend analysis. From 1996 through 2000, birds were annually censused at all 212 plots. Census plots are visited one morning between the end of spring migration, about May 30, and the beginning of July. All birds seen or heard within 100 meters of the plot are documented, and information about species and method of detection (*i.e*., song or visual) are recorded. Census methods are described by Bolsinger (1996). Data from each plot allow for estimates of local abundance and species diversity. Such estimates are used to compare density of breeding individuals within habitat types and installation-wide. Data collected prior to 1996 represented baseline data on bird abundance as too few plots were sampled to reveal any but the most extreme differences in annual bird abundance. Bird monitoring data have been analyzed to reveal potential trends that might be of concern.

The Monitoring Avian Productivity and Survivorship (MAPS) program on Fort Drum began in 1992. MAPS project specifications can be found in DeSante, *et al*. (2000). Estimates are derived from mist-net captures of adult and young birds at established banding stations. Generally, netting and banding occurs once during each of seven consecutive, 10-day periods from late May to mid-August.

Fort Drum collects American Woodcock population data by performing surveys along 11 transect routes. Transects are used to conduct woodcock singing-ground surveys.

Wild Turkey and Ruffed Grouse are two major species of upland game birds on Fort Drum. Their populations have been monitored since 1993 by driving two established routes and recording the number of gobbling turkeys heard and the number of drumming grouse heard. Routes are driven three times each during spring. Turkeys are also surveyed indirectly by persons using Fort Drum who voluntarily submit a sight survey card to the fish and wildlife biologist. Sight survey cards are a State-sponsored program. These, and other bird surveys, particularly special projects, such as the Masters thesis project to be completed by 2001 on the breeding biology of the Henslow's Sparrow, are further discussed in Section 5.8.2.

Fort Drum participates in a NYSDEC-sponsored waterfowl breeding survey. Two survey quadrants are located on the installation and are surveyed for the number of mated pairs occurring annually. Installation personnel also assist NYSDEC with an off-installation goose drive/banding program. Wood Duck and bluebird nest box programs also provide productivity trend data for those species through the maintenance and monitoring of boxes by Fort Drum personnel.

Objective 6. Survey birds through the LCTA program.

Objective 7. Continue monitoring neotropical migratory bird use of Fort Drum through the MAPS program.

Objective 8. Survey turkey, grouse, and woodcock.

Objective 9. Perform terrestrial waterfowl surveys.

Objective 10. Add to the bird baseline inventory using observations and data from other field projects, such as the study of the Henslow's Sparrow.

Objective 11. Support and assist NYSDEC with waterfowl surveys on and off-installation.

Fish

Fish population manipulation is based on data collected and analyzed from fish population surveys. Fisheries management on Fort Drum is water-specific, which requires collection of population data from different bodies of water.

Many Fort Drum fisheries have been surveyed using electro-fishing and angler surveys to determine fish population information. Stream surveys have been conducted to monitor changes in habitat conditions and analyze other physical, chemical, and biological data. Water quality has been monitored through macroinvertebrate surveys and by measuring water quality parameters, such as dissolved oxygen. Section 5.8.3 discusses past fish survey efforts on Fort Drum. The *Report on the Results of 1994-1995 Fishery Resource Surveys, Fort Drum, New York (Part I)* (McCosh and Lowie, 1996a) presents waterbody-specific survey recommendations. These are included in objectives 15-37 below.

Objective 12. Perform an angler survey of Remington, Quarry, and Conservation ponds and Mud Lake to determine stocking and future management needs.

Objective 13. Perform a detailed age, growth, and survivability study to monitor fish populations in Indian and Narrow lakes; continue monitoring mercury levels; and evaluate spawning habitat in these waterbodies.

Objective 14. Perform a longer temporal study (2-3 consecutive days) of oxygen and temperature regimes in late summer to determine the extent of stratification and anoxic conditions in Indian and Narrow lakes.

Objective 15. Perform physical, chemical, and biological data collection from Conservation Pond and Indian Pond (particularly contaminant monitoring in Indian Pond due to its close proximity to Indian and Narrow lakes) and Mud Lake to determine future management opportunities.

Objective 16. Perform an age structure analysis of Conservation Pond.

Objective 17. Perform analyses of fish tissue for toxin levels in Remington Pond and Pleasant Creek.

Objective 18. Examine available breeding habitat upstream from LeRay Pond.

Objective 19. Monitor fish and macroinvertebrate diversity and bio-mass to determine effects of repairs to the water control structure in LeRay Pond.

Objective 20. Perform water quality and habitat surveys and population dynamics in Indian River.

Objective 21. Promote the warm-water fishery west of the Main Impact Area and the cool-water fishery east of the Main Impact Area on Indian River.

Objective 22. Survey winter survival of brown trout in Black Creek.

Objective 23. Survey fish habitat and water chemistry on Pleasant creeks.

Objective 24. Determine distribution of brook trout populations and identify brook trout spawning habitat in Trout Brook and Pleasant Creek and its tributaries and protect indigenous populations.

Objective 25. Establish reference sites to monitor fish age structures, growth rates, and mortality rates on Black River.

Objective 26. Perform a stream survey on Bonaparte and Rockwell creeks.

Objective 27. Perform a complete assessment of Indian Pond.

Objective 28. Monitor human use, habitat, and community trends while integrating management goals of threatened and endangered species, contaminants, access, use, and education issues.

Objective 29. Add to the fish baseline inventory using observations and data from other field projects and continue fisheries assessment in other important water bodies.

Reptiles and Amphibians

Reptiles and amphibians have been periodically surveyed on Fort Drum since 1994 when the Natural/Cultural Resources Branch surveyed to determine species and their abundance. In 1996 the LCTA program conducted an amphibian and reptile survey on a subset of permanent plots. This survey provided a species checklist but not population trend data. Effects of purple loosestrife on developing amphibians are being studied as part of a graduate research project on the installation, which should be completed in 2001. Fort Drum initiated the North American Amphibian Monitoring program in 2000. Surveys for this nationwide program are performed four times annually. These and other reptile and amphibian survey efforts are discussed further in Section 5.8.4.

Objective 35. Complete the study of effects of purple loosestrife on developing amphibians.

Objective 36. Continue the North American Amphibian Monitoring program.

7.3.2 Threatened, Endangered, or Species of Concern

Project – Threatened, Endangered, or Species of Concern Inventory and Monitoring
Drivers: Stewardship; Endangered Species Act compliance; Compliance with Defense policies
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: U.S. Fish and Wildlife Service
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Comply with the Endangered Species Act, consider species of concern, and give consideration to

State-listed species.
The Bald Eagle is the only federally-listed faunal species known to occur on Fort Drum (Section 5.8.6). An initial investigation of summer foraging by Indiana bats has been completed. There were no Indiana bats found on Fort Drum during this investigation. Further investigations are required to address other potential temporal use. Species of concern do not receive substantive or procedural protection under the Endangered Species Act of 1973, (16 U.S.C. Section 1531, et. seq.), however, the U. S. Fish and Wildlife Service does encourage federal agencies and other appropriate parties to consider these species when carrying out projects. Twenty-nine State-listed species of fauna are known on Fort Drum. These species are monitored as part of the LCTA program. LCTA survey efforts are discussed in Section 5.7.2.

Objective 1. If fauna that are federally-listed are found on Fort Drum or if fauna already known on Fort Drum become federally-listed, develop an inventory/monitoring program for these species.

Objective 2. Continue to monitor State-listed fauna through the LCTA program.

Objective 3. Continue to survey for federally-listed fauna as determined to be necessary based on the professional recommendations of the natural resources management staff.

7.4 Water Quality

Water quality monitoring is important to measuring ecosystem health at Fort Drum. Land-based environmental degradation eventually affects water quality and aquatic ecosystems dependent upon good water quality.

It is essential to collect further physical, chemical, and biological data on Fort Drum lakes, ponds, and streams to make sound water quality and fisheries management decisions. This includes the continued investigation of physical, chemical, and biological properties and associated aquatic organisms in Fort Drum surface waters. Surface water and groundwater monitoring are discussed in sections 5.5.1.3 and 5.5.2 respectively.

Surface water and groundwater quality are compliance programs, particularly regarding the Clean Water Act. Fort Drum must monitor its surface water and groundwater resources to maintain compliance, but these programs are not natural resources responsibilities within the Army and thus, are not a required part of this INRMP. Groundwater management is within Public Works. The current level of groundwater monitoring is adequate. Surface water quality monitoring beyond those aspects that may affect the fisheries management program are not natural resources responsibilities. Objectives specific to water quality monitoring relative to fisheries management are discussed in Section 7.3.1. Below objectives are general to most projects described in Chapter 8 of this plan, and they do not require funding beyond what is in these other projects. Thus, a specific project for the use of water quality information for project decisions is not required.

Goal. Use water quality parameters to manage military activities and conserve fish and wildlife habitat.

Objective 1. Use site-specific water testing for natural resources programs, such as LRAM and erosion control projects as needed during the next five years.

Objective 2. Use water-related inventory data to make decisions regarding land use, restoration options, and fish and wildlife habitat management options.

Objective 3. Continue evaluating the results of monitoring and clean-up of the contamination plume from Oneida Street to determine its potential impacts on fisheries resources in Pleasant Creek and Remington Ponds.

7.5 Soils

Approximately 60% of Fort Drum has a complete soil inventory (Soil Conservation Service, 1989; 1960). Soils descriptions are discussed in Section 5.3. A Memorandum of Agreement (MOA) with the Natural Resources Conservation Service (NRCS) is in effect to complete this project in FY03. No additional general soils surveys are required during the next five years.

Below objectives are general to most projects described in Chapter 8 of this plan, and they do not require funding beyond what is in these other projects. Thus, a specific project for the use of soil information for project decisions is not required.

Goal. Use soil parameters to manage military activities, protect soil stability, restore training lands, and conserve wildlife habitat.

Objective 1. Use site-specific soil testing for natural resources programs, such as LRAM and erosion control projects, as needed during the next five years.

Objective 2. Use soil inventory data to make decisions regarding land use, restoration options, and wildlife habitat management options.

8.0 NATURAL RESOURCES MANAGEMENT

"*There are some who can live without wild things,*
and some who cannot."
Aldo Leopold, A Sand County Almanac

This chapter includes management practices that directly affect soil, water, vegetation, and fauna. It includes forest management, habitat management, wetlands management, water quality programs, grounds maintenance, pest management, training land management, fire management, and direct manipulation of fish and wildlife and threatened and endangered species management. This chapter includes all programs that will be used to manage installation natural resources during the next five years.

8.1 Forest Management

Project - Forest Management
Drivers: Maintaining the capability of training lands to support the military mission (Sikes Act); Stewardship; Compliance with Defense policies
Project Timing: Objectives 1-3 and 7-17 - ongoing indefinitely; objectives 4 and 5 - 2001; objective 6 - 2001-2003
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Manage the forest ecosystem to support the military mission, maintain ecosystem integrity, and produce forest products on a sustainable basis.

8.1.1 History of Forest Management on Fort Drum

Most of the land that comprises Fort Drum was acquired during the early 1940's and was primarily farms, villages, and State of New York lands. Forested land at the time represented approximately 31,000 acres (Figure 8.1.1). Much of the abandoned farmland at the time was used as open maneuver space for mechanized and armoured vehicle training. Over time, significant portions of the abandoned farmland have undergone successional processes and reverted to forest in the 50+ years of Army ownership. In the year 2000, forested land represents approximately 66,000 acres or more than twice the acreage found on Fort Drum in 1945. This represents a loss of open maneuver space at the rate of over 1 acre/day.

Professional forest management began in the 1950's and continues to this day. Early forest management focused on commercial sawtimber and pulp production with limited emphasis on wildlife management and followed traditional management practices of selective cutting of larger trees and commercially valuable species. Since the early 1990's, forest management efforts have focused on ecosystem management with more emphasis on the training mission, wildlife habitat enhancement, and water quality, and less emphasis on the traditional forest products of sawtimber and pulpwood.

The January 1998 Ice Storm, which affected millions of acres across the Northeastern U.S. and eastern

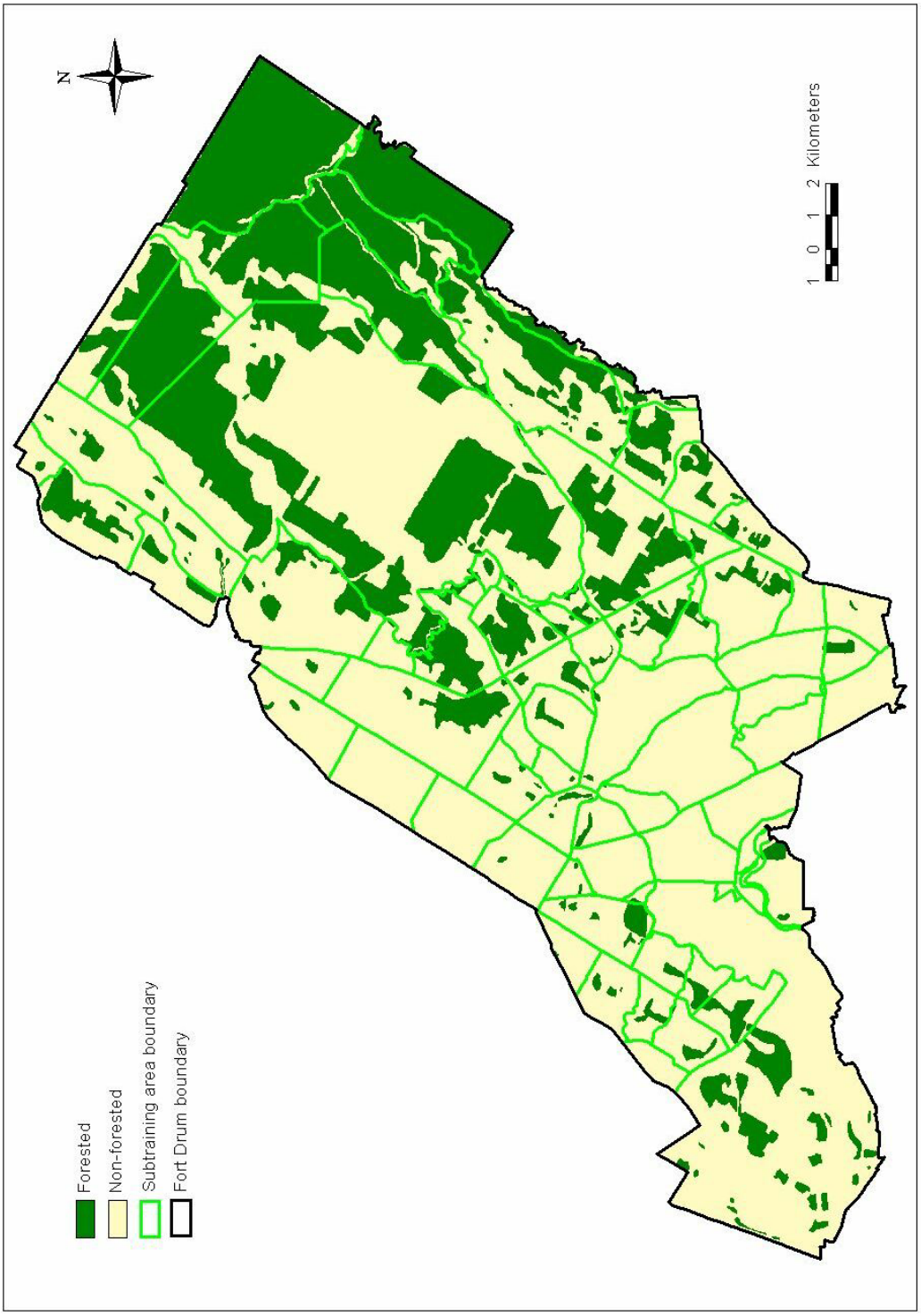

Figure 8.1.1. 1940's forested land on Fort Drum, New York.

Canada, impacted approximately 25,000 acres on Fort Drum. Almost 15,000 acres were impacted severely and salvage harvesting began within three months after the storm. To date nearly 3,504 acres have been salvage harvested and the last salvage harvests will occur during 2001-2002 with a total of nearly 4,431 acres harvested since the Ice Storm.

Objective 1. Continue ecosystem focused management with more emphasis on the training mission, wildlife habitat enhancement, and water quality, and less emphasis on the traditional forest products of sawtimber and pulpwood.

8.1.2 Forest Management Strategy

Forest resources of Fort Drum are a heterogeneous ecological complex comprised of a rich mixture of tree species and forest types combined with varying age classes and a variety of sites, topography, soil, exposure, and drainage patterns. These characteristics, along with directives to manage for training, biodiversity, old growth, rare species, etc., make forest management challenging on the installation.

Forest management on Fort Drum is primarily concerned with producing large diameter trees for maneuver, concealment, and bivouac areas and to provide future training areas. The goal for deciduous stands is to have 40-60, 18+-inch DBH (diameter at breast height) trees per acre; mixed stands 40-80, 18+-inch DBH trees; and 60-80, 18+-inch DBH trees per acre in coniferous stands. These goals require both pre-commercial and commercial harvest. Normally, up to 2,000 acres may be harvested annually through thinnings, regeneration cuts, and land clearing. Land clearing is used for the creation of open maneuver areas and construction of buildings, ranges, and other physical improvements to infrastructure.

Forest management units will be commercially harvested using even-aged and uneven-aged silviculture methods, depending on the ultimate goal for the unit. Even-aged reproductive methods include shelterwood, seed-tree, and clearcuts and are most often used in upland forested areas for wildlife objectives and to control spacing in order to support maneuverability. Uneven-aged reproductive methods include single-tree selection and group selection methods and are used to support environmentally sensitive areas, such as wetlands, streams, cultural resources, special wildlife areas, and other special needs.

Forest management in the cantonment area is essentially the same as in training areas; both even-aged and uneven-aged methods are used. However, additional precautions concerning management practices are observed due to special conditions, such as family housing, in the cantonment area. The *2000 Urban Forest Inventory Analysis of Mountain View and Pine Plains Area Fort Drum* (Zehr *et al*., 2000) describes problem areas and maintenance needs and provides recommendations for correcting urban forest problems in the cantonment area.

Management units or individual trees in the main impact area or on some special sites, such as cemeteries and cultural resources sites, are not harvested unless there is a special demand or an opportunity for management. For instance, the main impact area may be harvested if safety concerns can be addressed and such an opportunity arises.

Fort Drum will use adaptive management methods to develop management unit-specific prescriptions as opposed to performing scheduled rotational forestry. The monitoring of characteristics, such as stem density and canopy closure, within individual units will indicate when a unit has reached or has passed its

desired threshold for harvest. Treatments for individual management units will be developed inclusive of objectives for that area and other programs.

Fort Drum's forestry program has emphasized support of the military mission, enhancement of ecosystem integrity in many areas, production of commercial forest products, protection of watersheds, management of wildlife habitat, and provisions for outdoor recreation. Undoubtedly, future years will bring change to the forestry program. It is important to maintain options to implement changing society views on the management of our nation's forests, such as found on Fort Drum.

Objective 2. Produce large diameter trees for maneuverability, concealment, and bivouac areas and to provide future training areas using both pre-commercial and commercial activities.

Objective 3. Implement recommendations of the *2000 Urban Forest Inventory Analysis of Mountain View and Pine Plains Area Fort Drum* (Zehr *et al*., 2000) for correcting urban forest problems in the cantonment area.

Objective 4. Develop a Forestry Management Plan during 2001-2005 and integrated it with programs in this plan.

8.1.3 Scope of Forest Management

Forest management can occur on 51,623 acres of Fort Drum. It is anticipated that Fort Drum will probably harvest between about 1,000 and 2,000 acres annually. However, there may be years when monitoring indicates that much less should be harvested and other instances, such as when the Wheeler-Sack Army Airfield expansion occurred, when more acreage will be harvested. Overall, harvests will follow management unit prescriptions.

8.1.4 Management Units

Management units have not been delineated for forest management purposes on Fort Drum. Some timber sales use sub-training area boundaries to delineate sale areas. Natural/Cultural Resources personnel will delineate management units on Fort Drum during 2001. Fort Drum Natural/Cultural Resources Branch teams will develop stand specific prescriptions for each management unit during 2001-2005.

Objective 5. Assist in management unit delineation on Fort Drum during 2001.

Objective 6. Prepare unit-specific prescriptions for NRMU's on Fort Drum during 2001-2003.

8.1.5 Commercial Forest Products

Although changing technologies and increasing trends toward biodiversity and ecosystem management have changed the emphasis for managing and monitoring forests, the forest management program at Fort Drum still produces commercial timber. Commercial timber on the installation typically includes species such as red oak, white oak, red maple, sugar maple, American beech, black cherry, American basswood, eastern hemlock, eastern white pine, and red pine.

Objective 7. Continue to produce commercial timber within biodiversity and ecosystem management

directives.

Objective 8. Ensure that natural resources personnel are as free as possible of commercial influence to accomplish landscape management, compliance, and stewardship.

8.1.6 Emphasized Species

Two forest types comprise the majority of forest and woodland areas on the installation, deciduous woodlands and forests and mixed forests. Section 5.7.1 discusses dominant species and species composition within forest types.

Objective 9. Base species emphasis on management unit prescriptions and individual site objectives.

8.1.7 Timber Stand Improvement

Timber stand improvement (TSI) is accomplished using several different methods on Fort Drum. TSI is performed using primarily mechanical methods, prescribed burning, and/or chemical methods if necessary. TSI activities are used to influence tree species composition and quality in young stands. Activities include but are not limited to crop tree release, pruning, girdling, planting, prescribed burning, and herbicide treatments.

Thinning is used in all forest types to control spacing, produce forest products, increase stand diameter and quality, and influence tree species composition for eventual regeneration. Thinnings normally occur once every 15 to 20 years. Aspen stands normally are thinned at 20-25 years of age. Whenever possible, thinning is incorporated with military training to create conditions favorable for training. Post-harvest inspections are done to determine if goals of harvests have been met.

Objective 10. Use TSI to control spacing and influence species composition and quality on Fort Drum.

8.1.8 Harvests

Fort Drum will conduct harvests on about 1,000 acres of forestland in 2001. Generally, Fort Drum anticipates harvesting between 1,000 and 2,000 acres of timber annually. Harvests during 2001-2005 will depend on the development of management unit prescriptions and results of monitoring of individual management units. Changes in land use (relocating activities, changes to the Fort Drum mission, etc.) may affect harvestable volumes.

Fort Drum has a large firewood program, which annually sells about 300 permits. Permits cost $5.00 per standard cord and are required for cutting firewood on the installation. This level of firewood cutting is expected to continue or increase during 2001-2005.

Objective 11. Harvest between 1,000 and 2,000 acres annually during 2001-2005 unless management unit prescriptions or other circumstances dictate otherwise.

Objective 12. Continue the firewood program.

8.1.9 Reforestation

Most regeneration on Fort Drum is natural and this is expected to continue into the foreseeable future using the silvicultural techniques described in Section 8.1.2.

Only about 1,028 acres on Fort Drum have been artificially reforested since about 1919. Most artificial reforestation occurred by planting conifer species to prevent soil erosion in impacted areas.

Objective 13. Continue to promote natural reforestation through silvicultural means.

8.1.10 Records and Reporting

The Natural/Cultural Resources Branch maintains general forestry files and library materials, including information on silvicultural, harvest, and TSI practices; contracts; markets and sales; products; etc. The Natural/Cultural Resources Branch GIS is used extensively for mapping and decision-making associated with the forestry program and will be invaluable to delineation of management units and developing prescriptions during 2001-2005.

At the beginning of each fiscal year, Fort Drum submits a report of timber availability to FORSCOM for planned timber harvest. After notice of approval, individual reports of availability are sent to the Norfolk District of the Army Corps of Engineers as preparations for each sale area are completed. An information copy of the letter to the District Engineer is sent to FORSCOM. Most past sales have been conducted through the Corps of Engineers, however, limited local sales have been conducted by Fort Drum. The Fort Drum forestry program incorporates this information into timber sales prospectus, which are distributed to potential bidders. Fort Drum's forestry program has primary responsibility for timber sale inspections. Inspections of sale areas are performed regularly to ensure that harvest operations are conducted in an orderly manner and that compliance with contract specifications are maintained. A end-of-year report is sent to FORSCOM summarizing annual forestry activities.

Objective 14. Maintain forestry files, library materials, and GIS data.

Objective 15. Follow appropriate timber harvest reporting procedures.

Objective 16. Refine local sale methods and increase local sales.

8.1.11 Special Considerations

Outside environmental influences (*i.e*., economic, social, or political) may alter various aspects of the forestry program. Harvest and forest management strategies will be altered as needed to accommodate these influences, based on Army policy.

Forestry management has major impacts on wildlife habitat. Many forestry management practices affect wildlife habitat (*e.g*., harvest and timber stand improvement). Location, shape, size, type, and distribution of timber cuts are analyzed from the standpoint of wildlife habitat management to provide a series of vegetative stages that are beneficial to both forestry and wildlife.

The NEPA process is used to evaluate proposed timber sales on Fort Drum. This process uses a Record of Environmental Consideration and includes provisions to ensure that cultural resources sites, wetlands, and

other special or unique areas are protected during harvest operations. Chapter 13 more fully describes these provisions.

Objective 17. Alter harvest and forest management strategies as appropriate to accommodate new information and outside influences.

8.2 Agricultural Outleases

No agricultural activities have been permitted on Fort Drum since 1979. Grazing of domestic animals is not allowed due to the determination that it is not economically feasible for the installation (Farquahar and Gordon, 1991). There are no plans to institute either agricultural or grazing leases since they are not compatible with the military mission or ecosystem management strategies.

8.3 Habitat Management

Habitat management is accomplished through focused wildlife habitat management projects, forest management, wetlands management, fire management, and similar programs. The following sections primarily describe the focused wildlife habitat programs and projects. Other activities are described in their corresponding sections of the INRMP.

The purpose of habitat management is to improve and maintain diverse vegetation/land cover types that support native fauna. Habitat management can also help maintain ecologically sound population levels of game and non-game species. The diverse vegetation/land cover types on Fort Drum are beneficial to various wildlife populations. Broad based habitat improvement is a major focus of general wildlife management. However, more specific management programs are often necessary for individual species or a group of species. Moreover, wildlife enhancements aimed at one or several species are often beneficial to many non-targeted species.

8.3.1 Wildlife Habitat Management

Project - Wildlife Habitat Management
Drivers: Stewardship; Compliance with Defense policies
Project Timing: Objectives 3 - 5, 7, and 11 - as needed; Other objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Base species management on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests.

Below habitat management practices on Fort Drum are categorized as a means to discuss them. However, there is overlap within these sections as well as with other sections of this INRMP.

8.3.1.1 Forest Management and Habitat Implications

Different forest management practices have different effects on wildlife habitat. Many wildlife species

require a mix of forest size classes and openings to complete their life cycle. It is important to consider the effects or potential effects of any forest or land management practices on habitats that may be shared by different wildlife species. Uneven-aged management techniques are used in areas for species requiring a continuous forest canopy cover and a shade-tolerant species mix. Many wildlife species use different age classes or size classes (seedling sized stands, sapling/pole sized stands, etc.) during their life cycle. Even-aged management techniques are used to produce appropriate age or size class mixtures necessary for these species. Structural features, such as trees with cavities and downed logs, are retained in harvested areas unless they present a hazard to military operations. Overall, forestry may be the single best management mechanism for wildlife on Fort Drum.

Subsequent impacts of forest operations on military operations and wildlife habitats are monitored and evaluated as part of a post-harvest survey using Training Requirements Integration feedback and vegetative indicators. Revisions to forest management guidelines are made, as necessary, to better achieve military, wildlife, and forest management objectives. The converse is also true; some wildlife management projects may impact timber resources. Examples include inducing stump sprouts for deer browsing and managing aspen stands for Ruffed Grouse and American Woodcock.

Both aspen and alder management benefits species that utilize early successional habitats, including Ruffed Grouse and American Woodcock. Rotational clearcutting of aspen benefits primarily Ruffed Grouse by sustaining a diversity of aspen age classes. Wetter sites are surveyed and evaluated for their potential to be managed primarily for alder development, targeting associated benefits for American Woodcock and other wet area-oriented species.

Conifer forests provide essential thermal shelter for deer to survive winter conditions. As conifer forests decline due to natural succession, proper forest management measures will be taken to maintain conifer cover. Harvesting will occur in and near deer wintering areas to improve thermal cover and to provide forage areas. Mixed conifer and deciduous stands should be managed to provide improved thermal cover by removing hardwood species and releasing conifer species, especially hemlock.

Objective 1. Consider wildlife species and habitat requirements when prescribing forest management practices.

Objective 2. Provide structural features, such as cavities and downed logs, unless they present a hazard.

Objective 3. Maintain/manage forest areas with conifers for improved thermal cover and forage.

8.3.1.2 Wildlife Openings

Managing forest openings is important for many wildlife species as many species use forest openings for displaying and feeding. Military maneuvers create some forest openings on Fort Drum. However, most recently created forest openings are a by-product of forest management practices and may provide a beneficial habitat component for many wildlife species. Conversely, the number, size, and location of forest openings may have adverse impacts on species dependent on a continuous forest canopy. Some openings have been created due to the large amount of salvage cutting due to the ice storm of 1998. Salvage cutting associated with ice storm damage will slow considerably by 2001. Some openings may need to be created and/or maintained through vegetation management practices during 2001-2005. The LRAM program periodically brush hogs some areas to maintain them for training purposes, thus ensuring

the continued existence of some openings that may be beneficial to wildlife. Determinations of how many and which openings to maintain are made on a case-by-case basis.

Objective 4. Create or maintain wildlife openings as needed during 2001-2005.

8.3.1.3 Beaver Ponds and Wetlands

Many beaver ponds on Fort Drum provide high quality habitats for other species of wildlife, particularly Wood Ducks and Black Ducks. However, older ponds may not provide such high quality habitat. Beaver ponds should be drained if inactive for more than five years, through dam removal or by inserting water level control tubes through dams (Claypoole *et al*., 1994). Fort Drum has about 50 water level control tubes installed in beaver dams. Draining a pond allows soils to aerate, metals to oxidize, plant succession to be delayed, and seeds of wetland plants to germinate and provide food for waterfowl (Fredrickson and Taylor, 1982; Kirby, 1988). Drained ponds may encourage beavers to return and re-flood sites after habitat around ponds is restored. Thus, beaver-caused damage may be reduced in other areas.

Maintaining an accurate map of active and inactive beaver sites on Fort Drum facilitates the scheduling and draining of older impoundments. Drained sites are monitored periodically to determine their value to waterfowl and to estimate the length of time it takes for beavers to re-flood these areas. However, a permit must be obtained from the NYSDEC prior to draining any pond on Fort Drum. Ponds inactive for more than five years may also need a Section 404 permit. Draining of ponds should occur in the non-nesting or non-spawning season.

The large number of natural wetlands appears to be suitable for waterfowl habitats (Claypoole *et al*., 1994). However, there are some concerns about waterfowl populations and their habitats on Fort Drum. Different military training activities have been identified as having the potential to damage wetlands and/or disturb breeding and migrating waterfowl. Examples include troop and tank movements, active artillery ranges, and low altitude helicopter flights (including flying through wetland corridors to avoid radar). Waterfowl are essentially intolerant to human disturbance, especially during breeding and brood-rearing periods (Coulter and Miller, 1968). Human disturbance can reduce foraging efficiency and the time available for feeding, possibly reducing reproductive success (Drobney, 1990). Disturbances, such as the downdraft from helicopter rotors, may flush ducks off nests, leaving eggs unincubated and susceptible to predators. Flushing ducks off nests repeatedly may lead to nest abandonment. During migration, waterfowl also need to forage intensively and rest to replenish energy reserves. Disturbances can minimize the time spent feeding and resting.

High waterfowl concentration areas on Fort Drum include Indian Lake, Mud Lake, Matoon Creek, Training Area 14B, and Quarry Pond (Claypoole *et al*., 1994). Fort Drum has established a database on migrating waterfowl and their habitat use to support the goals of the North American Waterfowl Management Plan.

Field observations and data from the LCTA program indicate that the northern and northeastern portions of Fort Drum are less frequently used for training than other portions of the reservation. Accessibility to this area is difficult and a long range plan includes improving this accessibility. Therefore, at the present time, waterfowl habitat management efforts should be focused on the area north of the main impact area, from Antwerp and the Indian River east to Indian Pond. This area will be managed for both migrating and nesting waterfowl if disturbances are not severe enough to adversely affect waterfowl reproductive

success from April to October. Disturbances will be kept as low as possible during the migration and nesting periods. Research will be conducted, if possible, to determine what effects military activities are having on waterfowl populations.

In addition to those mentioned above, the following areas were identified as having high quality waterfowl habitats (Claypoole *et al*., 1994): Warren Swamp; wetlands within breeding survey plots 13, 17, 20, 26, 27, 48, 51; and the area along the boundary of Fort Drum from Quarry Pond to Mud Lake, and the large wetland partially in plot 29, and mostly to the south and east of the plot (Map 4 in Claypoole *et al*., 1994). These areas, or at least some of these areas, will be managed for waterfowl if military training activities do not appear to be having substantial adverse impacts on waterfowl reproduction. Additional surveys may be conducted to determine if breeding pairs, broods, or migrating waterfowl are using these areas.

Black Duck nest sites require concealing vegetation, a substrate for building nests (*e.g*. ground litter), and a location near a change in cover (Kirby, 1988). Black Ducks return in early spring to nest; therefore, residual vegetation must be available to provide nesting cover. Kirby (1988) recommends that early successional stages of wetland vegetation, newly flooded woody vegetation, and riparian vegetation along streambanks and lakes all be protected for Black Duck broods.

Mallard hybridization with Black Ducks is believed to reduce Black Duck populations (Andrle and Carroll, 1988; Kirby, 1988). Therefore, management strategies should be focused on increasing Black Duck, but not Mallard, populations. Habitat enhancement should not be aimed at mallards.

Objective 5. Maintain water level control tubes and remove inactive beaver dams as needed during 2001-2005.

Objective 6. Maintain a map of beaver dam sites and periodically monitor drained beaver ponds.

Objective 7. Obtain appropriate permits prior to draining any ponds on Fort Drum.

Objective 8. Protect high waterfowl concentration areas from development and minimize military training in these areas during migration and nesting periods.

Objective 9. Minimize human-related waterfowl disturbance on Fort Drum.

Objective 10. Manage wetlands, especially those with limited military use, with waterfowl needs as a priority.

8.3.1.4 Nesting Structures

In 1996 about 100 Bluebird boxes (50 paired box locations) were installed in the cantonment area to provide bluebird nesting habitat. These nest boxes are maintained and monitored through the fish and wildlife program, and data are collected to determine nest box usage and nest success.

In 1988, the Department of Interior and Department of Defense signed an agreement to improve and

protect migratory waterfowl habitats on certain military installations. Projects initiated under this agreement were designed to assist in meeting the goals of the North American Waterfowl Management Plan, signed in 1986. Fort Drum was selected as a site for implementing NAWMP due to its geographic location in the Lower Great Lakes-St. Lawrence Basin Joint Venture Area and its large wetland acreage.

Nesting box installment is one method used to increase reproductive success of cavity nesting waterfowl. A nest box program was initiated to assist in meeting the habitat improvement objectives of wildlife management and the goals of the North American Waterfowl Management Plan. About 60 Wood Duck nest boxes were installed on Fort Drum prior to 1991, however, most of them had fallen down or were no longer suitable for nesting by that time. During the winter of 1992, about 50 Wood Duck nest boxes were installed on wetlands within Fort Drum.

Waterfowl nest boxes installed in 1992 have proven successful in helping Wood Duck and/or Hooded Merganser reproduction. Installed boxes are monitored three times annually to ensure nesting success. Monitoring entails banding hens and counting eggs to determine productivity. Damaged boxes are repaired or replaced. Predator guards are installed on boxes without such devices to prevent nest predation. Some boxes are moved to better habitats. Typically no nesting trees are allowed to be removed within 60 feet of wetlands, especially red maple, American elm, and American beech. These species provide natural nesting cavities for wood ducks (Haramis, 1990; Soulliere, 1990). An attempt is also made to minimize any human activities, such as military training, in these areas during the nesting and brood rearing season, April-July.

To ensure that nest boxes are beneficial to Wood Duck populations, boxes are installed in or near areas where hens raise their broods.

In addition to Wood Duck and Bluebird boxes, Fort Drum has installed bat boxes in some range areas. Bat boxes provide roosting sites for bats using installation range areas. Bat boxes are maintained and monitored by fish and wildlife program personnel.

Objective 11. Maintain and monitor Bluebird and waterfowl nest boxes and bat boxes as needed during 2001-2005.

Objective 12. Support the North American Waterfowl Management Plan through continued implementation of the waterfowl nest box program on Fort Drum.

8.3.1.5 Food Plots

Waterfowl food plots were established adjacent to waterfowl ponds in 1980 and 1981 on Fort Drum. These plots have been discontinued on Fort Drum. Wetlands on Fort Drum appear to have suitable food resources for waterfowl (Claypoole *et al*., 1994). The type and quality of wetlands provide various food sources for waterfowl. Therefore, maintaining wetland complexes is an important measure to ensure a variety of food resources for waterfowl. Feeding areas on Fort Drum are protected from pesticide and herbicide applications to maintain food resources.

Several measures were taken in the past to enhance the deer population, however, noe of them proved to be practicable on a sustainable basis. Fort Drum has no plans to re-institute a food plot program. However, intensive habitat manipulation for deer management will be accomplished primarily through

the integrated approach that combines the application of professional silvicultural practices with wildlife habitat management objectives.

Objective 13. Monitor availability of suitable foraging habitat resulting from forest management activities on the installation.

8.3.1.6 Invasive Weed Biological Control

Fort Drum participates in a cooperative program using biological control agents to control purple loosestrife, leafy spurge, and spotted knapweed populations on Fort Drum. Biological control of invasive and exotic plant species is further discussed in Section 8.9.

8.3.1.7 Prescribed Burning

Prescribed burning is planned fire, with specific objectives, applied to a predetermined area under strict guidelines and parameters. On Fort Drum, prescribed burning helps maintain training areas, enhances natural ecosystem diversity, improves grassland management, enhances wildlife habitat, and reduces fuels. Prescribed burning has the potential to be one of the most cost effective and efficient management tools available to managers for habitat and training area manipulation.

Prescribed burning is closely coordinated among the forestry, wildlife, fire protection, and training programs at Fort Drum. The prescribed burning program on Fort Drum has been in an experimental and developmental stage for the last few years. Preliminary results have been inconclusive, and the effectiveness of prescribed fire as a management tool on Fort Drum is still in question. However, results are site-specific, and accomplishment of objectives for some fires has occurred while others have accomplished less than expected. Regardless, objectives, such as oak and pitch pine regeneration, enhancing access and maneuverability, maintaining open maneuver space, enhancing grassland bird habitat, and timber stand improvement alter wildlife habitats and thus, affect species using those areas to one degree or another. Prescribed burning is discussed further in Section 8.10.2.

Objective 14. Ensure appropriate consideration is given to effects of prescribed burns on wildlife and their habitats during the prescribed burning planning process.

8.3.1.8 Threatened and Endangered Species Management Projects

The status of federally-listed threatened and endangered species on the installation is discussed in Section 6.8.6. Fort Drum is not required to manage State-listed species; however, it is Army policy to protect such species whenever possible. Other natural resources-related management projects maintain or improve habitats used by State-listed species known to occur on Fort Drum. Thus, no project or objectives specific to threatened and endangered species habitats is necessary.

8.3.2 Aquatic Habitat Management

Project - Aquatic Habitat Management
Drivers: Stewardship; Potential Endangered Species Act compliance; Compliance with Defense policies
Project Timing: Objective 2 and 3 - 2001; Other objectives - ongoing indefinitely
Regulatory Approvals: None required

Vehicle for Project Implementation: Inhouse and external support

Goal. Maintain and enhance the natural diversity of aquatic communities on Fort Drum.

The *Aquatic Resources Management Plan, Fort Drum, New York (Part II)* (McCosh and Lowie, 1996b) was prepared using results from McCosh and Lowie (1996a). McCosh and Lowie (1996a) presented results of fisheries habitat quantity and quality assessments, including structural and substrate information for fish spawning, cover, and feeding. Habitat enhancement possibilities for Fort Drum fisheries include riparian zone enhancement, such as stream bank stabilization, settling pools, structural cover, half logs, or stream baffling.

Management decisions are based on surveying Fort Drum fish communities to assess management needs. Fisheries-specific strategies (*e.g.,* Mud Lake strategies, Indian River strategies) are presented by McCosh and Lowie (1996b); however, many are not habitat-specific and are, thus, included in other sections of this plan. For example, fisheries monitoring objectives are included in Section 7.2.2, and water quality monitoring objectives are included in Section 7.3.1. McCosh and Lowie (1996b) also included general goals and objectives for Fort Drum fisheries, which are included in the most appropriate sections of this plan. For example, determining the presence and distribution of threatened and endangered fish and semi-aquatic species is included in Section 7.3.2.

Objective 1. Implement fish habitat management recommendations of the *Aquatic Resources Management Plan, Fort Drum, New York (Part II)* (McCosh and Lowie, 1996b).

Objective 2. Prevent further degradation of the Conservation Pond shoreline at the parking lot by stabilizing the shore area.

Objective 3. Dredge Conservation Pond and/or repair the water control structure.

Objective 4. Improve habitat in designated stream stretches on Black Creek and on the West Branch of Black Creek for cold-water sport fish populations.

Objective 5. Stabilize streambanks where necessary on Black Creek, West Branch Black Creek, and Pleasant Creek to reduce sediment loading.

Objective 6. Determine the source of sedimentation downstream of Remington Pond and improve the stream substrate in Pleasant Creek by preventing and reducing sediment runoff, both below and above Remington Pond.

Objective 7. Improve stream substrate and banks by preventing and reducing sediment runoff into West Creek.

8.4 Fish and Wildlife Population Management

Project - Fish and Wildlife Population Management
Drivers: Stewardship; Potential Endangered Species Act compliance; Compliance with Defense policies
Project Timing: Objective 8 and 9 - 2001; All other objectives - ongoing indefinitely

Regulatory Approvals: None required, unless federally-listed species are found, which could require Section 7 consultation
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Maintain fish and wildlife populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities.

Fort Drum began to manage its fish and wildlife resources in 1958 when the Department of the Army issued AR 420-74, which required Army installations to open all or part of installations to the public for hunting and fishing, if feasible. In 1959 the first cooperative plan, or agreement, for the conservation and development of fish and wildlife resources was signed between the Fort Drum Commander, USFWS, and NYSDEC. Thereafter, the plan was revised and renewed periodically. The most recent agreement was signed in 1997. The purpose of these agreements was to ensure a cooperative effort between agencies for the protection, development, and management of fish and wildlife resources on Fort Drum. This Plan supersedes previous tripartite cooperative agreements, per the Sikes Act Improvement Act of 1997.

The manipulation of fish and wildlife populations is an important aspect of fish and wildlife management. Human use of sustainable resources is a critical aspect of ecosystem management. Fish and wildlife population management for selected species is discussed below in sections specific to each species or group of species. In general, the population reduction option selected for most game species is recreational harvesting. Additional management of game and nongame species is through habitat modifications often associated with programs other than fish and wildlife, *i.*e., forestry.

Chapter 11.0, *Outdoor Recreation*, includes recreational aspects of game management. Below descriptions of harvest strategies do not include detailed historic harvest data. The Fort Drum fish and wildlife biologist maintains these data. The 10th Mountain Division Light Infantry and Fort Drum Regulation 420-3 delineates responsibilities, eligibility, safety, etc. for recreational use of Fort Drum.

8.4.1 Big Game

Deer are the major big game species on Fort Drum. Fort Drum has been opened to the public for deer hunting since 1959. Management of white-tailed deer focuses on maintaining the population slightly below or at the carrying capacity of the range to allow for an upward trend in habitat condition. During the 1970s the deer population was high enough to allow trapping activities to occur on the installation, which supplemented populations in other parts of the State. Census of white-tailed deer is discussed in Section 7.3.1, and habitat management that directly affects white-tailed deer is described in Section 8.3.

Generally, deer seasons, bag limits, etc. on the installation follow State regulations. Fort Drum is State Wildlife Management Unit 6H within the State's Northern Zone. However, Fort Drum offers a unique opportunity, compared to general hunting in the State, for deer hunting within the cantonment area. In 1996 Fort Drum initiated a cantonment area archery hunting program to control the deer population. Special regulations apply to this hunt, including availability of a limited number of special doe tags as part of the NYSDEC Deer Management Assistance Program. In 1999 Fort Drum responded to safety concerns associated with the Wheeler-Sack Airfield expansion, which enclosed an additional 700 acres within the airfield, including a population of deer. After most of the deer were driven from the airfield, a special Nuisance Deer Permit was obtained from NYSDEC allowing the remaining deer to be baited and shot with the meat contributed to the State Hunters for the Hungry Program.

Black bears are hunted on Fort Drum following NYSDEC established seasons and regulations. Bear harvested have been weighed and aged at the installation's check station.

Objective 1. Continue to use hunting to maintain big game populations at or slightly below carrying capacities.

8.4.2 Small Game

Small game species occurring on Fort Drum include the gray squirrel, cottontail rabbit, snowshoe hare, Ruffed Grouse, Wild Turkey, and pheasant. Hunting these species within NYSDEC-specified seasons is the primary population management mechanism used on Fort Drum. Ruffed Grouse and Wild Turkey are monitored annually to determine population status (Section 7.3.1). Habitat alterations, such as forestry practices that maintain aspen openings of different ages and create small openings for brood rearing and drumming, affect small game species, particularly Ruffed Grouse and Wild Turkey populations.

During the early 1970s and in 1996 a number of Korean Ring-necked Pheasants were released on Fort Drum by NYSDEC. However, most of these birds died, presumably due to lack of food and unsuitable local climate. There are no plans to introduce more pheasants or other wildlife species.

Objective 2. Continue to use hunting as the primary population management mechanism for small game species on Fort Drum.

8.4.3 Furbearers

Furbearers on Fort Drum include the muskrat, mink, raccoon, opossum, skunk, beaver, weasel, red fox, otter, fisher, bobcat, and coyote. Raccoon, red fox, opossum, skunk, weasel, coyote, and bobcat hunting is allowed on Fort Drum using NYSDEC seasons and regulations. In addition to hunting, these species also may be trapped, and trapping for muskrat, mink, fisher, beaver, and otter is also allowed using NYSDEC trapping seasons and regulations.

Management beyond hunting and trapping of furbearers is not performed on the installation except for measures taken to control beaver. Fort Drum's beaver population is controlled through trapping, installing water level control tubes and metal fencing, and beaver dam removal. Trapping is the most economical means of controlling excess beaver. Trapping is encouraged to remove excess beaver, and special exceptions, such as requesting an extension to the trapping season on Fort Drum and allowing some trappers to trap within impact area boundaries, are occasionally necessary. Fort Drum also allows one trapper, randomly selected, to trap furbearers in the cantonment area to control furbearer populations. No other furbearer control program is planned, nor is the need for such a program anticipated. Under normal conditions, furbearers are an asset to a well-managed wildlife program.

Furbearer hunting and trapping pressure is primarily dependent upon pelt prices or the expectation of those prices. The demand for furs and prices have waned over the last decade. While increases in harvest can be sustained by current populations, expanded interest in furbearer hunting and trapping is unlikely unless pelt prices rebound.

Objective 3. Continue to use hunting and trapping to control furbearer populations on Fort Drum.

8.4.4 Migratory Birds

Migratory game birds and migratory waterfowl occurring on the installation include American Woodcock, Common Snipe, Virginia Rail, ducks, and geese. Migratory bird hunting is the primary activity affecting migratory game birds on Fort Drum. However, protection and management of open water areas and wetlands and other efforts, such as establishing and maintaining nesting structures, also affects populations. The monitoring of migratory birds is discussed in Section 7.3.1.

Regulations, permits, bag limits, procedures, etc. applicable to Fort Drum are discussed in Section 11.3.2. The 10th Mountain Division Light Infantry and Fort Drum Regulation 420-3 and the State *Hunting and Trapping Regulations Guide* are the primary regulations for hunting and trapping on Fort Drum.

Objective 4. Continue to use hunting as the primary migratory bird population management activity.

8.4.5 Fish

Many ponds and lakes on Fort Drum support abundant warm water fisheries with some supporting a combination of warm and cold water fisheries. Many streams on Fort Drum once supported native cold water fisheries, primarily brook trout. Most native brook trout populations have disappeared due to beaver activity, which can be detrimental to trout fisheries by causing an increase in water temperatures and silt deposition and impeding migration. As a result, several streams are now inhabited by brown trout, which are more tolerant of these conditions.

When water quality parameters, substrate, and structural cover are considered with species presence, trophic guild, and ecological niche designations, the following generalizations may be made about Fort Drum's waterbodies:

- Mud, Indian, and Narrow Lakes, and Indian Pond exhibit cool- to warm-water communities.
- The major food chain is exemplified with largemouth bass as the primary top predator and *Lepomis* spp., yellow perch, and brown bullhead as prey. Northern pike, chain pickerel, and smallmouth bass could also be added as top predator populations.
- Indian Lake has a major pelagic cool-water community with walleye as the top predator and yellow perch and white sucker serving as prey. This food chain will not remain stable if walleye are not replacing themselves at a self-sustaining rate.
- Quarry Pond has a cold-water habitat regime with rainbow trout stocked annually; however, additional species composition (white sucker, brown bullhead, and yellow perch) indicates populations that are adaptable to warm and cool-water temperature regimes.
- If a rainbow trout fishery is desired, put-grow-and-take will be the necessary management approach. Conservation Pond is a textbook example of warm-water habitat with associated fish species.
- Remington Pond is an amalgamation. It has self-sustaining populations of warm-water fish species and some stocked cold-water species, possibly supplemented by upstream wild trout. Access and use make this an ideal area for outdoor educational opportunities such as story boards and nature trails.
- LeRay Pond is a cold-water impoundment with only brook trout present.

By combining habitat and species composition and their guild and niche designations, the following generalizations may be made about Fort Drum's flowing surface waters:

- Indian River east is a cool-water system.
- Indian River west has slightly warmer waters with associated fish species.
- Black Creek has cold-water characteristics conducive to brown trout rather than brook trout; with warmer water habitats and finer substrates, due to beaver activity.
- West Branch of Black Creek has mostly cold-water characteristics, (much of the watershed is modified by beaver activity, creating isolated warmer water habitats and fine substrates) most notably self-sustaining brook trout populations.
- Trout Brook, its tributaries, and tributaries of Pleasant Creek are truly cold-water communities due to their extreme headwater locations being fed by springs. The native brook trout population may need special attention to preserve their fragile habitat.
- Pleasant Creek, like West Branch, supports a range of water regimes and associated communities with cooler-water fish species more abundant.
- West Creek is a cold-water stream with brook trout populations.
- Black River is a large river with mostly cooler-water communities and enough backwater sloughs to sustain some warm-water fish.

8.4.5.1 Fish Harvest Management

Fish management at Fort Drum is directed at maintaining a harvestable surplus of game fish. Each lake is an entity in itself and may experience population fluctuations over the short- and long-term, stemming from fish harvest, variable recruitment, enforced regulations, stocking, fish kills, pond productivity, aquatic weed infestation, etc. Primary species emphasized in the Fort Drum fisheries program include both warm-water and cold-water species.

All bodies of water on Fort Drum, except those in permanently restricted areas, are open to fishing in accordance with New York state fishing laws, provided there is no interference with military training. The 10th Mountain Division Light Infantry and Fort Drum Regulation 420-3 outlines responsibilities, eligibility, procedures, etc. for fishing at Fort Drum. Figure 5.5.1 shows surface water resources on the installation. Regulations, permits, bag limits, procedures, etc. applicable to fishing on Fort Drum are discussed in Section 11.1.3.2.

Objective 5. Manage fisheries resources to maintain a harvestable surplus of game fish.

8.4.5.2 Fish Population Control

Fish population control for game species consists of recreational harvest, which is managed through bag and other limits, further discussed in Section 11.4.1. There has been some need for direct control of undesirable species in installation lakes and ponds. Remington and Conservation ponds have been reclaimed in the past. Reclamations, stocking records, and fisheries-specific population management are discussed in Section 8.4.5.3.

Objective 6. Use recreational harvest to manage game fish populations on Fort Drum.

8.4.5.3 Fish Stocking

Stocking is used to establish fish populations in renovated lakes and ponds and to maintain or supplement populations in lakes and streams. Fish stocking on Fort Drum has occurred regularly with fish from State-operated hatcheries. Various species have been stocked, with varying degrees of success, including brown, brook, and rainbow trout and walleye.

About 4,300 trout (brook, brown, and rainbow) are stocked annually on Fort Drum primarily in Remington and Quarry ponds, as well as Black Creek. Fort Drum educates installation fishermen about possible negative effects of unwanted introductions made by the public. The installation relies on scientific management techniques to determine which water bodies to stock, what species to stock, stocking levels, etc.

Fisheries-specific Population Management (derived from the 1996 Aquatic Resources Management Plan)

Remington Pond was reclaimed by means of a toxicant in 1957, 1962, and 1968 in an effort to eliminate non-game fish species, such as carp, suckers, and sunfish. However, reclamations were deemed incomplete. In 1968, 950 brook trout were stocked in Remington Pond. By 1980 the stocking rate was 800 brown trout and 700 brook trout. In 1980 fisheries of this pond were reassessed, and further reclamation was recommended by NYSDEC because of a possible displacement of brown trout by large populations of non-game species. The pond has an abundance of warm-water fish species. Since 1980, brown trout and brook trout have been released annually in Remington Pond.

Quarry Pond has been managed since about 1966. At that time it contained only limited numbers of brook trout, rainbow trout, and pumpkinseed. In about 1980 Quarry Pond was stocked with 350 yearling rainbow trout, and from 1984 to 1993 it was stocked with 200 rainbow trout annually. Annual stocking continues with spring yearlings. The pond was not stocked in 1994, and no rainbow trout were collected in a 1995 assessment. However, anglers did report catching trout. Failure to collect rainbows in the assessment may be due to a limited sampling effort in 1995 or possible die-offs due to anoxia in the hypolimnion. Quarry Pond provides one of the better opportunities for a put-grow-and-take trout fishery on Fort Drum. However, the "grow" aspect seems to be limited in this water body.

Conservation Pond was annually stocked with 300 brook trout in the 1970s and 1980s and 600 brook trout in late 1980s and early 1990s. Management of the pond was reassessed in 1989 and 1993, with a recommendation in 1993 to stop stocking brook trout due to an abundance of warm-water fish species and lack of trout. It appears that Conservation Pond is not capable of supporting a trout fishery. Conservation Pond was reclaimed in the 1950s, 1960s, and 1981 to remove warm water fish species. The pond is shallow and weedy.

Mud Lake, a bay of Lake Bonaparte, is a shallow lake that receives moderate fishing pressure and supports boating and other recreational activities from users of Lake Bonaparte. Yellow perch, largemouth bass, and other centrarchids are present. Abundant young-of-the-year and a low number of adults, for all species, suggests Mud Lake serves as nursery habitat for the larger Lake Bonaparte system. Large piscivores for this system occur less than expected. It is possible that larger-sized fish use colder, deeper waters of Lake Bonaparte and the individuals in the shallower Mud Lake are not permanent

residents. Location of juvenile habitat, aging, and comparison of age-1 and older fish would give a clearer picture of fisheries ecology.

Both ***Indian Lake*** and ***Narrow Lake*** have the best fisheries on Fort Drum, including a very good warm-water fishery and some cool-water fishery. The limited cold-water fishery may be due to an anoxic hypolimnion after stratification. These lakes receive moderate fishing pressure. Walleye fry were stocked in the following densities: 1,480 k (k = 1,000) (1965-68), 600 k (1969), 400 k (1971, 1973), and 250 k (1981). Walleye stocking was discontinued in 1982 as natural reproduction appeared to be adequate. A survey in 1995 found primarily centrarchids, yellow perch, suckers, northern pike, and walleye. No walleye young-of-the-year were identified in 1995; however, two juveniles were collected. If these walleye are senescent and not reproducing on a self-sustainable basis, there is concern that habitat may be limiting spawning. However, anglers catch some walleye, largemouth bass, and smallmouth bass in these lakes. Therefore, predation on young-of-the-year walleye may be limiting their numbers.

Slightly acidic water in Indian Lake may negatively affect fish reproduction. Lake surveys suggest a stable adult walleye population and an increasing northern pike population in both Indian and Narrow lakes. However, anglers are catching some walleye and large/smallmouth bass in these lakes.

Indian River supports a wide variety of aquatic habitats and is capable of supporting diverse fish populations. Recreational opportunities on this river are limited since much of the river serves as the main impact area boundary. One possible problem in the fishery is the low dissolved oxygen content in this river. Fish species present are indicative of a warm-water community.

Black River contains diverse aquatic habitats and fisheries and, according to local anglers, has good walleye and smallmouth bass populations. Black River supports both warm- and cool-water species. Black River receives light to moderate fishing pressure. Boating and swimming are prohibited on the river in the Fort Drum vicinity. No records exist on past management of Black River.

Brown trout stocking in ***Black Creek*** began in the late 1950s. Other trout species have also been stocked in the creek, and about 3,000 brown trout are now stocked annually. The most recent surveys of Black Creek indicate that summer temperatures are marginal for trout and that few stocked trout survive the winter. Natural spawning, if occurring, is limited due to lack of suitable habitat. In addition, habitat has been degraded by large beaver populations. However, Black Creek is the site where some beaver dam removal is scheduled during 2001-2005.

In 1994 the first modern survey since 1931 of the ***West Branch Black Creek*** was conducted. This survey found that the large beaver population was degrading fish habitat, that water temperature was adequate for trout, and that the creek probably contains the best remaining trout habitat on Fort Drum. The West Branch Black Creek receives light angler pressure.

West Creek was stocked with brown trout in 1980 to determine winter survival. A naturally spawning, brook trout population was found during the early 1980s surveys. Currently, fish habitat is degraded, as indicated by rising temperature and sedimentation that is related to extensive beaver activity and Fort Drum cantonment area expansion. Presently, West Creek has a viable brook trout population. The creek receives very light angler pressure.

Pleasant Creek was stocked in the past with rainbow trout above Remington Pond and brown trout below

the pond. Currently, the creek is not stocked. There is a wild brook trout population located in the portion of Pleasant Creek above Remington Pond and in many of its tributaries. The section below Remington Pond has been degraded by beaver activity.

Besides limited habitat and limited fisheries, such as in ***Trout Brook***, ***Rockwell Creek***, and ***Bonaparte Creek*** another concern is elevated mercury levels in some open waters (*e.g*. ***Indian Lake***) on Fort Drum. Mercury levels may be great enough to impair fish and wildlife resources, especially young fish, aquatic invertebrates, and fish-eating birds (Claypoole *et al*., 1994).

Objective 7. Continue annual stocking of Remington and Quarry ponds, as well as Black Creek, to support heavy recreational fishing use.

Objective 9. Rely on scientific management techniques to guide fish stocking on Fort Drum.

8.4.6 Endangered, Threatened, and Other Species of Special Concern

AR 200-3 states (Section 11-2(a-e)) that the Army has five primary requirements under the Endangered Species Act:

- to conserve listed species,
- not to "jeopardize" listed species,
- to "consult" and "confer",
- to conduct a biological assessment, and
- not to "take" listed fish and wildlife species or to remove or destroy listed plant species.

Fort Drum is committed to these five primary requirements.

Objective 10. Implement requirements of the Endangered Species Act, as stated by AR 200-3.

8.4.6.1 Status of Endangered Species

Section 5.8.6 discusses the status of faunal species that are either federal- or State-listed as endangered, threatened, or species of special concern at Fort Drum. Section 7.3.2 describes monitoring programs for these species on Fort Drum.

8.4.6.2 Endangered Species Management Programs

There are no known, resident federally-listed threatened or endangered species found on Fort Drum. The *Endangered and Threatened Species Survey, Fort Drum, New York* (Coastal Environmental Services, Inc., 1993) indicated that military training activities (*e.*g. trampling, vehicle traffic, and occasional fires caused by munitions) may retard the natural succession of northern sandplain grasslands, allowing these grasslands to remain open and to be used by a number of rare species. Therefore, it is suggested that the disturbance regime be maintained, but not increased. However, if these military disturbances could be limited during the primary breeding season for these grassland species (May through August), then adverse impacts on breeding success could be minimized. If natural succession makes an area unsuitable

for a rare species, vegetation management procedures will be carried out to retard successional processes.

The following guidelines are recommended in areas where there are populations of rare species:

- avoid directly driving and maneuvering over the plants during the growing season,
- avoid crushing nests and/or young birds with vehicles,
- minimize traffic in areas where rare species of birds or other rare animals are nesting or breeding,
- designate areas to guide traffic if necessary,
- maintain water levels surrounding rare aquatic plants and prevent alteration to water levels by avoiding watershed disturbances, and
- avoid low-level flying in areas where rare birds, such as Red-shouldered Hawks, may nest in tree tops.

There are no immediate threats to the three exemplary natural communities identified by Coastal Environmental Services, Inc. (1993). One of the two medium fen communities found in Training Area 19 is a boggy mat on the shore of Marsh Pond, and the other is located on the shore of Mud Lake. The northern white cedar swamp is not threatened by training activities.

In general, military training activities do not threaten natural communities and survival of rare species on Fort Drum. However, habitats of State-listed species known to occur on the installation will be monitored through the LCTA program. Appropriate measures will be taken if potential threats to these species and their habitats are found.

All natural and cultural resources management activities, especially forest management practices, in areas where rare species occur strive to prevent habitat damage. Management practices avoid creating favorable conditions for exotic plant species, as any exotic species may impose threats to native flora, thus, affecting rare species and natural communities. Native species will be planted in open areas to prevent soil erosion by wind or trampling. Construction projects, such as road building and maintenance, will not begin until an examination of rare species habitats has been completed and recommendations on land use have been made. Recreational activities on land or water have been and will continue to be regulated so that rare species habitats are not disturbed.

Objective 11. Comply with the Endangered Species Act.

Objective 12. Give consideration to State-protected species in all Army actions.

Objective 14. Ensure training guidelines are followed in areas with rare species populations.

8.4.7 Other Species Management

Protection and habitat management are the primary tools used to manage non-game species. Non-game populations are seldom managed directly at Fort Drum; however, non-game species may not be willfully taken. Management activities that provide for a variety of vegetative habitats benefit non-game species in general on Fort Drum. This is consistent with ecosystem management.

In 1995 a study began on Fort Drum to evaluate the relationship between vegetation structure and the

diversity of birds in grasslands used for military training maneuvers. To maintain the early successional stages required by many grassland bird species, management techniques, such as grazing, prescribed burning, and mowing, are often employed. Though these are standard practices, none have been employed at Fort Drum for the purpose of habitat management.

For species, such as the Henslow's Sparrow, which may require tall, dense ungrazed vegetation and standing dead vegetation, these management tools might not produce the optimal habitat. Training maneuvers may help maintain open grasslands by retarding the growth of trees and shrubs. In addition, the disturbance caused by training is less monosymmetric than that of either fire or mowing and more effective than grazing at reducing woody vegetation. Thus, the periodic, large-scale disturbance of vegetation caused by military maneuvers may help preserve avian biodiversity in general and Henslow's Sparrow populations in particular. Because Fort Drum may support one of the largest populations of Henslow's Sparrows among public lands in the Northeast, a research project that focuses specifically on the habitat characteristics and breeding biology of Henslow's Sparrows was initiated in 1998 (Section 5.8.2).

Wildlife habitat programs (Section 8.3), wetlands management (Section 8.5), water quality management (Section 8.6), LRAM (Section 8.7), fire management (Section 8.10), Training Requirements Integration (Section 8.11), and effective environmental awareness programs (Chapter 10) will benefit nongame species in general, consistent with ecosystem management strategies.

Objective 14. Protect all species listed by any federal or State law from illegal harvest.

8.5 Wetlands Management

Project - Wetlands Management
Drivers: Compliance with Clean Water Act, Stewardship; Compliance with Defense policies
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: U.S. Army Corps of Engineers (Clean Water Act objectives)
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Manage wetlands to ensure "no net loss" per Executive Order 11990.

Wetlands protection is required by Executive Order 11990, *Protection of Wetlands*. Protection and maintenance of habitat are the primary thrust of wetlands management on Fort Drum. The quality of wetland watersheds affects the quality of downstream wetland plant and animal communities. Water resources are discussed in Section 5.5, and wetlands are discussed in Section 5.7.5.

Environmental clearance review is the primary means of detecting threats to wetlands on Fort Drum. The Natural/Cultural Resources Branch reviews actions that may affect wetlands. Reviews come from several sources: work orders, service orders, military mission plans, NEPA documentation, major construction plans, etc. If necessary, projects with potential impacts are referred to the Corps of Engineers (New York District) to determine if jurisdictional wetlands are implicated, establish mitigation procedures, and/or obtain permits. Wetland-affecting projects require NEPA documentation (Chapter 13).

Activities in wetlands that require federal permits include but are not limited to: placement of fill material, ditching activities when the excavated material is sidecast, mechanized land clearing, land leveling, most road construction, and dam construction. The Corps of Engineers permit process requires coordination with the USFWS and the State Historic Preservation Office (SHPO) to allow for the assessment of potential impacts to protected species and cultural resources.

The 10th Mountain Division and Fort Drum Regulation 350-4 provides for the protection of wetlands from military and civilian damage. Regulation 350-4 indicates that training activities must be minimized in and around wetlands, streams, and other water bodies; the excavation or depositions of any fill material into wetlands, or the fording of streams, ponds, lakes, wetlands, etc. are prohibited; and sensitive wetlands and mitigation project areas are marked with Seibert Stakes and must be avoided.

Military and non-military missions often require areas for construction. However, Executive Order 11990, Protection of Wetlands (1977) and The Clean Water Act (1977) require no net wetland losses on federal lands in the United States. Therefore, when any activity is deemed to have a potential regulated impact on wetlands, the wetland ecosystem in that area is delineated and impacts on wetlands is minimized through the project planning process. Wetland impacts are mitigated. Exceptions are if an activity is determined to have limited effects on wetlands and the activity falls under a nationwide permit category. However, this does not exempt the project from delineation and mitigation requirements.

Wetland delineations are accomplished where required to facilitate construction projects on Fort Drum. They are conducted according to their order of receipt and priorities set by military mission needs. The installation Wetland Program Manager is in charge of field operations of wetland delineation. Wetland delineations have been completed in a number of range projects and have been mapped and reviewed/accepted by the New York District, Corps of Engineers.

If a wetland will be impacted, filled, or otherwise altered due to a construction project, mitigation may be required to compensate for the loss of wetland functions and values. The Fort Drum Wetland Program Manager cooperates with the New York District, Corps of Engineers, USFWS, EPA, and NYSDEC to assess mitigation requirements for each construction project that may have the potential of affecting wetlands. Once the need for mitigation is determined, an area is located for the development of wetlands. A mitigation project is designed with review and approval by New York District, Corps of Engineers regulatory personnel. Mitigation projects are carried out by New York District, Corps of Engineers construction units or contractors under the supervision of the Fort Drum Wetlands Program Manager and New York District, Corps of Engineers regulatory personnel.

Numerous mitigation projects are under construction to compensate for wetlands impacted by various construction projects on Fort Drum (Section 5.7.5). An attempt is being made to combine material borrow sites with wetland mitigation construction sites when possible. This will reduce the number of sites, cost of materials, and construction of mitigation sites. Sites compatible for use as both mitigation sites and borrow pits are located through cooperative efforts of Fort Drum Natural/Cultural Resources Branch personnel. The Fort Drum command has made the commitment to designate compensatory wetland creation areas under Section 404 permits as being off-limits to military maneuvers.

Compensatory wetlands creation acreage totals about 70 acres. These created wetlands are to mitigate major construction project impacts on Fort Drum. Monitoring of these wetlands is a long-term

requirement of the permit

The amount of wetlands on Fort Drum has increased in recent years due to increased beaver activity. Information on wetlands and wetland boundaries will be updated periodically. Accurate information on wetlands is necessary for both waterfowl and beaver management, although wetland boundaries are not static.

The variety of wetlands on Fort Drum not only benefit different waterfowl species and other wildlife but also support many good to high quality native plant communities. In some areas of wetlands, such as sedge meadows, succession is altering plant communities. Management measures, such as prescribed burns, may become necessary in the future to retard successional changes and maintain existing wetland types. If any management activity is conducted in these plant communities, caution must be taken to avoid creating favorable habitat conditions for exotic species, such as purple loosestrife and other undesirable plant species.

Objective 1. Use the environmental review process to protect wetlands.

Objective 2. Continue to pursue the establishment of a wetland mitigation banking project on Fort Drum.

Objective 3. Provide certified jurisdictional wetland delineations (and permit application, if necessary) if a project is planned in a suspected wetland.

Objective 4. Maintain wetlands quality through active management (*e.g.*, prescribed burning), if necessary.

8.6 Water Quality

Project - Protect Water Quality
Drivers: Compliance with Clean Water Act, Stewardship; Compliance with Defense policies
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: U.S. Army Corps of Engineers (Clean Water Act objectives)
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Protect surface water quality at Fort Drum.

Within the installation boundary, there are two sites producing drinking and other-use water supplies and reasonably high quality groundwater (sections 3.6.3 and 5.5), and Fort Drum intends to preserve that quality. Section 7.4 describes water quality monitoring.

AR 200-1 establishes the following objectives for water resources on Army lands:

- Conserve all water resources.
- Control or eliminate sources of pollution to surface or ground waters through conventional or innovative treatment systems.
- Demonstrate leadership in attaining the national goal of zero discharge of water pollutants.
- Provide drinking water that meets applicable standards.

- Cooperate with federal, state, and local regulatory authorities in forming and implementing water pollution control plans.
- Control or eliminate runoff and erosion through sound vegetative and land management practices.
- Consider nonpoint source pollution abatement in all construction, installation operations, and land management plans and activities.

An additional Army requirement is the preparation and implementation of a Stormwater Management Plan. Attainment of most of the above objectives is not the responsibility of Army installation natural resources programs, but some of them, especially the last two, are clearly natural resources management concerns. The below discussion specifically deals with actions taken by the installation with regard to water quality.

Most water quality laws and regulations are not the responsibility of natural resources organizations at the Fort Drum, and are thus not within this INRMP. Groundwater management consists of restoration projects associated with individual sources of pollution. Some waters on the installation are naturally high in undesirable elements. These projects are not considered as natural resources management and are not included within this INRMP.

Erosion is not a significant recognized threat to water quality on Fort Drum. The implementation of the LRAM component of ITAM (Section 8.7) has enhanced the installation's ability to protect water quality from sedimentation.

Water quality of some lakes and streams is monitored by the Natural/Cultural Resources Branch. Stream water quality is assessed using a macroinvertebrate community composition measure established by NYSDEC. The water quality of lakes and ponds is monitored by collecting information on parameters, such as dissolved oxygen, pH, hardness, alkalinity, conductivity, total nutrients, and zooplankton abundance.

INRMP activities will follow all point and non-point source pollution prevention requirements. Activities will be designed to maintain or improve water quality. Fort Drum personnel participates in the Jefferson County Water Quality Coordinating Committee.

Provisions within this INRMP that will specifically reduce negative impacts to water quality or mitigate such damage are found in sections 8.5 - *Wetlands Management*, 8.7 - *Land Rehabilitation and Maintenance*, 8.9 - *Pest Management*, and 13.0 - *NEPA*.

Objective 1. Continue Natural/Cultural Resources Branch monitoring of water quality parameters in some installation lakes and streams.

Objective 2. Control or eliminate runoff and erosion that could affect surface waters.

Objective 3. Consider nonpoint source pollution abatement in construction, installation operations, and land management plans and activities.

Objective 4. Continue to participate in the Jefferson County Water Quality Coordinating Committee.

Objective 5. Maintain the health advisory for human fish consumption from Indian and Narrow lakes until

up-to-date mercury levels are published by NYSDEC and indicate otherwise.

8.7 Land Rehabilitation and Maintenance

Project - Land Rehabilitation and Maintenance Implementation
Drivers: AR 350-4; Compliance with the Clean Air and Clean Water acts; Stewardship; Compliance with Defense policies
Project Timing: Objective 1 - 2001, Objective 2 - ongoing indefinitely, Objective 3 - 2001-2005
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Select, prioritize, and design projects to return damaged areas to full training support capability.

The Land Rehabilitation and Maintenance (LRAM) program plans, designs, and executes land rehabilitation, maintenance, and reconfiguration projects based on requirements and priorities identified in the LCTA and the Training Requirements Integration (TRI) components of the ITAM program, and coordinated and approved by the Natural/Cultural Resources Branch. The objective of the LRAM program is to sustain training lands to ensure their availability to support U.S. Armed Forces training and mission requirements, indefinitely. This is accomplished through active management to repair degraded areas in a timely manner and to minimize future damage.

The LRAM Coordinator identifies and recommends priorities for projects within the program, develops scopes of work, submits work requests to the appropriate authority, monitors project execution, and verifies that all requested work is completed in a satisfactory manner. LRAM projects are executed through mechanisms such as service orders and work orders submitted to the Operations and Maintenance Division, support by the U.S. Army Corps of Engineers, and troop labor, when available. An interagency Memorandum of Agreement between the U.S. Army, Fort Drum, and the Natural Resources Conservation Service, Syracuse, provides an additional execution mechanism.

The LRAM program strives to achieve a proactive approach, however, rehabilitation work is inherently reactive. The goals of the rehabilitation effort are to return areas to a more stable condition and offset future adverse impacts through the use of standard soil and water conservation techniques. This generally involves grading of rutted or bermed areas, re-establishing vegetation on exposed soils, and hardening high traffic locations. All training activities that involve excavation (and therefore generate a Record of Environmental Consideration, or REC) are evaluated for residual damage using the short-term Site Rehabilitation Prioritization (SRP). The SRP is also used to track degraded areas that are not associated with a REC but warrant a site evaluation. The LRAM Coordinator, upon receipt of the SRP report from the LCTA Coordinator, prioritizes potential projects and incorporates them into the work schedule.

The maintenance portion of the LRAM program keeps training areas in a usable state. Maintenance projects are preventative in nature and are designed to arrest and/or reverse natural and anthropogenic processes. Open grasslands are preferred environments for tracked and wheeled vehicle training. Natural successional patterns will, over time, convert these areas to shrublands and forests. A similar situation exists on artillery firing points and helicopter landing zones. Woody vegetation is suppressed in these areas using a combination of mechanical (cutting, trampling), chemical (plant growth regulators, herbicides), and prescribed fire mechanisms. Projects are coordinated with the forestry program to open

densely vegetated, underutilized areas to increase training opportunities while dispersing impacts. Passive engineering techniques, such as barrier placement, are used to redirect traffic from sensitive areas, thereby preventing degradation and potential non-compliance with established regulations (Harland Bartholomew and Associates, Inc., 1997).

A third category of LRAM projects provides innovative training opportunities while addressing specific environmental concerns. An example is the use of organic waste, such as tree stumps from construction projects, to create vegetation islands in barren areas. The islands provide needed cover for troop training exercises and also combat wind erosion by providing a substrate for airborne particle deposition. Once revegetated, they serve as seed sources to colonize surrounding areas, thereby speeding the rate of recovery.

Future LRAM projects include exploring options to reduce vegetation around targets in the main impact area. General LRAM goals are to annually accomplish the list of items below.

- Repair up to 50 acres of maneuver damage.
- Reseed and/or fertilize up to 500 acres of exposed soils.
- Clear up to 300 acres of densely vegetated areas.
- Suppress succession of woody vegetation on up to 5,000 acres.
- Improve up to 15 miles of access roads to training areas.

The LRAM programs work plan/budget for FY 01-03 includes the projects listed below.

FY01

- Repair eroded areas by revegetating 50 acres in TAs 5, 7, 8, 9, and 14;
- maintain training area trails by upgrading 2,000 meters of degraded secondary and tertiary access trails in TAs 10, 11, and 13;
- redesign Flick Road;
- repair Coolidge Road;
- construct hardened artillery sites;
- reduce maneuver corridor/training area inhibiting vegetation in TAs 11, 12, and 17;
- construct two bivouac sites in TAs 8 and 9;
- improve three bivouac sites in TAs 5 and 11;
- improve four firing positions in TAs 8, 9, and 14;
- create three and maintain three landing zones in TAs;
- construct or enhance tactical concealment islands in TAs 5 and 12; and
- repair entrance aprons in TAs 10, 11, and 13.

FY02

- Repair eroded areas by revegetating 50 acres in TAs 5, 7, 8, 9, and 14;
- maintain training area trails by upgrading 2,100 meters of degraded secondary and tertiary access trails in TAs 9, 13, and 14;
- redesign Borland Road;
- repair Flick Road;
- design a tactical maneuver corridor from Range 23 to TA 12;

- reduce maneuver corridor/training area inhibiting vegetation in TAs 12, 13, and 14;
- construct two bivouac sites in TAs 18 and 19;
- improve three bivouac sites in TAs 7 and 17;
- improve four firing positions in TAs 5 and 7;
- create three and maintain three landing zones in TAs;
- construct or enhance tactical concealment islands in TAs 11 and 13; and
- repair entrance aprons in TAs 9, 12, and 14.

FY03

- Repair eroded areas by revegetating 50 acres in TAs 5, 7, 8, 9, and 14;
- maintain training area trails by upgrading 2,200 meters of degraded secondary and tertiary access trails in TAs 17, 18, and 19;
- redesign Russell Turnpike;
- repair Borland Road;
- reduce maneuver corridor/training area inhibiting vegetation in TAs 11, 12, and 17;
- construct four bivouac sites in TAs 18 and 19;
- improve three bivouac sites in TAs 18 and 19;
- construct two firing positions in TA 19;
- improve four firing positions in TAs 15 and 17;
- create three and maintain three landing zones in TAs;
- construct or enhance tactical concealment islands in TAs 5 and 12; and
- repair entrance aprons in TAs 7, 8, and 13.

Objective 1. Develop the LRAM work plan/budget for FY04 and FY05.

Objective 2. Coordinate all projects at the conceptual through completion levels with other Natural/Cultural Resources programs.

Objective 3. Implement projects listed in the LRAM work plan during FY 01-05.

8.8 Cantonment Grounds Management

Project - Grounds Management Support
Driver: Compliance with Executive Order 13112, *Invasive Species*; Compliance with Presidential directive; Stewardship; Compliance with Defense policies
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse

Goal. Provide support to maintain an aesthetically pleasing cantonment landscape that preserves natural ecosystem functions as much as possible.

The Grounds Maintenance Shop within the Public Works Operation and Maintenance Division is responsible for installation grounds improvement and landscaping. The Operation and Maintenance Division maintains detailed information on grounds management, including appropriate species of grass,

shrubs, and trees for planting; planting and maintenance procedures; fertilization schedules and guidelines; mowing and irrigation guidelines; disease and insect control; and sanitation. The Natural/Cultural Resources Branch's primary role in cantonment management is to provide technical advice when requested.

Forested areas in the cantonment area are managed by the installation forester for commercial forest products using both even-aged and uneven-aged methods. The *2000 Urban Forest Inventory Analysis of Mountain View and Pine Plains Area Fort Drum* (Zehr *et al*., 2000) describes problem areas and maintenance needs and provides recommendations for correcting urban forest problems on Fort Drum. Natural/cultural resources-related items other than forestry occurring within the cantonment area are managed by the appropriate resource manager to meet the particular program objectives. Special operating restrictions or mitigation measures are considered due to the proximity of family housing.

In managing natural resources in the cantonment area, Fort Drum acknowledges its responsibilities as listed in the White House Memorandum, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds* (Office of the President, 1994). The memorandum's requirements include:

X using regionally native plants for landscaping;
X using construction practices that minimize adverse effects on the natural habitat;
X reduce pollution by reducing the use of fertilizer and pesticides, using integrated pest management, recycling green waste, and minimizing runoff;
X implementing water-efficient practices; and
X creating demonstrations of these practices to promote their use elsewhere.

Objective 1. Provide professional advice to assist the grounds landscaping and maintenance program toward the use of native species.

Objective 2. Implement recommendations provided by Zehr e*t al*. (2000) regarding maintenance and management of Fort Drum's urban forest.

Objective 3. Manage natural/cultural resources occurring within the cantonment area to meet appropriate natural/cultural resources objectives.

Objective 4. Follow requirements listed in the 1994 White House Memorandum as closely as possible.

8.9 Pest Management

Project - Pest Management Support
Driver: Compliance with Executive Order 13112, *Invasive Species*; Compliance with Presidential directive; Stewardship; Compliance with Defense policies
Project Timing: All Objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and contract

Goal. Control those plant and animal species that affect natural resources management (*e.g.*, reduce ecosystem functionality, displace native species) or directly affect the military mission on Fort Drum.

Cantonment area pest management on Fort Drum is primarily accomplished by the Fort Drum Pest Control Shop. The Pest Management Coordinator and Pest Control Shop are within Public Works. Fort Drum employees who apply or oversee the application of pesticides are DoD-certified, and training and certification is conducted by the State for contract pest management technicians. Natural/Cultural Resources Branch personnel provide technical advice when requested.

The *Fort Drum Installation Pest Management Plan* (U.S. Army Center for Health Promotion and Preventive Medicine, 1997) identifies and prioritizes pests and their destructive effects to determine particular levels of protection. The plan emphasizes pest management within the cantonment area.

Integrated pest management (IPM) is used at Fort Drum, and typically a combination of IPM techniques is required to resolve a problem on a sustained basis. IPM includes the implementation and coordination of optimum sanitation, good structural design and maintenance of facilities, mechanical control, cultural control, biological control, and regulatory control. The IPM comprehensive approach to pest control or prevention, using methods of pest control in a compatible manner, avoids damage and minimizes adverse side effects to nontarget organisms and the environment.

Pest control efforts are implemented on the basis of surveillance. Pest surveys are used to determine the type of pest, extent of problem, and pest management technique most appropriate for safe, effective, and economic control.

The Office of the President (1994) called upon heads of federal agencies to reduce the amount of pesticide use by using IPM practices. IPM practices have been an important part of the Fort Drum pest management program for many years. Chemical control is used only when non-chemical techniques are inadequate or impractical. Furthermore, chemical control will not be used as a substitute for good sanitary practices or proper building maintenance. The Fort Drum pest management program is consistent with the Presidential directive (Office of the President, 1994) to reduce pesticide use by using Integrated Pest Management. In addition, Fort Drum's herbicide use has declined as a result of implementation of landscape management practices to control weeds (Parsons Engineering Science, 1995).

Fort Drum recognizes six general categories of pests that cause significant damage and require control or management:

X disease vectors and medically important pests (mosquitoes, ticks, fleas, and rodents),
X stored product pests,
X structural pests (termites and carpenter ants),
X general household and nuisance pests (cockroaches, blackflies, ants, filth flies, spiders, wasps, etc.),
X vertebrate pests (birds, snakes, skunks, and raccoons), and
X vegetative concerns (weed control).

In 1994 the Department of Defense issued the following three Measures of Merit that defined the course of installation pest management programs:

X Have a current pest management plan.

X Reduce pesticide use by 50% over a seven-year period (1994-2000).
X Have pesticide applicators certified within two years of employment.

The Fort Drum Installation Pest Management Plan is current. All chemicals used on Fort Drum are EPA approved. Integrated pest management techniques have enabled the installation to reduce its use of pesticides. Fort Drum is exempted from the reduction of persticde use requirement per FORSCOM. The installation understands both obvious and long term threats to both humans and ecosystem functions from pesticides. Pesticide applicators meet certification requirements.

The Fort Drum Installation Pest Management Plan discusses many aspects of pest management that are not directly within the scope of this INRMP, such as control of disease vectors and protection of facilities. Below discussions of animal and plant control are specific to the management of natural resources on Fort Drum.

Objective 1. Revise, based on Most Efficient Organization (MEO) considerations, the Fort Drum Installation Pest Management Plan (U.S. Army Center for Health Promotion and Preventive Medicine, 1997).

Objective 2. Maintain an updated Integrated Pest Management Plan on a five-year cycle.

Objective 3. Emphasize integrated pest management techniques to continue to reduce the use of pesticides.

Objective 4. Ensure pesticide applicators are fully certified.

8.9.1 Animal Pests

The number and variety of birds, mammals, and other wildlife that inhabit the installation require that outdoor applications of pesticides avoid nontarget organisms and aquatic environments. Fort Drum minimizes spray drift and prevents pesticides from entering sensitive areas.

Nuisance wildlife may damage structures, aircraft or roadways, and pose threats to military training activities. For example, flooding caused by beavers may block roads, negatively affecting military training missions and resource management operations. Populations and activities of nuisance wildlife are monitored, and appropriate management measures are employed to control such populations on Fort Drum.

Squirrels and skunks can damage insulation, electrical wires, and other building materials. Skunks, raccoons, opossums, and coyotes can be a nuisance in residential areas and around garbage. Rabbits can damage ornamental plantings, and beavers can flood areas and damage vegetation through dam building and feeding. Most species of wildlife are protected by State law, and a permit to control them is required.

Beavers have caused many adverse impacts on roads, culverts, and military training areas. Problems created by beavers have been aggravated in recent years, despite management measures aimed at controlling their activities. Surveys have indicated as many as 441 potential beaver sites on Fort Drum, excluding the main impact area, with a minimum beaver occupation rate of 49%, or 216 sites (Claypoole *et al*., 1994). The estimated 49% beaver occupancy rate, or minimum 1.3 active beaver colonies per

square mile, is much higher than the 20% occupancy rate, or 0.44 active sites per square mile, recommended by NYSDEC for areas surrounding Fort Drum. To minimize beaver-human conflicts, the beaver population should be maintained at levels consistent with military mission and public interests. Several measures are used to control the beaver population on Fort Drum, including trapping, installing water level control tubes and metal fencing, and beaver dam removal. Beaver habitat management measures are discussed in Section 8.3.1.3.

Beaver population management requires accurate data on beaver occupation rates and habitat distribution. Aerial surveys are conducted each fall, if possible, of the entire installation. Beaver activity is monitored, and any new problems associated with beavers are identified. Beaver flooding locations and methods used to alleviate problems at these locations have been documented since 1992. Data will continue to be accumulated for comparing the cost/benefits of various control methods. This is further discussed in Section 7.3.1.

Nuisance wildlife in the cantonment area, such as skunks and stray animals, are captured and removed by Fort Drum game wardens. Predators or other species control, if required, must be coordinated with game wardens and the Natural/Cultural Resources Branch.

Objective 5. Control nuisance wildlife as needed to protect facilities, infrastructure, and to maintain the military mission.

Objective 6. Obtain appropriate permits for the control of nuisance wildlife.

8.9.2 Non-Native/Noxious Plants

Non-native and/or noxious weeds pose threats to native habitats, endangered species, and plant community composition and diversity. More specifically, they threaten wetland ecosystems, complicate land restoration projects, add to the cost of pest management, and in general, threaten ecosystem functionality. Fort Drum is dedicated to the prevention of introduction of invasive species as well as their control, per Executive Order 13112, *Invasive Species*.

Purple loosestrife is a herbaceous perennial that was first introduced to North America in the early 19th Century and has become a serious problem in wetland ecosystems. The replacement of native plant species with purple loosestrife reduces food and cover for wetland wildlife species, including several State species of concern, such as American Bittern, Least Bittern, and wood turtle. Several methods have been employed in the past to control the expansion of purple loosestrife, including hand removal, water level manipulation, mowing, disking, herbicide treatment, and prescribed burning. However, biological control has proven to be the most effective method of reversing the proliferation of this exotic plant and maintaining the diversity of native flora in wetland ecosystems.

Fort Drum initiated a program in 1996 in cooperation with Cornell University's Biological Control on Non-indigenous Plant Species Program to establish a biological control of purple loosestrife through the release of insect species that are natural enemies of the plant. The program employs three highly host-specific European insect species that have been rigorously screened and approved by the U.S. Department of Agriculture and Animal and Plant Health Inspection Service for introduction in the United States. *Galerucella pusilla* and *G. calmeriensis* are leaf-eating beetles that defoliate the plant, and *Hylobious*

transversovittatus is a root-mining weevil that attacks the storage tissue. Insects are released annually at specific control sites, and have been successful in reducing the density of purple loosestrife on Fort Drum. In 1997 a rearing facility was established on Fort Drum for the propagation of control agents. The eventual goal is a reduction of purple loosestrife to approximately 10% of its current abundance. Control of purple loosestrife will be continued using several methods including hand removal, herbicides, and biological control.

Leafy spurge (*Euphobia esula*) and black swallow-wort (*Cynanchum nigrum*) are invasive plants that are spreading easterly and annually increasing on Fort Drum. These species have been monitored, and in 2000 Fort Drum began utilizing biological control agents for their control.

Forest damage caused by pests, disease, and/or rodents may be detected by the installation forester and/or in conjunction with personnel from the NYSDEC forestry office in Lowville, New York. There are no major forest insect or disease problems on Fort Drum, although damage by the sugar maple leaf borer has been observed in the past.

Objective 7. Prevent the introduction of and control invasive species as per Executive Order 13112, *Invasive Species*.

Objective 8. Continue to rear and utilize biological control agents to control purple loosestrife, leafy spurge, black swallow-wort, and other invasive species on Fort Drum.

8.10 Fire Management

8.10.1 Fire Prevention and Suppression

Project - Fire Prevention and Suppression
Driver: Stewardship; Compliance with Defense policies
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and contract

Goal. Prevent and suppress wildfires to maintain ecosystem biodiversity and functionality.

Fire danger on Fort Drum may be greater than in surrounding areas due to military training and more frequent use of woodlands and forests. However, the number and severity of fires has been reduced by enforcement of installation fire regulations. Fort Drum regulations stress that it is the responsibility of each Army unit to suppress any fire in their area.

The Fort Drum Fire Department is responsible for fire suppression on the installation. Fort Drum also maintains mutual support agreements with many surrounding communities for fire suppression. Fort Drum Fire Department personnel are first responders to fire incidents on the installation, but if training activities are ongoing at the site of a fire, entry clearance must be coordinated with the Range Control Office. Personnel in the Natural/Cultural Resources Branch Forestry Office also respond to range fires and assist by providing management-related recommendations on fire suppression.

The Fire Department is manned 24 hours per day, 7 days a week and equipped with structural, forest, brush, and grass fire fighting apparatus. Fire fighters are fully trained in wildfire suppression. Various hand tools are carried on trucks to allow suppression in areas inaccessible to vehicles, although specialized vehicles are available for off-road fire fighting activities.

The road system on Fort Drum provides quick access for fire management and facilitates effective response to wildfires. Roads also serve as firebreaks in training areas. Fires in the main impact area may be allowed to burn if they meet management objectives. If necessary, aerial water buckets will be employed or backfires from roads are used to reduce the chance of a fire escaping from the impact area.

The primary emphasis of fire management on the Fort Drum is prevention. Unit commanders stress fire regulations to their soldiers. Education programs on fire prevention and safety are available to all Public Works personnel. Fort Drum's active wildfire suppression program protects numerous acres of forest habitat and provides a safe environment for soldiers, employees, and resource users.

Objective 1. Require all military units and other installation personnel to report and begin suppression of wildfires as soon as possible.

Objective 2. Provide natural/cultural resources management-related recommendations relative to fire suppression activities to Fort Drum Fire Department personnel.

Objective 3. Respond to wildfires as soon as possible and begin immediate suppression, consistent with safety requirements.

8.10.2 Prescribed Burning

Project - Prescribed Burning
Driver: AR 350-4; Stewardship
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Develop a prescribed burning program to maintain training mission capabilities and enhance ecosystem biodiversity and functionality on Fort Drum.

The prescribed burning program has been under development on Fort Drum for the last few years in cooperation with the U.S. Forest Service (Green Mountain National Forest), and the U.S. Army Environmental Center. The objectives of the prescribed burning program are to control stem density, reduce fuel loads, and regenerate certain species and habitat conditions. Regardless of the objectives for a particular burn, most prescribed burns improve access and maneuverability for military and other activities and reduce emergency response incidents by reducing wildfire potential.

Monitoring individual prescribed burning sites is imperative to the developing program due to the uncertainty associated with the effectiveness of fire as a management tool on Fort Drum. Monitoring plots are established within each burn area and monitored before and after prescribed fire is applied. Data collected includes military use, ground cover, species, size, height, number of woody stems, amount of dead and downed woody material, etc. In addition, a large area in Training Area 12B has been established

as an experimental area that will be burned at different intervals and monitored for vegetative and other responses to burn frequencies.

Long range scheduling of prescribed burning is not feasible as wildfire and annual burning conditions greatly affect burning schedules. However, Fort Drum anticipates prescribe burning between 1,000 and 1,500 acres annually. The size of individual prescribed burns on Fort Drum varies from about 10 to 300 acres in forested areas and up to about 500 acres in more open areas. Opportunities for prescribed burning are weather-dependent. Spring and fall seasons are used for most burns. However, the spring burning season must minimize disturbing wildlife that may be going into the nesting season. On selected areas, especially those where more thorough reductions of woody vegetation are desired, a summer drought period burn may be required. For purposes of effective burning and fire control, parameters of temperature, relative humidity, wind speed and direction, and fuel moisture must normally be met prior to burning.

The Fort Drum Fire Department supports the Natural/Cultural Resources Branch in prescribed burning with personnel, equipment, and logistical assistance. Natural/Cultural Resources Branch personnel receive appropriate fire management/suppression training from qualified trainers sanctioned by the National Wildfire Coordination Group before participating in prescribed burning. The Natural/Cultural Resources Branch is developing a burn map to better coordinate with the installation Fire Department. Maps will delineate areas burned by wildfires, past prescribed burns, areas scheduled for prescribe burning, “Let Burn” areas, etc.

A long range burning plan is difficult to develop as there are many unpredictable variables that affect burning, such as weather, Fire Department support, and competing tasks. Such a plan will need to be developed as a flexible, evolutionary document.

Objective 1. Continue to develop the prescribed burning program on Fort Drum.

Objective 2. Monitor prescribed burn areas and use experimental plots to determine the effectiveness of prescribed burning on Fort Drum.

Objective 3. Apply prescribed fire only within acceptable parameters (temperature, relative humidity, etc).

Objective 4. Incorporate and maintain burn areas as a GIS data layer for fire effects monitoring, and coordination purposes.

Objective 5. Depending on results of experimental burns and success of the prescribed burning program as a whole, develop a long range burn plan during 2001-05.

8.11 Training Requirements Integration

Project - Training Requirements Integration
Driver: AR 350-4; Stewardship
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Integrate Fort Drum training requirements for land use with the sustained capability of the land to support such use.

The Training Requirement Integration (TRI) component of the ITAM program is the direct interface between training requirements for land use and the capability of land and natural resources to support that training. TRI is a major land protection phase of ITAM. It uses information from LCTA and the GIS to determine viable training load carrying capacities and to locate military training exercises accordingly. Load carrying capacity takes into account the status of natural and cultural environments of training areas at the time training activities take place.

8.11.1 Mission Planning

The Natural/Cultural Resources Branch makes recommendations for land use design and management considerations to trainers and planners and coordinates with them on properly scheduling and allocating land use for military training with minimum environmental damage. Interfacing land rehabilitation actions with training requirements ensures mission support. The degree of ITAM program success greatly depends on cooperation and coordination between resource users and managers.

LCTA data analysis has indicated about a 25% to 30% loss of grasslands on non-sandy soils due to natural succession since 1991. Once grasslands revert to shrublands, military use drops, and if left alone, these shrublands most likely revert to second growth forests characterized on Fort Drum by almost impassable tangles of brush. Both LCTA and grassland bird project data show that military use is correlated with a decrease in woody stems on non-sandy grasslands. This suggests that through coordination with military units, military use, specifically tank maneuvers, may be an effective tool in maintaining and/or recovering overgrown training lands. By expanding into shrubby areas, training may be used as a maintenance tool to benefit both the ITAM program and bird populations dependent on large contiguous areas of open grasslands. Prescribed burning in grassland areas may also be effective in retarding woody stem growth.

Grasslands on sandy soils (designated a significant community type by the New York Natural Heritage Program) may be dependent on military activity for their continued existence. Activities involving large-scale excavation on sandy grassland or forest soils should be avoided if possible, as rehabilitation efforts in sandy areas are costly and often complex. When locating intensive excavation activities, it may be more cost effective to use non-sandy areas as much as possible. Alternatively, repeated large-scale ground disturbance activities should be restricted to certain designated locations within the sandy areas.

Fort Drum has been rehabilitating bivouac areas and establishing new bivouac areas (taking into account soil types and forest type) as data indicated deterioration of many sites. Also LCTA data indicates that while military use seems to have no adverse effect on bare ground, canopy cover, and litter in shrublands, it does decrease woody stem densities, indicating that these areas could be used to a greater extent with no adverse impacts.

In 2000 the Natural/Cultural Resources Branch utilized LCTA and other data in its GIS to develop a working example of how the tools of TRI are used to support the military mission on Fort Drum. A Cross Country Movement Model was generated with the primary objective of determining how variables (*e.g.*, vegetation, moisture, soils, topography, land use) affect speed and mobility of HMMWVs and if

concentrating management activities in specific areas of the installation could improve those conditions. The GIS depicted these variables on a series of maps. When the variable of vegetation, a variable that significantly limits mobility was incorporated, the GIS indicated clearly where vegetation removal (*i.e.*, forestry activities) should be concentrated for the most benefit to military training (Figure 8.11.1). Thus, this model will be used to focus forestry program vegetation manipulation to the areas within the installation that will produce the most benefit to military training.

Objective 1. Assist military mission trainers and planners with land use design and management considerations to ensure minimum environmental damage.

Objective 2. Encourage military mission trainers and planners to expand into shrubland, particularly for tank-related maneuvers.

Objective 3. Continue to support the military mission by developing models, such as the Cross Country Movement Model, and utilizing models to direct management.

8.11.2 Range Carrying Capacity

The Army is developing a methodology and integrated support system (Army Training and Testing Area Carrying Capacity [ATTACC]) for estimating operations and support costs of using land at Army installations for training and testing purposes (Department of the Army, 1999). Major objectives of ATTACC are:

- to identify training and testing land carrying capacity and
- to establish a model to predict LRAM requirements based on training and testing usage.

Fort Drum is in the process of obtaining military use information to correlate this use with training land condition information as part of the process of determining training carrying capacities on a training area-specific basis. Once completed, ATTACC models will be evaluated for potential use as a management tool.

Objective 4. Collect military use data for the potential development and implementation of a training scheduling system based on military use carrying capacity (ATTACC).

8.11.3 Training Restrictions

Fort Drum does not shut down training areas or rotate training areas as some installations do. Fort Drum requires training units to prepare and submit a Record of Environmental Consideration to the Environmental Division prior to any training exercise. The Record of Environmental Consideration lists appropriate restrictions, such as not allowing entrenching operations. The 10th Mountain Division and Fort Drum Regulation 350-4 includes restrictions that directly impact training on Fort Drum. The Environmental Guidelines packet distributed by the Environmental Division outlines activities that have demonstrated a greater need for environmental review.

Environmental constraints at Fort Drum do not preclude units from training to standards. Constraints may cause a unit to alter the conditions under which a task is trained, but standards are maintained. The ITAM program has been designed to aid Fort Drum in ensuring that units can train to standard while complying

with environmental laws and regulations.

Objective 5. Continue to provide training units lists of mission-specific restrictions using the Record of Environmental Consideration system.

Objective 6. Use training restrictions, when required, to protect sensitive natural and cultural resources and minimize damage to training areas.

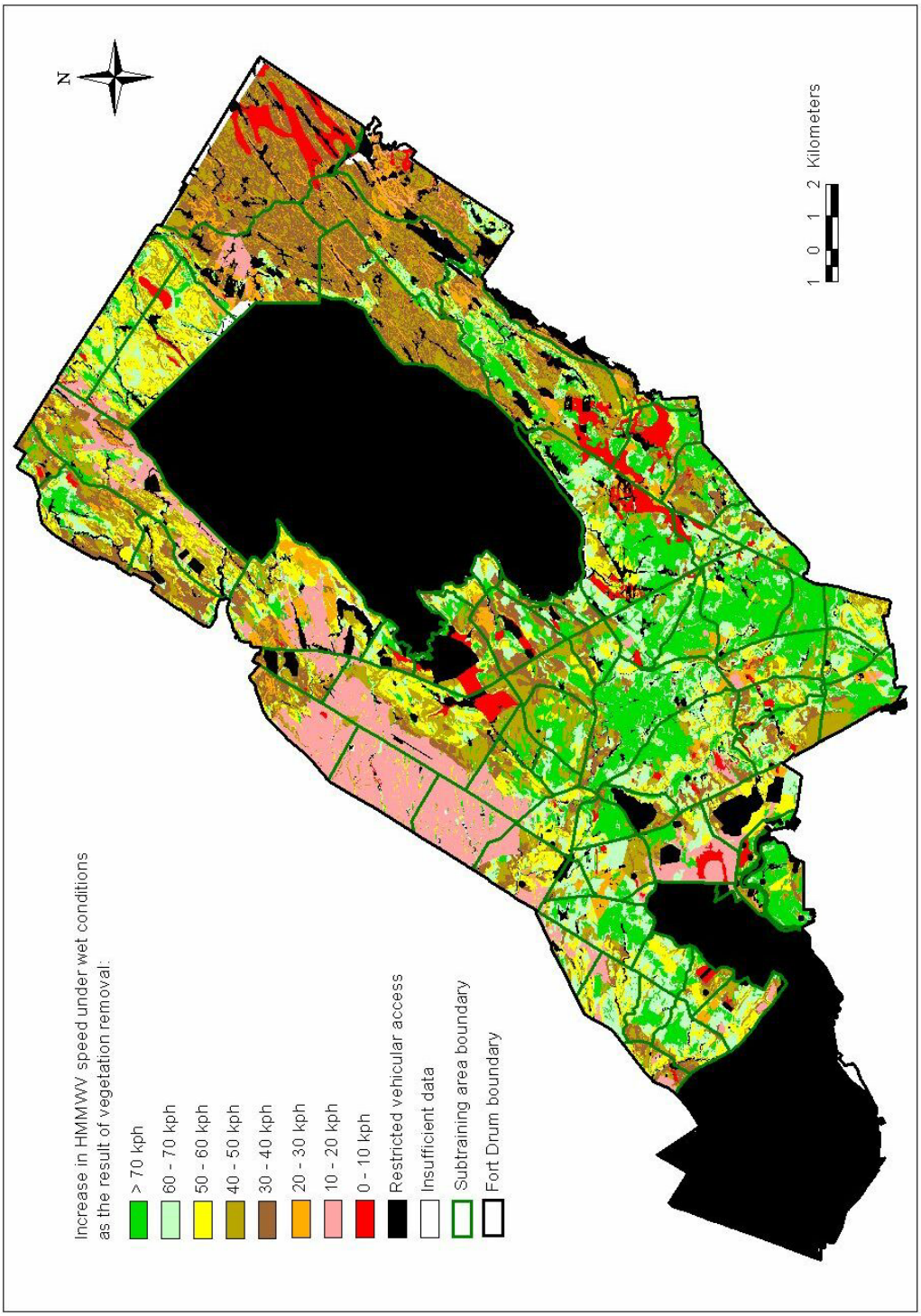

Figure 8.11.1. Cross-country movement model.

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9.0 NATURAL RESOURCES ENFORCEMENT

"*It is our task to protect those resources for future generations - to hand down undiminished the natural wealth and beauty which are ours today*."
President John F. Kennedy, 1961

Many aspects of natural resources management require effective environmental law enforcement (*e.g.*, protection of rare or unique species; protection of sensitive areas; hunting, trapping, and fishing recreation; protection of cultural resources).

9.1 History, Authority, and Operations

The Law Enforcement Command (LEC) commander serves as the Fort Drum Provost Marshall and is the installation game warden. The LEC is part of the Directorate of Emergency Services. The LEC provides command and staff support to the 10th and 511th Military Police (MP) companies, and in addition to natural and cultural resources law enforcement, the Provost Marshall in conjunction with the 10th and 511th MP companies, provides road and range patrols, military police investigations, crime prevention, and physical security.

The Fort Drum Commander confers commissions on Fort Drum game wardens. Fort Drum game warden personnel are trained (Section 9.4) professionals. They are fully equipped with modern enforcement tools, including weapons, 4-wheel drive vehicles, all-terrain vehicles, snowmobiles, a boat, mobile radios, and cell phones. The number of game wardens on the installation has fluctuated; currently there are five full-time civilian game wardens. MP personnel assist game wardens during busy seasons.

Enforcement of fish and wildlife laws, in addition to many other state environmental laws on Fort Drum, is also provided by New York State Environmental Conservation Officers. The State officer covering Fort Drum spends about 65 percent of his/her time on the installation. During white-tailed deer seasons, as many as four State officers are on or in the immediate area of Fort Drum. The USFWS has a local special agent that Fort Drum game wardens coordinate with regarding violations of federal fish and wildlife laws.

Fort Drum game wardens enforce all federal and State natural resources laws and Fort Drum regulations on the installation. Game wardens also perform traffic, penal, and criminal enforcement activities on the installation. Generally, wardens work alone, but during night shifts, two man teams are scheduled.

9.2 Jurisdiction

Fort Drum has concurrent jurisdiction. Enforcement can be performed by officers with federal or State commissions. Fort Drum officers use the Federal Magistrate Court to adjudicate violators who are issued 1805 citations for State or federal natural resources-related violations. Violators of Fort Drum regulations are issued 1408 citations, which are cause for administrative action that may result in forfeiture of privileges on the installation. Fort Drum officers annually issue about 200 natural resources-related, 1805 and 1408 citations. State and federal enforcement officers use District or State courts for case adjudication.

9.3 Enforcement Emphasis

The emphasis of natural resources enforcement on Fort Drum is associated with particular seasons. The installation experiences a large influx of hunters during high profile seasons, such as deer, which often means more violations. Shooting from a vehicle or from a road and hunting in closed areas comprise a high percentage of violations during high profile seasons. Impact area or closed area violations are an enforcement emphasis area on Fort Drum. Impact area violations occur year-round but are more common during high profile seasons. The current enforcement emphasis strategy has developed over several years and will continue unless it becomes apparent that other enforcement problem areas need to be emphasized.

9.4 Training

The Sikes Act mandates that DoD installations employ adequate numbers of professionally trained natural resources personnel, including law enforcement personnel to implement the INRMP. The Act authorizes DoD to enforce all federal environmental laws, including National Historic Preservation Act, Archeological Resources Protection Act, Migratory Bird Treaty Act, Clean Water Act, and Endangered Species Act when violations occur on the installation. DoD Directive 4715.3 (May 3, 1996) states, "*Professional natural and cultural resources staff shall oversee the enforcement of applicable laws as an integral part of an installation's conservation program".*

Fort Drum provides game wardens with LEC and MP training. In addition, wardens attend a NYSDEC-sponsored conservation course, annual State refresher training courses, and various municipal police courses. Wardens have attended other courses including winter survival and National Military Fish and Wildlife Association (NMFWA) annual refresher training. In addition, most Fort Drum game wardens are retired police officers, who bring years of police training and experience to the installation.

Fort Drum game wardens are well trained by police standards. However, a need exists for Fort Drum game wardens, particularly new officers, to have formal natural/cultural resources law enforcement training. The best available option, especially for new wardens, is to use the basic law enforcement course at the Federal Law Enforcement Training Center and the USFWS two week, follow-up course to satisfy the need for basic training.

There is a generally recognized requirement for a 40-hour-minimum annual refresher training for enforcement officers. Less training opens the employer to liability risks in the event of legally debatable officer actions. NMFWA continues to offer annual training for experienced wardens. This training is one week and uses highly qualified instructors, many of whom have national reputations. The course is open to all of the DoD and is held on various military installations. This is the most commonly used course by military installations for refresher training. This training and other short-term courses and annual refreshers attended through the State adequately fulfill Fort Drum game warden annual training requirements.

9.5 Project - Natural/Cultural Resources Enforcement

Project - Natural/Cultural Resources Enforcement
Driver: Maintaining the capability of training lands to support the military mission (Sikes Act); Compliance with Endangered Species, National Historic Preservation, and Archeological Resources Protection acts; Stewardship; Compliance with Defense policies
Project Timing: Objective 3 - annually until all wardens receive training, then as needed; Other objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse

Goal. Assure legal compliance of military and civilian activities with regard to natural and cultural resources on Fort Drum.

Objective 1. Maintain a law enforcement program for military and civilian activities that relates to natural and cultural resources protection on Fort Drum.

Objective 2. Coordinate enforcement activities with other agencies, particularly NYSDEC and the USFWS.

Objective 3. Provide Natural/Cultural Resources Branch support to LEC for annual formal natural/cultural resources law enforcement training to one Fort Drum game warden.

Objective 4. Provide quality annual refresher training to Fort Drum game wardens.

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10.0 AWARENESS

Conservation awareness is instrumental in creating conditions needed to manage natural resources. The Fort Drum approach to awareness stresses education. It provides military personnel and the public with insights into installation natural environments and conservation challenges. The more people know about the installation's unique and valuable natural resources, the more responsibly they act toward them.

Education also promotes awareness of critical environmental projects and the rationale behind them. Activities, such as fish stocking, land rehabilitation, wildfire suppression, etc. can be accomplished with little conservation awareness effort since installation personnel, recreationists, and the general public naturally support these easily understood efforts. However, issues such as protection of sensitive areas for little known plant and wildlife species, prescribed burning, permit fees and their uses, etc. require effective conservation communication to get positive support and, perhaps more importantly, to avoid adverse reactions from various users. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

10.1 Environmental Awareness

Project - Environmental Awareness
Driver: Maintaining the capability of training lands to support the military mission (Sikes Act); National Historic Preservation, Archeological Resources Protection, Clean Air and Clean Water acts; Stewardship; Compliance with Defense policies; AR 350-4
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse and possible external support

Goal 1. Develop an awareness of values of, and requirements for, natural and cultural resources protection on Fort Drum to support sustained military training.

Goal 2. Educate military users to minimize impacts to the land and natural resources to sustain and enhance training.

Effective land management measures help solve potential problems in land use associated with training activities. Moreover, most adverse effects on the environment and/or natural resources are preventable by making relevant personnel aware of the value of quality environments and natural resources in training areas (U.S. Army Construction Engineer Research Laboratory, 1987). Educating soldiers in environmental awareness is a responsibility of the ITAM Program Manager and the Natural/Cultural Resources Branch. The ITAM program provides information to soldiers to improve their understanding of how the military mission and other activities affect the environment. The Natural/Cultural Resources Branch informs soldiers about complying with environmental laws through educational materials and presentations.

Educational materials developed through the ITAM program on Fort Drum include posters, a *Leader's Handbook*, *Leader's Guide*, *Soldier's Pocket Guide*, narrated slide shows, and a video tape "*Fort Drum Training and the Environment*". These materials describe training-related damage that may be caused by tactical mistakes and how to follow rules and regulations to minimize environmental degradation.

Educational materials from the Natural/Cultural Resources Branch, in addition to those from the ITAM program are presented at various military-sponsored educational events, such as the Safety Stand-down Day, Earth Day, Arbor Day, and Fort Drum Mountainfest. Seminars and/or lectures on training and the environment have also been presented to unit commanders, senior officers, and soldiers.

Environmental Awareness (EA) training is conducted regularly, including a weekly training session for visiting units that is also open to all those training at Fort Drum, and upon request by the Environmental Division. The focus of this training is field-oriented, and it is directed to those who use Fort Drum for military training, new technology/equipment testing and fielding, construction/destruction projects, and real property actions. EA training is formally provided to Active Component units at Battalion Commanding Officers conferences, Commander/1st Sergeant courses, Local Training Area Coordinators conferences, Safety Stand-Down briefings, Environmental Safety briefings, and to Reserve Component Units at Annual Training Pre-Camp conferences, Annual Training Planning conferences, and Advanced Party briefings.

More educational materials need to be developed or produced for the Environmental Awareness Program. This is a continuous effort that requires periodic modification and development of educational materials to reflect changes in environmental policies and regulations and to describe the proper use of new military weaponry and/or equipment on Fort Drum training lands.

Knowledge about wetlands is generally limited within the military and surrounding civilian communities. The installation's wetlands program, along with other natural/cultural resources management programs, need to provide up-to-date information on wetlands, including wetland definition/classification and information on the importance of wetland ecosystems to the environment.

Objective 1. Use the ITAM Environmental Awareness Program to inform soldiers of the need to protect the Army's limited resources, present means for minimizing damage, and encourage good land stewardship and wise tactical use of installation natural resources.

Objective 2. Provide decision makers with the information needed to make judgments that affect the Natural/Cultural Resources Program.

Objective 3. Revise Military Personnel Awareness materials (*e.g.*, field card, posters, video) as needed to maintain the accuracy and mission-relevancy of these materials.

Objective 4. Provide mission briefings to military personnel training at Fort Drum and update these presentations as needed to maintain their accuracy and mission-relevancy.

Objective 5. Provide seminars and/or lectures to unit commanders, senior officers, and soldiers on training and the environment.

Objective 6. Develop new military personnel awareness materials and briefings as needed to ensure support of the military mission, compliance with environmental laws (*e.g.*, NEPA, Endangered Species Act, Clean Air Act, Clean Water Act), and stewardship of public lands.

Objective 7. Provide an understanding of Fort Drum's Natural/Cultural Resources Program and

installation environmental policies to military and civilian users.

Objective 8. Provide information on wetlands and the importance of wetland ecosystems to the environment to Fort Drum users.

10.2 Public Awareness

Project - Public Awareness
Driver: National Historic Preservation, and Archeological Resources Protection acts; Stewardship; Compliance with Defense policies
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse

Goal. Provide information to Fort Drum and external interested communities regarding natural resources and associated management programs at Fort Drum.

The Natural/Cultural Resources Branch is responsible for environmental education for the public using Fort Drum. Environmental information is provided in formats suited to each audience, including displays and presentations at local schools; talks to community organizations; festivals, such as Mountainfest, Earth Day, and Environmental Awareness Day; and articles in local and military newspapers. Environmental personnel are involved in Project WILD, Project WET, International Migratory Bird Day, and NYSDEC-sponsored Free Fishing clinics. A logo and uniform for Natural/Cultural Resources Branch personnel has made the public more aware of the Branch and its work.

Environmental education materials, such as brochures and posters, are available from the Environmental Division. In 1998 brochures containing a faunal checklist of species found on Fort Drum were produced. The Natural/Cultural Resources Branch possesses numerous taxidermy mounts of indigenous birds and mammals. These mounts are often used for community outreach programs. Interactions between Fort Drum and the surrounding communities have been accomplished through such organizations as the New York State Wetlands Forum, Society of American Foresters, The Wildlife Society, and other professional organizations to exchange information and knowledge on environmental subjects.

Objective 1. Improve the general program knowledge of all persons associated with the Natural/Cultural Resources Branch, particularly those who come into regular contact with interested persons.

Objective 2. Provide prepared talks, dependent upon personnel and time availability. Whenever possible, use these opportunities to explain contemporary natural resources issues and management.

Objective 3. Use newspapers, television, and radio to inform the Fort Drum and surrounding community of matters important to the Fort Drum natural/cultural resources program.

Objective 4. Participate in activities, such as Project WILD, Project WET, and NYSDEC-sponsored Free Fishing clinics to promote the Natural/Cultural Resources Branch image and/or programs.

Objective 5. Maintain taxidermy mounts of indigenous birds and mammals for use for community

outreach programs.

Objective 6. Pursue interactions between Fort Drum and surrounding communities and professional organizations to exchange information and knowledge on environmental subjects.

Objective 7. Participate in Earth Day and other organized events as appropriate, and evaluate other special events for their usefulness in promoting the Natural/Cultural Resources Branch image and/or programs.

11.0 OUTDOOR RECREATION

Fort Drum is a large, relatively undeveloped, open space. This open space and outdoor recreation opportunities associated with it are perhaps the installation's best natural attributes in terms of community quality of life.

Outdoor recreation enhances the quality of life for military and civilian personnel. As such, Army lands with suitable natural resources are to be managed to allow outdoor recreational opportunities, consistent with the Sikes Act. For the purposes of this INRMP and to be consistent with DoD Directive 7400.4 and AR 200-3, outdoor recreation is defined as recreational programs, activities, or opportunities that depend on the natural environment. Examples include hunting, horseback riding, picnicking, bird-watching, hiking, and camping. Developed or constructed facilities and activities, such as golf courses, tennis courts, baseball facilities, etc., are not included.

People and social uses/needs are an integral part of ecosystem management. The Outdoor Recreation Program is based on providing quality experiences while sustaining ecosystem integrity. Activities that have a direct effect on species populations, such as game harvest, will be monitored to determine potential effects. Special consideration will be given to protecting critical areas (*e.g.*, cultural resources sites) from negative impacts due to outdoor recreation.

11.1 Military Mission Considerations

The military mission has priority over outdoor recreation involving range access. If outdoor recreational activities are to continue to thrive on Fort Drum, this military mission priority must not be compromised. If recreational or management activities conflict with military activities, the military mission comes first.

11.2 Public Access

Public access is a tradition on Fort Drum. Fort Drum has been open to the public for hunting, fishing, and trapping for more than 50 years. There are many opportunities for the general public to participate in installation activities. In maintaining a policy of public access, Fort Drum relies on a responsible public to adhere to restrictions placed on range access, IAW Access Control Plan dated 30 May 2001.

Department of Defense Directive 4715.3, *Environmental Conservation Program*, May 3, 1996, states, "*The principal purpose of DoD lands and waters is to support mission-related activities. Those lands and waters shall be made available to the public for educational or recreational use of natural and cultural resources when such access is compatible with military mission activities, ecosystem sustainability, and other considerations such as security, safety, and fiscal soundness. Opportunities for such access shall be equitably and impartially allocated*".

Paragraph 2-10 of Army Regulation 200-3, *Natural Resources -- Land, Forest, and Wildlife Management*, states that access by recreational users, *... 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 such times as such access can be granted without bona fide impairment of the military mission, as determined by the installation commander*. This regulation further states that

withholding public access must be substantiated by a statement in the Integrated Natural Resources Management Plan.

Recreational activities at Fort Drum are prohibited in the main impact area and areas designated as off-limits or restricted due to safety considerations. Range Control may also shut down active training areas to recreationists. The installation can be closed at the discretion of the Installation Commander when deemed necessary.

Fort Drum hunting, trapping, and fishing programs will remain open to military personnel and the public with a New York hunting, trapping, or fishing license. These individuals need only obtain installation hunting, fishing, and/or trapping permits; an Access Pass; and appropriate federal permits. Other recreationists must obtain a Recreational Permit and an Access Pass. There are no restrictions on the number of permits issued to the public.

Fort Drum policies toward public access are within both the spirit and letter of Army and Defense policies. They will be continued during 2001-2005.

11.3 Hunting, Fishing, and Trapping Programs

Project - Hunting, Fishing, and Trapping Programs
Driver: Stewardship; Compliance with Defense policies
Project Timing: Objectives 12 and 14 - 2002; Objective 13 - 2003; All other objectives - ongoing indefinitely
Regulatory Approvals: None required except for NYSDEC regulatory support for hunting, fishing, and trapping
Vehicle for Project Implementation: Inhouse

Goal. Provide opportunities to the Fort Drum community and general public for quality, safe, and equitable hunting, fishing, and other outdoor recreation, consistent with needs of the Fort Drum military mission.

11.3.1 Hunting, Fishing, and Trapping Activities

Fort Drum is open to the public after obtaining permits from the Directorate of Community Activities (DCA) Outdoor Recreation Office for hunting, fishing, and trapping. Excellent opportunities for anglers are provided by the many streams, lakes, and ponds on Fort Drum. These waters support various fish species, and several waters are stocked, further contributing to fishing opportunities. However, fishing activities must be regulated; based on fish populations, fishing pressure, etc. Fishing regulations are designed to ensure future fishing opportunities, but also conserve fisheries resources.

A variety of wildlife species offer a number of opportunities for hunting and trapping on Fort Drum. Hunting and trapping seasons or dates are announced annually by the NYSDEC for different game species. These dates may be extended or shortened in a particular year, depending on circumstances. For example, beaver trapping season was extended in 1992 and 1993 to reduce excess beaver. The entire installation with exception of permanently off-limits areas, is open to hunting, fishing, and trapping. However, in the cantonment area only archery hunting is allowed, and trapping for beavers in the

cantonment area is by the selection process and is for population reduction. There is no recreational trapping permitted in this area. Bag limits for hunting, fishing, and trapping on Fort Drum are normally identical to those used outside the installation.

Deer hunting on Fort Drum provides many hours of outdoor enjoyment and provides an economic boost to the installation natural resources program and to NYSDEC from the sale of licenses and permits. During FY99 about 1,100 big game permits (including bear hunters) were sold on Fort Drum. The number of big game hunters has ranged from 1,116 to 1,559 during the past five years. Limited deer harvest statistics can be obtained through the fish and wildlife program office. Deer and bears harvested on Fort Drum have been weighed and aged at the installation big game check station.

Fort Drum annually has about 600 small game hunters. In 1999, 667 hunters pursued small game on Fort Drum.

Furbearer hunters must possess a State small game hunting or sportsman's license. Trappers must possess a State trapping license. During 1999, Fort Drum had 36 trappers. Over the past five years, trapper numbers have ranged from 25 to 51. Trapping harvest data are available through the fish and wildlife program office.

Hunters must possess a small game or sportsman license, must register annually with the Harvest Information Program, and for waterfowl must possess a federal migratory bird stamp to hunt migratory birds. State, federal, and Fort Drum regulations are in effect for migratory game bird and migratory waterfowl hunting on the installation.

In 1999, fishing on Fort Drum experienced a significant increase in participation with 1,339 permits sold.

Fort Drum hunting, fishing, and trapping regulations will not change significantly during 2001-2005. Revisions, if necessary, will be made annually, depending on factors, such as a change in federal or State laws/policies and Army regulations, schedule of military training missions, and known population changes of individual game species.

Objective 1. Continue to follow NYSDEC season, bag limit, and other regulation structures for hunting, fishing, and trapping with only limited exceptions for management or safety purposes.

11.3.2 Hunter, Trapper, and Angler Administrative Processes

Military installations usually have complex hunter and angler control systems. These are needed to accommodate recreational activities without interference with the military mission and to ensure safe, high quality recreational experiences. Records of permit sales and hunting, trapping, and fishing trips are maintained by the Natural/Cultural Resources Branch. Recreational users can access any training area that is open for recreation that day, and there is no limit to the number of training areas a user can check into each day. Check In/Check Out procedures for recreationists are discussed in Section 11.3.2.4.

Objective 2. Continue recreationist control systems to ensure safe conditions and equitable treatment of users.

11.3.2.1 Hunting, Trapping, and Fishing Regulations

The NYSDEC issues regulations for hunters, trappers, and anglers in New York, including those who use Fort Drum. The 10th Mountain Division Light Infantry and Fort Drum Regulation Number 420-3, *Hunting, Fishing, Trapping, and Camping*; NYSDEC *Hunting and Trapping Regulations Guide*; and NYSDEC *Fishing Regulations Guide* are primary means of establishing controls on hunting, fishing, and trapping on Fort Drum. In addition, Fort Drum may issue supplemental orders if specific needs arise. During 2001-2005 rules and regulations will be updated as needed.

Objective 3. Update recreation rules and regulations and issue supplemental orders as needed during 2001-2005.

11.3.2.2 Fort Drum Permits

A Fort Drum Recreational Permit and an Access Pass must be obtained from the Outdoor Recreation Center for all recreational pursuits on Fort Drum. A Release and Hold Harmless Agreement must be completed before receiving the Recreational Permit and Access Pass. There are two types of Recreational Permits: hunting, trapping, and fishing permits for those engaged or assisting with those activities; and all other recreational pursuits (*e.g*., berry and mushroom picking, picnicking, hiking, and camping). In addition, archery hunters are required to attend and qualify at an Archery Qualification Session to meet shooting requirements and receive a qualification card to hunt on Fort Drum. A Nighttime Fishing/Overnight Camping Access Pass is required for those activities.

There is no charge for Recreational Permits for activities other than hunting, fishing, and trapping. Access Passes are free. Fort Drum hunting, fishing, and trapping permits cost the same for both military and civilian users. Seasonal, combination, and daily rates are available. A fee schedule is included in Fort Drum Regulation 420-3. The permit fee schedule is evaluated annually, and changes are posted by mid-August.

Objective 4. Continue to provide recreation permits through the Outdoor Recreation Center.

Objective 5. Evaluate the Fort Drum recreation fee schedule annually.

11.3.2.3 State Licenses

Persons are responsible for obtaining New York hunting, trapping, and fishing licenses before obtaining installation permits. State licenses are sold at the Outdoor Recreation Center. Federal permits (*i.e*. duck stamps) must be obtained at post offices.

Objective. 6. Continue to provide State license sales at the Outdoor Recreation Center.

11.3.2.4 Check In/Check Out Procedures

Recreational users must check in daily with Range Control by leaving their permit number prior to entering Fort Drum training areas. Check in with Range Control can be either done in-person or by calling the Sportsmen's Hotline. The Hotline lists training areas open for recreation, and persons are required to

leave their access number when calling the hotline. Persons nighttime fishing or overnight camping, with exception of camping at designated campsites at Remington Pond, must check in and check out with Range Control in-person. The check in/check out process has worked well on Fort Drum.

Objective 7. Continue the check in/check out procedures at Fort Drum during 2001-2005.

11.3.2.5 Recreation Maps

Fort Drum maps are essential for recreationist use of training areas. Maps are provided to recreationists when permits are obtained. In addition, Fort Drum Regulation 420-3 includes a Cantonment Archery Hunting Areas map. Maps feature training area boundaries, off-limits areas, major roads, and other features for orientation. Maps appear to be adequate for continued recreationist access during 2001-2005.

Objective 8. Continue to provide recreationists appropriate maps of Fort Drum during 2001-2005.

11.3.2.6 Safety Considerations

Sports and recreational activities on Fort Drum must be regulated to avoid conflicts between the military mission and recreation. Recreationists are required to check with the Fort Drum Range Control Office for clearance of an attempted recreational area and receive instructions on any off-limit areas. Safety rules must be followed during each recreational activity. The archers qualification session before being allowed to hunt in the cantonment area and other safety precautions, such as requiring archers to hunt from elevated deer stands and hunting a minimum distance from occupied buildings, foster safe hunting activities in the cantonment area.

The State of New York requires archery hunters to attend an archery qualification class, all hunters to attend a hunter safety course, and boaters to attend a boater safety class before being allowed permits to pursue these activities in the State. These requirements also apply to Fort Drum recreationists.

Objective 9. Continue to ensure Fort Drum recreationists follow safety requirements of the State and Fort Drum.

11.3.3 Fishing Events

Fort Drum has sponsored fishing-related activities in the past, usually in cooperation with the NYSDEC and the USFWS for a free fishing weekend. The free fishing weekend allows anyone to fish waters of Fort Drum without a State license or Fort Drum permit. In addition to free fishing, Fort Drum offers special activities at Remington Pond. Activities include educational presentations on fishing techniques, fish biology and identification, angling ethics, and boating safety. A kids' casting contest and fishing derby, complete with prizes, are also part of the activities.

Objective 10. Continue to support fishing events on Fort Drum during 2001-2005.

Objective 11. Promote catch-and-release fishing practices in conjunction with sports club practices at Indian Pond.

Objective 12. Evaluate opportunities for catch-and-release and/or youth fishing derbies at LeRay Pond.

Objective 13. Enhance or develop fishing opportunities and consider special regulations on Black Creek and on the West Branch of Black Creek.

Objective 14. Re-evaluate recreational use restrictions for the Black River.

11.4 Other Natural Resources Oriented Outdoor Recreation

Project - Other Natural Resources Oriented Outdoor Recreation
Driver: Stewardship; Compliance with Defense policies
Project Timing: Objective 3 - 2001; Objective 5 - 2002; Objective 6 - 2003; Other objectives - ongoing indefinitely
Regulatory Approvals: None required
Vehicle for Project Implementation: Inhouse

Goal. Manage outdoor recreation to provide safe and pleasing outdoor experiences consistent with the needs of the Fort Drum military mission while maintaining ecosystem integrity and function.

Fort Drum provides natural resources-related recreation including bird watching, camping, picnicking, hiking, berry and mushroom picking, and snowmobiling, although these activities receive less participation than hunting, fishing, and trapping. Outdoor recreation, other than hunting, fishing, and trapping, is generally a responsibility of Outdoor Recreation. The Outdoor Recreation Center rents a large variety of outdoor equipment and provides opportunities for group outdoor activities, such as bicycle, skiing, canoe, and kayak trips; offpost fishing charters; and campouts.

Fort Drum has six designated campsites at Remington Pond, which can be used by calling the Outdoor Recreation Center. Additional recreational vehicle campsites are being developed in the old Officers Loop area. Primitive camping, no facilities, is allowed in installation training areas provided campers check in and check out with the Range Control Office and obtain the appropriate Fort Drum pass. Fort Drum Regulation 420-3 includes regulations and restrictions for camping and other types of recreational activities. Picnicking pavilions, picnic tables, barbeque grills, bathroom and shower facilities, and a swimming area are also available at Remington Pond.

Fort Drum has established a hiking trail beginning and ending near the Outdoor Recreation Center. The longest loop on this trail is about three miles and is not only used for hiking but often for crosscountry skiing. One designated snowmobile trail occurs on Fort Drum but receives little use due to a plethora of trails in the area surrounding the installation. Fort Drum's policy for off-road vehicles is stated in Fort Drum Regulation 420-3. Off-road vehicles are not allowed to be used on the installation with exception of the designated snowmobile trail and for trapping.

Objective 1. Encourage the development of facilities that improve use and enjoyment of fishing, hunting, and other natural resources-based recreation.

Objective 2. Promote Indian Pond as a primitive camping and fishing opportunity.

Objective 3. Improve Conservation Pond access area for recreational purposes by providing picnic tables

and trash bins.

Objective 4. Continue to support the Fort Drum policy of no off-road vehicles being allowed on the installation with exception of the designated snowmobile trail and for trapping purposes.

Objective 5. Design and construct a interpretive nature trail near Remington Pond.

Objective 6. Construct and maintain a trail to allow access to West Creek while protecting vegetation and soil stability.

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12.0 CULTURAL RESOURCES PROTECTION

Cultural resources management at Fort Drum is provided in accordance with Section 106 and Section 110 of the National Historic Preservation Act (16 U.S.C. Section 470, as amended), the Archeological Resources Protection Act (16 U.S.C. Section 470aa-47011), the American Indian Religious Freedom Act (42 U.S.C.), the Native American Graves Protection and Repatriation Act (25 U.S.C. Section 3001 *et seq*.), Executive Order 11593 (*Protection and Enhancement of Cultural Environment*), DoD Directive 4710.1 (*Archeological and Historic Resources Management*, 1984), and AR 420-40.

Management of Fort Drum cultural resources is a mission of the Natural/Cultural Resources Branch. The Chief, Natural/Cultural Resources Branch presently performs the additional functions of the Cultural Resources Program Manager. A Cultural Resources Coordinator provides contract support in all aspects of cultural resources management, including coordination with the New York State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation, native American tribal organizations, and the public, as appropriate. Fort Drum established the Cultural Resource Management program in 1989.

The installation has not completed a Integrated Cultural Resources Management Plan (ICRMP). A draft ICRMP has been completed and will be finalized during 2001. In the interim, the following procedures have been and will continue to be followed:

- inventory historic properties located on Fort Drum and all other real property assets controlled by Fort Drum and establish a database of all inventory data;
- identify and document all historic properties in accordance with the National Historic Preservation Act Section 110;
- evaluate the eligibility of sites, structures, and buildings for the National Register of Historic Places, and nominate all properties determined eligible for the National Register;
- designate eligible historic properties as “off-limits” and implement a historic property monitoring program, and mitigate the potential effects of undertaking projects on eligible historic properties;
- stabilize, rehabilitate, and maintain historic buildings to minimize or avoid potential adverse effects;
- maintain an artifact storage and interim curation facility to manage and preserve prehistoric and historic artifacts and associated records recovered on Fort Drum; and
- raise the level of public awareness and appreciation in historic properties on the installation through developing educational programs and publications.

12.1 Cultural Resources

Cultural Resources include, but are not limited to, buildings, structures, prehistoric and historic archeological sites, native sacred sites, and cemeteries.

12.1.1 Cultural Resources Inventory

Fort Drum has made an extensive commitment to cultural resources inventory, evaluation, preservation, and management. In 1983 Fort Drum conducted a preliminary impact assessment, documenting the

potential effects of intensive Army training on predicted cultural resources. An archeological survey of 11,189 acres was completed between 1986-1988 for construction of the 10th Mountain Division (Light Infantry) headquarters. This survey documented over 400 archeological sites that were associated with six thematic historical contexts (U.S. Army, 10th Mountain Division (LI), Fort Drum, 1994).

The Cultural Resources Management program includes the Cultural Resource Survey Project and the LeRay Mansion Restoration Project. The Cultural Resource Survey Project has surveyed a total of 55,796 acres of 65,548 acres accessible for survey. There have been 564 historic sites and 188 prehistoric sites documented on Fort Drum. Of the known sites, 82 have been considered eligible or potentially eligible for National Register status and are protected.

The LeRay Mansion Restoration Project completed installation of a sprinkler system in 1994. In 1996 the exterior of the building was resurfaced, and a handicap access ramp was installed. One historic district, The Leray Mansion Historic District, with five historic structures, and five officially designated archeological districts have been established on Fort Drum.

Fort Drum has identified and protects 13 cemeteries, and the draft ICRMP has designated 707 acres off-limits to training. There are an additional 358 acres temporarily off-limits to digging. Of the over 300 farmsteads on Fort Drum, a selected subset was subjected to Phase III Data Recovery and these sites are protected. As a result, remaining farmsteads are considered mitigated under a memorandum of agreement with the New York SHPO.

12.1.2 National Register of Historic Places Eligibility

Eligibility of archeological sites for inclusion in the NRHP is the principal criterion determining management prescriptions. Generally, sites fall into one of three categories with regard to NRHP eligibility.

- ***Eligible***: These sites have been determined eligible for the NRHP and therefore are subject to protection. They should not be affected without consultation per Section 106 of the National Historic Preservation Act and development of a plan to mitigate adverse effects.
- ***Ineligible***: These sites have been determined ineligible for the NRHP and do not require protection from adverse effects.
- ***Potentially eligible***: Further investigation is required to determine NRHP eligibility. Therefore, these sites are potentially eligible for the NRHP and require protection until determinations of eligibility can be made.

12.1.3 Native American Consultation and Coordination

Various laws and regulations require Fort Drum to consult with Native Americans regarding Army activities on sites within the installation. The National Historic Preservation Act requires that federal agencies consult with the Advisory Council on Historic Preservation regarding any proposed action that has the potential to affect a property on or eligible for the NRHP. This includes consultation and coordination with the SHPO and interested parties, including but not limited to Native Americans.

The Archaeological Resources Protection Act requires that archaeological resources on public and Indian lands be protected. This includes notifying Indian tribes, in advance, of possible harm to sites with

religious or cultural importance.

The Native American Graves Protection and Repatriation Act protects the ownership and control of native American human remains and related cultural items excavated or discovered on federal lands. If human remains are discovered during projects, work must stop, and a reasonable effort must be made to protect the discovery. Appropriate Native American groups must be notified, and requirements of Section 106 of National Historic Preservation Act and the Native American Graves Protection and Repatriation Act must be followed for excavation and disposition of the remains. The Native American Graves Protection and Repatriation Act also requires a 30-day delay period after the discovery of human remains before project work in the area of the discovery can resume. Work may resume earlier if consultation and agreement occur.

The American Indian Religious Freedom Act covers the protection of intangible, ceremonial, or traditional values and concerns not tied to specific cultural properties. Fort Drum must establish contact with interested Native American groups during the regular course of the National Historic Preservation Act Section 106 process.

Executive Order 13007 (*Indian Sacred Sites*) stipulates that if a federally-recognized tribe or representative of an Indian religion identifies a sacred site on Fort Drum, the installation commander must enter into consultation with that group or individual to provide access to and ceremonial use of the site and avoid adversely affecting the physical integrity of such sites.

12.2 Natural Resources Management Implications

The Natural/Cultural Resources Branch will continue to conduct field surveys to identify historical resources within areas of potential effect. A draft ICRMP has been developed to properly manage historic and cultural resources at Fort Drum and comply with federal regulations. These actions may affect natural resources management on Fort Drum.

Natural resources projects on Fort Drum have the potential to adversely affect significant cultural resources, just as cultural resources field investigations may impact sensitive natural resources. All projects, whether for natural or cultural resources management, will receive an environmental review through the NEPA process. Through this review, affected programs will have an opportunity to assess potential impact to resources. If natural or cultural resources may be impacted, steps must be taken to avoid or mitigate damage.

It is important to ensure that provisions of this INRMP are also consistent with the protection of cultural resources. Prior to any ground-disturbing, natural resources activity, Fort Drum will evaluate proposed activities for compliance with all appropriate cultural resources laws and regulations.

Natural resources management practices that have potential to adversely affect archeological sites and cultural resources are outlined below.

Land Rehabilitation and Maintenance/erosion control. Of all practices associated with natural resources management on Fort Drum, LRAM/erosion control projects have perhaps the greatest potential to affect archeological sites. Projects involving excavation, earth moving, and fill deposition can damage

or bury archeological sites. Generally, however, effects on archeological sites from reduced erosion are positive.
Forest management. Forest management, mechanical clearing, and other thinning practices can cause moderate ground disturbance, potential erosion and result in damage to archeological sites.
Road maintenance/construction. The construction of new roads and maintenance of existing roads involve significant ground disturbance that can damage archeological sites and promote erosion.
Wetland mitigation. The construction of compensatory wetlands can involve moderate ground disturbance that can damage archeological sites.
Prescribed burning. Prescribed burning can increase erosion, potentially damaging archeological sites, and can damage historic resources.
Outdoor recreation programs. Public access associated with hunting, trapping, fishing, and other outdoor recreation activities has limited potential to increase the risk of vandalism to archeological sites. Construction of angler access sites can involve moderate to significant ground disturbance that can damage archeological sites.

Even with proper review, natural resources projects still have potential to affect archeological sites through accidental discovery. Fort Drum land managers will avoid adverse effects to cultural resources from natural resources management through proper review and planning. Proposed projects will be submitted, as part of standard NEPA review, to the Cultural Resources Program Manager for approval, determinations of effect, and Section 106 consultation, as necessary.

Numerous provisions of this INRMP benefit cultural resources management on Fort Drum. These include *Military Personnel Awareness* (Section 10.1), *Land Rehabilitation and Maintenance* (Section 8.8), *Enforcement* (Chapter 9), and *NEPA Implementation* (Chapter 13).

12.3 Project - Cultural Resources Protection

Project - Cultural Resources Protection
Driver: Compliance with various cultural resources laws and regulations; Stewardship; Compliance with Defense policies
Project Timing: Objective 1 - 2001; All other objectives - ongoing indefinitely
Regulatory Approvals: SHPO, in some cases
Vehicle for Project Implementation: Inhouse

Goal. Implement this INRMP in a manner consistent with the protection of cultural resources at Fort Drum.

Objective 1. Complete a Integrated Cultural Resources Management Plan during 2001.

Objective 2. Implement provisions of the Integrated Cultural Resources Management Plan that relate to natural resources management.

Objective 3. Consider natural resources projects when planning cultural resources surveys and use results of cultural resources surveys to plan natural resources projects.

Objective 4. Avoid or mitigate adverse effects to cultural resources from natural resources through proper

review and planning. Submit proposed projects, as part of NEPA review, to the Cultural Resources Program Manager for approval, determinations of effect, and Section 106 consultation, as necessary.

Objective 5. Take the following protective measures upon discovery of sites.

- Cease ground disturbing activities immediately and report to the Cultural Resources Program Manager upon discovery of potential cultural deposits.
- Consider alternatives for moving the project to another location.
- If remains are determined by the Cultural Resources Coordinator to be of no cultural significance, do no further investigation and resume the project. Protect the site until such time that it is determined ineligible for the NRHP if remains are determined to be of cultural significance.

Objective 6. Use natural resources techniques and projects to protect cultural resources sites.

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13.0 NATIONAL ENVIRONMENTAL POLICY ACT IMPLEMENTATION

The National Environmental Policy Act (NEPA) was created to disclose environmental concerns with human activities and resolve them to the best degree possible. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. NEPA regulations (AR 200-2, *Environmental Effects of Army Actions*) require mitigation or full disclosure of damage to the environment. NEPA was not legislated to stop actions. Rather, it was crafted to identify environmental problems, providing an opportunity to resolve them using planning at early stages of project development.

13.1 Responsibilities and Implementation

13.1.1 Responsibility

The Fort Drum Environmental Division NEPA Coordinator is responsible for ensuring that appropriate environmental documentation is prepared and reviewed for all federal actions (*e.g.*, military training, new technology/equipment testing, construction projects, real property actions).

Training units are required to submit a Record of Environmental Consideration (REC), Fort Drum Form 541, for approval with a project name, date and duration, proponent, and a detailed description of the proposed action to the Environmental Division before training activities can begin. The REC must be filed with the Environmental Division a minimum of two weeks prior to preparing or occupying the field for training. Larger training missions, such as Division-or Brigade-level, must coordinate and submit RECs 30 days prior to training as part of the planning process. Once approved, RECs are retained with the unit in the field. Natural/Cultural Resources Branch projects, such as forestry activities (timber cuts) and LRAM projects, must also submit RECs prior to initiation.

An Environmental Guidelines packet, distributed through the Environmental Division, outlines activities that have demonstrated a greater need for environmental review on Fort Drum. Guidelines also instruct the proponent on the do's and don'ts for environmental compliant training.

Decisive planning and coordination are essential for the military mission to be successful. NEPA is an integral part of the planning and environmental review process. Early coordination and an understanding of the unit's requirements enhances the ability to adequately assess the potential for adverse environmental impacts, ultimately improving overall mission accomplishments while ensuring environmental compliance.

13.1.2 NEPA Documentation

The most common NEPA document prepared for projects that impact natural resources is a Categorical Exclusion (CX). This simple documentation generally works well for routine projects, such as borrow sites, small digging projects, and similar projects where natural sites are not damaged.

Environmental Assessments (EAs) are required when conditions for a CX are not met. This can happen

when a large construction project is planned, when the action involves a wide geographic area, or when wetlands or other sensitive plant communities may be involved. Examples include major LRAM projects, new military missions, or major construction. EAs require the Commander's approval, publishing a Finding of No Significant Impact (FONSI), and waiting 30 days for public comment.

If an FONSI is not appropriate, the following options are available:

- modify the action to remove significant impacts;
- mitigate significant adverse impacts;
- drop the action; or
- publish a Notice of Intent to prepare an Environmental Impact Statement.

Fort Drum has no NEPA documentation for the natural resources program as a whole. The EA prepared for this INRMP fulfills that requirement.

13.1.3 Mitigation

Mitigation is an excellent way to either consider less damaging options or provide means to off-set damage to the environment and should be considered throughout the NEPA process. Below are five general mitigation tactics:

Avoidance: Avoid adverse impacts on natural resources by not performing activities that would result in such impact. Confine construction to areas where no significant impact would occur to natural resources.

Limitation of action: Reduce the extent of an impact by limiting the degree or magnitude of the action. Minimize impacts of construction projects by arranging timing, location, and magnitude of actions so that they have the least impact on natural resources.

Restoration of the environment: Restore the environment to its previous condition or better. This could involve reseeding and/or replanting an area with native plants after it has been damaged by construction projects.

Preservation and maintenance operations: Design the action to reduce adverse environmental effects. This could involve actions such as monitoring and controlling pollution, contamination, disturbance, or erosion caused by construction projects that would impact natural resources.

Replacement: Replace the resource or environment that will be impacted by construction projects. Replacement can occur in-kind or otherwise, on-site, or at another location. This could involve creation of the same type or better quality habitat for a particular impacted fish or wildlife species or creation of habitat for another species.

Mitigation that is identified in a FONSI is a Class 1 "must fund" for environmental purposes. This provides a reliable mechanism to fund mitigation included in NEPA documents.

13.2 NEPA and Natural Resources Management

As part of the planning process the Fort Drum Environmental Division conducts an environmental review and, following the planning and decision making process, prepares appropriate NEPA documentation. The environmental review is conducted by an interdisciplinary team that investigate the proposed action for potential impacts to land, water, vegetation, air, quality-of-life, cultural resources, etc. Recommendations for avoidance, minimization, and mitigation are made through this process.

Natural Resources personnel are involved in the planning and design phase of many projects. Involvement at this point of the planning process allows personnel to suggest and promote alternative actions and to make recommendations for avoidance of impacts and possible mitigation scenarios. NEPA will ensure that INRMP activities are properly assessed and planned to avoid and minimize impacts.

13.3 NEPA and This INRMP

Effects of implementation of this INRMP are documented in an EA. This INRMP can be referenced with regard to description of affected environment to reduce verbiage in other NEPA documents.

13.4 Use of NEPA

Project - Use of NEPA
Driver: Compliance with NEPA and other federal laws affected by individual projects; Stewardship; Compliance with Defense policies
Project Timing: Objective 1 - 2001; Other objectives - ongoing indefinitely
Regulatory Approvals: None
Vehicle for Project Implementation: Inhouse

Goal 1. Use NEPA to identify projects and activities on Fort Drum that might impact natural resources and work with project planners to resolve issues early in the planning process.

Goal 2. Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA.

Goal 3. Help Fort Drum comply with NEPA.

Objective 1. Document effects of implementation of this INRMP through an EA.

Objective 2. Reference this INRMP and its associated EA in descriptions of affected environment to reduce verbiage in other NEPA documents.

Objective 3. Classify mitigation as a “must fund” for budgetary purposes.

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14.0 IMPLEMENTATION

This Plan is only as good as Fort Drum's capability to implement it. While this INRMP was prepared with a goal of 100% implementation, all activities, construction, design aspects, and other components of this INRMP are subject to the availability of annual funding, availability of manpower and subject to mission requirements. Fort Drum will make best efforts to request funding through appropriate channels. Where projects identified in the plan are not implemented due to lack of funding, availability of manpower, mission requirements or other compelling circumstances, Fort Drum will review the plan's goals and objectives to determine whether adjustments are necessary. Below are described the organization, personnel, and funding needed to implement programs described in chapters 8-13.

14.1 Organization

The Natural/Cultural Resources Branch at Fort Drum can implement most of this INRMP and fulfill general goals and policies established in Chapter 1 and more specific goals and objectives within chapters 7-13. Other Fort Drum organizations identified in Section 2.1 are also capable of implementing their portions of this INRMP with no organizational changes, although they may elect to make changes during 2001-2005 for improved operations efficiency.

14.2 Personnel

"The management and conservation of natural and cultural resources under DoD control, including planning, implementation, and enforcement functions, are inherently governmental functions that shall not be contracted."[5]

14.2.1 INRMP Implementation Staffing

Project - INRMP Implementation Staffing
Driver: Compliance with Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP; Support of the military mission; Stewardship; Compliance with Defense policies
Project Timing: Objective - ongoing indefinitely
Regulatory Approvals: None directly
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Provide staffing of natural resource management professionals required to effectively manage natural resources on Fort Drum (Department of Army, 1995).

The following staffing is required to implement this INRMP at Fort Drum:

Chief Natural/Cultural Resources Branch	1	F*
Forester	1	F
Forestry Technician	3	F

[5] DoD Instruction 4715.3, Environmental Conservation Program, 2 May 96.

Seasonal Forestry Technician	4	
Wetlands Biologist	1	F
Wetlands Technician	1	F
Seasonal Wetlands Technician	2-3	
LCTA Coordinator	1	
LRAM Coordinator	1	
Seasonal ITAM Technician	5-10	
GIS Analyst	2	
Seasonal GIS Analyst	1	
Fish and Wildlife Biologist	1	F
Biological Technician	1	F
Seasonal Biological Technician	2	
Archeologist	1	F
Cultural Resources Technician	2	
Seasonal Cultural Resources Technician	14-25	
NEPA Coordinator	1	F
NEPA Assistant (seasonal)	1	
Natural Resources Specialist	1	F
Natural Resources Data Entry Clerk	1	

* - Full time permanent Department of Army civilians

Above personnel do not include personnel within DCA, Office of the Staff Judge Advocate, and other personnel within Public Works who have roles in implementation of this INRMP.

Objective. Provide staffing for Fort Drum natural resources program as indicated in the above discussion.

14.2.2 Personnel Training

Project - Personnel Training
Driver: Compliance with Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP; Support of the military mission; Stewardship; Compliance with Defense policies
Project Timing: All objectives - ongoing indefinitely
Regulatory Approvals: None directly
Vehicle for Project Implementation: Inhouse and possible external support

Goal. Provide training to natural resources personnel implementing this INRMP.

Fort Drum natural resources organizations have a goal to continuously improve the success of natural resources management activities through professional development and information exchange. This will be accomplished by:

- maintaining staff knowledge of management strategies at the current state of the art through training and participation in or hosting workshops, research presentations, and other activities of regional and national professional natural resources research and conservation programs; and
- sharing information with natural resources experts to ensure maximum benefits of adaptive management and research efforts.

Fort Drum plans to send one or more persons to each of the following annual workshops or professional conferences:

ITAM annual workshop
National Military Fish and Wildlife Association annual workshop
North American Wildlife and Natural Resources Conference
Society of American Foresters/DoD natural resources annual meeting
The Wildlife Society Conference
Partners in Flight national, regional, and state meetings (often in conjunction with other listed meetings)
FORSCOM training sessions
Meetings of regional initiatives

Other conferences/workshops will be evaluated for their usefulness, and decisions will be made based on appropriateness to ongoing projects and funding availability. Projects that are especially useful include ecosystem restoration workshops, global position system training, and advanced GIS training.

The Wildlife Society, Society of American Foresters, American Fisheries Society, and National Military Fish and Wildlife Association are among the professional societies applicable to meeting the needs of Fort Drum natural resources managers. Membership in these societies is encouraged. They have some of the best scientific publications in their professions, and literature review is a necessary commitment to maintain standards. Attending meetings of these societies provides excellent opportunities to communicate with fellow professionals as well as maintain professional standards. Professional natural resources law enforcement depends on proper training of enforcement personnel. Enforcement training is available through numerous sources. Natural/Cultural Resources Enforcement training is discussed in Section 9.4.

Objective 1. Encourage Natural/Cultural Resources Branch personnel to join professional societies and their state/regional chapters as well as be active in them.

Objective 2. Send at least one person to each of the annual workshops or professional conferences discussed above.

Objective 3. Evaluate other conferences/workshops for their usefulness as training tools, and send personnel to those most justified, based on current training needs and those most related to Fort Drum activities.

Objective 4. Ensure that natural/cultural resources personnel obtain the one-time or occasional refresher training needed to fulfill job requirements (*e.g.*, GIS user training, NEPA training, endangered species documentation/consultation training).

Objective 5. Actively participate in training sessions to disseminate knowledge learned at Fort Drum.

Objective 6. Whenever appropriate, author/co-author papers for scientific journals presenting research/project results.

14.2.3 External Assistance

There is no requirement for a specific project for external assistance since objectives within this area are included within other projects of this INRMP. However, the below goal and objectives are appropriate to list.

Goal. Provide external specialized skills, personnel, and resources to support the Fort Drum natural resources program.

The rapid development of natural resources management combined with military personnel cutbacks have resulted in the highest need ever for outside assistance with natural resources programs on Fort Drum. The growth of environmental compliance requirements has increased many of these needs and added considerably to the need for specialized external assistance in other areas, including on-the-ground personnel support. It is impossible for Fort Drum to hire the specialized expertise needed for some projects within this INRMP. Fort Drum will require expertise from universities, agencies, and contractors to accomplish tasks within this Plan. Fort Drum will reimburse parties for much of this assistance.

Objective 1. Implement external support projects, which are described in more detail in appropriate sections of this INRMP.

14.2.3.1 Personnel Assistance

The ***Intergovernmental Personnel Act*** of 1972 (IPA) is a system whereby a federal or state agency "borrows" personnel from other federal or state agencies, including universities, for a limited term and a specific job. If used, Fort Drum would pay the borrowed employee's salary and administrative overhead. Thus, borrowed employees could cost about 25-30 percent more than inhouse employees. Major advantages are that personnel are directly supervised by the Natural/Cultural Resources Branch, and manpower billets are not required. IPA agreements are used throughout DoD for assistance with research, management, and even administration.

Another "borrowed personnel" option is through the ***Oak Ridge Institute of Science and Education*** (ORISE). ORISE involves colleges and universities and a management and operating contractor for the U.S. Department of Energy. The program offers students, post-graduates, and associate degree graduates opportunities to gain experience in their respective fields. Stipends are equivalent to salaries for employees hired with similar educational backgrounds, and a 30% overhead is added. The normal limit on individual ORISE personnel is three years. Installations may assist in the selection of ORISE personnel.

The Conservation Assistance Program of the ***Student Conservation Association*** is available to provide graduate students to work on specific projects at Fort Drum. These programs do not require the payment of salaries but do require per diem and housing for participants.

Objective 2. Consider using IPA, ORISE, Student Conservation Association, and/or volunteers for personnel assistance.

14.2.3.2 Other Agency Assistance

Fort Drum recognizes the importance of cooperating with federal and State agencies. Sections 2.2, 2.3, and 2.4 identify other agencies and organizations with whom Fort Drum has cooperatively worked in recent years. During 2001-2005 Fort Drum will use State and federal agencies, particularly this INRMP's signatory partners, the USFWS and the NYSDEC, to assist with implementation of various aspects of this INRMP.

Objective 3. Use State and Federal agencies, particularly INRMP signatory partners, the USFWS and NYSDEC to assist with implementation of this INRMP.

14.2.3.3 University Assistance

Much research done on Fort Drum is through universities (Section 2.5). Some research is used to fulfill graduate degree requirements. The Sikes Act Improvement Act facilitates the use of university research since the proposed language exempts implementation of INRMPs from provisions of the Economy Act, which requires strict competition for services.

Objective 4. Use universities, particularly Colleges of the State University of New York (SUNY) system and Cornell University, to assist with implementation of this INRMP.

14.2.3.4 Other Support

Contractors give Fort Drum access to a wide variety of specialties and fields. A variety of projects could use the support of contractors in the next five years. Contractor and other sources of support will be evaluated on a case-by-case basis during the next five years.

Objective 5. Use contractors to assist with implementation of this INRMP.

14.3 Data Storage, Retrieval, and Analysis

Project - Data Storage, Retrieval, and Analysis
Driver: Compliance with Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP; Support of the military mission; Stewardship; Compliance with Defense policies
Project Timing: Objective 10 - 2005; All other objectives - Ongoing Indefinitely
Regulatory Approvals: None
Vehicle for Project Implementation: Inhouse

Goal. Store, analyze, and use data in an efficient, cost-effective manner.

The capability to store, retrieve, and analyze data is central to professional management of natural resources, and it is essential to implementing the adaptive management aspect of ecosystem management. Fort Drum is committed to providing efficient, cost-effective systems for data storage and analysis.

Data collected will be statistically analyzed and stored in the Natural/Cultural Resources Branch. Data will be available for use by Fort Drum personnel, and will be integrated into the GIS system.

14.3.1 Microcomputer System

Microcomputers are essential to the routine operation of efficient natural resources management organizations. The volume of data is too substantial to handle without computers, and routine administrative tasks are accomplished considerably more efficiently with computers.

The Natural/Cultural Resources Branch is well-equipped with regard to microcomputers, having quality personal computers with appropriate printers and other peripherals. There are no major needs with regard to this system beyond normal upgrades and replacement of hardware and software.

Objective 1. Upgrade microcomputer hardware and software as needed during the next five years.

14.3.2 Geographic Information System

A GIS allows users to manipulate spatial data (*e.g.* maps, aerial photos, satellite images) in a similar fashion as a data management program allows the analyses and presentation of mathematical data. Data can be purchased and converted into most software formats, or it can either be scanned or digitized directly from maps or aerial photographs. A GIS can analyze different map layers to show the relationship of one map layer to another. For example, if a project involved putting a line-of-sight antenna in a location, a good GIS could map all areas that could be reached by an antenna of a certain height out to a certain distance.

A common use for GIS is for siting construction projects, such as a new firing range. For example, criteria for this project might be that the facility be within five miles of the cantonment area, exclude archeological sites and wetlands, have less than two percent slope, and have relatively stable soils. GIS could produce a map with all areas having these features. A GIS could also be used to show the relative ability of Fort Drum to support specific types of proposed military training missions.

In 1991 the Fort Drum Natural/Cultural Resources Branch established a GIS program as a component of the ITAM Program. Since its inception, the GIS has been used and supported by natural/cultural resources, environmental compliance, and training support programs. Geographic data are stored by category or theme. Appendix 14.3.1.2 contains a list of available GIS themes.

Themes associated with land use planning and natural/cultural resources program management requirements can be used separately or together to create a new layer, perform spatial analysis, or compose a map. Spatial analysis is based on theme locations or attributes. Common requests of the Fort Drum GIS include maps and acreage reports.

The GIS program is staffed by two GIS analysts. They provide decision support and long-term planning/design guidelines for the ITAM, LCTA, and LRAM coordinators and program managers in the Environmental Division, Combat Readiness Training Division, Engineering Division, and Terrain Analysis. Analysts also assist Environmental Division members with ArcView® support. The GIS program has provided data and maps to individuals and contractors off-post who are involved in environmental and range-related projects.

The GIS program originally used Geographic Resources Analysis Support System, a GIS package developed by U.S. Army Construction Engineer Research Laboratory. In order to acquire more advanced

GIS features, a conversion of data and transferal to Arc/Info® and its related software was completed in 1996. Arc/Info® is used to perform operations on features stored as points, lines, or polygons; ArcGrid® allows manipulation of raster images; ArcTIN® is used for surface modeling; and ArcView® provides a user-friendly environment to query, display, and plot themes. Arc/Info®'s capability of interacting with other database management programs and file formats allows the GIS program to complete analyses with inventory and monitoring databases managed by Natural/Cultural Resources Branch programs.

In 1996 GIS workstations were incorporated into an NT-based RMAT network that permits sharing of data between the Engineering and Environmental Divisions in Public Works and the Combat Readiness Training Division in the Readiness Business Center. Thus, a networked individual can draw spatial and/or attribute data from several different locations into one GIS project. For example, a proposed range design created by the Engineering Division can be electronically superimposed onto the wetlands theme to determine whether wetlands are impacted. NT versions of Arc/Info® and ArcView® were purchased to enable program managers to perform conventional GIS routines with their own data through the network in a user-friendly environment.

The GIS program has continued to evolve and provides a significant amount of analysis as opposed to simply generating maps. For example, aerial photography and satellite imagery are being used to make timber stand delineations using pre- and post-ice storm images. The Cross Country Movement Model, discussed in Section 8.11, is a good example of how Fort Drum is using the GIS to show the relative ability of Fort Drum lands to support specific types of military training missions. The GIS program has experienced unprecedented demand for its support. Demand has grown with an increased awareness of the range of available GIS services, the availability of user-friendly GIS software, and network access to data.

Objective 2. Develop or obtain databases needed to support Fort Drum natural and cultural resources programs.

Objective 3. Attach tabular data to spatial data layers, such that a "point and click" provides such data on the spot.

Objective 4. Provide desktop GIS to all appropriate Natural/Cultural Resources Branch personnel.

Objective 5. Make more use of analytical capabilities of the Fort Drum GIS to provide natural resources management options.

Objective 6. Create user-friendly interfaces to enable a wider use of GIS databases specific to needs of installation users.

Objective 7. Provide on-line support for operating systems and GIS software.

Objective 8. Regularly replace or upgrade GIS and imagery hardware and software to maintain the capability to use developing GIS technology.

Objective 9. Require all spatially related data be stored on, or accessible to, the GIS.

Objective 10. Provide periodic on-site, system support to guarantee minimal downtime.

Objective 11. Provide periodic system support for hardware security and communications including data backups and network communications.

14.3.3 Remote Imagery

The oldest aerial imagery of Fort Drum was black and white photographs from the 1950s. More recently, 1991 aerial photos are available but not digitally; however, a 1995 set of photos is available digitally. In 2000, color infrared and true color installation-wide aerial photos were taken and incorporated into the GIS.

Objective 12. Use remote imagery for improved decision-making for military activities, environmental management, and natural and cultural resources management and protection.

Objective 13. Update aerial photographs and/or other imagery every five years (the next in 2005).

14.4 Project/Program Summary

Projects, goals, and objectives within this INRMP can be used to monitor the effectiveness of natural resources management at Fort Drum. Section 14.5 contains a list of projects for budget purposes, and Appendix 14.4 contains a list of projects, goals, and objectives for this INRMP in the order they appear. Goals and objectives are abbreviated from chapters 7-14. The list does not include a priority system for two reasons:

- The Sikes Act requires implementation of this INRMP, making it difficult to justify priorities for implementation, which implies priorities for compliance. Federal agencies are required to comply with federal laws.
- Many projects or programs affect obviously high priority species/communities/ecosystems/etc. (federally-listed species, wetlands, etc.) and at the same time affect species/communities/ ecosystems/etc. that, prior to the passage of Sikes Act amendments, were not priorities (*e.g.*, nonlisted species, noncritical habitat). It is often difficult to separate the benefactors of many programs. The development of compensatory wetlands is a good example.

14.5 Implementation Funding Options

Natural resources management relies on a variety of funding mechanisms, some of which are self-generating and all of which have different application rules. Below are general discussions about different sources of funding to implement this INRMP. As noted, not all of these are now used by Fort Drum.

14.5.1 Environmental Program Requirements

Most projects described in this INRMP, exclusive of ITAM, are budgeted using the Environmental Program Requirements (EPR) Report. Below are sources of funds within the EPR system:

14.5.1.1 Forestry Funds

Forestry funds are generated from sale of forest products. Individual installations can be reimbursed for approved forest management expenses.

Forty percent of excess revenue produced by an installation is provided to the State of New York. The remainder is deposited into the DoD Forest Reserve Account, which funds approved natural resources projects. Such projects include timber management, reforestation, timber stand improvement, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment, disease and insect control, planning (including compliance with laws), marking, inspections, sales preparations, personnel training, and sales. DA Regulation AR 200-3 (Chapter 5) outlines collection and expenditure systems.

The forestry program will generate an average of about $400,000 annually during 2001-2005. Of this income, about $400,000 will be required to operate the Forestry program and purchase equipment annually.

14.5.1.2 Sikes Act Funds

Sikes Act funds are collected via sales of licenses to hunt, trap, or fish. They are authorized by the Sikes Act and regulated via AR 200-3, Chapter 6. These funds may be used only for fish and wildlife management on the installation where they are collected. They have no year-end (unobligated funds carry over on 1 October). Fort Drum will generate about $25-30,000 annually for fish and wildlife management from the sale of permits during 2001-2005. Army policy encourages self-sufficiency with regard to managing game populations on military lands. Fort Drum will, from time to time, examine options to increase Sikes Act income to maintain its quality hunting, trapping, and fishing program.

14.5.1.3 Agricultural Funds

Agricultural funds are derived from agricultural leases on installations. They are centrally controlled at Department of Army and Major Command levels with no requirements for spending where they were generated. AR 200-3 (Chapter 2) outlines procedures for collection and spending these funds. They are primarily intended to offset costs of maintaining agricultural leases, but they are also available for preparing and implementing INRMPs. These are the broadest use funds available exclusively to natural resources managers.

Fort Drum is technically authorized to request agricultural funds from FORSCOM since there is no requirement for funds to be generated at spending installations. However, due to base closures and other factors, agricultural funds are decreasing, so it is unlikely that Fort Drum will be able to effectively compete for them during 2001-2005.

14.5.1.4 Environmental Funds

Environmental funds are a special subcategory of Operations and Maintenance funds. They are set aside by the Department of Defense for environmental purposes but are still subject to restrictions of Operations and Maintenance funds. Compliance with laws is the key to getting environmental funding. Environmental funds are most commonly used for projects that return the installation to compliance with federal or state laws, especially if noncompliance is accompanied by Notices of Violation or other enforcement agency actions.

"Must fund" classifications include mitigation identified within *Findings of No Significant Impact* and items required within Federal Facilities Compliance Agreements. This INRMP is a Federal Facilities Requirement Agreement, and some projects and programs within it are used to mitigate various military activities. In addition, 1997 amendments to the Sikes Act require implementation of INRMPs, which make implementation of this INRMP a priority for funding.

The following table lists environmental projects associated with implementation of this INRMP:

Environmental Projects*

Project	Section	FY 01	FY 02	FY 03	FY 04	FY 05	Totals
Flora Inventory and Monitoring	7.2	5	5	5	5	5	$25
General Wildlife Inventory and Monitoring	7.3.1	95	100	105	115	115	$530
Threatened, Endangered, or Species of Concern Inventory and Monitoring	7.3.2	34	100	50	55	55	$294
Forest Management	8.1	401	376	380	383	400	$1,940
Wildlife Habitat Management	8.3.1	20	25	30	35	40	$150
Aquatic Habitat Management	8.3.2	25	75	50	50	50	$250
Fish and Wildlife Population Management	8.4	30	31	32	33	34	$160
Wetlands Management	8.5	2,170	2,200	2,210	420	430	$7,430
Protect Water Quality	8.6	134	134	134	141.2	141.2	$684.4
Grounds Management Support	8.8	0	0	0	0	0	$0
Pest Management Support	8.9	3.5	43.5	40	0	0	$87
Fire Prevention and Suppression	8.10	10	15	18	20	23	$86
Prescribed Burning	8.10.2	40	50	55	60	65	$270
Natural/Cultural Resources Enforcement	9.5	0	0	0	0	0	$0
Public Awareness	10.2	0	0	0	0	0	$0
Hunting, Fishing, and Trapping Programs	11.3	40	45	50	53	55	$243
Other Natural Resources Oriented Outdoor Recreation	11.4	0	0	0	0	0	$0
Cultural Resources Protection	12.3	898	1,546	1,170	638	638	$4,890
Use of NEPA	13.4	10	12	15	18	20	$75

INRMP Implementation Staffing	14.2.1	1,705	1,790	1,880	1,974	2,072	$9,421
Personnel Training	14.2.2	30	30	30	30	30	$150
Data Storage, Retrieval, and Analysis	14.3	30	32	33	35	36	$166
Totals		$5,680.5	$6,609.5	$6,287	$4,065.2	$4,209.2	$26,851.4

* Funding in thousand of dollars.

The above table indicates environmental funding as of 1 Januaray 2001.

Thus, the total Environmental Fund budget for this INRMP is estimated at $26,851,400.00 for 2001-2005. These estimates will be adjusted as needed each year.

14.5.2 Training Funds

Fort Drum is a Category I installation with regard to ITAM implementation and funding (Office of the Deputy Chief of Staff for Operations and Plans, 1995). ITAM funding requests are not submitted via the EPR process. Instead, the 5-year ITAM Work Plan is used to channel ITAM funding requests from Fort Drum, through FORSCOM and the Army Training Support Center, to the Office of the Deputy Chief of Staff for Operations and Plans. Fort Drum requires the following ITAM budget for FY 01 through FY 05:

ITAM Funding*

Project	FY 01	FY 02	FY 03	FY 04	FY 05	Totals
LRAM	$1,578	$961	$1,004	$807	$**	$4,350
EA	$25	$25	$25	$0	$**	$75
TRI	$172	$142	$142	$128	$**	$584
LCTA/GIS	$302	$320	$385	$338	$**	$1,345
Totals	$2,077	$1,448	$1,556	$1273	$1000+	$7,354+

* Funding in thousand of dollars.
** Budget numbers not available.

Thus, the total ITAM budget for this INRMP is estimated at $7,354,000.00 for 2001-2005. These estimates will be adjusted as needed each year.

14.6 INRMP Implementation Costs

Below is a summary of funding avenues and dollars required for implementation of this INRMP.

Type Funds*	FY 01	FY 02	FY 03	FY 04	FY 05	Totals
Forestry	$400	$400	$400	$400	$400	$2,000
Sikes Act	$25	$25	$25	$25	$25	$125
Agriculture	$0	$0	$0	$0	$0	$0
Environmental	$5,680.5	$6,609.5	$6,287	$4,065.2	$4,209.2	$26,851.4
ITAM	$2,077	$1,448	$1,556	$1,273	$1,000+	$7,354+
Totals	$8,182.5	$8,482.5	$8,268	$5,763.2	$5,634.2+	$36,330.4+

* Funds in thousands of dollars.

Thus, total five-year funding to implement this INRMP will be $36,330,400.00+.

Non-appropriated funds are used to defray outdoor recreation costs, exclusive of hunting, trapping, and fishing programs, associated with this INRMP. However, these costs are not included within this plan.

14.7 Command Support

Command support is essential to implementation of this INRMP. Many projects for natural resources management within the next five years require command support. The Commander is personally liable for noncompliance with environmental laws, such as those affected by this INRMP. Thus, he has a personal interest in ensuring that this Plan is properly implemented.

This Plan has the support of the Fort Drum Commander and other personnel in command positions who are needed to implement this INRMP. The Command is dedicated to implementation of this INRMP as required by the Sikes Act and other Federal laws. Just as importantly, the Command is dedicated to maintaining and improving the military mission at Fort Drum. Implementation of this INRMP is a means to that end.

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ACRONYMS

CX	Categorical Exclusion
DBH	Diameter at breast height
DoD	Department of Defense
DCA	Directorate of Community Activities
EA	Environmental Assessment
EPR	Environmental Program Requirements
FONSI	Finding of No Significant Impact
FORSCOM	Forces Command
GIS	Geographic Information System
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPA	Intergovernmental Personnel Act
IPM	Integrated Pest Management
ITAM	Integrated Training Area Management
LCTA	Land Condition Trend Analysis
LEC	Law Enforcement Command
LRAM	Land Rehabilitation and Maintenance
MAPS	Monitoring Avian Productivity and Survivorship
MP	Military Police
NEPA	National Environmental Policy Act
NMFWA	National Military Fish and Wildlife Association
NRMU	Natural Resources Management Unit
NYSDEC	New York State Department of Environmental Conservation
REC	Record of Environmental Consideration
RTLP	Range and Training Land Program
SHPO	State Historic Preservation Office
SRP	Site Rehabilitation Prioritization
TA	Training Area
TRI	Training Requirements Integration
TSI	Timber Stand Improvements
USFWS	U.S. Fish and Wildlife Service
WSAAF	Wheeler-Sack Army Airfield

INTEGRATED NATURAL RESOURCES

MANAGEMENT PLAN

FORT DRUM, NEW YORK

APPENDICES

APPENDIX 2.3.1: Items of Cooperation Between the U.S. Fish and Wildlife Service, New York State Department of Environmental Conservation, and Fort Drum, New York

PURPOSE: The purpose of this document is to specifically list items to be provided by the New York State Department of Environmental Conservation (NYSDEC), U.S. Fish and Wildlife Service (USFWS), and Fort Drum for cooperative implementation of the Fort Drum Integrated Natural Resources Management Plan. Items not specifically listed will generally be the responsibility of Fort Drum unless the other agencies agree to assist with their implementation.

AUTHORITY: In accordance with the authority contained in Title 10, U.S. Code, Section 2671, and Title 16, U.S. Code, Section 670 the Department of Defense, the Department of Interior, and the State of New York, through their duly designated representatives whose signatures appear on the Fort Drum Integrated Natural Resources Management Plan, specifically approve the Integrated Natural Resources Management Plan and the below specific items of cooperation among the three agencies.

MUTUAL AGREEMENT:

- Persons hunting, trapping, or fishing the lands or waters of Fort Drum shall be required to obtain special Fort Drum hunting or fishing licenses unless exempt by Fort Drum regulations. Funds derived from the sale of these licenses will be used exclusively for the implementation of the fish and wildlife portions of the Fort Drum Integrated Natural Resources Plan in accordance with Army regulations and the Sikes Act. Fees charged shall be established by the installation in accordance with Army regulations. Persons guilty of violating the requirement for these special licenses may be prosecuted under 10 USC 2671(c).
- Persons hunting, trapping, or fishing the lands of Fort Drum must purchase State licenses, tags, and stamps as required by NYSDEC, unless exempt by NYSDEC regulations. The NYSDEC agrees that military personnel stationed in New York may purchase hunting, trapping, and fishing licenses at resident prices. The NYSDEC agrees that active military personnel who are New York State residents and are in the state for a maximum of 30 days are exempt from fishing license and small game license requirements.
- A federal waterfowl stamp is required for hunting waterfowl as prescribed by federal laws.
- All hunting, trapping, and fishing on Fort Drum will be in accordance with federal and state fish and game laws.
- Representatives of the NYSDEC and the USFWS will be admitted to the installation at reasonable times, subject to requirements of military necessity and security. Such personnel may use U.S. Army transportation on a nonreimbursable basis, to include aircraft, for fish and wildlife related functions on Fort Drum provided such transportation is available without detriment to the military mission.
- The NYSDEC and USFWS shall furnish technical assistance for development and implementation of professionally sound natural resources programs on Fort Drum provided funding for such support is available.
- Fort Drum shall furnish assistance and facilities to the NYSDEC and/or USFWS for mutually agreed upon natural resources research projects, to include aircraft for fish and wildlife related

projects. It shall be the policy of the Commanding General, Fort Drum to encourage and support research conducted by the participating agencies. To this end, suitable land areas, animals, facilities, and personnel may be made available at the Commanding General's discretion, when requested, providing the proposed studies are compatible with, and in no way limit, accomplishment of the military mission.

- No exotic species of fish or wildlife will be intentionally introduced on Fort Drum lands without prior written approval of the Army, NYSDEC, and the USFWS.
- The NYSDEC shall establish season and bag limits for harvest of game species on Fort Drum. Fort Drum may make special requests for such regulations according to procedures established by NYSDEC. Requests for regulations not in accordance with those established statewide will be based on data specific to Fort Drum or designed to meet Fort Drum's training schedules.
- Hunting, trapping, and fishing on Fort Drum will be authorized and controlled by the installation commander in accordance with locally published installation regulations promulgated in compliance with applicable federal and State laws, Army regulations, military requirements, and the Integrated Natural Resources Management Plan.
- Fort Drum will operate biological check stations to collect harvest data required by NYSDEC and Fort Drum. The NYSDEC may collect additional data on fish or wildlife resources at Fort Drum with approval of Fort Drum for access to training lands.
- Public access for hunting, trapping, and fishing is approved under a system of controls established by Fort Drum in cooperation with NYSDEC. Civilians will be considered on an equal basis with military and Army civilian employees for hunting, trapping, and fishing permits. Should there be a need for quotas on the number of hunters permitted on a daily or seasonal basis for reasons of safety or recreational carrying capacity, such quotas will not be instituted prior to consultation with the NYSDEC.
- Hunting, trapping, and fishing will be allowed only in areas where there is no conflict with military training activities and no unreasonable safety hazard to participants, military personnel and dependents, or Army civilian employees. Certain areas will be closed to hunting, trapping, and fishing, including, but not limited to, impact areas containing unexploded ordnance.
- Fort Drum has concurrent enforcement jurisdiction where laws are enforceable by federal- or state-commissioned personnel. Enforcement will be a joint responsibility of Fort Drum, the NYSDEC, and the USFWS.
- Fort Drum agrees to cooperate with USFWS and NYSDEC for management of threatened or endangered species residing on the installation. Such efforts will be in compliance with federal and State laws and applicable Army regulations.
- The NYSDEC and the USFWS will provide technical and professional advice on all matters concerning wildlife and fish management when necessary.
- Fort Drum has the option to directly transfer funds to the NYSDEC and USFWS for implementation of this Integrated Natural Resources Management Plan.
- It is understood that implementation of this INRMP requires certain latitude with regard to professional decisions. However, Fort Drum agrees that any land use change, which significantly impacts natural resources must include modification of this INRMP in addition to any other environmental compliance requirements.

LIMITATIONS:

The military mission of Fort Drum supersedes natural resources management and associated recreational activities, and such activities must be compatible with the military mission. However, where there is conflict between the military mission and provisions of the Endangered Species Act, the Sikes Act, or any other law associated with natural resources conservation, such conflicts will be resolved according to statutory requirements.

REQUIRED REFERENCES:

- Nothing contained in this agreement shall modify any rights granted by treaty to any Native American tribe or to members thereof.
- The possession of a special permit for hunting migratory game birds will not relieve the permittees of the requirements of the Migratory Bird Stamp Act, as amended.
- This INRMP is a Federal Facilities Compliance Agreement.
- As required by the Sikes Act, the following agreements are made:

(1) This Fort Drum Integrated Natural Resources Management Plan is the planning document required by the Sikes Act, as amended. This Plan contains those items specifically required by law. In the event the Sikes Act is amended after this INRMP is signed, this plan will be amended to conform with the new requirements within the Sikes Act, if needed.

(2) This plan will be reviewed by the NYSDEC, USFWS, and Fort Drum on a regular basis, but not less often than every five years.

(3) No land or forest products from land on Fort Drum will be sold under Section 2665 (a) or (b), Title 10 USC and no land will be leased on Fort Drum under Section 2667 of such Title 10 unless the effects of such sales or leases are compatible with the purposes of the Integrated Natural Resources Management Plan.

(4) With regard to implementation and enforcement of the Fort Drum Integrated Natural Resources Management Plan, neither Office of Management and Budget Circular A-76 nor any successor circular thereto applies to the procurement of services that are necessary for that implementation and enforcement, and priority shall be given to the entering into of contracts for the procurement of such implementation and enforcement services with Federal and State agencies having responsibility for the conservation or management of fish or wildlife.

(5) The Fort Drum Integrated Natural Resources Management Plan is not, nor will be treated as, a cooperative agreement to which Chapter 63 of Title 31, United States Code applies.

(6) This Integrated Natural Resources Management Plan will become effective upon the date subscribed by the last signature and shall continue in full force for a period of five years or until terminated by written notice to the other parties by any of the parties signing this agreement. This agreement may be amended or revised by agreement between the parties hereto. Action to amend or revise may originate with any of the other participating agencies.

APPENDIX 5.7.1a: Ecological Communities With LCTA Plots on Fort Drum

Cover type	Ecological Community[1, 2, 3]	NHP Global and State Rank[4]
Forested	Northern successional hardwoods	G5 S5
	Pine-northern hardwood forest	G4 S4
	Beech-maple mesic forest	G4 S4
	Hemlock-northern hardwood forest	G4G5 S4
	Maple-basswood rich mesic forest	G4 S2S3
	Appalachian oak-hickory forest	G4G5 S4
	Plantation	G5 S5
	Appalachian oak-pine forest	G4G5 S4
Shrubland	Successional shrubland	G4 S4
Grassland	Successional old field	G5 S4
	Successional northern sandplain grassland	G4? S2?
Barren	- no NYNHP designation -	
Wetland	Red maple-hardwood swamp	G5 S4S5
	Shrub swamp	G5 S5
	Shallow emergent marsh	G5 S5
	Hemlock-hardwood swamp	G4G5 S4
	Northern white cedar swamp	G3G4 S2S3

1. Types of ecological communities based on Reschke (1990).
2. Table does not list all communities that occur on Fort Drum.
3. Community types are listed from most to least common within each cover type.
4. Global and State rank determined by the New York Natural Heritage Program. Ranks carry no legal weight.

Global Rank:

G3 Either rare and local throughout its range (21 to 100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range (*e.g.* a physiographic region), or vulnerable to extinction throughout its range because of other factors.

G4 Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

State Rank:

S2 Typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.

S3 Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State.

S4 Apparently secure in New York State.

S5 Demonstrably secure in New York State.

? Indicates that a question exists about the rank.

APPENDIX 5.7.1b: Plants Known to Occur on Fort Drum

Abies balsamea	*Acalypha virginica*	*Acer negundo*
Acer pensylvanicum	*Acer rubrum*	*Acer saccharinum*
Acer saccharum	*Acer spicatum*	*Achillea millefolium*
Acinos arvensis	*Acorus americanus*	*Actaea pachy. x spicata*
Actaea pachypoda	*Actaea spicata*	*Adiantum pedatum*
Aesculus glabra	*Agalinis tenuifolia*	*Agrimonia* sp.
Agropyron repens	*Agrostis capillaris*	*Agrostis gigantea*
Agrostis perennans	*Agrostis scabra*	*Agrostis stolonifera*
Alisma plantago-aquatica	*Alliaria petiolata*	*Allium canadense*
Allium tricoccum	*Alnus incana*	*Alopecurus aequalis*
Alyssum alyssoides	*Ambrosia artemisiifolia*	*Amelanchier arborea*
Amelanchier sp.	*Ammophila breviligulata*	*Amphicarpea bracteata*
Anaphalis margaritacea	*Anchistea virginica*	*Andromeda polifolia*
Andropogon virginicus	*Anemone canadensis*	*Anemone virginiana*
Antennaria neglecta	*Antennaria neglecta*	*Antennaria plantaginifolia*
Anthoxanthum odoratum	*Apios americana*	*Apocynum androsaemifolium*
Aquilegia canadensis	*Aquilegia vulgaris*	*Arabis glabra*
Aralia hispida	*Aralia nudicaulis*	*Aralia racemosa*
Arctium lappa	*Arctium minus*	*Arenaria serpyllifolia*
Arethusa bulbosa *	*Arisaema triphyllum*	*Armoracia lacustris* *
Aronia melanocarpa	*Aronia prunifolia*	*Arrhenatherum elatius*
Artemsia absinthium?	*Artemisia vulgaris*	*Asarum canadense*
Asclepias incarnata	*Asclepias syriaca*	*Asclepias tuberosa*
Asparagus officinalis	*Asplenium platyneuron*	*Asplenium trichomanes*
Aster acuminatus	*Aster borealis* *	*Aster cordifolius*
Aster divaricatus	*Aster ericoides*	*Aster firmus* *
Aster lanceolatus	*Aster lateriflorus*	*Aster linariifolius*
Aster macrophyllus	*Aster novae-angliae*	*Aster ontarionis* *
Aster pilosus	*Aster puniceus*	*Aster umbellatus*
Athyrium asplenioides	*Athyrium pycnocarpon*	*Athyrium thelypterioides*
Barbarea vulgaris	*Beckmannia syzigachne*	*Berteroa incana*
Betula alleghaniensis	*Betula lenta*	*Betula papyrifera*
Betula populifolia	*Bidens beckii* *	*Bidens cernua*
Bidens tripartita	*Bidens vulgata*	*Blephilia hirsuta*
Boehmeria cylindrica	*Botrychium dissectum*	*Botrychium multifidum*
Botrychium virginianum	*Brachyletrum septentrionale*	*Brasenia schreberi*
Brassica juncea	*Bromus ciliatus*	*Bromus inermis*
Bromus racemosus	*Bromus tectorum*	*Bulbostylis capillaris*
Calamagrostis canadensis	*Calla palustris*	*Callitriche palustris*
Calopogon tuberosus	*Caltha palustris*	*Calystegia sepium*
Calystegia spithamea	*Campanula aparinoides*	*Campanula rapunculoides*
Campanula rotundifolia	*Camptosorus rhizophyllus*	*Capsella bursa-pastoris*
Cardamine diphylla	*Cardamine pensylvanica*	*Cardamine pratensis*
Carex annectens	*Carex aquatilis*	*Carex arctata*
Carex argyrantha *	*Carex atlantica*	*Carex aurea*

Carex bebbii	*Carex blanda*	*Carex bromoides*
Carex brunnescens	*Carex canescens*	*Carex communis*
Carex comosa	*Carex crinita*	*Carex cristatella*
Carex cryptolepis *	*Carex debilis*	*Carex deflexa*
Carex deweyana	*Carex diandra*	*Carex disperma*
Carex eburnea	*Carex festucacea*	*Carex flava*
Carex folliculata	*Carex gracillima*	*Carex granularis*
Carex gynandra	*Carex hirtifolia*	*Carex houghtonii* *
Carex hystericina	*Carex interior*	*Carex intumescens*
Carex lacustris	*Carex lanuginosa*	*Carex lasiocarpa*
Carex laxiculmis	*Carex laxiflora*	*Carex leptalea*
Carex lucorum	*Carex lupuliformis* *	*Carex lupulina*
Carex lurida	*Carex normalis*	*Carex novae-angliae*
Carex ormostachya	*Carex pallescens*	*Carex peckii*
Carex pedunculata	*Carex pensylvanica*	*Carex plantaginea*
Carex platyphylla	*Carex projecta*	*Carex pseudocyperus*
Carex retrorsa	*Carex rosea*	*Carex rostrata*
Carex rugosperma	*Carex scabrata*	*Carex scoparia*
Carex sprengelii	*Carex stipata*	*Carex stricta*
Carex swanii	*Carex tenera*	*Carex tribuloides*
Carex trisperma	*Carex tuckermanii*	*Carex umbellata*
Carex vesicaria	*Carex virescens*	*Carex vulpinoidea*
Carex woodii	*Carpinus caroliniana*	*Carya cordiformis*
Carya glabra	*Caulophyllum thalictroides*	*Celastrus scandens*
Celtis occidentalis	*Centaurea jacea*	*Centaurea maculosa*
Centaurium pulchellum	*Cephalanthus occidentalis*	*Cerastium arvense*
Cerastium fontanum	*Ceratophyllum demersum*	*Ceratophyllum echinatum* *
Chaenorrhinum minus	*Chamaedaphne calyculata*	*Chamaesyce vermiculata*
Chelone glabra	*Chenopodium album*	*Chenopodium capitatum*
Chimaphila umbellata	*Chrysosplenium americanum*	*Cichorium intybus*
Cicuta bulbifera	*Cicuta maculata*	*Cinna arundinacea*
Cinna latifolia	*Circaea alpina*	*Circaea lutetiana*
Cirsium arvense	*Cirsium vulgare*	*Cladium mariscoides*
Claytonia caroliniana	*Clematis virginiana*	*Clinopodium vulgare*
Clintonia borealis	*Comandra umbellata*	*Comptonia peregrina*
Convallaria majalis	*Convolvulus arvensis*	*Conyza canadensis*
Coptis trifolia	*Corallorhiza trifida*	*Coreopsis lanceolata*
Cornus alternifolia	*Cornus amomum*	*Cornus canadensis*
Cornus foemina	*Cornus rugosa*	*Cornus sericea*
Coronilla varia	*Corydalis sempervirens*	*Corylus cornuta*
Crataegus sp.	*Cycloloma atriplicifolium*	*Cynanchum nigrum*
Cynoglossum virginianum *	*Cyperus bipartitus*	*Cyperus houghtonii* *
Cyperus lupulinus	*Cyperus schweinitzii* *	*Cyperus strigosus*
Cypripedium acaule	*Cypripedium calceolus*	*Cypripedium reginae*
Cystopteris bulbifera	*Cystopteris fragilis*	*Dactylis glomerata*
Dalibarda repens	*Danthonia compressa*	*Danthonia spicata*
Daucus carota	*Decodon verticillatus*	*Dennstaedtia punctilobula*
Deschampsia flexuosa	*Desmodium canadense*	*Desmodium glutinosum*
Desmodium nudiflorum	*Dianthus armeria*	*Dicentra canadensis*

Dicentra cucullaria	*Diervilla lonicera*	*Digitaria ischaemum*
Digitaria sanguinalis	*Dipsacus sylvestris*	*Dirca palustris*
Draba verna	*Drosera rotundifolia*	*Dryopteris carthusiana*
Dryopteris clintoniana	*Dryopteris cristata*	*Dryopteris goldiana*
Dryopteris intermedia	*Dryopteris marginalis*	*Dulichium arundinaceum*
Echinochloa muricata	*Echinocystis lobata*	*Echium vulgare*
Eleocharis acicularis	*Eleocharis elliptica*	*Eleocharis erythropoda*
Eleocharis intermedia	*Eleocharis obtusa*	*Eleocharis smallii*
Elodea canadensis	*Elymus hystrix*	*Elymus virginicus*
Epifagus virginiana	*Epigaea repens*	*Epilobium angustifolium*
Epilobium coloratum	*Epilobium hirsutum*	*Epilobium leptophyllum*
Epilobium strictum	*Epipactis helleborine*	*Equisetum arvense*
Equisetum fluviatile	*Equisetum hyemale*	*Equisetum sylvaticum*
Equisetum variegatum	*Eragrostis frankii*	*Eragrostis minor*
Eragrostis pectinacea	*Eragrostis spectabilis*	*Erigeron annuus*
Erigeron philadelphicus	*Erigeron strigosus*	*Eriocaulon septangulare*
Eriophorum vaginatum	*Eriophorum virginicum*	*Erythronium americanum*
Eupatorium maculatum	*Eupatorium perfoliatum*	*Eupatorium rugosum*
Euphorbia esula	*Euphrasia stricta*	*Euthamia graminifolia*
Fagus grandifolia	*Festuca duriuscula*	*Festuca elatior*
Festuca filiformis	*Festuca ovina*	*Festuca rubra*
Festuca subverticillata	*Filipendula rubra*	*Fragaria vesca*
Fragaria virginiana	*Fraxinus americana*	*Fraxinus nigra*
Fraxinus pennsylvanica	*Galearis spectabilis*	*Galeopsis* sp.
Galium aparine	*Galium asprellum*	*Galium circazeans*
Galium lanceolatum	*Galium mollugo*	*Galium palustre*
Galium tinctorium	*Galium trifidum*	*Galium triflorum*
Gaultheria hispidula	*Gaultheria procumbens*	*Gaylussacia baccata*
Gentiana andrewsii	*Gentiana linearis*	*Geranium bicknellii*
Geranium robertianum	*Geum aleppicum*	*Geum canadense*
Geum macrophyllum	*Geum rivale*	*Geum* sp.
Glechoma hederacea	*Gleditsia triacanthos*	*Glyceria borealis*
Glyceria canadensis	*Glyceria grandis*	*Glyceria melicaria*
Glyceria septentrionalis	*Glyceria striata*	*Gnaphalium obtusifolium*
Gnaphalium uliginosum	*Goodyera pubescens*	*Gratiola neglecta*
Gymnocarpium dryopteris	*Hackelia virginiana*	*Hamamelis virginiana*
Hedeoma pulegioides	*Hedyotis caerulea*	*Hedyotis longifolia*
Helenium autumnale	*Helianthemum canadense*	*Helianthus divaricatus*
Helianthus giganteus?	*Heliopsis helianthoides*	*Hemerocallis fulva*
Hemerocallis lilio-asphodelis	*Hepatica nobilis*	*Hesperis matrionalis*
Heteranthera dubia	*Hieracium aurantiacum*	*Hieracium caespitosum*
Hieracium piloselloides	*Hieracium scabrum*	*Hippuris vulgaris* *
Holcus lanatus	*Humulus lupulus*	*Hydrocotyle americana*
Hydrophyllum virginianum	*Hypericum canadense*	*Hypericum ellipticum*
Hypericum mutilum	*Hypericum perforatum*	*Hypericum punctatum*
Ilex verticillata	*Impatiens capensis*	*Impatiens glandulifera*
Inula helenium	*Iris versicolor*	*Isoetes echinospora*
Juglans cinerea	*Juncus alpinoarticulatus*	*Juncus articulatus*
Juncus brevicaudatus	*Juncus bufonius*	*Juncus canadensis*

Juncus dudleyi	*Juncus effusus*	*Juncus marginatus*
Juncus militaris	*Juncus nodosus*	*Juncus pelocarpus*
Juncus tenuis	*Juncus torreyi*	*Juniperus communis*
Juniperus virginiana	*Kalmia angustifolia*	*Kalmia polifolia*
Lactuca canadensis	*Laportea canadensis*	*Larix decidua*
Larix laricina	*Lathyrus latifolius*	*Lechea intermedia*
Ledum groenlandicum	*Leersia oryzoides*	*Leersia virginica*
Lemna minor	*Lemna trisulca*	*Lepidium campestre*
Leptoloma cognatum	*Leucanthemum vulgare*	*Lilium canadense*
Linaria canadensis	*Linaria vulgaris*	*Lindera benzoin*
Linnaea borealis	*Liparis loesellii*	*Lithospermum officinale*
Lobelia cardinalis	*Lobelia inflata*	*Lobelia spicata*
Lolium perenne	*Lonicera canadensis*	*Lonicera dioica*
Lonicera morrowii	*Lonicera morrowii X tatari+*	*Lonicera oblongifolia*
Lonicera tatarica	*Lotus corniculata*	*Ludwigia palustris*
Luzula acuminata	*Luzula multiflora*	*Lycopodium annotinum*
Lycopodium clavatum	*Lycopodium complanatum* *	*Lycopodium digitatum*
Lycopodium hickeyi	*Lycopodium innundatum*	*Lycopodium lagopus*
Lycopodium lucidulum	*Lycopodium obscurum*	*Lycopodium tristachyum*
Lycopus americanus	*Lycopus uniflorus*	*Lysimachia ciliata*
Lysimachia nummularia	*Lysimachia quadrifolia*	*Lysimachia terrestris*
Lysimachia thyrsiflora	*Lythrum salicaria*	*Maianthemum canadense*
Malaxis unifolia	*Malus pumila*	*Malva moschata*
Malva neglecta	*Matricaria matricarioides*	*Matteuccia struthiopteris*
Medeola virginiana	*Medicago lupulina*	*Medicago sativa*
Melampyrum lineare	*Melilotus alba*	*Melilotus officinalis*
Menispermum canadense	*Mentha arvensis*	*Milium effusum*
Mimulus ringens	*Mitchella repens*	*Mitella diphylla*
Mitella nuda	*Moehringia lateriflora*	*Monarda didyma*
Moneses uniflora	*Monotropa uniflora*	*Muhlenbergia frondosa*
Muhlenbergia glomerata	*Muhlenbergia mexicana*	*Muhlenbergia uniflora*
Myosotis laxa	*Myrica gale*	*Myriophyllum* sp.
Myriophyllum spicatum	*Najas* sp.	*Nemopanthus mucronatus*
Nuphar lutea	*Nymphaea odorata*	*Odontitis verna*
Oenothera biennis	*Oenothera perennis*	*Onoclea sensibilis*
Orobanche uniflora	*Oryzopsis asperifolia*	*Oryzopsis pungens*
Oryzopsis racemosa	*Osmorhiza claytonii*	*Osmorhiza longistylis*
Osmunda cinnamomea	*Osmunda claytoniana*	*Osmunda regalis*
Ostrya virginiana	*Oxalis acetosella*	*Oxalis stricta*
Panax quinquefolius	*Panax trifolius*	*Panicum acuminatum*
Panicum boreale *	*Panicum capillare*	*Panicum clandestinum*
Panicum columbianum	*Panicum depauperatum*	*P. depauperatum* var. *involuta*
Panicum dichotomum	*Panicum linearifolium*	*Panicum virgatum*
Panicum xanthophysum	*Parthenocissus inserta*	*Parthenocissus* sp.
Pastinaca sativa	*Peltandra virginica*	*Penstemon digitalis*
Penstemon hirsutus	*Penthorum sedoides*	*Phalaris arundinacea*
Phegopteris connectilis	*Phleum pratense*	*Phlox divaricata*
Phlox paniculata	*Phlox subulata*	*Phragmites australis*
Phryma leptostachya	*Physalis heterophylla*	*Phytolocca americana*

Picea glauca	*Picea mariana*	*Picea rubens*
Pilea pumila	*Pinus banksiana*	*Pinus resinosa*
Pinus rigida	*Pinus strobus*	*Pinus sylvestris*
Plantago lanceolata	*Plantago major*	*Plantago rugelii*
Platanthera clavellata	*Platanthera flava*	*Platanthera hyperborea*
Platanthera lacera	*Platanthera obtusata*	*Platanthera orbiculata*
Platanthera psycodes	*Poa alsodes*	*Poa annua*
Poa compressa	*Poa palustris*	*Poa pratensis*
Poa saltuensis	*Poa trivialis*	*Podophyllum peltatum*
*Podostemum ceratophyllum**	*Pogonia ophioglossoides*	*Polygala paucifolia*
Polygala polygama	*Polygala sanguinea*	*Polygala verticillata*
Polygonatum pubescens	*Polygonella articulata*	*Polygonum amphibium*
Polygonum arifolium	*Polygonum aviculare*	*Polygonum cilinode*
Polygonum convolvulus	*Polygonum cuspidatum*	*Polygonum hydropiper*
Polygonum hydropiperoides	*Polygonum lapathifolium*	*Polygonum persicaria*
Polygonum sagittatum	*Polygonum virginianum*	*Polypodium virginianum*
Polystichum acrostichoides	*Pontederia cordata*	*Populus alba*
Populus albaX?	*Populus balsamifera*	*Populus deltoides*
Populus grandidentata	*Populus tremuloides*	*Portulaca oleracea*
Potamogeton amplifolius	*Potamogeton epihydrus*	*Potamogeton hillii* *
Potamogeton illinoensis	*Potamogeton natans*	*Potamogeton perfoliatus*
Potamogeton pusillus	*Potamogeton richardsonii*	*Potamogeton zosteriformis*
Potentilla argentea	*Potentilla arguta*	*Potentilla fruticosa*
Potentilla norvegica	*Potentilla palustris*	*Potentilla recta*
Potentilla simplex	*Prenanthes alba*	*Prenanthes altissima*
Prenanthes sp.	*Proserpinaca palustris*	*Prunella vulgaris*
Prunus nigra	*Prunus pensylvanica*	*Prunus serotina*
Prunus virginiana	*Pteridium aquilinum*	*Pycnanthemum tenuifolium*
Pyrola elliptica	*Pyrola rotundifolia*	*Quercus alba*
Quercus coccinea	*Quercus macrocarpa*	*Quercus rubra*
Quercus velutina	*Ranunculus abortivus*	*Ranunculus acris*
Ranunculus hispidus	*Ranunculus longirostris*	*Ranunculus recurvatus*
Ranunculus repens	*Ranunculus reptans*	*Reseda lutea*
Rhamnus alnifolia	*Rhamnus cathartica*	*Rhamnus frangula*
Rhus typhina	*Rhynchospora alba*	*Ribes americanum*
Ribes aureum	*Ribes cynos-bati*	*Ribes glandulosum*
Ribes hirtellum	*Ribes lacustre*	*Ribes triste*
Robinia pseudo-acacia	*Rorippa palustris*	*Rosa palustris*
Rubus allegheniensis	*Rubus flagellaris*	*Rubus hispidus*
Rubus idaeus	*Rubus occidentalis*	*Rubus odoratus*
Rubus pubescens	*Rubus* sp.	*Rudbeckia hirta*
Rudbeckia lacinata	*Rumex acetosella*	*Rumex crispus*
Rumex verticillatus	*Sagittaria* sp.	*Salix alba*
Salix amygdaloides	*Salix bebbiana*	*Salix candida*
Salix discolor	*Salix eriocephala*	*Salix fragilis*
Salix humilis	*Salix lucida*	*Salix pedicellaris*
Salix petiolaris	*Salix pyrifolia* *	*Salix sericea*
Salix serissima	*Sambucus canadensis*	*Sambucus racemosa*
Sanguinaria canadensis	*Sanguisorba minor*	*Sanicula marilandica*

Sanicula trifoliata	*Saponaria officinalis*	*Sarracenia purpurea*
Saxifraga pensylvanica	*Saxifraga virginiensis*	*Schizachne purpurascens*
Schizachyrium scoparium	*Scirpus atrocinctus*	*Scirpus atrovirens*
Scirpus cyperinus	*Scirpus hudsonianus*	*Scirpus microcarpus*
Scirpus pendulus	*Scirpus subterminalis*	*Scirpus tabernaemontanii*
Scleranthus annuus	*Scutellaria galericulata*	*Scutellaria lateriflora*
Sedum telephium	*Senecio pauperculus*	*Setaria glauca*
Setaria viridis	*Silene antirrhina*	*Silene latifolia*
Silene noctiflora	*Silene vulgaris*	*Sisyrinchium angustifolium*
Sisyrinchium montanum	*Sium suave*	*Smilacina racemosa*
Smilacina stellata	*Smilacina trifolia*	*Smilax herbacea*
Smilax hispida	*Solanum carolinense*	*Solanum dulcamara*
Solanum nigrum	*Solidago bicolor*	*Solidago caesia*
Solidago canadensis	*Solidago flexicaulis*	*Solidago gigantea*
Solidago juncea	*Solidago nemoralis*	*Solidago puberula*
Solidago rugosa	*Solidago squarrosa*	*Sonchus asper*
Sonchus oleraceus	*Sorbaria sorbifolia*	*Sorbus decora*
Sparganium americanum	*Sparganium chlorocarpum*	*Sparganium eurycarpum*
Sparganium natans *	*Spergula arvensis*	*Sphenopholis obtusata*
Spiraea alba	*Spiraea latifolia*	*Spiraea tomentosa*
Spiranthes cernua	*Spiranthes lacera*	*Spirodela polyrhiza*
Sporobolus cryptandrus	*Sporobolus neglectus*	*Sporobolus vaginiflorus*
Stachys palustris	*Staphylea trifolia*	*Stellaria graminea*
Stellaria longifolia	*Streptopus roseus*	*Symphoricarpos albus*
Symphoricarpos occidentalis	*Symplocarpus foetidus*	*Syringa vulgaris*
Tanacetum vulgare	*Taraxacum officinale*	*Taxus canadensis*
Thalictrum dioicum	*Thalictrum pubescens*	*Thelypteris noveboracensis*
Thelypteris palustris	*Thuja occidentalis*	*Tiarella cordifolia*
Tilia americana	*Toxicodendron radicans*	*Tragopogon porrifolius*
Tragopogon pratensis	*Triadenum fraseri*	*Trichostema dichotomum*
Trientalis borealis	*Trifolium arvense*	*Trifolium aureum*
Trifolium hybridum	*Trifolium pratense*	*Trifolium repens*
Trillium erectum	*Trillium grandiflorum*	*Trillium undulatum*
Triosteum (perfoliatum)	*Tsuga canadensis*	*Tussilago farfara*
Typha angustifolia	*Typha latifolia*	*Ulmus americana*
Ulmus rubra	*Ulmus thomasii* *	*Urtica dioica*
Utricularia cornuta	*Utricularia geminiscapa* *	*Utricularia gibba*
Utricularia intermedia	*Utricularia vulgaris*	*Uvularia grandiflora*
Uvularia perfoliata	*Uvularia sessilifolia*	*Vaccinium angustifolium*
Vaccinium corymbosum	*Vaccinium macrocarpon*	*Vaccinium myrtilloides*
Vaccinium oxycoccos	*Vaccinium pallidum*	*Vallisneria americana*
Veratrum viride	*Verbascum lychnitis*	*Verbascum thapsus*
Verbena hastata	*Verbena urticifolia*	*Veronica americana*
Veronica officinalis	*Veronica peregrina*	*Veronica scutellata*
Veronica serpyllifolia	*Viburnum acerifolium*	*Viburnum cassinoides*
Viburnum lantanoides	*Viburnum lentago*	*Viburnum rafinesquianum*
Viburnum recognitum	*Viburnum trilobum*	*Vicia cracca*
Vicia tetrasperma	*Vinca minor*	*Viola adunca*
Viola affinis	*Viola blanda*	*Viola canadensis*

Viola conspersa	*Viola fimbriatula*	*Viola macloskeyi*
Viola pubescens	*Viola renifolia*	*Viola rostrata*
Viola rotundifolia	*Viola sororia*	*Viola* sp.
Vitis riparia	*Vitis* sp.	*Waldsteinia fragarioides*
Wolffia borealis	*Wolffia columbiana*	*Woodsia ilvensis*
Xanthoxyllum americanum	*Zizia aurea*	

* - State-listed Rare Species by the New York Natural Heritage Program

APPENDIX 5.8: Fauna Known to Occur on Fort Drum

MAMMALS

Common Name	Scientific Name
Northern short-tailed shrew	*Blarina brevicauda*
Beaver	*Castor canadensis*
Coyote	*Canis latrans*
Southern red-backed vole	*Clethrionomys gapperi*
Star-nosed mole	*Condylura cristata*
Virginia opossum	*Didelphis virginiana*
Big brown bat	*Eptesicus fuscus*
Porcupine	*Erethizon dorsatum*
Northern flying squirrel	*Glaucomys sabrinus*
Southern flying squirrel	*Glaucomys volans*
Silver-haired bat	*Lasionycteris noctivagans*
Hoary bat	*Lasiurus cinereus*
Snowshoe hare	*Lepus americanus*
River otter	*Lutra canadensis*
Bobcat	*Lynx rufus*
Woodchuck	*Marmota monax*
Fisher	*Martes pennanti*
Striped skunk	*Mephitis mephitis*
Meadow vole	*Microtus pennsylvanicus*
Short-tailed weasel, ermine	*Mustela erminea*
Long-tailed weasel	*Mustela frenata*
Mink	*Mustela vison*
Little brown bat	*Myotis lucifugus*
Northern long-eared bat	*Myotis septentrionalis*
Woodland jumping mouse	*Napaeozapus insignis*
White-tailed deer	*Odocoileus virginianus*
Muskrat	*Ondatra zibethicus*
Hairy-tailed mole	*Parascalops breweri*
White-footed mouse	*Peromyscus leucopus*
Deer mouse	*Peromyscus maniculatus*
Raccoon	*Procyon lotor*
Gray squirrel	*Sciurus carolinensis*
Masked shrew	*Sorex cinereus*
Smokey shrew	*Sorex fumeus*
Pygmy shrew	*Sorex hoyi*
Southern bog lemming	*Synaptomys cooperi*
Eastern cottontail	*Sylvilagus floridanus*
Red squirrel	*Tamiasciurus hudsonicus*
Eastern chipmunk	*Tamias striatus*
Black bear	*Ursus americanus*
Red fox	*Vulpes vulpes*
Meadow jumping mouse	*Zapus hudsonius*

BIRDS

Scientific Name	Common Name
Accipiter cooperii	Cooper's Hawk - SSC
Accipiter gentilis	Northern Goshawk - SSC
Accipiter striatus	Sharp-shinned Hawk - SSC
Actitis macularia	Spotted Sandpiper
Agelaius phoeniceus	Red-winged Blackbird
Aix sponsa	Wood Duck
Ammodramus henslowii	Henslow's Sparrow - ST
Ammodramus savannarum	Grasshopper Sparrow - SSC
Anas acuta	Northern Pintail
Anas americana	American Wigeon
Anas clypeata	Northern Shoveler
Anas crecca	Green-winged Teal
Anas discors	Blue-winged Teal
Anas platyrhynchos	Mallard
Anas rubripes	American Black Duck
Anas strepera	Gadwall
Archilochus colubris	Ruby-throated Hummingbird
Ardea herodias	Great Blue Heron
Asio flammeus	Short-eared Owl - SE
Aythya affinis	Lesser Scaup
Aythya americana	Redhead
Aythya collaris	Ring-necked Duck
Aythya valisineria	Canvasback
Bartramia longicauda	Upland Sandpiper - ST
Bombycilla cedrorum	Cedar Waxwing
Bonasa umbellus	Ruffed Grouse
Botaurus lentiginosus	American Bittern - SSC
Branta canadensis	Canada Goose
Bubo virginianus	Great Horned Owl
Bucephala albeola	Bufflehead
Bucephala clangula	Common Goldeneye
Buteo jamaicensis	Red-tailed Hawk
Buteo lagopus	Rough-legged Hawk
Buteo lineatus	Red-shouldered Hawk - SSC
Buteo platypterus	Broad-winged Hawk
Butorides virescens	Green Heron
Calidris bairdii	Baird's Sandpiper
Calidris fuscicollis	White-rumped Sandpiper
Calidris melanotos	Pectoral Sandpiper
Calidris minuta	Least Sandpiper
Calidris pusilla	Semipalmated Sandpiper
Caprimulgus vociferus	Whip-poor-will - SSC
Cardinalis cardinalis	Northern Cardinal
Carduelis flammea	Common Redpoll
Carduelis pinus	Pine Siskin
Carduelis tristis	American Goldfinch
Carpodacus mexicanus	House Finch
Carpodacus purpureus	Purple Finch

BIRDS

Scientific Name	Common Name
Cathartes aura	Turkey Vulture
Catharus fuscescens	Veery
Catharus guttatus	Hermit Thrush
Catharus ustulatus	Swainson's Thrush
Certhia americana	Brown Creeper
Ceryle alcyon	Belted Kingfisher
Chaetura pelagica	Chimney Swift
Charadrius vociferus	Killdeer
Chlidonias niger	Black Tern
Chordeiles minor	Common Nighthawk - SSC
Circus cyaneus	Northern Harrier - ST
Cistothorus palustris	Marsh Wren
Coccothraustes vespertinus	Evening Grosbeak
Coccyzus americanus	Yellow-billed Cuckoo
Coccyzus erythropthalmus	Black-billed Cuckoo
Colaptes auratus	Northern Flicker
Colinus virginianus	Northern Bobwhite
Columba livia	Rock Dove
Contopus virens	Eastern Wood-Pewee
Corvus brachyrhynchos	American Crow
Corvus corax	Common Raven
Cyanocitta cristata	Blue Jay
Dendroica caerulescens	Black-throated Blue Warbler
Dendroica cerulea	Cerulean Warbler - SSC
Dendroica coronata	Yellow-rumped Warbler
Dendroica discolor	Prairie Warbler
Dendroica fusca	Blackburnian Warbler
Dendroica magnolia	Magnolia Warbler
Dendroica occidentalis	Hermit Warbler
Dendroica pensylvanica	Chestnut-sided Warbler
Dendroica petechia	Yellow Warbler
Dendroica pinus	Pine Warbler
Dendroica striata	Blackpoll Warbler
Dendroica virens	Black-throated Green Warbler
Dolichonyx oryzivorus	Bobolink
Dryocopus pileatus	Pileated Woodpecker
Dumetella carolinensis	Gray Catbird
Empidonax alnorum	Alder Flycatcher
Empidonax flaviventris	Yellow-bellied Flycatcher
Empidonax minimus	Least Flycatcher
Empidonax traillii	Willow Flycatcher
Eremophila alpestris	Horned Lark - SSC
Falco peregrinus	Peregrine Falcon - SE
Falco sparverius	American Kestrel
Gallinago gallinago	Common Snipe
Gallinula chloropus	Common Moorhen
Gavia immer	Common Loon - SSC

BIRDS

Scientific Name	Common Name
Geothlypis trichas	Common Yellowthroat
Haliaeetus leucocephalus	Bald Eagle - ST, FT
Helmitheros vermivorus	Worm-eating Warbler
Hirundo rustica	Barn Swallow
Hylocichla mustelina	Wood Thrush
Icteria virens	Yellow-breasted Chat - SSC
Icterus galbula	Baltimore Oriole
Ixobrychus exilis	Least Bittern - ST
Junco hyemalis	Dark-eyed Junco
Lanius excubitor	Northern Shrike
Larus delawarensis	Ring-billed Gull
Lophodytes cucullatus	Hooded Merganser
Loxia leucoptera	White-winged crossbill
Melanerpes carolinus	Red-bellied Woodpecker
Melanerpes erythrocephalus	Red-headed Woodpecker - SSC
Meleagris gallopavo	Wild Turkey
Melospiza georgiana	Swamp Sparrow
Melospiza melodia	Song Sparrow
Mergus merganser	Common Merganser
Mergus serrator	Red-breasted Merganser
Mimus polyglottos	Northern Mockingbird
Mniotilta varia	Black-and-white Warbler
Molothrus ater	Brown-headed Cowbird
Myiarchus crinitus	Great Crested Flycatcher
Nyctea scandiaca	Snowy Owl
Oporornis philadelphia	Mourning Warbler
Otus asio	Eastern Screech-owl
Oxyura jamaicensis	Ruddy Duck
Pandion haliaetus	Osprey - SSC
Parula americana	Northern Parula
Parus atricapillus	Black-capped Chickadee
Baelophus bicolor	Tufted Titmouse
Passer domesticus	House Sparrow
Passerculus sandwichensis	Savannah Sparrow
Passerina cyanea	Indigo Bunting
Phasianus colchicus	Ring-necked Pheasant
Pheucticus ludovicianus	Rose-breasted Grosbeak
Picoides pubescens	Downy Woodpecker
Picoides villosus	Hairy Woodpecker
Pinicola enucleator	Pine Grosbeak
Pipilo erythrophthalmus	Eastern Towhee
Piranga olivacea	Scarlet Tanager
Plectrophenax nivalis	Snow Bunting
Pluvialis squatarola	Black-bellied Plover
Podilymbus podiceps	Pied-billed Grebe - ST
Polioptila caerulea	Blue-gray Gnatcatcher
Pooecetes gramineus	Vesper Sparrow - SSC

BIRDS

Scientific Name	Common Name
Porzana carolina	Sora
Quiscalus quiscula	Common Grackle
Rallus limicola	Virginia Rail
Regulus calendula	Ruby-crowned Kinglet
Regulus satrapa	Golden-crowned Kinglet
Riparia riparia	Bank Swallow
Sayornis phoebe	Eastern Phoebe
Scolopax minor	American Woodcock
Seiurus aurocapillus	Ovenbird
Seiurus noveboracensis	Northern Waterthrush
Setophaga ruticilla	American Redstart
Sialia sialis	Eastern Bluebird
Sitta canadensis	Red-breasted Nuthatch
Sitta carolinensis	White-breasted Nuthatch
Sphyrapicus varius	Yellow-bellied Sapsucker
Spiza americana	Dickcissel
Spizella arborea	American Tree Sparrow
Spizella pallida	Clay-colored Sparrow
Spizella passerina	Chipping Sparrow
Spizella pusilla	Field Sparrow
Stelgidopteryx serripennis	Northern Rough-winged Swallow
Strix varia	Barred Owl
Sturnella magna	Eastern Meadowlark
Sturnus vulgaris	European Starling
Tachycineta bicolor	Tree Swallow
Thryothorus ludovicianus	Carolina Wren
Toxostoma rufum	Brown Thrasher
Tringa flavipes	Lesser Yellowlegs
Tringa melanoleuca	Greater Yellowlegs
Tringa solitaria	Solitary Sandpiper
Troglodytes aedon	House Wren
Troglodytes troglodytes	Winter Wren
Turdus migratorius	American Robin
Tyrannus tyrannus	Eastern Kingbird
Vermivora chrysoptera	Golden-winged Warbler - SSC
Vermivora peregrina	Tennessee Warbler
Vermivora pinus	Blue-winged Warbler
Vermivora ruficapilla	Nashville Warbler
Vireo flavifrons	Yellow-throated Vireo
Vireo gilvus	Warbling Vireo
Vireo olivaceus	Red-eyed Vireo
Vireo philadelphicus	Philadelphia Vireo
Vireo solitarius	Blue-headed Vireo
Wilsonia canadensis	Canada Warbler
Wilsonia citrina	Hooded Warbler
Wilsonia pusilla	Wilson's Warbler
Zenaida macroura	Mourning Dove

BIRDS

Scientific Name	Common Name
Zonotrichia albicollis	White-throated Sparrow

SSC – State Species of Concern
ST – State Threatened
SE – State Endangered
FT – Federal Threatened

FISH

Scientific Name	Common Name
Ambloplites rupestris	Rock bass
Ameiurus melas	Black bullhead
Anguilla rostrata	American eel
Castostomus commersoni	White sucker
Catostomus catostomus	Longnose sucker
Clinostomus elongatus	Redside dace
Cottus bairdi	Mottled sculpin
Cottus cognatus	Slimy sculpin
Culaea inconstans	Brook stickleback
Cyprinella spilopterus	Spotfin shiner
Cyprinus carpio	Common carp
Esox lucius	Northern pike
Esox masquinongy	Muskellunge
Esox niger	Chain pickerel
Etheostoma flabellare	Fantail darter
Etheostoma olmstedi	Tessellated darter
Fundulus diaphanus	Banded killifish
Hypentelium nigricans	Northern hogsucker
Ictalurus nebulosus	Brown bullhead
Lepomis cyanellus	Green sunfish
Lepomis gibbosus	Pumpkinseed
Lepomis macrochirus	Bluegill
Lota lota	Burbot
Luxilus cornutis	Common shiner
Margariscus margarita	Pearl dace
Micropterus dolomieui	Smallmouth bass
Micropterus salmoides	Largemouth bass
Notemigonus crysoleucas	Golden shiner
Notropis atherinoides	Emerald shiner
Notropis hudsonius	Spottail shiner
Notropis lubidundus	Sand shiner
Noturus flavus	Stonecat
Noturus gyrinus	Tadpole madtom
Oncorhynchus mykiss	Rainbow trout
Perca flavescens	Yellow perch
Percina caprodes	Logperch

FISH

Scientific Name	Common Name
Pimephales notatus	Bluntnose minnow
Pimephales promelas	Fathead minnow
Pomoxis nigromaculatus	Black crappie
Rhinichthys atratulus	Blacknose dace
Rhinichthys cataractae	Longnose dace
Salmo trutta	Brown trout
Salvelinus fontinalis	Brook trout
Semotilus atromaculatus	Creek chub
Stizostedion vitreum	Walleye
Umbra limi	Central mudminnow

AMPHIBIANS and REPTILES

Scientific Name	Common Name
Ambystoma maculatum	Spotted salamander
Ambystoma spp.	Jefferson salamander complex - SSC
Bufo americanus	American toad
Chelydra serpentina	Snapping turtle
Chrysemys picta picta	Midland painted turtle
Clemmys insculpta	Wood turtle - SSC
Desmognathus sp.	Dusky salamander
Diadophis punctatus	Northern ringneck snake
Emydoidea blandingii	Blanding's turtle - ST
Eurycea bislineata	Two-lined salamander
Gyrinophilus porphyriticus	Northern spring salamander
Hemidactylium scutatum	Four-toed salamander
Hyla versicolor	Gray treefrog
Lampropeltis triangulum triangulum	Eastern milk snake
Nerodia sipedon	Northern water snake
Notophthalmus viridescens	Eastern red-spotted newt
Opheodrys vernalis	Smooth green snake
Plethodon cinereus	Eastern red-backed salamander
Pseudacris crucifer	Northern spring peeper
Pseudacris triseriata	Western chorus frog
Rana catesbeiana	Bullfrog
Rana clamitans	Green frog
Rana palustris	Pickerel frog
Rana pipiens	Northern leopard frog
Rana septentrionalis	Mink frog
Rana sylvatica	Wood frog
Storeria dekayi	Northern brown snake
Storeria occipitomaculata	Northern redbelly snake
Thamnophis sirtalis	Eastern garter snake

SSC – State Species of Concern
ST – State Threatened

Insects Collected And Observed At Fort Drum[6, 7, 8]
(1996-1997)

FAMILY ACRIDIDAE
Arphia sulphurea Fabricius
Dissosteira carolina Linnaeus
Melanoplus sanguinipes Fabricius

FAMILY GRYLLIDAE
Gryllus sp.

FAMILY CICIDAE
Tibicen sp.

FAMILY MYRMELIONIDAE
Myrmeleon immaculatus DeGeer

FAMILY CICINDELIDAE
Cicindela lepida Dejean
Cicindela punctulata Olivier
Cicindela formosa generosa Dejean
Cicindela scutellaris lecontei Haldeman
Cicindela sexguttata Fabricius

FAMILY SCARABAEIDAE
Cotalpa lanigera Linnaeus
Phyllophaga sp.
Popillia japonica Newman

FAMILY BUPRESTIDAE
Chalcophora fortis LeConte

FAMILY CERAMBYCIDAE
Tetraopes tetraopthalmus Forst.

FAMILY CHRYSIDIDAE
Hedychridium sp.
Hedychrum sp.

[6]Arranged in phylogenic order

[7]Compiled by F.E. Kurczewski, SUNY College of E. S. & F., Syracuse, NY.

[8]Species of Lepidoptera identified by E.J. Stanton, SUNY College of E. S. & F., Syracuse, NY.

Trichrysis sp.

FAMILY TIPHIIDAE
Tiphia sp.
Paratiphia sp.
Methocha stygia Say

FAMILY SCOLIIDAE
Campsomeris plumipes Drury

FAMILY EUMENIDAE
Monobia quadridens Linnaeus
Ancistrocerus catskill Saussure
Eumenes fraternus Say

FAMILY VESPIDAE
Dolichovespula maculata Linneaus

FAMILY POMPILIDAE
Priocnessus nebulosus Dahlbom
Priocnemis cornica Say
Calicurgus hyalinatus Fabricius
Dipogon sayi Banks
Auplopus architectus Say
Evagetes mohave Banks
Evagetes parvus Cresson
Episyron biguttatus Fabricius
Episyron quinquenotatus Say
Anoplius (Arachnophroctonus) relativus Fox
Anoplius (Arachnophroctonus) semirufus Cresson
Anoplius (Pompilinus) marginatus Say
Anoplius (Pompilinus) splendens Dreisbach
Anoplius (Pompilinus) subcylindricus Banks
Anoplius (Pompilinus) tenebrosus Cresson
Anoplius (Anoplius) illinoensis Robertson
Anoplius (Anoplius) ventralis Banks
Anoplius (Anoplius) virginiensis Cresson
Arachnospila scelestus Cresson

FAMILY SPHECIDAE
Chalybion californicum Saussure
Sceliphron caementarium Drury
Sphex ichneumoneus Linnaeus
Podalonia luctuosa Smith
Podalonia robusta Cresson
Ammophila harti Fernald
Ammophila procera Dahlbom

Ammophila urnaria Dahlbom
Mimesa basirufa Packard
Mimesa cressonii Packard
Stigmus americanus Packard
Astata leuthstromi Ashmead or *unicolor* Say
Liris argentata Beauvois
Tachytes obductus Fox
Tachysphex similis Rohwer
Tachysphex tarsatus Say
Tachysphex terminatus Smith
Lyroda subita Say
Plenoculus davisi Fox
Miscophus americanus Fox
Oxybelus bipunctatus Olivier
Oxybelus emarginatus Say
Oxybelus subcornutus Cockerell
Oxybelus subulatus Robertson
Anacrabro ocellatus Packard
Lindenius buccadentis Mickel
Lindenius columbianus Kohl
Crossocerus maculiclypeus Fox
Crabro advena Smith
Crabro argusinus R. Bohart
Crabro cribrellifer Packard
Crabro latipes Smith
Crabro monticola Packard
Alysson melleus Say
Ochleroptera bipunctata Say
Gorytes canaliculatus Packard
Gorytes simillimus Smith
Sphecius speciosus Drury
Bicyrtes quadrifasciata Say
Bicyrtes ventralis Say
Microbembex monodonta Say
Bembix americana Lepeletier
Bembix pruinosa Fox
Philanthus bilunatus Cresson
Philanthus gibbosus Fabricius
Philanthus lepidus Cresson
Philanthus politus Say
Philanthus solivagus Say
Aphilanthops frigidus Smith
Cerceris clypeata Dahlbom
Cerceris fumipennis Say

FAMILY COLLETIDAE
Colletes sp. 1

Colletes sp. 2

FAMILY ANTHOPHORIDAE
Nomada sp. 1
Nomada sp. 2

FAMILY APIDAE
Bombus sp. 1
Bombus sp. 2
Apis mellifera Linnaeus

FAMILY HESPERIIDAE
Erynnis juvenalis Fabricius
Poanes hobomok Harris

FAMILY PAPILIONIDAE
Papilio glaucus Linnaeus

FAMILY NYMPHALIDAE
Vanessa atalanta Linnaeus
Danaus plexippus Linnaeus

FAMILY SATYRIDAE
Coenonympha tullia inornata W.H. Edwards
Megisto cymela Cramer

FAMILY SIMULIIDAE
Simulium vittatum Zetterstedt

FAMILY TABANIDAE
Chrysops cincticornis Walker
Chrysops frigidus Osten Sacken
Chrysops geminatus Wiedemann
Chrysops indus Osten Sacken
Chrysops lateralis Wiedemann
Chrysops macquarti Philip
Chrysops moechus Osten Sacken
Chrysops montanus Osten Sacken
Chrysops shermani Hine
Chrysops univittatus Macquart
Chrysops venus Philip
Chrysops vittatus Wiedemann
Tabanus atratus Fabricius
Tabanus quinquevittatus Wiedemann
Hybomitra lasiophthalma Macquart

FAMILY RHAGIONIDAE

Chrysopilus thoracicus Fabricius

FAMILY THEREVIDAE
Thereva frontalis Say

FAMILY ASILIDAE
Promachus bastardii Macquart
Holcocephala calva Loew

FAMILY BOMBYLIIDAE
Anthrax albofasciatus Macquart

FAMILY SARCOPHAGIDAE
Senotainia trilineata Wulp
Senotainia vigilans Allen
Phrosinella aurifacies Downes

APPENDIX 6.2.1: Cover Types and Acreage by Sub-Training Area on Fort Drum

Sub-training area	Acres	Forest	Rangeland or Grassland	Developed or Disturbed	Water or Wetland	Other
3A	684	392	230	6	56	0
3B	359	0	304	11	26	18
3C	479	161	265	0	53	0
3D	778	100	596	0	69	13
3E	489	28	390	5	42	24
4A	803	549	188	39	8	19
4B	396	262	68	19	4	43
4C	189	138	42	4	0	5
4D	595	500	63	7	23	2
4E	1132	710	302	18	92	10
5A	563	57	401	23	1	81
5B	849	617	151	24	51	6
5C	261	69	156	13	23	0
5D	1175	385	510	25	12	243
5E	1062	470	174	388	29	1
6A	767	597	104	0	55	11
6B	133	33	75	13	10	2
6C	244	152	3	22	12	55
7A	489	398	33	7	46	5
7B	993	713	117	7	79	77
7C	638	434	36	4	102	62
7D	909	543	246	7	105	8
7E	662	609	7	12	23	11
7F	466	359	51	9	47	0
7G	916	562	255	10	57	32
8A	494	162	81	209	41	1
8B	2198	1553	267	12	211	155
8C	2230	1733	155	20	299	23
9A	1597	1353	76	16	138	14
9B	619	494	41	15	69	0
9C	986	516	111	20	248	91
10A	455	231	23	6	48	147
10B	732	228	269	6	205	24
10C	918	243	470	11	194	0
11A	496	333	112	8	43	0
11B	620	228	318	11	63	0
11C	307	176	107	2	22	0
11D	298	4	192	6	96	0

Sub-training area	Acres	Forest	Rangeland or Grassland	Developed or Disturbed	Water or Wetland	Other
11E	855	227	527	11	90	0
12A	1055	116	869	17	41	12
12B	1176	5	1064	10	87	10
12C	1349	0	1203	8	123	15
12D	1205	170	969	13	46	7
13A	3071	818	1651	62	540	0
13B	676	101	488	22	64	1
14A	741	325	78	18	309	11
14B	3622	2465	109	111	688	249
14C	1197	616	82	22	307	170
14D	953	365	86	11	148	343
14E	718	472	146	9	59	32
14F	404	217	37	14	70	66
14G	3388	1905	341	105	636	401
15A	338	169	91	11	28	39
15B	218	91	77	25	25	0
15C	1007	451	331	12	213	0
15D	180	144	18	1	17	0
15E	167	151	0	1	15	0
16A	1261	609	26	26	600	0
16B	365	142	38	33	152	0
16C	2877	1496	905	143	333	0
17A	3016	1062	1610	116	224	4
17B	976	380	486	0	108	2
17C	1540	921	474	20	115	10
17D	365	98	227	27	8	5
18A	1516	1206	88	26	186	10
18B	2434	1814	115	5	500	0
19A	4213	3296	31	1	880	5
19B	2624	1900	78	136	509	1
19C	2165	1508	6	0	647	4
19D	2000	1402	6	11	581	0
20	2463	2033	50	6	374	0
Total Acres	78,116	42,767	19,296	2,048	11,425	2,580

APPENDIX 14.3.1.2: Fort Drum GIS Themes

GENERAL
Borrow pits
Contour lines at five-foot intervals
Culverts
Digital aerial photos
Digital elevation model**
Fort Drum boundary
Land physiography
Landcover/landuse, Coastal Environmental Services
Landcover/landuse, Geonex
Landfills
Latrines
Main impact area boundary
ND beacons
New York State boundary
New York State counties
New York State municipal areas
Old impact areas (early 1950s and prior)
Original land survey lots (1700s)
Original Pine Camp boundary
Power lines
Quarries
Railroads
Roads and trails
State land boundaries from 1940s
Training and subtraining areas
Wells

ARCHEOLOGY
Archeological sites, including villages and cemeteries
Cultural resource survey areas
Leray Mansion features
Prehistoric sensitivity model
Registered archeological districts

CANTONMENT
Bow hunting zones
Buildings
Digging restriction areas
Fences
Grading sites
Hedges
Hydrology

Landfills
Local training areas
Pads
Parking areas
Railroads
Roads
Trails
Wheeler-Sack Airfield

FORESTRY
Firewood sale areas
Forest blowdown areas
Forested areas, 1945
Forest inventory plots
Old beach grass plantings (early 1950s and prior)
Old timber cutting units (early 1950s and prior)
Potential metal-impacted areas
Timber cutting units
Trees on Leray Mansion site

HYDROLOGY
Coastal Environmental Services wetlands
Flight landing strip offset
Habitat enhancement areas
Hydrology
Mitigation sites
OSCAR wetland delineations
Sand aquifer
Storm outfall locations
Water table
Wetlands, Coastal Environmental Services
Wetlands, GPS-delineated
Wetlands, National Wetlands Inventory
Wetlands, NYS Department of Transportation

LCTA
Accidental burn areas
Bivouac area monitoring plots
Bivouac areas to be monitored by LCTA Program
Denuded areas
LCTA land units used to allocate LCTA plots
LCTA plots
Mountain Peak disturbance areas
Secondary LCTA Bird Census Points

LRAM
Corps of Engineers work sites, 1997

CRREL study sites, 1997
LRAM rehabilitation sites
Site rehabilitation prioritization (SRP) sites

NEPA
Record of Environmental Consideration (REC) review locations

RANGE-RELATED
Abandoned battle points
Ammo pads
Battle positions
Bleachers
Buildings
Bunkers
Cement pads
Convoy live fire locations
Culverts
Defensible position in the cantonment
Dirt piles
Engineer Qualification Areas
Field artillery pads
Firing limits
Firing points
Firing targets used in Bnoise Modeling Test
Generators
Helipads
Hellfire
IMBP sites
Landing zones and associated features
Latrines
Live fire village and associated features
Machine gun ranges
Maintenance areas
Markers for ranges
Mobil conduct of fire trainers (MCOFT)
MOUT site and associated features
Movers
Moving targets
Observation posts
Proposed Caswell Mover
Proposed Forward Operating and Support Area
Range 41A offset
Range 48 gunnery range project
Range 48 wetland mitigation sites
Range safety cones
Roads and proposed roads
Skeet range and associated safety danger zone

Stationary armored targets
Stationary infantry targets
Stinger missile exercise areas
Supply points
Tent pads
Tower
Trails
Trenches

RECREATION
Snowmobile trails

SOILS
Bedrock geology
Soils with soil attribute data
Surface geology

WILDLIFE
Grassland bird census points
Grouse management locations
Habitats at MAPS banding stations
Herp array survey locations
Marsh monitoring locations
Mist nets at MAPS banding stations
Predator scent stations
Rare plant or bird species sightings
Rare species sightings
Roads, trails, and hydrology near MAPS banding stations
Trout stocking locations
Turkey survey locations
Water levelers
Woodcock survey locations
Wood duck nest boxes

*Many themes are incomplete
****Digital elevation model*: This is a raster image composed of cells storing elevation values. This will be used to generate new topographic themes, including slope, aspect, surface curvature, and shade relief.

APPENDIX 14.4: List of INRMP Goals and Objectives

The below list of **projects** with their ***goals*** and objectives is presented in the order they appear in this INRMP. Goals and objectives are summarized; their full terminology is within Chapters 7-14.

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
7.1	**Land Condition Trend Analysis**						
	Provide long-term assessments of changes in the condition of training lands at Fort Drum						
	1. Remeasure a subset of the core permanent plots		X	X	X	X	X
	2. Remeasure established special use plots	As needed					
	3. Remeasure special use burn plots		X	X	X	X	X
	4. Establish and survey additional special use plots as special situations demand	As needed					
	5. Prepare Site Rehabilitation Prioritization forms for areas with evidence of ground disturbance	As needed					
	6. Survey Record of Environmental Consideration sites	As needed					
	7. Monitor bivouac areas surveyed in 1997 to assess crown damage		X				
	8. Inventory all core plots			X			
7.2	**Flora Inventory and Monitoring**						
	Inventory Fort Drum floral resources and monitor species or communities that are indicators of ecosystem integrity, habitat conditions, capability of lands to support military missions, status of sensitive species or communities, and other special interests						
	1. Update the flora inventory (including herbarium mounts) as new species are found	X					
	2. Maintain the computerized plant checklist	X					
	3. Maintain an updated inventory of forest resources	X					
	4. Perform post-harvest inventories	X					
	5. Monitor forest parameters as part of continued development of unit-specific management	X					
	6. If plants that are federally-listed are found or if plants already known on Fort Drum become federally-listed, develop an inventory/monitoring program for these species	As needed					
	7. Continue to monitor State-listed plant species through the LCTA program	X					
	8. Continue to survey for federally-listed flora as determined to be necessary	As needed					
	9. Maintain a database on wetland resources	X					
	10. Perform a functional assessment of created, restored, and enhanced mitigation areas	X					
	11. Perform vegetation surveys on created, restored, and enhanced mitigation areas	X					
	12. Monitor hydrological parameters on created, restored, and enhanced mitigation areas	X					

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	13. Delineate jurisdictional wetland boundaries on created, restored, and enhanced mitigation areas	X					
	14. Take representative photographs of all mitigation areas	X					
	15. Use site-specific surveys to evaluate wetland resources if potential wetland impacts are proposed	As needed					
	16. Update the vegetation map	As needed					
7.3.1	**General Wildlife Inventory and Monitoring**						
	Inventory faunal resources and regularly monitor species that are indicators of ecosystem integrity and other special interests						
	1. Investigate continued deer and bear harvest data collection	X					
	2. Perform aerial beaver density/activity surveys	X					
	3. Perform periodic telephone surveys of trappers	Uncertain					
	4. Distribute trapper harvest forms	X					
	5. Continue with baseline wildlife population monitoring	X					
	6. Survey birds through the LCTA program	X					
	7. Continue monitoring neotropical migratory birds using MAPS	X					
	8. Survey for turkey, grouse, and woodcock	X					
	9. Perform terrestrial waterfowl surveys	X					
	10. Add to the bird baseline inventory using observations and data from other field projects	Uncertain					
	11. Support and assist NYSDEC with waterfowl surveys	Uncertain					
	12. Perform an angler survey of Remington, Quarry, and Conservation ponds and Mud Lake	Uncertain					
	13. Perform a detailed age, growth, and survivability study; continue monitoring mercury levels; and evaluate spawning habitat in Indian and Narrow lakes		X	X			
	14. Perform a longer temporal study of oxygen and temperature regimes in Indian and Narrow lakes	Uncertain					
	15. Perform physical, chemical, and biological data collection from Conservation and Indian ponds and Mud Lake	Uncertain					
	16. Perform an age structure analysis of Conservation Pond	Uncertain					
	17. Perform analyses of fish tissue for toxin levels in Remington Pond and Pleasant Creek	Uncertain					
	18. Examine available breeding habitat upstream from LeRay Pond	Uncertain					
	19. Monitor fish and macroinvertebrate diversity and bio-mass in LeRay Pond	Uncertain					
	20. Perform water quality and habitat surveys and population dynamics in Indian River	Uncertain					
	21. Promote the warm-water fishery west of the Main Impact Area and the cool-water fishery east of the Main Impact Area on Indian River	X					

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	22. Survey winter survival of brown trout in Black Creek	Uncertain					
	23. Survey fish habitat and water chemistry on Pleasant creeks	Uncertain					
	24. Determine distribution of brook trout populations and identify brook trout spawning habitat in Trout Brook and Pleasant Creek and its tributaries and protect indigenous populations	Uncertain					
	25. Establish reference sites to monitor fish age structures, growth rates, and mortality rates on Black River	Uncertain					
	26. Perform a stream survey on Bonaparte and Rockwell creeks	Uncertain					
	27. Perform a complete assessment of Indian Pond	Uncertain					
	28. Monitor human use, habitat, and community trends while integrating management goals of threatened and endangered species, contaminants, access, use, and education issues	Uncertain					
	29. Add to the fish baseline inventory using observations and data from other field projects	Uncertain					
	30. Complete the study of effects of purple loosestrife on developing amphibians	X					
	31. Continue the North American Amphibian Monitoring program	X					
7.3.2	**Threatened, Endangered, or Species of Concern Inventory and Monitoring**						
	Comply with the Endangered Species Act and give consideration to State-listed species						
	1. If fauna that are federally-listed are found or if fauna already known on Fort Drum become federally-listed, develop an inventory/monitoring program for these species	X					
	2. Continue to monitor State-listed fauna through the LCTA program	X					
	3. Continue to survey for federally-listed fauna as determined to be necessary	X					
7.4	**Water Quality**						
	Use water quality parameters to manage military activities and conserve fish and wildlife habitat						
	1. Use site-specific water testing for natural resources programs	X					
	2. Use water-related inventory data to make decisions regarding land use, restoration options, and fish and wildlife habitat management options	X					
	3. Continue evaluating the results of monitoring and clean-up of the contamination plume from Oneida Street	X					
7.5	**Soils**						
	Use soil parameters to manage military activities, protect						

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	soil stability, restore training lands, and conserve wildlife habitat						
	1. Use site-specific soil testing for natural resources programs	X					
	2. Use soil inventory data to make decisions regarding land use, restoration options, and wildlife habitat management options	X					
8.1	**Forest Management**						
	Manage the forest ecosystem to support the military mission, maintain ecosystem integrity, and produce forest products on a sustainable basis						
	1. Continue ecosystem-focused management with less emphasis on traditional forest products	X					
	2. Produce large diameter trees for maneuverability, concealment, and bivouac areas and to provide future training areas	X					
	3. Implement recommendations of the *2000 Urban Forest Inventory Analysis of Mountain View and Pine Plains Area Fort Drum* (Zehr and DeAlessio, 2000)	X					
	4. Develop a Forestry Management Plan		X				
	5. Assist in delineation of forest management units		X				
	6. Prepare unit-specific prescriptions for NRMU's		X	X	X		
	7. Produce commercial timber within biodiversity and ecosystem management directives	X					
	8. Ensure that natural resources personnel are as free as possible of commercial influence	X					
	9. Base species emphasis on management unit prescriptions and individual site objectives	X					
	10. Use TSI to control spacing and influence species composition and quality on Fort Drum	X					
	11. Harvest between 1,000 and 2,000 acres of timber		X	X	X	X	X
	12. Continue the firewood program	X					
	13. Promote natural reforestation through silvicultural means	X					
	14. Maintain forestry files, library materials, and GIS data	X					
	15. Follow appropriate timber harvest reporting procedures	X					
	16. Refine local sale methods and increase local sales	X					
	17. Alter harvest and forest management strategies as appropriate to accommodate new information and outside influences	X					
8.3.1	**Wildlife Habitat Management**						
	Base species management on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests						
	1. Consider wildlife species and habitat requirements when prescribing forest management practices	X					

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	2. Provide structural features, such as cavities and downed logs	X					
	3. Maintain/manage forest areas with conifers for improved thermal cover and forage	As needed					
	4. Create or maintain wildlife openings	As needed					
	5. Maintain water level control tubes and remove inactive beaver dams	As needed					
	6. Maintain a map of beaver dam sites and periodically monitor drained beaver ponds	X					
	7. Obtain appropriate permits prior to draining any ponds	As needed					
	8. Protect high waterfowl concentration areas during migration periods	X					
	9. Minimize human-related waterfowl disturbance	X					
	10. Manage wetlands with waterfowl needs as a priority.	X					
	11. Maintain and monitor Bluebird and waterfowl nest boxes and bat boxes	As needed					
	12. Support the North American Waterfowl Management Plan	X					
	13. Monitor availability of suitable foraging habitat resulting from forest management activities on the installation	X					
	14. Ensure appropriate consideration is given to effects of prescribed burns on wildlife and their habitats	X					
8.3.2	**Aquatic Habitat Management**						
	Maintain and enhance the natural diversity of aquatic communities						
	1. Implement fish habitat management recommendations of the *Aquatic Resources Management Plan, Fort Drum, New York (Part II)* (McCosh and Lowie, 1996b)	X					
	2. Prevent further degradation of the Conservation Pond shoreline		X				
	3. Dredge Conservation Pond and/or repair the water control structure		X				
	4. Improve habitat in designated stream stretches on Black Creek and on the West Branch of Black Creek	X					
	5. Stabilize streambanks where necessary on Black Creek, West Branch Black Creek, and Pleasant Creek	X					
	6. Determine the source of sedimentation downstream of Remington Pond and improve the stream substrate in Pleasant Creek, both below and above Remington Pond	X					
	7. Improve stream substrate and banks by preventing and reducing sediment runoff into West Creek	X					
8.4	**Fish and Wildlife Population Management**						
	Maintain fish and wildlife populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities						
	1. Continue to use hunting to maintain big game populations	X					

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	2. Continue to use hunting as the primary population management mechanism for small game species	X					
	3. Continue to use hunting and trapping to control furbearer populations	X					
	4. Continue to use hunting as the primary migratory bird population management activity	X					
	5. Manage fisheries resources to maintain a harvestable surplus of game fish	X					
	6. Use recreational harvest to manage game fish populations	X					
	7. Continue annual stocking of Remington and Quarry ponds	X					
	9. Rely on scientific management techniques to guide fish stocking	X					
	10. Implement requirements of the Endangered Species Act, as stated by AR 200-3	X					
	11. Comply with the Endangered Species Act	X					
	12. Give consideration to State-protected species in all Army actions	X					
	13. Ensure training guidelines are followed in areas with rare species populations	X					
	14. Protect all species listed by any federal or State law from illegal harvest	X					
8.5	**Wetlands Management**						
	Manage wetlands to ensure "no net loss" per Executive Order 11990						
	1. Use the environmental review process to protect wetland	X					
	2. Continue pursuing the wetland mitigation banking project	X					
	3. Provide certified jurisdictional wetland delineations if a project is planned in a suspected wetland	X					
	4. Maintain wetlands through active management (*e.g.*, prescribed burning)	X					
8.6	**Protect Water Quality**						
	Protect surface water quality at Fort Drum						
	1. Continue Natural/Cultural Resources Branch monitoring of water quality parameters	X					
	2. Control or eliminate runoff and erosion that could affect surface waters	X					
	3. Consider nonpoint source pollution abatement in construction, installation operations, and land management plans and activities	X					
	4. Continue to participate in the Jefferson County Water Quality Coordinating Committee	X					
	5. Maintain the health advisory for human fish consumption from Indian and Narrow lakes	X					

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
8.7	**Land Rehabilitation d Maintenance Implementation**						
	Select, prioritize, and design projects to return damaged areas to full training support capability						
	1. Develop the LRAM work plan/budget for FY04 and FY05		X				
	2. Coordinate all projects at the conceptual through completion levels with other Natural/Cultural Resources programs	X					
	3. Implement projects listed in the LRAM work plan		X	X	X	X	X
8.8	**Grounds Management Support**						
	Provide support to maintain an aesthetically pleasing cantonment landscape that preserves natural ecosystem functions						
	1. Provide professional advice to assist the grounds landscaping and maintenance program toward the use of native species	X					
	2. Implement recommendations provided by Zehr and DeAlessio (2000)	X					
	3. Manage natural/cultural resources occurring within the cantonment area to meet appropriate natural/cultural resources objectives	X					
	4. Follow requirements listed in the 1994 White House Memorandum as closely as possible	X					
8.9	**Pest Management Support**						
	Control those plant and animal species that affect natural resources management or directly affect the military mission						
	1. Revise the Fort Drum Installation Pest Management Plan (U.S. Army Center for Health Promotion and Preventive Medicine, 1997)	X					
	2. Maintain an updated Integrated Pest Management Plan	X					
	3. Emphasize integrated pest management techniques	X					
	4. Ensure pesticide applicators are fully certified	X					
	5. Control nuisance wildlife to protect facilities, infrastructure, and to maintain the military mission	X					
	6. Obtain appropriate permits for the control of nuisance wildlife	X					
	7. Prevent the introduction of and control invasive species as per Executive Order 13112, *Invasive Species*.	X					
	8. Continue to rear and utilize biological control agents to control purple loosestrife, leafy spurge, black swallow-wort, and other invasive species	X					
8.10.1	**Fire Prevention and Suppression**						
	Prevent and suppress wildfires to maintain ecosystem biodiversity and functionality						
	1. Require all military units and other installation personnel to report and begin suppression of wildfires	X					
	2. Provide natural/cultural resources management-related	X					

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	recommendations relative to fire suppression activities to Fort Drum Fire Department personnel						
	3. Respond to wildfires as soon as possible and begin immediate suppression	X					
8.10.2	**Prescribed Burning**						
	Develop a prescribed burning program to maintain training mission capabilities and enhance ecosystem biodiversity and functionality						
	1. Continue to develop the prescribed burning program	X					
	2. Monitor prescribed burn areas and use experimental plots to determine the effectiveness of prescribed burning	X					
	3. Apply prescribed fire only within acceptable parameters	X					
	4. Incorporate and maintain burn areas as a GIS data layer for fire effects monitoring, and coordination purposes	X					
	5. Develop a long range burn plan	X					
8.11	**Training Requirements Integration**						
	Integrate Fort Drum training requirements for land use with the sustained capability of the land to support such use						
	1. Assist military mission trainers and planners with land use design and management considerations to ensure minimum environmental damage	X					
	2. Encourage military mission trainers and planners to expand into shrubland	X					
	3. Continue to support the military mission by developing models, such as the Cross Country Movement Model, and utilizing models to direct management	X					
	4. Collect military use data for use in the planning process to develop and implement a training scheduling system based on military use carrying capacity (ATTACC)	X					
	5. Continue to provide training units lists of mission-specific restrictions using the Record of Environmental Consideration system	X					
	6. Use training restrictions, when required, to protect sensitive natural and cultural resources and minimize damage to training areas	X					
9.5	**Natural/Cultural Resources Enforcement**						
	Assure legal compliance of military and civilian activities with regard to natural and cultural resources						
	1. Maintain a law enforcement program for military and civilian activities that relates to natural and cultural resources protection	X					
	2. Coordinate enforcement activities with other agencies	X					
	3. Provide Natural/Cultural Resources Branch support to LEC for annual formal natural/cultural resources law enforcement training to one game warden		X	X	X	X	X
	4. Provide quality refresher training to game wardens	X					
10.1	**Environmental Awareness**						

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	Develop an awareness of values of and requirements for natural and cultural resources protection to support sustained military training						
	Educate military users to minimize impacts to the land and natural resources to sustain and enhance training						
	1. Use the ITAM Environmental Awareness Program to inform soldiers of the need to protect the Army's limited resources, present means for minimizing damage, and encourage good land stewardship and wise tactical use of installation natural resources	X					
	2. Provide decision makers with the information needed to make judgments that affect the Natural/Cultural Resources Program	X					
	3. Revise Military Personnel Awareness materials to maintain the accuracy and mission-relevancy	X					
	4. Provide mission briefings to military personnel and update presentations to maintain accuracy and mission-relevancy	X					
	5. Provide seminars and/or lectures to unit commanders, senior officers, and soldiers on training and the environment	X					
	6. Develop new military personnel awareness materials and briefings	X					
	7. Provide an understanding of Fort Drum's Natural/Cultural Resources Program and installation environmental policies to military and civilian users	X					
	8. Provide information on wetlands and the importance of wetland ecosystems to the environment	X					
10.2	**Public Awareness**						
	Provide information to Fort Drum and external interested communities regarding natural resources and associated management programs						
	1. Improve the general program knowledge of all persons associated with the Natural/Cultural Resources Branch	X					
	2. Provide prepared talks. Whenever possible, use these opportunities to explain contemporary natural resources issues and management	X					
	3. Use newspapers, television, and radio to inform the Fort Drum and surrounding community of matters important to the natural/cultural resources program	X					
	4. Participate in activities, such as Project WILD, Project WET, and NYSDEC-sponsored Free Fishing clinics	X					
	5. Maintain taxidermy mounts of indigenous birds and mammals	X					
	6. Pursue interactions between Fort Drum and surrounding communities and professional organizations	X					
	7. Participate in Earth Day and other organized events as appropriate, and evaluate other special events for their	X					

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	usefulness						
11.3	**Hunting, Fishing, and Trapping Programs**						
	Provide opportunities for quality, safe, and equitable hunting, fishing, and other outdoor recreation, consistent with needs of the military mission						
	1. Continue to follow NYSDEC season, bag limit, and other regulation structures for hunting, fishing, and trapping with only limited exceptions for management or safety purposes	X					
	2. Continue recreationist control systems to ensure safe conditions and equitable treatment of users	X					
	3. Update recreation rules and regulations and issue supplemental orders	X					
	4. Continue to provide recreation permits through the Outdoor Recreation Center	X					
	5. Evaluate the recreation fee schedule		X	X	X	X	X
	6. Continue to provide State license sales at the Outdoor Recreation Center	X					
	7. Continue the check in/check out procedures	X					
	8. Continue to provide recreationists appropriate maps	X					
	9. Continue to ensure Fort Drum recreationists follow safety requirements of the State and Fort Drum	X					
	10. Continue to support fishing events on Fort Drum	X					
	11. Promote catch-and-release fishing practices in conjunction with sports club practices at Indian Pond	X					
	12. Evaluate opportunities for catch-and-release and/or youth fishing derbies at LeRay Pond			X			
	13. Enhance or develop fishing opportunities and consider special regulations on Black Creek and on the West Branch of Black Creek				X		
	14. Re-evaluate recreational use restrictions for the Black River			X			
11.4	**Other Natural Resources Oriented Outdoor Recreation**						
	Manage outdoor recreation to provide safe and pleasing outdoor experiences consistent with the needs of the military mission while maintaining ecosystem integrity and function						
	1. Encourage the development of facilities that improve use and enjoyment of fishing, hunting, and other natural resources-based recreation	X					
	2. Promote Indian Pond as a primitive camping and fishing opportunity	X					
	3. Improve Conservation Pond access area for recreational purposes by providing picnic tables and trash bins				X		
	4. Continue to support the Fort Drum policy of no off-road vehicles being allowed on the installation	X					
	5. Design and construct a interpretive nature trail near Remington Pond			X			

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	6. Construct and maintain a trail to allow access to West Creek				X		
12.3	**Cultural Resources Protection**						
	Implement this INRMP in a manner consistent with the protection of cultural resources						
	1. Complete a Integrated Cultural Resources Management Plan		X				
	2. Implement provisions of the Integrated Cultural Resources Management Plan that relate to natural resources management	X					
	3. Consider natural resources projects when planning cultural resources surveys and use results of cultural resources surveys to plan natural resources projects	X					
	4. Avoid or mitigate adverse effects to cultural resources from natural resources through proper review and planning	X					
	5. Take protective measures upon discovery of sites	X					
	6. Use natural resources techniques and projects to protect cultural resources sites	X					
13.4	**Use of NEPA**						
	Use NEPA to identify projects and activities that might impact natural resources and work with project planners to resolve issues early in the planning process						
	Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA						
	Help Fort Drum comply with NEPA						
	1. Document effects of implementation of this INRMP through an EA		X				
	2. Reference this INRMP and its associated EA in descriptions of affected environment to reduce verbiage in other NEPA documents	X					
	3. Classify mitigation as a "must fund" for budgetary purposes	X					
14.2.1	**INRMP Implementation Staffing**						
	Provide staffing of natural resource management professionals required to effectively manage natural resources						
	Provide staffing for the natural resources program	X					
14.2.2	**Personnel Training**						
	Provide training to natural resources personnel						
	1. Encourage natural resources personnel to join professional societies and their state/regional chapters	X					
	2. Send at least one person to each of the annual workshops or professional conferences	X					
	3. Evaluate other conferences/workshops for their usefulness as training tools, and send personnel to those most justified	X					
	4. Ensure that natural/cultural resources personnel obtain the one-time or occasional refresher training needed to	X					

Section	Projects/Goals/Objectives*	Implementation Year					
		Ongoing	01	02	03	04	05
	fulfill job requirements						
	5. Actively participate in training sessions to disseminate knowledge learned at Fort Drum	X					
	6. Whenever appropriate, author/co-author papers for scientific journals presenting research/project results	X					
14.2.3	**External Assistance**						
	Provide external specialized skills, personnel, and resources to support the natural resources program						
	1. Implement external support projects	X					
	2. Consider using IPA, ORISE, Student Conservation Association, and/or volunteers for personnel assistance	X					
	3. Use State and Federal agencies to assist with implementation of this INRMP	X					
	4. Use universities to assist with implementation of this INRMP	X					
	5. Use contractors to assist with implementation of this INRMP	X					
14.3	**Data Storage, Retrieval, and Analysis**						
	Store, analyze, and use data in an efficient, cost-effective manner						
	1. Upgrade microcomputer hardware and software	X					
	2. Develop or obtain databases needed to support natural and cultural resources programs	X					
	3. Attach tabular data to spatial data layers, such that a "point and click" provides such data on the spot	X					
	4. Provide GIS to all pertinent Natural/Cultural Resources personnel	X					
	5. Make more use of analytical capabilities of the GIS to provide natural resources management options	X					
	6. Create user-friendly interfaces	X					
	7. Provide on-line support for operating systems and GIS software	X					
	8. Regularly replace or upgrade GIS hardware and software	X					
	9. Require all spatially related data be stored on, or accessible to, the GIS	X					
	10. Provide periodic on-site, system support	X					
	11. Provide periodic system support for hardware security and communications	X					
	12. Use remote imagery for improved decision-making	X					
	13. Update aerial photographs and/or other imagery						X

* Project title (in **bold**) follows section number; goal(s) appear in ***bold/italics***; objectives are numbered consecutively following goals. Both goals and objectives are condensed from chapters 7-14.