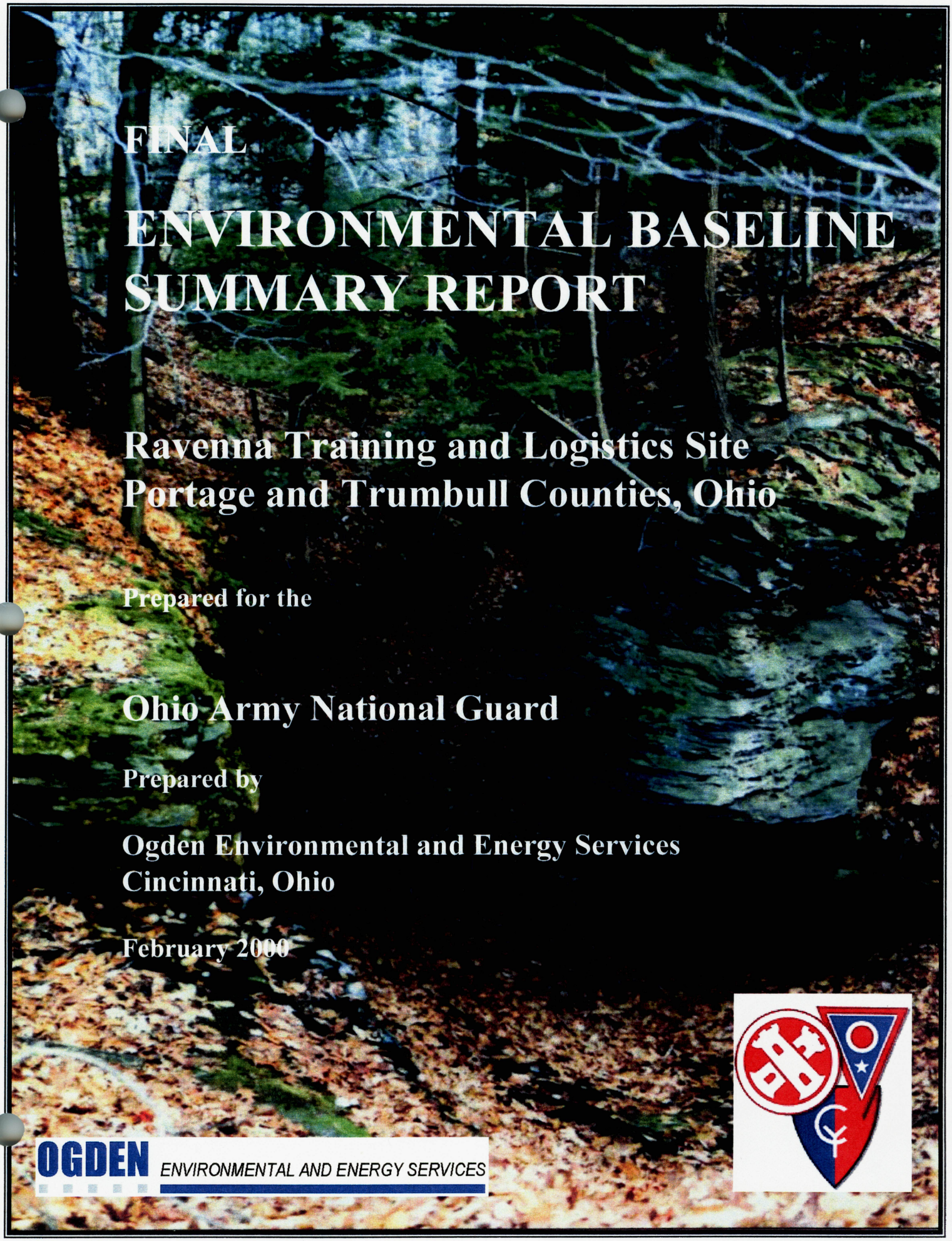

FINAL

ENVIRONMENTAL BASELINE SUMMARY REPORT

Ravenna Training and Logistics Site
Portage and Trumbull Counties, Ohio

Prepared for the

Ohio Army National Guard

Prepared by

Ogden Environmental and Energy Services
Cincinnati, Ohio

February 2000

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

EXECUTIVE SUMMARY

The Ohio Army National Guard (OHARNG) is required to manage the land and natural resources necessary for units to conduct and sustain quality military training. The OHARNG, as part of the land and natural resources management program, is initiating a three-phased approach to the long-term planning of military training at the Ravenna Army Ammunition Plant (RVAAP), an inactive World War II-era ammunition production and storage facility in northeastern Ohio. The RVAAP is located within Portage and Trumbull Counties, approximately three miles northeast of Ravenna, Ohio. The entire facility consists of approximately 21,419 acres, measuring approximately 11 miles west-east by 3.5 miles north-south.

Until late 1998, approximately 2,832 acres of the RVAAP were licensed to the OHARNG for use as a multi-purpose training area, known as the Ravenna Training and Logistics Site (RTLS). To meet training land area requirements, the OHARNG acquired a total of approximately 16,164 acres at the RVAAP in late 1998 for training. In May 1999, the United States Property and Fiscal Officer (USP&FO) for Ohio, acting as a Title 10 Agent for the National Guard Bureau (NGB), assumed accountability for the property from the U.S. Army Industrial Operations Command (IOC). At that time, overall responsibility for the management of the majority of the property was transferred to the NGB, who has subsequently delegated the daily management of the leased portions to the OHARNG. High Explosives (HE) continue to be stored by the IOC on approximately 5,255 acres of the property. These areas remain off-limits to the OHARNG, and security of the installation remains the responsibility of the IOC and its Modified Caretaker Contractor (MCC). As referenced in this document, the entire property is now referred to as the RTLS.

The OHARNG's phased approach to long-term planning of military training at the RTLS is in full compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC §4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations (40 CFR §1500-1508); Army Regulations (AR) 200-1 and 200-2; and Department of Defense Instructions (DoDIs) 4715.3 and 4715.9. The phased approach of the OHARNG includes:

> **Phase I**: Identification of environmental resources, issues, constraints and opportunities at the facility in an Environmental Baseline Summary Report (EBSR);
>
> **Phase II**: Development and definition of a specific set of proposed actions, drawn from the Real Property Master Plan (RPMP) and Range Development Plan (RDP) recommendations, that will allow the conduct of required OHARNG training at the RTLS while minimizing environmental impact; and
>
> **Phase III**: Preparation of a consequent Environmental Assessment (EA) that identifies and documents the potential environmental, cultural, and socioeconomic impacts associated with the implementation of the proposed actions.

A large volume of environmental data exists, or is in the process of being collected for, the RTLS. Given the amount and technical nature of the available environmental information, it is extremely difficult for the majority of the general public to easily understand, interpret, or comprehend the data. Consequently, as the first phase of the OHARNG's comprehensive planning process at the RTLS, a process which will culminate in the completion of an EA on the OHARNG's long-range plan, this EBSR has been prepared. The primary purposes of this EBSR are to:

- Synthesize and summarize the current body of environmental data available for the RTLS;
- Identify data gaps and the need for specific additional studies or investigations necessary to fill these gaps at the RTLS;
- Identify environmental constraints and opportunities within the RTLS based on environmental information;
- Allow informed decision-making with respect to the long-range land development and use planning at the RTLS;

- Provide input to the implementation of the Integrated Training Area Management (ITAM) program at the RTLS; and
- Serve as the foundation for the completion of the RTLS EA for Enhanced Training and Operations.

The overall goal of this product is to provide the OHARNG with the information necessary to prepare and evaluate the most environmentally-sensitive long-range plan possible, while still achieving mission and planning objectives.

The format of this document follows the guidelines provided in the *Army National Guard Manual for Compliance with the National Environmental Policy Act of 1969: Guidance for Preparing Environmental Documentation for Army National Guard Actions in Compliance with NEPA.*

This EBSR is divided into five sections, as follows:

Section 1.0, Introduction, describes the location of the RTLS, provides a history of the installation, and describes current and future plans for OHARNG use of the site.

Section 2.0, Study Methodology, provides a description of the methods used during the preparation of this EBSR, and includes an overview of existing data sources and on-going and proposed future studies.

Section 3.0, Affected Environment, analyzes and describes current conditions at the RTLS.

Section 4.0, Summary of Findings, summarizes the findings of the EBSR and provides recommendations for future planning activities, including descriptions of data needs or gaps and recommended measures to fill those data needs.

Section 5.0, References, identifies all literature consulted, diagrams reviewed, and individuals or organizations contacted during preparation of the EBSR. References throughout the document are noted parenthetically by number and correspond with those listed in Section 5.

Summarily, the EBSR concludes that the continuation of responsible management of the property, in terms of providing quality military training while operating among valuable environmental resources, is a matter of preeminent importance. As this EBSR constitutes fulfillment of the first phase of the OHARNG's three-phased approach to the long-term planning of military training at the RTLS, the importance of Phases II and III should be emphasized. The subsequent proper conduct and implementation of the NEPA process will allow for sufficient and objective evaluation of long-range planning with regard to environmental resources.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ACM	Asbestos-containing Material
ADNL	A-weighted Day-Night Level
ADT	Average Daily Traffic
AEC	Atomic Energy Commission
AGO	Adjutant General, Ohio
AHERA	Asbestos Hazard Emergency Response Act
AHPA	Archaeological and Historic Data Preservation Act
AIRFA	American Indian Religious Freedom Act
AMATS	Akron Metropolitan Area Transportation Study
AMC	Army Materiel Command
AMSL	Above Mean Sea Level
ANGVD	Above National Geodetic Vertical Datum
AOC	Area of Concern
APC	Armored Personnel Carrier
AR	Army Regulation
ARNG	U.S. Army National Guard
ARPA	Archaeological Resources Protection Act
ARRP	Army Radon Reduction Program
AST	Aboveground Storage Tank
AT	Annual Training
ATLAM	Army Training Land and Analysis Model
ATF	U.S. Bureau of Alcohol, Tobacco, and Firearms
BLM	US. Department of Interior, Bureau of Land Management
BMP	Best Management Practice
CAA	Clean Air Act of 1970
CAAA	Clean Air Act Amendments of 1990
CDNL	C-weighted Day-night Level
CEMED	Cease Maintenance, Excess, and Dispose (of certain properties)
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CHP	Controlled Humidity Preservation
CHRIS	Chemical Hazard Response Information System
CO	Carbon Monoxide
CRMP	Cultural Resources Management Plan
CS	Combat Support
CSS	Combat Service Support
CTF	Collective Training Facility
CTZR	Charlestown Township Zoning Resolution
CWA	Clean Water Act of 1977
CY	Calendar Year
DA	Department of the Army
DbA	A-weighted in Decibels
DbC	C-weighted in Decibels
DDAGW	OEPA, Division of Drinking and Ground Waters
DDESB	Department of Defense Explosives Safety Board
DNAP	ODNR, Division of Natural Areas and Preserves
DoD	Department of Defense
DoDI	Department of Defense Instruction
DOW	ODNR, Division of Water
DRMO	Defense Re-utilization Mobilization Organization
DSW	OEPA, Division of Surface Water
DZ	Drop Zone
EA	Environmental Assessment
EAU	OEPA, DSW, Ecological Assessment Unit
EBSR	Environmental Baseline Summary Report
EIFS	Economic Impact Forecast System
EIS	Environmental Impact Assessment
EMP	Environmental Management Plan
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPCRA	Emergency Planning and Community Right-to-know Act of 1986
ESA	Endangered Species Act of 1973
FEMA	Federal Emergency Management Agency
FORSCOM	U.S. Army Forces Command
FS	Feasibility study
FSP	Force Support Package
FWMP	Fish and Wildlife Management Plan
FWPCA	Federal Water Pollution Control Act of 1972
FY	Fiscal Year

GIS	Geographic Information System(s)
GOCO	Government Owned, Contractor Operated
GPM	Gallons Per Minute
GSA	Government Service Administration
HAP	Hazardous Air Pollutant
HAZMIN	Hazardous Waste Minimization (program)
HQDA	Headquarters, Department of the Army
HRS	Hazard Ranking System
IAMP	Installation Asbestos Management Plan
IAP	Installation Action Plan
ICUZ	Installation Compatible Use Zone
IDT	Inactive Duty Training
IHWMP	Installation Hazardous Waste Management Plan
INRMP	Integrated Natural Resources Management Plan
IOC	U.S. Army Industrial Operations Command
IPMP	Integrated Pest Management Plan
IRP	Installation Restoration Program
ISCP	Installation Spill Contingency Plan
ISOFAC	Isolation Facility
ISWMP	Installation Solid Waste Management Plan
ITAM	Integrated Training Area Management (program)
LAP	Load, assemble, and pack
LTM	Long Term Monitoring
MCC	Modified Caretaker Contractor
MCOFT	Mobile Conduct-of-fire Training
MECH/AR	Mechanized Infantry and Armor
MILES	Multiple Integrated Laser Engagement System
MMR	Military Munitions Rule
MOA	Memorandum of Agreement
MOM	Measure of Merit
MOpA	Military Operations Area
MOUT	Military Operations in Urban Terrain
MPTR	Multi-Purpose Training Range
MSDS	Material Safety Data Sheet
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NCP	National Contingency Plan
NEPA	National Environmental Policy Act of 1969

NESHAP	National Emissions Standards for Hazardous Air Pollutants
NGB	National Guard Bureau
NHPA	National Historic Preservation Act
NIOSH/ OSHA	National Institute for Occupational Safety and Health/Occupational Safety and Health Administration
NO_2	Nitrogen dioxide
NOE	Nap-of-the-Earth
NO_x	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NRCS	USDA, Natural Resources Conservation Service
NRHP	National Register of Historic Places
O_3	Ozone
OAC	Ohio Administrative Code
OB	Open Burning
OD	Open Detonation
ODNR	Ohio Department of Natural Resources
ODOD	Ohio Department of Development
ODOW	ODNR, Division of Wildlife
OEPA	Ohio Environmental Protection agency
OHARNG	Ohio Army National Guard
OHPO	Ohio Historic Preservation Office
OPFOR	Opposing Forces (unit)
ORC	Ohio Revised Code
PA	Preliminary Assessment
PAg	Programmatic Agreement
PAM	Pamphlet
Pb	Lead
PCB	Polychlorinated Biphenyl
PCRPC	Portage County Regional Planning Commission
PL	Public Law
PM-10	Particulate matter with an aerodynamic size less than or equal to 10 micrometers
PM-2.5	Particulate matter with an aerodynamic size less than or equal to 2.5 micrometers
POV	Personally-owned Vehicle
PPA	Pollution Prevention Act of 1990
PPP	Pollution Prevention Plan
RC	Remediation Characterization
RCRA	Resource Conservation and Recovery Act of 1976
RDP	Range Development Plan

RETS	Remote Electronic Targetry Scoring
RI	Remedial Investigation
RMP	Risk Management Plan
ROI	Region of Influence
RPMP	Real Property Management Plan
RQ	Reportable Quantity
RTLP	Range and Training Land Development Program
RTLS	Ravenna Training and Logistics Site
RVAAP	Ravenna Army Ammunition Plant
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act of 1974
SI	Site Investigation
SO_2	Sulfur dioxide
SOP	Standard Operating Procedure
SPCC	Spill Prevention Control and Countermeasures (Plan)
SR	State Route
STRICOM	U.S. Army Simulation, Training, and Instrumentation Command
STX	Situational Training Exercises
SWPPP	Stormwater Pollution Prevention Plan
TA	Training Area
TC	Training Circular
TCPC	Tank Crew Proficiency Course
TNC	The Nature Conservancy
TOW	Tube-launched, Optically-tracked, Wire-guided (missile)
TrCPC	Trumbull County Planning Commission
TRI	Toxic Chemical Release Inventory
TSCA	Toxic Substance Control Act of 1976
TSI	Timber Stand Improvement
TSSF	Training Site Support Facility
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USAEPI	U.S. Army Environmental Policy Institute
USAFR	U.S. Air Force Reserve
USC	United States Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USP&FO	United States Property and Fiscal Officer
UST	Underground Storage Tank
UTES	Unit Training Equipment Site
VOC	Volatile Organic Compound
WMM	Waste Military Munitions
WRDA	Water Resources Development Act of 1990
WSRA	Wild and Scenic Rivers Act of 1968
WSP	Work Safety Plan
WWII	World War II

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1.0 INTRODUCTION

1.1 Location of the Study Area

The Ravenna Training and Logistics Site (RTLS) is located in northeastern Ohio within Portage and Trumbull Counties, approximately three miles northeast of Ravenna, Ohio. The entire facility consists of approximately 21,419 acres, measuring approximately 11 miles west-east by 3.5 miles north-south. For security purposes, the facility is completely enclosed by an eight-foot high cyclone fence; access to the facility is provided only at controlled and monitored access points.

The majority of the facility, comprising approximately 20,000 acres, is located in Charlestown, Freedom, Paris, and Windham Townships in Portage County, Ohio. The remaining approximately 1,419 acres in the extreme eastern portion of the facility is located in Braceville Township, Trumbull County. Proximate rural population centers include Newton Falls to the southeast, Braceville to the east, and Windham to the north. Larger population centers include Ravenna, located approximately three miles southwest of the study area, and Warren, located approximately eight miles northeast of the RTLS. Primary access to the site is provided by Interstate 80 to the north and east, and by State Route (SR) 5 to the south (see **Figure 1-1**).

1.2 Study Area History

1.2.1 Historical Use

The RTLS is situated on a tract of land purchased by the United States government in August 1940. Prior to federal ownership, the land consisted of 223 separate and privately-owned parcels, which were devoted primarily to agriculture (79). The facility was constructed by a total of approximately 17,000 people between the dates of September 1940 and August 1942. In early 1942, operations were commenced by approximately 15,000 employees, with a two-fold mission: ammunition loading and depot storage. These two operations were handled as separate tasks by the Ravenna Ordnance Plant and the Portage Ordnance Depot, respectively. In August 1943, the two operations were united and the facility was designated first as the Ravenna Ordnance Center, and then in November 1945 as the Ravenna Arsenal. The facilities were Government-owned, contractor-operated (GOCO) by the Atlas Powder Company from September 1940 until the end of World War II in 1945, at which time the operation was turned over to the U.S. Ordnance Department.

From 1946 to 1949, agricultural ammonium nitrate fertilizer was produced at the facility by the Silas Mason Company, and in 1950 the operations were placed in a stand-by status. In April 1951, delegated control of the facility was contracted to Ravenna Arsenal, Inc., a subsidiary of the Firestone Tire and Rubber Company. Also in 1951, munitions production was re-activated by the Ordnance Department in support of the Korean conflict. In October 1957, the facility was again placed in a stand-by status.

Between October 1960 and July 1961, the facility served as a bomb de-militarization center, with approximately 3,000 employees. In November 1961, the ammunition loading and depot storage operations were again separated, with the ammunition-loading portion being designated as the Ravenna Ordnance Plant and the overall facility being designated as the Ravenna Army Ammunition Plant (RVAAP).

In May 1968, the operations were again placed in active production, on a reduced scale, for loading of munitions to be used in the Southeast Asian Conflict. This production ceased in August 1972 and the operations were again placed in stand-by status. Even at the reduced scale of operations, the RVAAP was recognized at the time as the largest single industry in Portage County (120).

From June 1973 through March 1974 and September 1981 through June 1983, de-militarization activities were once again commenced with a reduced staff of approximately 300 employees. In October 1982, the Physics International Company, a subsidiary of Rockcor, Inc., purchased Ravenna Arsenal, Inc., including the contract for stand-by operations, from Firestone Tire and Rubber Company. In June 1985, Rockcor, Inc. was purchased by the Olin Corporation, which oversaw continued stand-by operations by Ravenna Arsenal, Inc. at the RVAAP.

In the fall of 1993, maintenance and stand-by operations at the RVAAP were discontinued and the facility was placed in a modified caretaker status, where it continues to stand present-day. The Mason & Hanger-Silas Mason Company, Inc. was selected as the modified caretaker contractor (MCC) of the facility upon its initial designation of caretaker status until the fall of 1998, at which time the modified caretaker contract was awarded to R&R International, Inc. The inactive facility continued to store explosives, but production lines were no longer maintained.

Until late 1998, approximately 2,832 acres of the RVAAP were licensed to the Ohio Army National Guard (OHARNG) for use as a multi-purpose training area, known as the RTLS. To meet training land area requirements, the OHARNG acquired a total of approximately 16,164 acres at the RVAAP in late 1998 for training. In May 1999, the United States Property and Fiscal Officer (USP&FO) for Ohio, acting as a Title 10 Agent for the National Guard Bureau (NGB), assumed accountability for the property from the U.S. Army Industrial Operations Command (IOC), a subordinate of the Army Materiel Command (AMC). At that time, overall responsibility for the management of the majority of the property was transferred to the NGB, who has subsequently delegated the daily management of the leased portions to the OHARNG. These 16,164 acres managed by the OHARNG are now collectively referred to as the RTLS.

High Explosives (HE) continue to be stored by the IOC on approximately 5,255 acres of the property. These areas remain off-limits to the OHARNG, and security of the installation remains the responsibility of the IOC and its MCC. *Additionally, several potentially contaminated Areas of Concern (AOCs) are present on the property. All existing and future identified AOCs remain the exclusive responsibility of the IOC.* The retained 5,255 acres of the installation are under jurisdictional control of the IOC, with approximately 29 personnel employed full-time at the facility. These retained 5,255 acres managed by the IOC are now collectively referred to as the RVAAP.

Along with assumption of responsibility for 16,164 acres of the property by the OHARNG, the legislative jurisdiction for the entire installation was retroceded to the State of Ohio by the U.S. Army. This designation indicates that the RTLS (formerly the RVAAP) no longer is entitled to exclusive federal jurisdiction; concurrent or entirely State of Ohio jurisdiction now applies to the property.

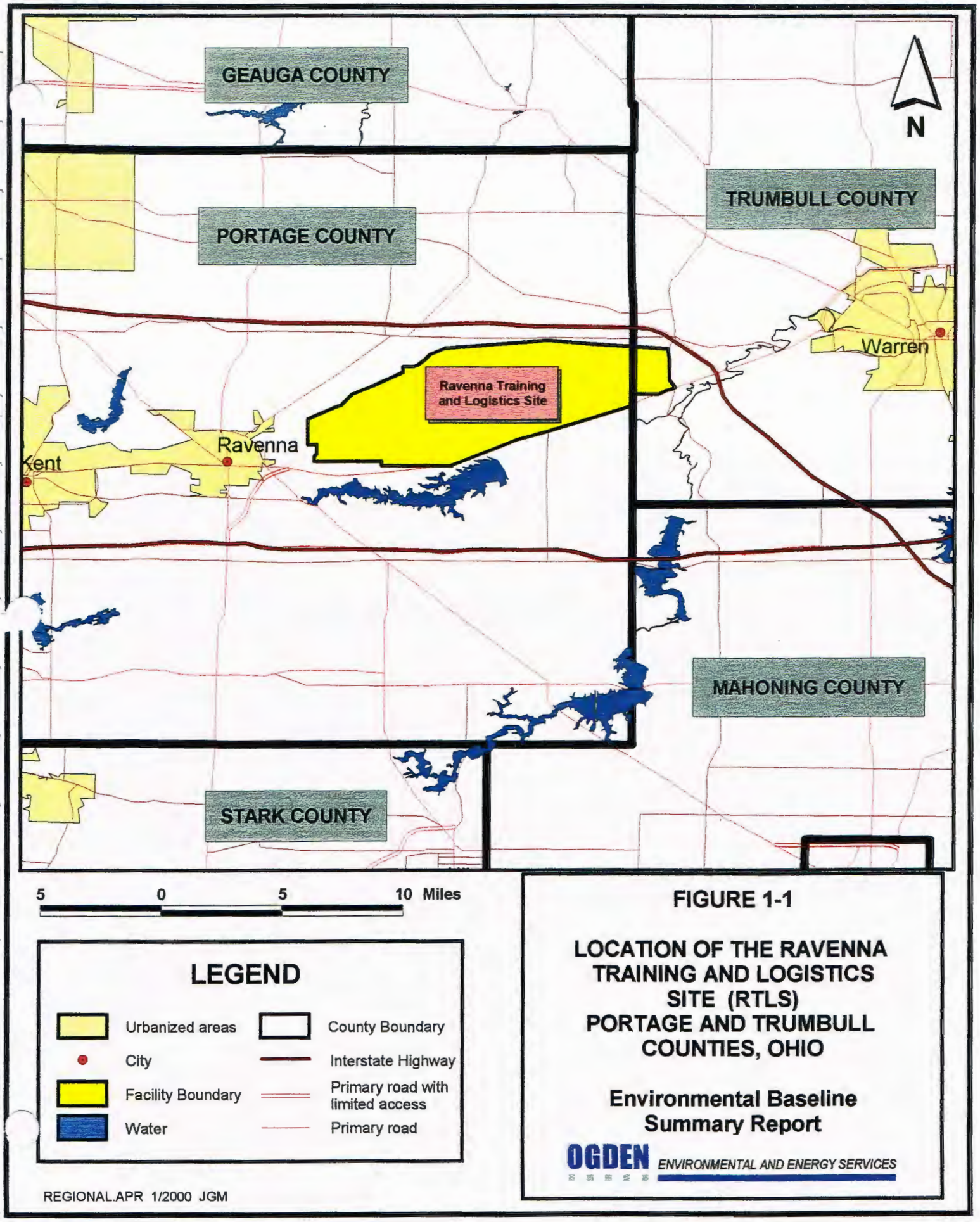

FIGURE 1-1

LOCATION OF THE RAVENNA TRAINING AND LOGISTICS SITE (RTLS) PORTAGE AND TRUMBULL COUNTIES, OHIO

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1.2.2 Current Use

1.2.2.1 U.S. Army IOC Control/Use

Explosives stored in various locations throughout the RVAAP and designated AOCs, comprising approximately 5,255 acres, continue to fall under the jurisdiction of the IOC for an indefinite period of time. Many of the components of the facility that have been deemed as excess by the IOC are currently being scrapped and/or sold for salvage. R&R International, Inc., the current MCC for the RVAAP facilities, manages the day-to-day logistical operations, including security, maintenance, inventory control, and environmental compliance. Currently there are four Department of the Army employees (IOC) and 25 civilian employees (R&R International) working at the RVAAP. Further details of the current IOC mission at the RVAAP, as well as the OHARNG mission and primary activities are provided in **Section 3.2.2**.

1.2.2.2 Ohio Army National Guard Control/Use

As stated above, prior to the transfer of property accountability to the USP&FO of Ohio in May 1999, approximately 2,832 acres of the RVAAP were licensed to the OHARNG for use as a multi-purpose training area, known as the RTLS. This area included Training Areas (TAs) A, B, C, D, E, F, G, and H. Current OHARNG uses of these areas are described in **Section 3.2.3.2**. In summary, these areas consist of light maneuver training areas, a Gunnery Table IV range and a 10-leg land navigation course. The U.S. Air Force Reserve (USAFR) has a drop zone (DZ) in TA J.

As of May 1999, the USP&FO for Ohio, acting as a Title 10 agent for the NGB, assumed responsibility for 16,164 acres of the property from the U.S. Army IOC (see **Section 1.2.1**). The USP&FO assumed responsibility for the daily management of the land and natural resources. Responsibility for those resources was subsequently delegated to the OHARNG by the USP&FO. HE continue to be stored by the IOC on approximately 5,255 acres of the RTLS, which remains off-limits to the OHARNG, and security of the installation remains the responsibility of the IOC and its MCC. The additional lands acquired by the OHARNG in 1999 are not currently actively used by the OHARNG; the OHARNG's proposed future use of these lands is the focus of this environmental review process. Currently there are 9 OHARNG employees, eight military and one civilian, working at the RTLS.

1.2.3 Proposed OHARNG Future Use of the RTLS

1.2.3.1 OHARNG Mission

The mission of the RTLS is defined by the OHARNG: "The RTLS mission is to provide administrative, operating, security and logistics functions, to maintain and operate a battle-focused training environment to accommodate usage on a year-round basis. In addition, RTLS will initiate plans and budgets for future modernization and/or development of training areas. RTLS will provide continuous operation of its training areas (within allocated resources) to assist the Adjutant General's Department in accomplishing its training mission" (39).

1.2.3.2 OHARNG Planning

Pursuant to United States Army Forces Command (FORSCOM) Regulation 220-3, FORSCOM/Army National Guard (ARNG) Regulation 350-2, and Training Circular (TC) 25-1,

the OHARNG used the Reserve Component Training Concept in the planning and development of training requirements for the OHARNG at the RTLS. The results of this analysis are provided in the *Range and Training Land Program (Range Development Plan)* and are summarized herein (40). These regulations and associated guidance documents, including Adjutant General, Ohio (AGO) Circular 350-98-2, dictate that:

- Infantry and armor units of the OHARNG will focus on platoon maneuver and crew gunnery qualification during pre-mobilization;
- The maneuver platoon must demonstrate proficiency annually;
- Lane training/Situational Training Exercises (STXs) will be conducted during one inactive duty training (IDT) period, and lane training during annual training (AT) annually for force support package (FSP) units;
- The training goal for the OHARNG is platoon-level training;
- Civil disturbance training is required for all designated street mission units; and
- Maneuver land requirements will be identified in accordance with the Army Training Land and Analysis Model (ATLAM) and with TC 25-1, *Training Land*, as modified by the Range and Training Land Methodology (40).

Pursuant to an annual requirement mandated by the NGB, the OHARNG has developed a Real Property Master Plan (RPMP), which examines all OHARNG facilities, including those at the RTLS. The RPMP allows strategic evaluation and use of existing resources and strategic evaluation, planning, and development of potential future factors that may affect the OHARNG. Within the RPMP, OHARNG facilities at the RTLS were examined in detail, resulting in recommendations with regard to current facility conditions and future development plans, as detailed in **Section 1.2.3.3**. The long-range objective of the future development for the RTLS is to maximize the quality of the training experience available, while broadening the training opportunities available, as specifically outlined in the OHARNG Range Development Plan (RDP).

1.2.3.3 OHARNG Facility Needs

As stated in the Final RPMP for the OHARNG (39), facility development plans at the RTLS include:

- *Siting of a new Unit Training Equipment Site (UTES) complex to enhance or replace the current UTES.* This project is identified as the number one construction priority among OHARNG logistics projects, as the existing facilities are inadequately sized and equipped so as to present a safety hazard to employees. According to the RPMP, the new UTES should be sited proximate to tracked vehicle training lands to minimize travel distances and costs due to decremented operations tempo funding; current funding only allows 27 miles/year/tracked vehicle in travel for each vehicle in the OHARNG arsenal inventory;
- *Installation of a new barracks building.* This barracks, constructed in early 1999, is located immediately to the west of the OHARNG Readiness Center, also completed in early 1999. These projects were reviewed in accordance with the requirements of NEPA as part of a separate environmental review process (97).
- *Installation of a new simulations building to house training simulators.* This building houses simulation training devices that the OHARNG has received from U.S. Army Simulation, Training, and Instrumentation Command (STRICOM). The simulation building is a relatively low-cost, Butler-type structure with a large clear-span distance, reinforced floor slab, large overhead doors, and minimal interior amenities. The facility

has been constructed in the vicinity of the new armory and TSSF facilities to maximize use of developed infrastructure and support capabilities in this specific location. This project was reviewed in accordance with the requirements of NEPA as part of a separate environmental review process (97).

1.2.3.4 OHARNG Training Needs

Available training areas at the RTLS presently are classified as light maneuver land, and vehicle movement is restricted to established roads and trails per RTLS standard operating procedure. At present, there is only one tank range in the State of Ohio, the Gunnery Table IV range at RTLS. Heavy maneuver training areas, which provide space for larger units, generally platoon through battalion, to perform collective maneuver tasks in a non-live fire environment, including space for force-on-force activities, are not currently available in the State of Ohio.

The OHARNG has two armor and one mechanized infantry battalion and one divisional cavalry squadron (see **Chart 3-1, Section 3.2.3.1**) and has a requirement to perform maneuver tasks up to the platoon level for mechanized infantry and armor (MECH/AR) platoons. Currently, all OHARNG platoon-level MECH/AR heavy maneuver training occurs primarily at Camp Grayling, Michigan; Camp Ripley, Minnesota; and Fort Knox, Kentucky during two-week annual training (AT) events; OHARNG units can only train as small units/crews within the state at RTLS or Camp Perry.

As stated in the RDP, the most land-intensive heavy platoon maneuver training area (required by the OHARNG and identified in TC 25-1) is the ambush mission/task. This training event requires of an area of 5 km by 10 km, or approximately 12,355 acres. This acreage is the recommended contiguous maneuver space needed to realistically and doctrinally train all the OHARNG squads against an opposing forces (OPFOR) unit (40). Consequently, the OHARNG is investigating the possibility of installing a heavy maneuver training area, approximately 12,355 contiguous acres in area, within the recently expanded RTLS. There is potential for training areas currently designated as light maneuver area at RTLS to be re-designated as heavy maneuver areas that would, within limits, allow for platoon-sized lane training events.

In addition to the discussion of the need for limited platoon-sized heavy maneuver areas, the OHARNG RDP contains, describes, analyzes, and prioritizes the current training facility needs at the RTLS based on the mission training requirements of OHARNG units:

- Upgrade Gunnery Table IV Range located in TA C to a Tank Crew Proficiency Course (TCPC), so as to meet current standards;
- Develop a Hand Grenade Qualification Course at IOC demolition area #2;
- Develop a Hand Grenade Familiarization Range at IOC demolition area #2;
- Maintain an Army Standard Light Demolition Range at IOC demolition area #2;
- Develop a Special Forces Isolation Facility (ISOFAC) by modifying an existing structure in storage area #5;
- Develop an Army Standard Military Operations in Urban Terrain (MOUT) Collective Training Facility (CTF);
- Develop a 50-foot Rappel Tower with Helicopter Mock-up;
- Develop a 34-foot Parachute Training Facility Tower; and
- Develop a non-live fire, Remote Electronic Targetry Scoring (RETS) Multi-Purpose Training Range (MPTR).

Although live-fire scenarios were included in the RDP analysis, the OHARNG has no specific plans for developing live-fire ranges at the RTLS. However, development of such ranges is not precluded.

Specific details of the current OHARNG mission and primary activities, as well as details of the available training assets at the RTLS are provided in **Section 3.2.2**.

1.3 Purpose and Need for the Study

The OHARNG is required to manage the land and natural resources necessary for units to conduct and sustain quality military training. The OHARNG, as part of the land and natural resources management program, is initiating a three-phased approach to the long-term planning of military training at the RTLS. This phased approach is in full compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC §4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations (40 CFR §1500-1508); and Army Regulations (AR) 200-1 and 200-2. The phased approach of the OHARNG includes:

> **Phase I**: Identification of environmental resources, issues, constraints and opportunities at the facility in an Environmental Baseline Summary Report (EBSR);
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>
> **Phase III**: Preparation of a consequent Environmental Assessment (EA) that identifies and documents the potential environmental, cultural, and socioeconomic impacts associated with the implementation of the proposed actions.

A large volume of environmental data exists, or is in the process of being collected for, the RTLS. Given the amount and technical nature of the available environmental information, it is extremely difficult for the majority of the general public to easily understand, interpret, or comprehend the data. Consequently, as the first phase of the OHARNG's comprehensive planning process at the RTLS, a process which will culminate in the completion of an EA on the OHARNG's long-range plan, this EBSR has been prepared. The primary purposes of this EBSR are to:

- Synthesize and summarize the current body of environmental data available for the RTLS;
- Identify data gaps and the need for specific additional studies or investigations necessary to fill these gaps at the RTLS;
- Identify environmental opportunities and constraints within the RTLS based on environmental information;
- Allow informed decision-making with respect to the long-range land development and use planning at the RTLS;
- Provide input to the implementation of the Integrated Training Area Management (ITAM) program at the RTLS; and
- Serve as the foundation for the completion of the RTLS EA for Enhanced Training and Operations.

The overall goal of this product is to provide the OHARNG with the information necessary to prepare and evaluate the most environmentally-sensitive long-range plan possible, while still achieving mission and planning objectives.

2.0 STUDY METHODOLOGY

2.1 Methods

Ogden collected existing information for the RTLS from a variety of sources, as referenced throughout this document. These sources included interviews and written consultation with representatives of the OHARNG; IOC; local, State, and Federal regulatory agencies; local planning agencies; and natural resource agencies; review of available documentation concerning historic, current, or pending studies and investigations at the RTLS; and review of other documentation available for the RTLS and its vicinity.

The format of this document follows the guidelines provided in the *Army National Guard Manual for Compliance with the National Environmental Policy Act of 1969: Guidance for Preparing Environmental Documentation for Army National Guard Actions in Compliance with NEPA* (110).

2.2 Overview of Existing Data Sources

A wealth of data exists for the RTLS. Information used in the preparation of this document was solicited from:

- Akron Metropolitan Area Transportation Study (AMATS);
- IOC personnel and files at the RTLS;
- Newton Falls Public Library;
- Ohio Department of Natural Resources (ODNR) Division of Natural Areas and Preserves (DNAP);
- ODNR Division of Water (DOW);
- ODNR Division of Wildlife (ODOW);
- Ohio Environmental Protection Agency (OEPA) Division of Surface Water (DSW), Ecological Assessment Unit (EAU);
- OEPA Northeast District Office Air Pollution Group;
- OEPA Northeast District Office Division of Drinking and Ground Waters (DDAGW);
- OHARNG;
- Portage County Regional Planning Commission (PCRPC);
- Trumbull County Planning Commission (TrCPC);
- U.S. Army Corps of Engineers (USACE), Louisville District;
- U.S. Army Corps of Engineers (USACE), Pittsburgh District;
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS); and
- U.S. Fish and Wildlife Service (USFWS).

Formal consultations were conducted with the DNAP, OEPA—DSW, EAU, ODOW, PCRPC, TrCPC, and USFWS. Copies of consultation letters are included in **Appendix 1**. Reference materials used in preparation of this EBSR are listed in **Section 5.0**.

2.3 Overview of On-going and Proposed Future Studies

On-going and proposed future studies and documentation that will be prepared for the RTLS before CY 2002 include:

- Fort Ohio Master Plan, Select Coverage;
- Environmental Noise Management Plan (ENMP);
- Comprehensive Floral and Faunal Surveys, with special emphasis on Threatened & Endangered Species and Ecologically-Sensitive Areas;
- Invertebrate Community Index on Selected Streams and Aquatic Community Sampling at Selected Wetlands;
- Facility-wide Watershed Management Plan; and
- Digital NRCS Soil Survey Update;

The portions of these plans and studies that were available at the time of preparation of this EBSR were reviewed and incorporated, as appropriate and as referenced herein.

3.0 AFFECTED ENVIRONMENT AT THE RTLS

For ease of reference, the entire 21,419-acre installation is referred to as the "RTLS" or "installation" throughout the remainder of this document when describing current conditions. This includes the 5,255 acres currently managed by the IOC as the RVAAP and the 16,164 acres currently managed by the OHARNG as the RTLS. When events or documents are referenced that pertain directly to: the historic RVAAP property prior to the OHARNG's land acquisition; actions taken on the part of the IOC specific to the former or current RVAAP property; or plans applicable to the RVAAP property prior to the OHARNG's land acquisition, the term "RVAAP" is used.

3.1 General Overview

The RTLS has variable topography, from relatively flat to gently rolling terrain in the eastern half to rolling and low hills in the western half. Remnant glacial topography is apparent in some areas, resultant from stream dissection of glacial drift components. Three named streams traverse the property: Hinkley Creek, Sand Creek, and South Fork Eagle Creek. Many beaver ponds, glacial depressions, and small lakes are scattered throughout the RTLS; wetlands may potentially persist on 70 to 80 percent of the installation lands (40).

The RTLS area, although historically disturbed by intensive agriculture, has reverted in many areas to the heavily forested woodlands that once covered much of the region. However, the reverted areas are typically comprised of vegetation less than approximately 60 years of age, as it was circa 1941 when agriculture was for the most part eliminated from the RVAAP property. Some areas, since cleared for agriculture, remain free of large overstory vegetation.

A great deal of wildlife exists within the installation, from many large mammal species to several types of reptiles to several hundred species of moths and butterflies (49,81). Closely-controlled white-tailed deer and waterfowl hunting are currently allowed on the property. These hunting activities are coordinated by the OHARNG and RTLS personnel with the assistance of ODOW.

Approximately forty sensitive species are believed to occur on or near the RTLS property, as identified by DNAP (50). Although they are widespread throughout the property, the majority of these species have been located in or near streams, wetlands, or other on-site moist areas.

3.2 Study Area Description

3.2.1 Geographic Setting

The RTLS is located in east-central Portage and southwestern Trumbull Counties, in northeastern Ohio. Trumbull County is bordered to the east by the Pennsylvania state line.

The 11-mile by 3.5-mile, 21,419-acre facility is located approximately 33 miles southeast of Cleveland, 21 miles northeast of Akron, 15 miles west of Warren, and 24 miles northwest of Youngstown, Ohio (see **Figure 3-1**). Specifically, the RTLS boundary is located approximately three miles northeast of Ravenna and approximately one mile northwest of Newton Falls, Ohio.

Major roadways in the vicinity of the installation include Interstate 80, which occurs less than one mile from the northern and eastern boundaries of the RTLS, and Ohio SR 5, which lies within the RTLS property line along the southern boundary.

3.2.2 Current IOC Mission and Primary Activities

The current mission of the IOC at the RTLS (RVAAP portion; 5,255 acres) is the storage of manufactured HE and remediation of contaminated sites. The facility was de-activated from its stand-by status in 1993, and now exists in a modified caretaker status. The modified caretaker status demonstrates that the majority of the former RVAAP facilities are no longer maintained. R&R International, Inc. is currently the MCC of the 5,255 acres, and manages the day-to-day logistical operations. Many of the components of the facility that have been deemed as excess by the IOC are currently being scrapped and/or sold for salvage.

HE storage areas will continue to be used by the IOC until their mission is completed and all energetic materiel is removed (178).

3.2.3 Current OHARNG Mission and Primary Activities

3.2.3.1 General Organization

The OHARNG has three Major Commands, the 37th Armor Brigade, the 16th Engineer Brigade, and the 73rd Troop Command within the state organization, as shown on **Figure 3-2**. All three Major Commands have both a federal and a state mission:

- **37th Armor Brigade**: The state mission of the 37th Armor Brigade is to provide units trained and equipped for immediate deployment in support of natural disasters and civil disturbances, while the federal mission is to provide command, control, and supervision of the tactical operations of the brigade's assigned and attached units;
- **16th Engineer Brigade**: The 16th Engineer Brigade's federal and state mission is to provide command and control of the operations of its assigned and attached units, ensuring combat readiness and preparedness for immediate deployment or activation; and
- **73rd Troop Command**: The federal mission of the 73rd Troop Command is to provide wartime combat-ready troops, while the state mission is to provide troops prepared to respond to local and state emergencies.

In addition, the 145th Regiment (Regional Training Institute) is a subordinate command of the OHARNG which has a mission of operating training and leadership schools for the OHARNG and the State of Ohio (40).

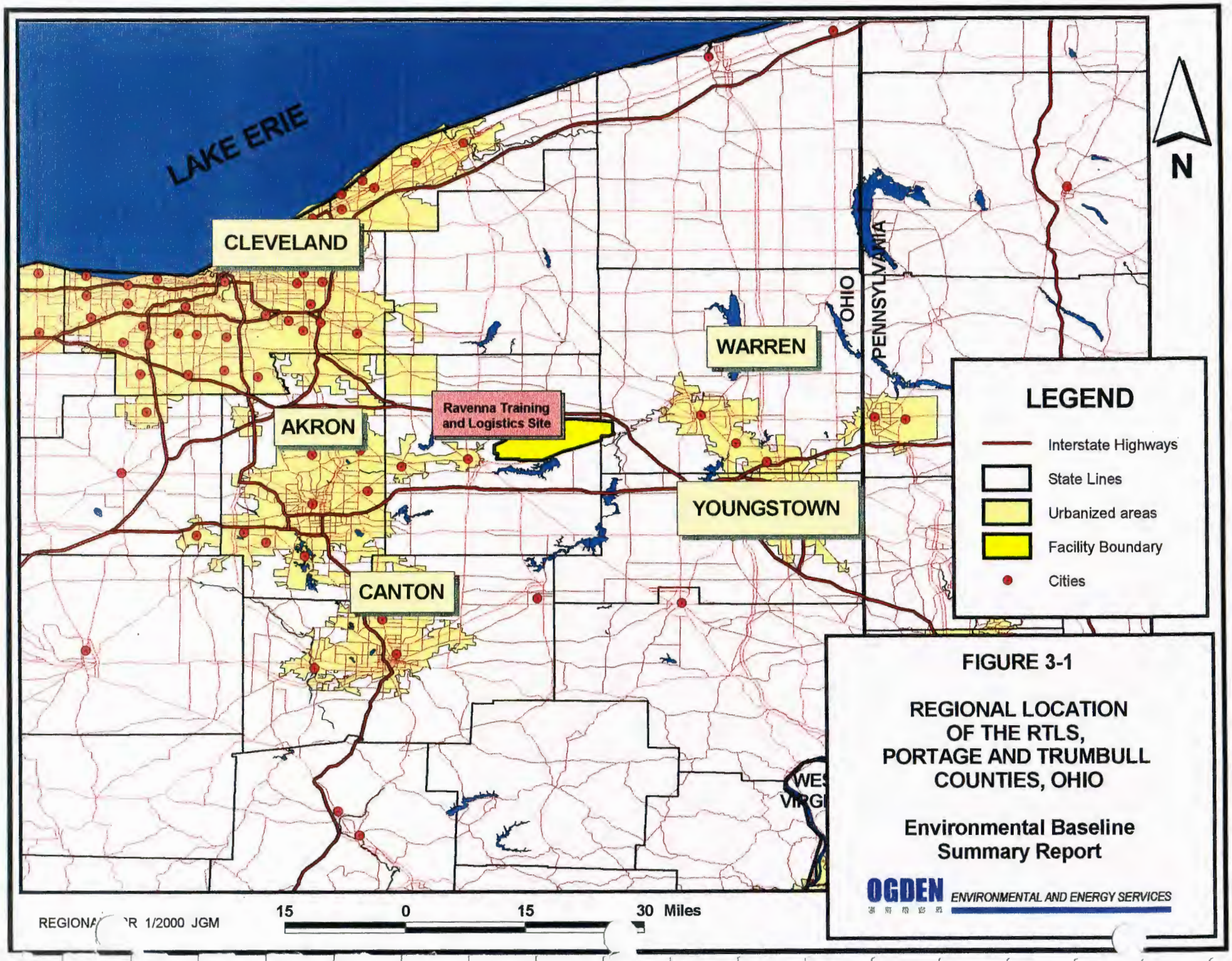
LAKE ERIE
CLEVELAND
AKRON
CANTON
YOUNGSTOWN
WARREN
Ravenna Training and Logistics Site
OHIO
PENNSYLVANIA
N
LEGEND
Interstate Highways
State Lines
Urbanized areas
Facility Boundary
Cities
15 0 15 30 Miles
FIGURE 3-1
REGIONAL LOCATION OF THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO
Environmental Baseline Summary Report
OGDEN ENVIRONMENTAL AND ENERGY SERVICES

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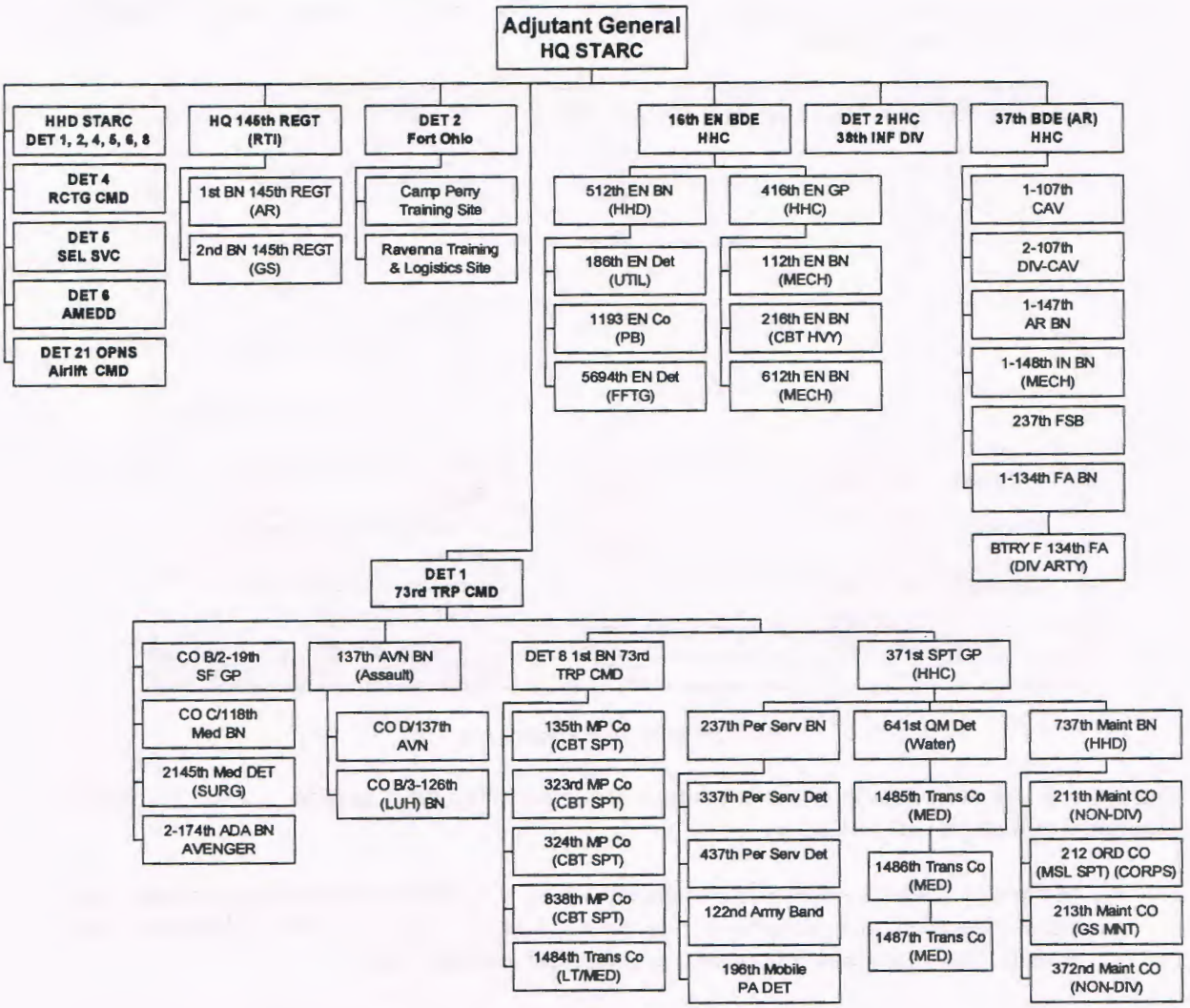
Figure 3-2 OHARNG Organizational Chart



3.2.3.2 RTLS Current Mission and Use

The mission of the training facilities located at the RTLS is to serve as the primary OHARNG training site in which to enhance the field operational skills of company-sized armor and battalion-sized infantry combat support (CS) and combat service support (CSS) units (39).

Until late 1998, approximately 2,832 acres of the RTLS was licensed to the OHARNG for use as a multi-purpose training area, known as the RTLS (as previously discussed in **Section 1.2.1**). At that time, the RTLS was comprised of several parcels, which included training areas (TAs) A, B, C, D, E, F, G, and H (126; see **Figure 3-3**). The reader should note that, although the OHARNG currently is responsible for 16,164 acres at the RTLS (see **Section 1.2.1**), the majority of current and on-going OHARNG activities are confined to the original 2,832-acre RTLS pending completion of the planning and environmental review processes for this additional acreage. A UTES, a Training Site Support Facility (TSSF), and an OHARNG Readiness Center also are

included within the 2,832-acre RTLS in TA C. A breakdown of the land acreage included in each parcel is shown in **Table 3-1**.

Table 3-1 OHARNG Training Area Sizes at the RTLS, Portage and Trumbull Counties, Ohio

Training Area/Parcel	Size (acres)	Current OHARNG Use
A	240	Light Maneuver Area
B	180	Light Maneuver Area
C	500	Light Maneuver Area
D	265	Light Maneuver Area
E	266	Light Maneuver Area
F	266	Light Maneuver Area
G	266	Light Maneuver Area
H	511	Land Navigation/Compass Training
J*	338	Aerial Drop Zone/Dismounted Tactical Training
Table IV Tank Range	1 Lane	Tank Stationary Gunnery Range
Wheeled Vehicle Convoy Route	21 Miles	Wheeled Vehicle Convoy Route
Tracked Vehicle Driver's Training Course	N/A	Tracked Vehicle Driver's Training Course
Land Navigation	10 Lanes	Land Navigation
Total	**2,832**	

* USAFR Drop Zone Training area

Pursuant to AR 415-28, *Department of the Army Real Property Category Codes*, the RTLS training facilities are categorized as:

- Maneuver Training Areas – Training areas for light, amphibious, and heavy training; and
- Other Specified and Scheduled Non-Firing Training Facility Land – Bivouac sites, assembly/staging areas, drop zones, airstrips, and landing zones.

TAs A, B, and C are located on the eastern edge of the RTLS, and are used by the OHARNG for tracked vehicle training, specifically a Multiple Integrated Laser Engagement System (MILES) Combat Tank Table IV qualification range. This facility is used for boresighting and simulated firing of M-1 tank weapons; Tube-launched, Optically-tracked, Wire-guided (TOW) anti-tank missiles; and Dragon missiles (39).

Current UTES facilities in TA C consist of two metal buildings totaling 4,000 square feet plus three small construction trailers of less than 1,000 square feet each. In addition, a 31,591 square foot barracks and an armory have recently been constructed in TA C, including both paved and gravel parking lots. The new armory is staffed by Company A, 1-107 Armor Battalion and Company B of the 237th Forward Support Battalion (FSB). The OHARNG now also controls approximately 840 buildings throughout the property, including a number of ground-level warehouses which are available for CHP uses.

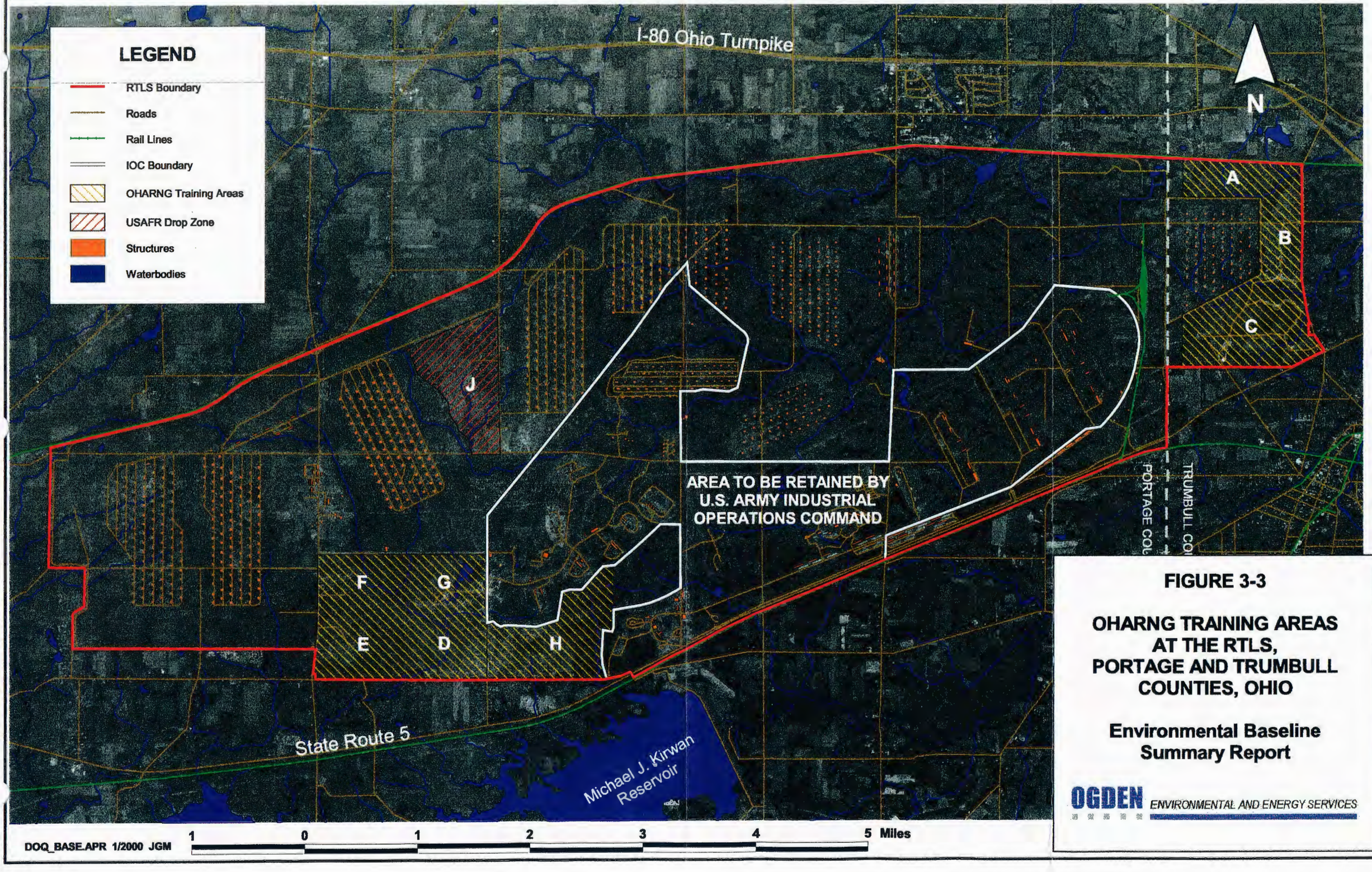


FIGURE 3-3

OHARNG TRAINING AREAS AT THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

Environmental Baseline Summary Report

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

TAs D, E, F, and G are in the south-central portion of the RTLS and contain nine light maneuver areas. These areas are used primarily for dismounted tactical training or bivouac, with some restricted wheeled vehicle access. TA H is used primarily as a land navigation/compass training course. TA J is used for three-second C-130 parachute aerial drop training by the U.S. Air Force Reserve (USAFR) and OHARNG units, as well as for dismounted tactical training by the OHARNG. These TAs are shown on **Figure 3-3** (40,126).

Other specialized training facilities located at the RTLS include:

- Mobile Conduct-of-Fire Training (MCOFT) concrete pad;
- Concrete pads for tanks to boresight weapons;
- A Bailey Bridge site (for engineer training);
- A 21-mile paved convoy route;
- A 12-mile paved ambush lane;
- A 5.5-mile forced march route; and
- A helicopter day, night, and night vision device nap-of-the-earth (NOE) navigation course.

At the current time, the RTLS has no live-fire or heavy maneuver ranges. The typical training year for the available non-live fire training facilities and light maneuver areas at RTLS is 173 days (40). In FY 99, the RTLS was utilized 23,624 man-days by OHARNG personnel, and 14,046 man-days by other branches of the military and/or law enforcement, for a total of 37,670 man-days. In general, the trend in training usage for the RTLS is that of a positive increase of 14 to 15 percent per year (178).

Overall, OHARNG use of the RTLS is limited by lack of areas available for live-fire training, presence of numerous HE storage areas (see **Section 3.13.2**), presence of wetlands on potentially 70 to 80 percent of the property (see **Section 3.8.2.2**), and potential for soil erosion (see **Section 3.6.4**) (39,40).

3.2.4 General Landscape

The general landscape of the RTLS is flat to gently sloping glacial terrain, with occasional bedrock outcrops. An elevational range of nearly 300 feet provides for light to moderate relief in certain portions of the study area. Overall relief in the eastern half of the property is greater due to a secondary glacial advance and subsequent scouring.

Woodland areas at the RTLS exhibit secondary growth vegetation characteristic of historical agriculture. The site is moderately to heavily forested, primarily with hardwood species. Some grasslands exist, although they are likely a remnant of the agricultural history of the area.

A number of man-made structures exist throughout the RTLS, with large structures situated in groups typically within open areas. Conspicuous structures include load lines, steam boiler stacks, administration areas, and security checkpoints. In addition, several hundred explosive storage structures, or "igloos", are located throughout the installation. However, the earth-covered nature of these structures precludes their prominence (23).

3.2.5 Climate

The climate of the RTLS area is continental, but the proximity of Lake Erie provides for fringe moderation. Temperatures in the area range from a low of approximately –20 degrees Fahrenheit (F) to a high of approximately 90 degrees F, with typically high humidity. The average minimum temperature is approximately 37 degrees F, and the average maximum temperature is about 60 degrees F. Overall, mean temperatures range from about 28 degrees F during the winter months to about 71 degrees F during the summer (79,117,130).

Average annual precipitation is about 36 inches, and average annual snowfall is about 36 inches. Prevailing winds are ordinarily from the west at around 10 miles per hour. The growing season typically lasts about 180 days, and usually begins in early April (79,117,130).

3.3 Land Use

3.3.1 Land Cover

The RTLS area has a diverse range of vegetation and habitat resources, with a broad classification of either improved (maintained) grounds, semi-improved grounds (once-improved grounds that are no longer maintained) and unimproved grounds (64). The majority of lands within the RTLS are post-successional agricultural lands, with the exception of a few areas of large mature forest and areas that were considered too wet to farm. It has been estimated that approximately 90 percent of the RTLS, with the exception of wet woods, had been cleared and were involved in some type of agriculture or other disturbance at one time (49).

Most woodland areas exhibit secondary or tertiary growth vegetation characteristic of historical agriculture, with most individual specimens less than 60 years of age. Existing grasslands also are likely a remnant of the agricultural history of the area. **Table 3-2** provides a breakdown of land coverage at the RTLS.

3.3.2 Aesthetics and Visual Resources

No specifically-identified aesthetic or visual resources occur at the RTLS. Limited topographic relief and relatively dense forest cover limit line-of-sight ability and inhibit large-scale landscape viewing.

Moderately rich wildlife viewing is available in most habitat areas, particularly in wetlands/marshes, secondary successional scrub-brush lands, and large mature forest. The typically hardwood nature of the forested areas provides for rich color displays in the fall, although limited by a proximal line-of-sight.

A sandstone gorge with locally severe topographic relief along the northern boundary of the installation (in the South Fork Eagle Creek drainage) has been recognized for its visual qualities. This area, historically known as Wadsworth Glen, includes a relatively rare and pristine hemlock-white pine-hardwood forest along with a somewhat diverse vegetative understory (49).

3.3.3 Building Function and Architecture

The RVAAP came into existence beginning in August 1940. The construction of the RVAAP occurred as two separate projects, the Ravenna Ordnance Plant and the Portage Ordnance Depot.

The property's current 21,419 acres include both the original load, assembly, and pack plant comprising the Ravenna Ordnance Plant built between September 1940 and March 1942, and the adjacent Portage Ordnance Depot, constructed between March 1941 and August 1942 (18).

Table 3-2 Land Coverage at the RTLS, Portage and Trumbull Counties, Ohio

Land Coverage Type	Acres
Improved Grounds	**15**
Semi-improved Grounds	
HE Storage	174
Drop Zones	338
Road shoulders/Railroad beds, etc.	302
Other	294
Subtotal	**1,123**
Unimproved Grounds	
HE Storage	16
Agricultural Leases	150
Ponds, Lakes, and Streams	171
Paved areas and Railroads	589
Buildings and Structures	210
Non-commercial Forest Land	6,306
Other	417
Subtotal	**7,859**
Commercial Forest Land	12,437
Total	**21,419**

Sources: 1) INRMP. 1995.
2) LTC Thomas Tadsen, Personal Communication. 1999.

In August 1940, the Federal government purchased 223 tracts of land, occupied by 220 to 250 families (more than 1,300 people), for a cost of approximately $1.796M. It is estimated that 400 houses, barns, privies, and other farm buildings were present when construction began in September 1940. During construction, the majority of these structures were demolished; however, approximately 58 farmhouses were retained and re-used as construction and operation housing or other functional application (18). Currently, the Bolton milk house, discussed in **Section 3.9.3**, is the sole remaining standing structure at the RTLS from this period.

Upon completion of construction in the 1940's, the facility included approximately 1,275 buildings and structures, not including the retained pre-construction farmhouses. Structures present at the RTLS include approximately 268 buildings associated with four load, assemble, and pack (LAP) facilities, two fuze lines, two booster lines, a detonator line, an artillery primer line, a percussion element line, and two ammonium nitrate lines; 37 inert storage warehouses; 69 magazines; 230 storage igloos; 23 administration buildings; 15 staff residences; and a host of additional infrastructure, services, community, and support facilities. The facilities were designed by Wilbur Watson and Associates of Cleveland, and were constructed by the Hunkin-Conkey Construction Company of Cleveland. The official cost of construction of the plant was $61,469,239 (18).

Due to the urgency associated with construction of the facility and the required functions of the buildings, architecture was basic, functional, and industrial in nature. The majority of the buildings at the RTLS are, however, of permanent construction. Only Load Line IV and 24 of the inert storage warehouses are of temporary construction, with wood framing members and sheet asbestos walls (18).

Although the functions of the buildings were highly specialized, exteriors are very similar in appearance. The permanent buildings are mostly steel-framed (i.e. steel super structure), one-story structures, with two or three bay end walls and rectangular or square footprints on concrete foundations. The structures typically have corrugated asbestos-covered, gable roofs with ridge ventilators; tile walls with brick piers or corners; single- or double-leaf doors with a glassed upper half; and multi-paned steel sash awning windows. Function-driven safety considerations resulted in the addition of concrete barrier walls and rubber flooring to some buildings. In the cases of the half-cylindrical, earth-covered storage igloos, exteriors are reinforced concrete, with a concrete floor and a single steel access door. In general, size is the only distinguishing feature among the buildings (18).

The buildings that were not industrial in nature, those primarily located in the administration area, were built mainly of frame construction and exhibit elements of the popular Colonial Revival style. Although standardized for rapid construction, the 15 staff houses in the administration area reflect the image of a typical suburb from the 1940s period (18).

3.3.4 Local Communities

The area surrounding the RTLS is rural, with no permanent residences on-site. Twenty-nine IOC/MCC staff and 9 OHARNG staff are currently employed at the facility, and most personnel commute from the surrounding area on a daily basis.

Local communities near the RTLS include Newton Falls, located approximately one mile to the southeast; Braceville, located one mile to the east; Ravenna, located approximately three miles to the southwest; and Windham, located less than one mile north of the facility boundary. Warren, a city of approximately 50,000 residents, is located approximately eight miles northeast of the RTLS. The demographics of local communities are discussed in **Section 3.10.1**.

3.3.5 Land Use, Environmental Compliance, and Resource Management Plans

Land use at the RTLS is governed by a variety of management plans. These plans are either specific to OHARNG activities; are general plans designed, prepared, and/or implemented by the IOC; or are local plans produced and implemented by local agencies and/or development authorities.

Pursuant to EO 12372, 31 USC 6506, 32 CFR, Part 243, and AR 210-70, intergovernmental coordination of proposed activities at the RTLS is initiated, as necessary, through local points, of contact, specifically identified as local county-level planning commissions in Portage and Trumbull Counties (see **Section 3.3.8**).

Land management plans specific to RTLS/OHARNG activities, or administered by the RTLS/OHARNG include:

Real Property Master Plan (RPMP), Ohio Army National Guard (select coverage) – The NGB requires each state's ARNG to annually submit an updated RPMP to the NGB for review. The RPMP allows strategic evaluation of use of existing resources and facilitates strategic

evaluation, planning, and development for future needs. Any proposed military construction projects must be included in the RPMP before design or construction funds will be authorized.

The OHARNG facilities at the RTLS were examined in detail, resulting in recommendations with regard to current facility conditions and future development plans in **Section 1.2.3.3**. The long-range objective of the future development for the RTLS is to maximize the quality of the training experience available, while broadening the training opportunities available, as specifically outlined in the OHARNG RDP.

Range and Training Land Development Program (RTLP) Range Development Plan (RDP) – The OHARNG RDP was developed for the OHARNG in accordance with AR 210-21, *Range and Training Land Program (RTLP) generic methodology*, dated October 1996. The RDP provides a view of available assets, identifies users, and establishes training requirements based on Army training doctrine and resource guidance information. The RDP also establishes current requirements and utilization levels for available training facilities, providing a near-term and long-term project plan for training coordinators, public works personnel, and environmental planners. The projects identified in the RDP consider the impacts on the OHARNG's mission, economic resources, environmental stewardship, and potential for productivity enhancements.

Environmental Noise Management Plan [*formerly* Installation Compatible Use Zone (ICUZ) Analysis Study] – The current ICUZ study was finalized in January 1988. However, the RTLS is in the process of preparing an ENMP, anticipated for completion in FY 01.

Under NEPA of 1969, the Noise Control Act of 1972 (PL 92-574), EO 12088, AR 200-1, and AR-200-2, the U.S. Army is required to assess the environmental impact of noise produced by its activities. Within such an assessment, strategies are formulated to establish proper land-use planning criteria in protecting both on- and off-post receptors from environmental noise. The primary tool used to minimize noise impacts is compatible land use planning, such as placing training activities in areas that allow for attenuation of noise and temporally planning training activities for times when noise impacts can be minimized (68,97).

The ENMP process is designed to protect the installation's mission from encroachment by off-post noise-sensitive land uses. The ENMP program requires quantification of the existing and future noise environment; coordination with state, regional, and local planning and zoning agencies; and exploring possible mitigation measures to reduce noise impacts. The ENMP program requires that a study be performed to identify noise contours, with both location and intensity described. Management practices are then implemented to isolate and minimize noise based on the results of the study (14,32). The ENMP program is discussed in further detail in **Section 3.5**.

Agricultural Lease Program (ALP) – The ALP administered at the RTLS includes two agricultural leases, one for commercial hay production on 90 acres of agricultural grassland and one for "sugar bush" sap production from a 60-acre sugar maple (*Acer saccharum*) woods. Both of these tracts lie in the northern portion of the installation, along the South Fork Eagle Creek. The hay lease is scheduled to expire on 1 January 2001 and the "sugar bush" lease is scheduled to expire on 31 October 2001 (109a, 109b).

Land use management plans prepared, implemented and/or administered by the IOC include:

Installation Action Plan (IAP) – The IAP for the RVAAP was prepared in accordance with Installation Restoration Program (IRP) guidance provided by the U.S. Army Environmental Center (USAEC). The IAP outlines the total multi-year environmental restoration program for an installation. IAPs present an integrated, coordinated approach to achieving an installation's environmental restoration goals. Such plans define all IRP requirements, propose a comprehensive approach to conduct investigations and remedial actions, and identify possible removals and interim remedial actions at an installation (114). The IAP for the RVAAP provides a summary of past remedial characterizations, the status of Areas of Concern (AOCs), summaries of current and completed remedial actions, projections for future remedial actions, and funding status and requirements for current and future remedial activities. Information from the RVAAP IAP is summarized in **Section 3.13.5**.

Environmental Management Plan (EMP) – The current EMP for the RVAAP, dated 1 September 1997, is an annual plan that comprehensively identifies the requirements, responsibilities, operations, organization, planning, and submissions that make up the environmental program at the RVAAP (31). Although not mandated for preparation by any current regulatory driver(s), the purpose of the EMP is to demonstrate both good faith and legal intent to operate a compliant environmental program at the RVAAP. Specifically, the EMP identifies regulatory points of contact, standard environmental procedures, current environmental plans, current environmental permits, environmental logs/records, temporal requirements, and reference materials applicable to the RVAAP (31). The EMP identifies only two environmental permits that the installation possesses, a general usage Stormwater Permit and a National Pollutant Discharge Elimination System (NPDES) Permit for the OHARNG wash rack at the UTES.

Land use management plans that are prepared, implemented, and/or administered jointly by both the RTLS/OHARNG and the IOC include:

Cultural Resources Management Plan (CRMP) – The installation's CRMP was published in April 1996, pursuant to the requirements of AR 200-4/420-4 (17). This comprehensive document, prepared by the IOC in consultation with the Ohio Historic Preservation Office (OHPO) and the Advisory Council on Historic Preservation (ACHP), provides detailed guidelines and procedures to enable the managers of the installation to meet their legal responsibilities for the identification, evaluation, and treatment of historic properties under their jurisdiction in accordance with applicable regulations and statutes. Further information regarding the CRMP is included in **Section 3.9**. The CRMP is scheduled to be updated by FY 01 with the intention of joint administration by both the IOC and the RTLS/OHARNG.

Watershed Management Plan – Research is currently being conducted by the USACE with regard to wetlands within the 21,419-acre footprint of the property. Wetlands will be delineated by interpretation of aerial photography and infrared imagery; ground-truthing (spot-checks) will be conducted on selected areas. This plan is expected to be available in FY 01.

The primary federal agency involved in the regulation and identification of wetlands is the USACE under Section 404 of the Federal Clean Water Act of 1972 (CWA) (33 USC §1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 USC §403). In addition, EO 11990 (24 May 1977) provides guidance for protection of wetlands and mandates the goal of no net loss of wetlands. AR 200-3 implements Army compliance with EO 11990, and AR 200-1 includes

guidance for protection, restoration, and enhancement of wetlands. Furthermore, NEPA provides guidance on minimizing damage to the environment, including wetlands [42 USC §4321, Chapter 12-2 b(2)]. Wetlands and the regulation thereof are discussed in further detail in **Section 3.8.2.2**.

Integrated Natural Resources Management Plan (INRMP) – The INRMP for the installation, prepared in 1995, is a dynamic strategy prepared to "describe the baseline conditions of the natural resources and provide management programs and guidance which allow for the successful completion of military mission operations while providing for the conservation of renewable resources, preservation of unique and rare resources, and long-term sustainability of ecosystems. The major management programs addressed in the INRMP include land management and grounds maintenance, forest management, fish and wildlife management, and agricultural management" (64). The plan is dynamic in that it is routinely reviewed and revised to reflect changes in the managed resources and/or management goals; major revisions to the INRMP are completed not less than every five years. AR 200-3 states that: "Integrated Natural Resources Management Plans, as referenced in the Sikes Act (16 USC §670a *et seq.*), shall be developed and maintained for all Army installations. These plans shall be prepared, implemented, and monitored by natural resources management professionals. The plans shall be coordinated with appropriate federal, state, and local natural resources managers and agencies with natural resources expertise and shall be made available for public comment." In addition, the INRMP provides for compliance with "Army policies, procedures, and standards, as outlined in AR 200-3, for the conservation, management, and restoration of land and the renewable natural resources, ecosystems, and biological diversity thereon, consistent with and in support of the military mission and in consonance with national policies (64)."

The installation INRMP is currently in the process of being revised to reflect the change in accountability for the property, and any changes that may occur as a result of the OHARNG's mission requirements.

Timber/Forestry Management Plan – The current Forest Management Plan (Part III of the installation INRMP) describes the methods used to manage the timber resources on the property. Although the plan indicates that large-scale, profit-based harvesting is no longer conducted at the facility, timber stand improvement (TSI) cutting is conducted in order to improve the quality and quantity of timber stands on the installation. Currently, very selective harvesting and TSI are conducted, with attainment of ecosystem management objectives being the driving force for the harvesting that does occur. Generally, single-tree and group selection harvesting are used to allow for the periodic harvest of timber while maintaining a continuous forest canopy in harvested woods. In certain areas, individual treatments may be used to meet the needs of rare species. In addition, more information regarding the management of forest resources at the facility, including specific management strategies and objectives, is provided in **Section 3.8.3.2**.

Fish and Wildlife Management Plan (FWMP) – The FWMP for the installation is a cooperative plan for the protection, conservation, and management of fish and wildlife resources as appropriate to the mission of the property. This plan, prepared by the USFWS and the cooperating entities, is a fully coordinated cooperative agreement rendered in accordance with the Sikes Act [PL 86-797, 16 USC §670 (a-o)] that is to be updated every five years. The cooperating entities include the USFWS, ODNR, ODOW, and the IOC (124).

Installation Hazardous Waste Management Plan (IHWMP) – The IHWMP is part of a combined IHWMP and Asbestos Management Plan (IAMP) prepared by the former MCC for the facility (24). The development and implementation of the IHWMP is required by AR 200-1, and

was produced in accordance with the Resource Conservation and Recovery Act of 1976, as amended (RCRA). The goal of this plan is to ensure that all hazardous waste generated, accumulated, stored, or treated at the installation is managed in compliance with state and federal regulations and Army regulations, as well as to ensure the protection of human health and the environment through established waste management procedures (24). Further information regarding management of hazardous waste on the property is included in **Section 3.13**.

Installation Spill Contingency Plan (ISCP) – The ISCP was developed by the former MCC for the facility in conjunction with the Spill Prevention Control and Countermeasures (SPCC) Plan as a stand-alone document (29). AR 200-1 specifies that an ISCP be developed to address potential spills or leaks of petroleum products and hazardous materials and wastes, and includes identification of specific procedures for activating spill response actions, including notification of emergency coordination personnel. The ISCP also describes procedures for containment and clean-up of spills or leaks and provides information on subsequent notification and reporting requirements. Further discussion of the ISCP is included in **Section 3.13.6**.

Integrated Pest Management Plan (IPMP) – The IPMP describes the various methods used to control pests at the RTLS, giving a description of the overall installation, the types of pests involved, and the controls employed. Pest control on the property is limited in nature, due to the relative inactivity of the facility. The text of the IPMP was excerpted for the most part from the 1995 Installation INRMP, and was produced in March of 1996 in accordance with AR 420-76 and Measure of Merit (MOM) 1.

Stormwater Pollution Prevention Plan (SWPPP) – The current SWPPP for all industrial activities at the installation was prepared in April 1998 by the former MCC (33). This plan identifies the potential sources of pollutants that may enter stormwater discharges and discusses Best Management Practices (BMPs) that may be used to prevent stormwater discharge pollution as well as a schedule for their implementation. The current SWPPP for the facility presents: an inventory of hazardous materials currently used at the installation; a description of potential pollutant sources; a summary of spills and leaks; a summary of stormwater discharge sampling data; a summary of inspection procedures; a summary of BMPs; facility maps; a copy of the Ohio EPA General Permit for Storm Water Associated with Industrial Activity, OHR000002; and other associated information.

Pollution Prevention Plan (PPP) – The PPP for the property was produced in 1997 by the former MCC (34a). This plan was produced with emphasis on meeting state and national pollution prevention goals, reducing long-term liabilities of waste disposal, saving money by reducing raw material purchases and waste treatment and disposal costs, and protecting public health and the environment. The PPP was produced as a means of compliance with: The Federal Pollution Prevention Plan Act of 1990, as amended; SARA; the Toxic Substances Control Act of 1976, as amended (TSCA); the Clean Air Act Amendments of 1990, as amended (CAAA); the Clean Water Act of 1977, as amended (CWA); The Montreal Protocol on Substances that Deplete the Ozone Layer; EO 12586; DoD Directive 4210.15, Hazardous Material Pollution Prevention; and AR 200-1. The PPP is further discussed in **Section 3.12.3**.

Integrated Solid Waste Management Plan (ISWMP) – The ISWMP was prepared in accordance with AR 420-47, which requires that each army installation develop and implement an ISWMP for their solid waste activities. The purpose of the ISWMP is to accomplish solid waste management at the installation cost-effectively, efficiently, and in a manner protective of human health and the environment. Within the confines of the ISWMP, this is accomplished by: 1) complying with all federal, state, local, and Army solid waste management regulations; 2)

reducing the rate of solid waste generation at the installation to meet national, DoD, and Army waste reduction goals to the maximum extent possible; and 3) re-using or recycling elements of the solid waste stream to the maximum extent possible. The ISWMP is further discussed in **Section 3.12.3**.

Spill Prevention Control and Countermeasures (SPCC) Plan – The installation SPCC Plan was prepared by the former MCC for the facility (32). The plan was prepared pursuant to: Section 311(j)(1)(C) of the Federal Water Pollution Control Act of 1972, as amended (FWPCA), and its implementing regulations as set forth in 40 CFR 112.7; RCRA; and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA). The SPCC Plan identifies the types of petroleum products and hazardous materials stored, all existing fuel and hazardous materials storage areas, and fuel and hazardous materials loading and unloading areas at the installation. In addition, the SPCC Plan sets in place standard procedures for spill prevention and control measures, referencing the ISCP, which is outlined above. Further discussion of the SPCC Plan is included in **Section 3.13.6**.

Several other local long-range plans and programs are also in place for the lands surrounding the property, and may affect adjacent land use on a limited basis. These programs include transportation improvement and management plans, land use and housing analysis plans, and rural development plans, as developed by local regulatory and property development authorities. These miscellaneous long-range plans are detailed in **Section 3.3.8**.

3.3.6 Local Zoning

The RTLS lies in both Portage and Trumbull counties, Ohio. Although the RTLS land area is classified differently with regard to zoning on several local levels, compliance with municipal zoning is not mandatory for federal property[1]. However, the RTLS does influence local land use for those areas surrounding the property. Aesthetics, dust, and noise issues are the primary factors concerning residents in these adjacent areas.

The majority of land surrounding the RTLS is zoned as agricultural and rural residential. Only one significant industrial facility, located in Windham, exists in the immediate area surrounding the RTLS. The USACE operates the Michael J. Kirwan Reservoir, located just south of the RTLS across SR 5 as a means of flood control for the Mahoning River. The adjacent areas surrounding the reservoir are managed by the Ohio Department of Natural Resources as West Branch State Park (65).

The majority of the RTLS, comprising approximately 20,000 acres, is located in Charlestown, Freedom, Paris, and Windham Townships in Portage County. Ravenna Township abuts the

[1] The OHARNG, under the NGB, is a federal entity and is therefore considered a "sovereign entity" under Article IV of the U.S. Constitution. As a federal sovereign entity, the OHARNG cannot be subject to state or local regulation except with their consent. In the areas of local zoning and land use, the OHARNG has not entirely waived its sovereign immunity. However, the Public Buildings Act of 1959 (PL 100-678, 6[a]; 40 USC 619) provides that federal facilities will be constructed "in compliance with one of the nationally recognized model building codes and with other applicable nationally recognized codes", and "after consideration of all requirements...of (1) zoning laws, and (2) laws relating to landscaping, open space, minimum distance of a building from the property line...and other similar laws" (40 USC 619 [a][b]). This same regulation, however, also states that "no action can be brought by the state or local municipality against the U.S. for failure to meet those requirements or carry out any recommendations made" (40 USC 619[e]).

The RTLS does influence local land use for those areas surrounding the property. In the cooperative spirit of 40 USC 619, the OHARNG considers the substance of applicable local zoning regulations.

facility along the western boundary in Portage County. The remaining 1,419 acres in the extreme eastern portion of the facility is located in Braceville Township, Trumbull County. Newton Township, Trumbull County abuts the facility to the east.

Area zoning is primarily residential, with isolated industrial and commercial zones surrounding the RTLS. **Table 3-3** indicates zoning for areas immediately adjacent to the RTLS.

Table 3-3 Zoning for Areas Immediately Adjacent to the RTLS, Portage and Trumbull Counties, Ohio

Township	Zoned Use
Braceville	Residential
Newton	Residential (R1/R2), Business and Commercial (B1/B2)
Charlestown	Residential (R-1), Open Space Conservation (O-C)
Freedom	Rural Residential
Paris	R-1 (Residential), C-1 (Commercial), and I-1 (Industrial)
Ravenna	Residential
Windham	Residential

3.3.6.1 Braceville Township

As stated previously, the eastern-most portion of the RTLS lies within Braceville Township in Trumbull County. Although the land area of the RTLS is not municipally-zoned within this township, the township has recognized that activities conducted at the RTLS may affect adjacent landowners. Specifically, standard nuisance and good neighbor rules apply, which prohibit "dangerous, hazardous, noxious, or offensive emissions of odor, dust, smoke, cinders, gas, fumes, noise, flame, electrical interference, refuse matter, water-carried wastes, or vibration" throughout this township (12). Property adjacent to the RTLS in Braceville Township is zoned as residential (180). It should also be noted that prohibited uses in all areas of Braceville Township include "businesses and industries which are a public nuisance [Manufacturing or storage of explosives, gunpowder, or fireworks] (12)."

3.3.6.2 Newton Township

Although none of the RTLS actually lies within Newton Township in Trumbull County, activities conducted within the RTLS boundaries may affect adjacent landowners in the jurisdiction. Property adjacent to the RTLS in Newton Township is zoned as Residential (R1/R2), and Business and Commercial (B1/B2) (11).

3.3.6.3 Charlestown Township

The RTLS occupies a considerable portion of Charlestown Township in Portage County. Although federal property is actually exempt from municipal zoning (40 USC 619), the Charlestown Township Zoning Resolution (CTZR) (13) indicates that the area within the boundaries of the RTLS is zoned as 'O-C', indicating 'Open Space-Conservation'. This designation permits use of O-C areas for single-family dwelling and mobile homes, wildlife refuges and game preserves, and accessory uses or buildings. 'Conditionally Permitted Uses'

include "Governmentally-owned and/or operated buildings or facilities, subject to Section 701.1 B1, B2, B3, and B4 (of the CTZR, as amended)". These sections of the CTZR indicate that a 'conditional zoning permit' may be granted for special cases (i.e., governmentally-owned and/or operated buildings or facilities), provided the landowner or developer provide detailed information regarding the proposed construction project to the Charlestown Township Board of Zoning Appeals (13). Areas adjacent to the RTLS in Charlestown Township are zoned as 'R-1' (single-family dwellings/lots) and as 'O-C' (West Branch State Park). In these adjacent areas, standard nuisance and good neighbor rules apply, as detailed above (13).

3.3.6.4 Paris Township

In Paris Township, the RTLS is not specifically zoned. As a general restriction, Paris Township prohibits "manufacture or storage of explosives, gunpowder, or fireworks, other than for personal use within the limits of existing laws (56)." Standard nuisance and good neighbor rules are not addressed, although they likely are implied. Adjacent property areas are zoned as R-1 (Residential), C-1 (Commercial), and I-1 (Industrial) (56).

3.3.6.5 Windham Township

The RTLS occupies a considerable portion of Windham Township. Zoning for the land within the boundaries of the RTLS is not addressed; however, areas adjacent to RTLS are zoned as Residential (128).

3.3.6.6 Freedom Township

The southeastern corner of Freedom Township is occupied by the RTLS. Although zoning for the RTLS is not addressed, areas adjacent to RTLS are zoned as 'Rural Residential'. Standard nuisance/good neighbor rules, as outlined above, apply for these areas (16).

3.3.6.7 Ravenna Township

Ravenna Township abuts the RTLS along its western edge. Zoning of lands directly adjacent to the RTLS is 'Residential', and standard nuisance and good neighbor rules apply (181).

3.3.7 Property Status

The RTLS is a federal property, owned by the citizens of the United States and under the overall control of the OHARNG as of 6 May 1999. The facility has been placed in a modified caretaker status since its de-activation in 1993 and is no longer being maintained. HE are stored in various locations throughout the site, of which the IOC will retain control for an indefinite period of time.

Approximately 16,164 acres of the property is currently is licensed to the OHARNG for use as a multi-purpose training area (the RTLS). Further information with regard to OHARNG use of property is presented in **Sections 1.2.1, 1.2.2.2 and 3.2.3**.

Approximately 150 acres of property in the northern-most portion of the RTLS are leased as commercial farmland via the ALP for the RTLS. Ninety acres of agricultural grassland are leased for commercial hay production and 60 acres of sugar maple woods are leased for maple syrup production.

The U.S. Department of Interior—Bureau of Land Management (BLM) controls the mineral rights for the entirety of the property, and arrangements for exploration and/or development are made through that agency. Federal ownership allows for public exploration and extraction of mineral resources upon issuance of proper quitclaim deeds. Currently, two petroleum resource development wells are in operation in the southwest corner of the property, under a lease arranged through the BLM (97).

Closely-controlled hunting and trapping are currently available at the RTLS under the terms of a Memorandum of Agreement (MOA) between the RVAAP and ODOW. The MOA establishes the relationship between involved agencies and sets forth general procedures under which the parties will operate with respect to hunting and trapping on the installation. While the MOA is not a legal requirement of the Sikes Act (16 USC §670a *et. seq.*) or AR 200-3, it exists to facilitate controlled public access for hunting and trapping. The MOA does not delegate managerial authority of any kind to the ODOW. The MOA is consistent with AR 200-3 and Chapters 1531 and 1533 of the Ohio Revised Code (ORC). The Sikes Act establishes the need for a cooperative management plan among the OHARNG, RTLS, the U.S. Fish and Wildlife Service (USFWS), and ODOW. Sikes Act requirements are currently met by established guidelines set forth in the installation INRMP, which is currently being revised to reflect any changes to the agreement that may occur as a result of the OHARNG's mission requirements.

Specific acreages for various uses of the property within the RTLS boundaries are detailed in **Table 3-2**.

3.3.8 Local Long-Range Plans and Programs

Several local regulatory and property development authorities have prepared long-range plans and programs for areas adjacent to and surrounding the RTLS. These plans address transportation improvement and management planning, land use and housing analysis planning, and rural development planning. These authorities include:

The Akron Metropolitan Area Transportation Study (AMATS) – AMATS is both a regulatory organization and an overall master-planning study, which commissions and conducts smaller studies with regard to "... the comprehensive, continuous and cooperative transportation planning process for Summit and Portage Counties, as well as Chippewa Township in Wayne County. The primary objective of AMATS is to guide the staged development of a balanced transportation system in concert with the existing and future development of the area and to efficiently serve the transportation needs of more than 666,000 persons (2)." Land use inventories for the political units within AMATS jurisdiction are conducted every five years, and are used to prepare and revise both long-range and short-range transportation plans, as well as long- and short-range land use forecasts. These plans/forecasts include:

AMATS FY 1998-2001 Transportation Improvement Program (TIP) – This plan summarizes the transportation improvements that will be conducted within the AMATS jurisdiction in FY 1998-2001, and specifically indicates that three transportation improvement projects will be conducted near the RTLS. These projects include: 1) preservation of the rail line along the northern boundary of the RTLS; 2) resurfacing and bridge repair for SR 5 west of the RTLS; and 3) resurfacing of SR 82 north of the property. No other projects included in the FY 1998-2001 TIP were located in the vicinity of the RTLS (3).

AMATS Year 2010 Transportation Plan – This plan presents a 20-year planning horizon for areas within the AMATS jurisdiction. The Year 2010 Transportation Plan identifies existing transportation problems, anticipates future problems, and ensures that planned improvements are consistent with the goals and objectives of residents and businesses in the area. The plan provides a clear understanding of both the positive and negative impacts of proposed transportation improvements in order to support the orderly development of the region. In addition, the plan acts as a guide to local officials in implementing transportation improvements involving federal funds. No specific long-range transportation improvements or needs are addressed for the area immediately surrounding the RTLS (4).

AMATS also performs many minor studies and prepares figures on demand for roadway traffic volumes throughout their jurisdiction.

Portage County Regional Planning Commission (PCRPC) – The PCRPC maintains databases and compiles information on building construction, general property development, property development projections, population estimates, and population projections. This information is then used to produce land use plans, economic development plans, housing improvement strategies, development simulation models, and growth scenarios for Portage County. The PCRPC also maintains a GIS database for Portage County.

Trumbull County Planning Commission (TrCPC) – The TrCPC is similar to the PCRPC in that it maintains databases and compiles current and future information on general property development and population. The TrCPC also produces development plans, strategies, and scenarios, including the following:

Trumbull County Land Use and Housing Analysis Plan – This plan, produced in 1977, is an update of the 1962 Trumbull County Comprehensive Plan. This plan defines the existing and future status of land use and housing in Trumbull County. The property was not specifically addressed in the plan. Surrounding communities, such as Newton Falls and Braceville, were projected to continue with growth and development at average rates (102).

Trumbull County Major Thoroughfare Plan – This plan, which was revised and re-issued in 1964, presents an inventory of existing highways in Trumbull County, identifies deficiencies in highway systems, and recommends improvements for various Trumbull County highways. No major improvements are recommended for highways within the vicinity of the RTLS (104).

Trumbull County Rural Development Plan – This plan identifies and ranks potential economic development sites in rural areas of the county via a screening analysis method. The plan presents a framework for the establishment of new economic development activities in the rural-urban fringes of the county. The plan was prepared in response to structural changes in the local economy that eliminated or curtailed development of basic industries and resulted in high unemployment rates (100). In this plan, the RTLS is identified as "Public Land", owned by the Department of Defense (DoD), and considered to have limited potential for economic development. RTLS-specific economic resources are identified as limited public hunting and oil/gas well development. Two small areas located directly east of the RTLS, near the SR 5/SR 34 intersection and SR 5/Interstate 80 intersection were ranked highly as potential sites for industrial development. Lands within or in the vicinity of the City of Newton Falls were identified as having potential for commercial and industrial development (100).

3.4 Air Quality

3.4.1 Regulatory Framework

The USEPA is the overall regulatory agency for air quality throughout the U.S. However, in most cases control is delegated to individual states. In some cases, such as Ohio, the individual states may subsequently delegate control to local air quality management agencies. Air quality at the RTLS is regulated by two separate regulatory agencies: the Akron Regional Air Quality Management District for Portage County, and the OEPA—Division of Air Pollution Control, Northeast District Office, for Trumbull County. These agencies regulate industrial and commercial sources of air pollution that are required to comply with appropriate federal, state, and local rules governing air emissions.

Two primary laws require consideration of air quality effects in military installation planning projects and activities: NEPA and the General Conformity Provision of the Clean Air Act of 1970 (CAA) (42 §USC 7401 et. seq.; 40 CFR Parts 50-87) Section 176(c), including the USEPA's implementation mechanism, the General Conformity Rule. The General Conformity Rule (40 CFR Part 51, Subpart W) requires federal agencies to prepare written Conformity Determinations for federal actions in or affecting National Ambient Air Quality Standards (NAAQS) non-attainment areas or maintenance areas (see **Section 3.4.3**). Local codes are variable, but for the most part air emissions are regulated at the state level. Zoning resolutions of the various Portage and Trumbull County townships comprising the RTLS typically prohibit 'nuisance dust'. Applicable state regulations are set forth in Ohio Revised Code (ORC) Chapter 3704. Federal air quality regulations are provided in the CAA and the Clean Air Act Amendments of 1990 (CAAA). These regulations provide a comprehensive national program with the collective goal of reducing the levels of pollutants in the ambient air. Major applicable sections of the CAAA are summarized below:

Title I of the CAAA requires air pollution source owners located in ozone non-attainment areas (see **Section 3.4.3**) to submit an emission statement to local regulatory authorities. The emission statement should identify and quantify air emissions of Nitrogen oxides (NO_x) and volatile organic compounds (VOCs) from stationary sources.

Title III of the CAAA requires facilities to demonstrate non-major source status for Hazardous Air Pollutant (HAP) emissions (see **Section 3.4.8**). Facilities unable to demonstrate non-major status for HAPs must meet emission control requirements.

Title V of the CAAA requires each state to develop a permit-to-operate system and emissions fee program for major sources of air pollution (see **Section 3.4.8**). Fees are calculated based on actual pollutant emission rates, resultant from emission source operation. The State of Ohio's rules for the Title V program became effective on April 20, 1994.

Executive Order (EO) 12856, made effective on 3 August 1993, requires all Federal facilities to comply with the Toxic Chemical Release Inventory (TRI) requirements of Title III, Section 313 of SARA. These regulations require reporting of all discharges to land, air, and water for chemicals which exceed applicable thresholds for manufacturing, processing, or 'other' uses (10,000 pounds/year/chemical)[2].

[2] Some of the HAPs emitted at the RTLS are regulated chemicals under SARA Title III, Section 313. Preliminary review of site emissions indicates that the RTLS is not likely subject to TRI reporting. However, continued assessment or analysis should be conducted to ensure compliance with these regulations.

A separate portion of the CAAA required the USEPA to produce regulations to prevent accidental releases of regulated substances and reduce the severity of those releases that do occur. The final rule for the Accidental Release Prevention Requirements: Risk Management Programs under CAAA Section 112(r)(7) was published in 1996 (40 CFR 68). The intent of Section 112(r) is to prevent accidental releases to the air and mitigate the consequences of such releases by focusing prevention measures on chemicals that pose the greatest risk to the public and the environment. Under these requirements, industry (and government) has an obligation to prevent accidents and operate safely. Information which summarizes these requirements are called a Risk Management Plan (RMP). Facilities are required to file RMPs by June 1999 [3].

3.4.2 Ambient Air Quality

The ambient air quality in an area can be characterized in terms of whether it complies with the primary and secondary NAAQS. The CAAA requires USEPA to set NAAQS for pollutants considered harmful to public health and the environment. NAAQS are provided for seven principle pollutants, called criteria pollutants, including the following:

- Carbon monoxide (CO);
- Lead (Pb)
- Nitrogen dioxide (NO_2);
- Ozone (0_3);
- Particulate matter with an aerodynamic size less than or equal to 10 micrometers (PM-10);
- Particulate matter with an aerodynamic size less than or equal to 2.5 micrometers (PM-2.5); and
- Sulfur dioxide (SO_2).

Criteria pollutants are relatively common throughout the U.S. They are believed to be detrimental to public health and the environment, and are known to cause property damage. NAAQS for criteria pollutants are shown in **Table 3-4** (121). Since the RTLS is located in a rural area at some distance from substantial mobile or stationary pollutant sources, local air quality is good, and criteria pollutant emissions are not believed to be an issue.

Primary NAAQS set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animal, crops, vegetation, and buildings (121,123).

As shown in **Table 3-4**, primary and secondary standards have been established for all criteria pollutants with the exception of carbon monoxide, which only has a primary standard. The numerical criteria of both the primary and secondary standards for NO_2, O_3, Pb, PM-10, an PM-2.5 are identical (121,123).

[3] As a federal facility, the RTLS may be subject to Section 112(r)(7) requirements. An assessment of the RTLS facilities and operations with respect to these requirements should be initiated in the near future.

Table 3-4 National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary Standard	Secondary Standard	Units
Carbon monoxide (CO)			
8-hour average	9	n/a	ppm
1-hour average	35	n/a	ppm
Nitrogen dioxide (NO_2)			
Annual arithmetic mean	0.053	0.053	ppm
Ozone (O_3)			
1-hour average*	0.12	0.12	ppm
8-hour average	0.08	0.08	ppm
Lead (Pb)			
Quarterly average	1.5	1.5	mcg/m3
Particulates <= 10 microns (PM-10)	50	50	mcg/m3
Annual arithmetic mean	150	150	mcg/m3
24-hour average			
Particulates <= 2.5 microns (PM-2.5)			
Annual arithmetic mean	15	15	mcg/m3
24-hour average	65	65	mcg/m3
Sulfur dioxide (SO_2)			
Annual arithmetic mean	0.03	n/a	ppm
24-hour average	0.14	n/a	ppm
3-hour average	n/a	0.50	ppm

n/a Standard not established

* The ozone 1-hour standard applies only to areas that were designated nonattainment when the ozone 8-hour standard was adopted in July 1997.

Source: U.S. Environmental Protection Agency website -- www.epa.gov/airs. 27 August 1998.

3.4.3 Criteria for Attainment/Nonattainment Areas

Areas are designated as "attainment", "nonattainment", "maintenance", or "unclassified" with respect to the NAAQS. General air quality monitoring is conducted in areas of high population density and near major sources of air pollutant emissions. Rural areas are typically not considered in such monitoring. Regions that are in compliance with the standards are designated as attainment areas. Areas for which no monitoring data is available are designated as unclassified, and are by default considered to be in attainment of the NAAQS. In areas where the applicable NAAQS are not being met, a nonattainment status is designated (121).

Both Portage and Trumbull counties are designated as full attainment areas for all criteria pollutants. As such, the procedural requirements of the General Conformity Rule (see **Section 3.4.1**) are not applicable to federal actions at the RTLS.

3.4.4 Existing Emission Sources

The RTLS does not currently possess any permitted emission sources. However, emissions from the everyday operation of the facility do exist. These include, but are not limited to, the following fugitive or insignificant sources:

- aircraft operation;
- asbestos from building renovation/demolition;
- construction/demolition dust;
- controlled open burning;
- emergency generators;
- landfills;
- light vehicle and heavy equipment operation;
- VOC losses from vehicle refueling and bulk fuel loading and storage;
- pesticide application;
- road dust;
- space heating; and
- wastewater treatment plants.

In addition, thoroughfares that affect local air quality through vehicle emissions include Interstate 80, and Ohio SRs 5, 14, 82, 88, 303, 534, and 700.

Army Regulation (AR) 200-1 requires all Army installations to develop and maintain an up-to-date inventory of all air pollution sources, and to comply with all local, state, and federal environmental regulations. This requirement was fulfilled in September 1994 by the submission of the *Final Report—Air Pollution Emission Statement for Ravenna Army Ammunition Plant, Ohio*. This document also satisfied requirements that were outlined in **Section 3.4.1** for Title I, Title III, and Title V of the CAAA. At the time the emission statement for the RTLS was completed, Portage County was classified as a non-attainment area for ozone, thus requiring the preparation of an emission statement.

3.4.5 Existing Air Pollution Source Permits

The RTLS does not currently possess any regulatory air pollution source permits, as there are no regulated sources in operation at the facility (194).

3.4.6 Proximate Sensitive Receptors

Due to the rural nature of the RTLS vicinity, few sensitive receptors for air pollutants exist. Sensitive receptors include, but are not limited to, asthmatics, children, and the elderly, as wells as specific facilities, such as long-term health care facilities, rehabilitation centers, convalescent centers, retirement homes, residences, schools, playgrounds, and child care centers. These sensitive population segments and facilities correspond with those that the primary NAAQS propose to protect.

Only a single potential sensitive receptor, Windham High School, lies within a one-mile radius of the RTLS. This school is located immediately outside the northern boundary of the installation. No other schools, hospitals, day care facilities, nursing homes, or other highly sensitive receptors are located within one mile of the boundaries of the RTLS. However, several residences directly border the perimeter of the facility, and Newton Falls is located approximately one mile southeast

of the eastern-most portion of the facility. Newton Falls possesses normal demographics with respect to such sensitive population segments and facilities. Over most area, relatively lush vegetation coupled with extensive moist (i.e. wetland) areas throughout the vicinity provides a natural filtration mechanism for airborne dust; thus, dust potential is low.

3.4.7 Local Meteorological Conditions

The local meteorological conditions are typical for the region, and do not provide for any unusual conditions with respect to air quality. Prevailing winds are ordinarily from the west at approximately 10 miles per hour. Typical mixing heights as related to wind dispersion are unknown; no agency-permitted sources exist at the RTLS, and therefore no modeling has been conducted (97,194).

Temperatures in the area range from a low of approximately –20 degrees F to a high of approximately 90 degrees F, with typically high humidity. Average minimum temperature is approximately 37 degrees F, and average maximum temperature is about 60 degrees F. Overall, mean temperatures range from about 28 degrees F during the winter months to about 71 degrees F during the summer. Average annual precipitation is about 36 inches, and includes about 36 inches of average snowfall (79,117,130).

3.4.8 Compliance with Federal/State Implementation Plans

As no permitted emission sources exist at the RTLS, emissions are limited to the fugitive or insignificant sources of pollutants listed in **Section 3.4.4**. Title V of the CAAA requires each state to develop a plan for implementation of the CAAA, including a permit-to-operate system and annual emissions fee program for "major sources" of air pollution. "Major sources" are those with a potential to emit:

- 100 tons per year or more of any one regulated pollutant (PM-10, PM-2.5, CO, NO_x, Pb, SO_2, and VOCs;
- 10 tons per year or more of any single HAP; or,
- 25 tons per year or more of any two or more combined HAPs (52)

The September 1994 emission statement prepared for the installation (RVAAP) indicates a non-major source status for criteria pollutants and VOCs, as well as non-major source status for HAPs. TRI reporting under SARA Title III, Section 313 is not likely necessary with respect to air emissions, as none of the listed SARA chemicals exceed the 10,000 pound/year threshold at the RTLS (19).

Considering the limited scope of activities that occur at the RTLS, all facilities are believed to be in full compliance with applicable air quality laws and regulations (19,193,194).

3.5 Noise

3.5.1 Regulatory Framework

Under NEPA of 1969, the Noise Control Act of 1972 (PL 92-574), EO 12088, AR 200-1, and AR-200-2, the U.S. Army, including the ARNG, is required to assess the environmental impact of noise produced by its activities. Within such an assessment, strategies are promulgated to

establish proper land-use planning criteria that protect both on- and off-post receptors from environmental noise.

The Environmental Noise Management Program (ENMP) is the primary tool the ARNG uses to analyze noise impacts and land use compatibility. The ICUZ program requires that a study be performed to identify noise contours with both location and intensity described. Management practices are then implemented to isolate and minimize noise based on the results of the study. The Operations Office at the RTLS and the Commander's Representative for the IOC currently handle noise complaints. Letters are written in response to complaints and every effort is made to schedule noisy training activities in temporal periods of least impact (i.e., daytime, weekday hours).

The noise environment at the RTLS includes the effects of both impulse and non-impulse noise. Non-impulse noise is generated from continuous low-energy noise sources, such as that produced by vehicles and aircraft. The unit of measure for non-impulse noise is A-weighted in decibels (dbA) over a 24-hour average day-night level (ADNL). Conversely, impulse noise sources are of short duration, such as explosive detonations. The unit of measure for impulse noise is C-weighted in decibels (dbC) over a 24-hour day-night level (CDNL).

The U.S. Department of Housing and Urban Development has established 75 dbA ADNL or greater as unacceptable for residences. The DoD and USEPA consider levels in excess of 65 dbA as normally unacceptable for residences. AR 200-1 considers noise levels in excess of 70 dbC to be unacceptable for residences.

AR 200-1 implements the federal laws concerning environmental noise for Army activities. Three noise zones are defined in the regulation:

- **Zone 1,** indicating acceptable noise levels (less than 15% of the population highly annoyed);
- **Zone 2,** indicating normally unacceptable noise levels (15-39% of the population highly annoyed); and
- **Zone 3,** indicating unacceptable noise levels (greater than 39% of the population highly annoyed).

These noise zones are defined for both ADNL and CDNL. The acceptability levels for both ADNL and CDNL were determined through social surveys conducted by many independent government and private organizations.

Although federal adherence to municipal zoning, including local noise regulations, is not mandatory as described in **Section 3.3.6**, ARs 200-1 and 200-2 require that noise impact analyses be conducted at the local level. Noise is regulated on a local basis at the township level. Local municipal zoning does not have any specific regulations pertaining to noise, but standard nuisance rules apply, as described in **Section 3.3.6**.

3.5.2 Noise Sources

Training is integral to the mission of the OHARNG and the USAFR at the RTLS. The OHARNG is involved in activities that are required for the combat readiness of the personnel involved. To simulate actual battle conditions, realistic sound levels are typically a necessary part of training operations. However, due to the current underlying IOC mission of the property (storage of

ammunition and explosives) and the lack of specific range areas, live-fire activities are currently not conducted within the property boundaries. Examples of current noise producing activities at the RTLS include:

- Tracked vehicle training activities;
- Motor vehicle convoys;
- Helicopter training flights of various kinds;
- Firing of blank ammunition and artillery simulators;
- Fixed wing aircraft operations; and
- General troop training.

The IOC produced an ICUZ study for the installation (RVAAP) in 1988; the RTLS is currently in the process of producing an ENMP, as required by military regulations. The existing ICUZ study conducted in 1988 for the installation indicated that there were three noise generating sources existing at the installation:

- A USAFR Air Drop Training Area, located in TA J;
- A detonation/demilitarization area, located roughly in the geographical center of the RTLS;
- An ARNG Helicopter Training Area, located in TAs D through H and unrestricted portions of the RTLS.

Within and in addition to the above, the following OHARNG-specific noise generating sources have been identified:

- Use of light vehicles within and out of all TAs
- Construction activities in all TAs
- Use of tracked vehicles within and out of all TAs
- Use of helicopters for mission-specific training, within and out of all TAs
- USAFR activities, specifically C-130 Air Transport Training and cargo and personnel parachute training within TA J and aerial spray training throughout the installation.
- Use of authorized, personally-owned vehicles (POVs)

3.5.3 Proximate Sensitive Receptors

Only a single potential sensitive receptor, Windham High School, lies within a one-mile radius of the RTLS. This school is located immediately outside the northern boundary of the installation. However, due to the nature of activities (or lack thereof) which currently take place in the northern portion of the property, no noise complaints have been received.

No other schools, hospitals, day care facilities, nursing homes, or other highly sensitive receptors are located within one mile of the boundaries of the RTLS. However, several residences directly border the perimeter of the facility, and Newton Falls is located approximately one mile southeast of the eastern-most portion of the facility.

Typically dense vegetation throughout the facility precludes clear sound transmission, and likely attenuates most noise from ground training activities at the RTLS. Mature forested areas are typically present around the perimeter of the RTLS, and likely further attenuate noise from most ground training activities.

3.5.4 Noise Monitoring Results

The 1988 ICUZ study concluded the following with respect to installation noise:

- The noise contours for explosives detonation activities do not extend beyond 1,000 meters from the firing points. This indicates that detonation activities do not likely affect off-post persons or residences.
- Noise contours for OHARNG operations in TAs D through H do not extend significantly beyond installation boundaries and are confined to the immediate vicinity of the airfield and flight paths. No Zone 3 areas extend beyond the perimeter boundary of the RTLS; only two small overlaps of Zone 2 areas extend beyond the perimeter boundary.
- Due to the relatively infrequent nature of USAFR operations at the RTLS, noise contours could not be developed (in 1988). However, extrapolated analysis by a variety of methods indicated that some annoyance from C-130 flyovers is possible. The USAFR conducts operations every Tuesday and Thursday and a minimum of one weekend per month. USAFR EAs containing noise contours are on file with IOC and are available for review upon written request.

3.5.5 Land Use Compatibility

The primary tool used to minimize noise impacts from military operations is compatible land use planning. The ENMP process is designed to protect the installation's mission from encroachment by off-post noise-sensitive land uses. The ENMP requires quantification of the existing and future noise environment; coordination with state, regional, and local planning and zoning agencies; and exploration of possible mitigation measures to reduce noise impacts. Based on the results of the 1988 ICUZ study, the current and potential future land use is likely compatible with the local noise environment. However, the pending ENMP should be prepared specific to potential future OHARNG activities.

3.6 Geology and Soils

3.6.1 Topography

The RTLS is physiographically located within the glaciated Allegheny Plateau section of the Appalachian Plateaus province, in the central portion of the Mahoning River Basin. The northern and central portions of the installation drain to Sand Creek and subsequently South Fork Eagle Creek, while the southern and western portions of the RTLS drain to Hinkley Creek and the West Branch of the Mahoning River. The eastern-most portion of the property drains to the West Branch of the Mahoning River near its confluence with the main trunk of the Mahoning River. Elevations within the area range from 1,220 feet above the National Geodetic Vertical Datum (ANGVD) in the western portion to 930 feet ANGVD in the eastern portion (23,64). The eastern and southern portions of the property display gently rolling to fairly level terrain, while the northern and western portions display low hills and a dendritic drainage pattern, resultant from stream dissection of the glacial drift. In many areas, steep relief is present due to cut-and-fill operations during the construction of the facility. Overall relief in the eastern half of the RTLS is greater due to glacial erosion during the Pleistocene (23,64).

3.6.2 Geology

The surface geology of the RTLS consists mostly of glacial till deposits with occasional outcrops of bedrock from the Pottsville Formation. The surface till at the installation occurs as ground moraines from the Wisconsonian glacial advance. The surface of the eastern two-thirds of the property is occupied by the clay-rich and relatively impermeable Hiram Till, while the western one-third is covered by the Kent Till, a silty, sandy material with a few cobbles and sporadic boulders (129). Pre-glacial valleys were deepened by scouring over two minor advances. The first advance occurred over the entire installation, depositing the Kent Till at a thickness of 20 to 40 feet. The second advance covered only the eastern two-thirds of the RTLS depositing the Hiram Till in a layer five to 15 feet thick. (23). Till thickness throughout the property ranges from less than three feet in some locations to approximately 45 feet (7).

Consultation with DNAP has revealed that there are no special geological features of concern in the vicinity of the RTLS (50).

3.6.2.1 Bedrock

The uppermost bedrock in the installation consists of several units of the Pottsville sandstone formation of Pennsylvanian age, which is underlain by Mississippian-age shales of the Cuyahoga formation. The lithology of the Pottsville formation varies from relatively impermeable shales formed in slow water depositional floodplain environments to coarse-grained, permeable sandstones formed in delta and stream conditions. The subunits of the Pottsville formation may produce artesian (free-flowing) conditions when the impermeable shale overlay is fractured or punctured, allowing access to the sandstone beneath (129).

The Sharon Member of the Pottsville formation sits directly atop the Cuyahoga formation shales, and consists of two units: the conglomerate unit (Sharon Conglomerate) and the shale unit (Sharon Shale). The Sharon Conglomerate is a porous, medium- to coarse-grained, gray-white orthoquartzite sandstone. It was deposited on the erosional surface of the Cuyahoga shales, and varies from approximately 40 to 180 feet in thickness as a result of having filled channels and valleys in the surface of the Cuyahoga formation. The Sharon Shale is a sandy, gray-black, fissile shale which is relatively impermeable, causing artesian conditions in the underlying sandstone. The Sharon Member forms the bedrock surface in the approximate eastern 50 to 66 percent of the RTLS (129).

The Connoquenessing Sandstone Member overlies the Sharon Member in the western sections of the installation, and is a medium- to coarse-grained, gray-white sandstone with thin interbeds of sandy shale (129).

The Mercer Member of the Pottsville formation overlies the Connoquenessing Sandstone, and consists of a silty to carbonaceous, relatively impermeable shale with minor sandstone lenses, thus contributing to the artesian nature of the underlying members (129).

The Mercer Member is overlain by the Homewood Member of the Pottsville Formation, the youngest bedrock unit in the area. The Homewood Member is a sandstone of white quartz, coarse-grained texture to tan, medium- to fine-grained texture (129).

The upper three members of the Pottsville formation are generally absent in the eastern sections of the RTLS due to either being deposited at the lower elevations of the western areas, or being

removed by glacial erosion. However, visible outcrops do exist as capstones on bedrock hills in the subsurface (129).

3.6.2.2 Hazards

No hazardous geological conditions are known to occur in the vicinity of the RTLS at this time, although an unstable substratum has been encountered during well-drilling activities (193). This substratum, which has thixotropic[4] properties, is an extremely fine-grained silt. It has been encountered in a few areas of the RTLS, primarily in the eastern third of the installation.

3.6.3 Seismology

No specific seismic data is currently available for the RTLS. However, material available from the Ohio Division of Geological Survey indicates that like much of the eastern United States, the area is not immune to seismic activity. Although no earthquakes have been recorded with epicenters in Portage or Trumbull Counties since instrumentation has become available, one earthquake was non-instrumentally recorded immediately in the vicinity of the RTLS in 1885. No additional details regarding this seismic activity were located (19a).

Consultation with the Ohio Emergency Management Agency indicates that no information on geological hazards or seismic activity is maintained by that agency (185a). Due to the site's intracontinental physiographic location, and due to the relatively low occurrence of damaging earthquakes, no studies are planned at this time (193).

3.6.4 Soil Types and Characteristics

Soil types at the RTLS exist as a glacial veneer, and for the most part were formed in glacial till ground moraines on upland areas. Small pockets of end moraine material also exist throughout the installation (23,64). Installation soils have been heavily influenced in many areas by human-related activities, including agriculture, cut-and-fill operations, fire, and general excavating.

The eastern two-thirds of the property roughly correspond to deposition of Hiram Till: a clay-rich, relatively impermeable till five to 15 feet thick deposited as a ground moraine (4). The Hiram Till coincides with the Mahoning-Ellsworth association, which is defined in **Table 3-5** (119).

The western one-third of the RTLS corresponds to deposition of Kent Till: a silty, sandy till with a few cobbles and sporadic boulders deposited over the entire area as a ground moraine with a thickness of 20 to 40 feet (23,119). This coincides with the Wadsworth-Rittman association, which is defined in **Table 3-5** (64,119).

In addition to the glacially-formed soils, recent alluvium is present in the Lower Sand Creek area and in the Eagle Creek/Sand Creek confluence area (23). This area corresponds with the Sebring-Holly-Caneadea association, defined in **Table 3-5**. Additional outwash sand and gravel is present in the elevated area in the northeastern corner of the installation (23,119).

[4] A thixotropic material is one which may be a solid in a resting state, but when subjected to certain types of vibration or shear stress loses viscosity and becomes liquid. "Quicksand" is an example of a material which exhibits thixotropic properties.

Table 3-5 Soil Association Descriptions for the RTLS, Portage and Trumbull Counties, Ohio

Soil Association, Portage County (Trumbull County)	Description
Mahoning-Ellsworth (Mahoning-Ellsworth)	Nearly level to very steep, somewhat poorly drained and moderately well drained soils formed in moderately fine textured glacial till
Loudonville-Mitiwanga-Dekalb (Loudonville-Mitiwanga)	Nearly level to moderately steep, well drained and somewhat poorly drained soils formed in moderately fine textured to moderately coarse textured glacial till
Sebring-Holly-Caneadea (Fitchville-Haskins-Sebring)	Nearly level and gently sloping, somewhat poorly drained and poorly drained soils formed in medium textured and moderately fine textured lacustrine material and medium textured to coarse textured glacial outwash over moderately fine textured and fine textured glacial till or lacustrine material
Chili (Chili-Jimtown-Oshtemo)	Nearly level to very steep, well drained and somewhat poorly drained soils formed in coarse textured and moderately coarse textured glacial outwash
Wadsworth-Rittman (Wadsworth-Rittman)	Nearly level to sloping, somewhat poorly drained and moderately well drained soils that formed in medium textured and moderately fine textured glacial till
Canfield-Ravenna-Wooster (Ravenna-Canfield)	Nearly level to sloping, somewhat poorly drained and moderately well drained soils formed in medium textured and moderately coarse textured glacial till
Remsen-Geeburg-Trumbull (Remsen-Geeburg)	Nearly level to sloping, somewhat poorly drained and moderately well drained soils formed in fine textured glacial till

SOURCES: 1) Soil Survey of Trumbull County, Ohio. USDA-Soil Conservation Service, 1992
2) Soil Survey of Portage County, Ohio. USDA-Soil Conservation Service, 1978

A review of the applicable soil surveys for Portage and Trumbull Counties reveals that some discrepancy is apparent between soil association nomenclature within these counties. **Table 3-5** presents a means of at least roughly corresponding these associations by denoting corresponding Trumbull County soil associations with parentheses.

The majority of the RTLS soils are thin, heavy-textured, seasonally wet, and limited in productivity by poor drainage (64,119). However, some areas have small pockets of productive and useful soils, characterized by favorable drainage, water capacity, texture, and pH. These areas include the Canfield, Chili, Dekalb, Geeburg, Oshtemo, Lakin, Loudonville, Rittman, and Tioga soils. Properties of individual soils within the installation are detailed in **Table 3-6**.

Table 3-6 Soils of the RTLS, Portage and Trumbull Counties, Ohio

Soil Map Unit	Symbol	Slope (%)	K-factor	T-factor	USDA Texture	Hydrologic Soil Group	Land Use Capability Class	Erosion Hazard	Equipment Limitation	Windthrow Hazard	Prime Farmland Status	Hydric Classification
Cut and Fill area	C.F.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bogart silt loam	BgA	0-2	*	*	Silt loam/gravelly-sandy loam	*	IIs-1	Slight	Slight	Slight	prime	n/a
Bogart silt loam	BgB	2-6	*	*	Silt loam/gravelly-sandy loam	*	IIe-4	Slight	Slight	Slight	prime	n/a
Bogart-Haskins complex	BhB	2-6	*	*	Silt loam/gravelly-sandy loam	*	IIw-4	Slight	Slight	Slight	prime	n/a
Canfield silt loam	CdC, CfC	6-12	0.37	4	Loam/silt loam	C	IIIe	Slight	Slight	Moderate	prime	n/a
Carlisle muck	Cg, Ch	n/a	*	*	Sapric material	A/D	Vw	n/a	n/a	n/a	prime	Hydric [5]
Chili loam	CnB	2-6	0.1-0.32	4	Loam/various	B	IIe	Slight	Slight	Slight	prime	n/a
Chili loam	CnC	6-12	0.1-0.32	4	Loam/various	B	IIIe	Slight	Slight	Slight	prime	n/a
Chili gravelly loam, moderately eroded	CoC2	6-12	*	*	Loam/gravelly-various loam	B	IIIe-3	Slight	Slight	Slight	prime	n/a
Chili silt loam	CpB, CsB	2-6	0.1-0.32	4	Loam/gravelly loam	B	unknown	Slight	Slight	Slight	prime	n/a
Chili silt loam	CpC, CsC	6-12	0.1-0.32	4	Loam/gravelly loam	B	unknown	Slight	Slight	Slight	prime	n/a
Chili-Oshtemo complex	CtD	12-18	0.1-0.24	5	Sandy loam	B	VIIe	Moderate	Moderate	Slight	prime	n/a
Damascus loam	Da	n/a	0.32	5	Loam/various	B/D	IIIw	Slight	Severe	Severe	prime [2]	Hydric [5]
Dekalb channery loam	DkB	2-6	*	*	Loam/various	*	IIe-3	Slight	Slight	Slight	prime	n/a
Dekalb channery loam	DkF	25-70	*	*	Loam/various	*	VIIe-2	Severe	Severe	Slight	prime	n/a
Ellsworth silt loam	ElB, EhB	2-6	0.32-0.43	3	Silt loam/clay loam	C	IIIe	Slight	Slight	Slight	prime	n/a
Ellsworth silt loam	ElC	6-12	*	*	Silt loam/silty clay loam	*	IVe-1	Slight	Slight	Slight	prime	n/a
Ellsworth silt loam, moderately eroded	ElC2, EhC2	6-12	0.32-0.43	3	Silt loam/clay loam	C	IVe	Slight	Slight	Slight	prime	n/a
Ellsworth silt loam, moderately eroded	ElD2, EhD2	12-18	0.32-0.43	3	Silt loam/clay loam	C	VIe	Moderate	Moderate	Slight	prime	n/a
Fitchville silt loam	FcA	0-2	0.37	5	Silt loam/silty clay loam	C	IIw	Slight	Slight	Slight	prime [2]	Hydric Components in depressions and drainageways [5]
Fitchville silt loam	FcB	2-6	0.37	5	Silt loam/silty clay loam	C	IIe	Slight	Slight	Slight	prime [2]	Hydric Components in depressions and drainageways [5]

Soil Map Unit	Symbol	Slope (%)	K-factor	T-factor	USDA Texture	Hydrologic Soil Group	Land Use Capability Class	Erosion Hazard	Equipment Limitation	Windthrow Hazard	Prime Farmland Status	Hydric Classification
Frenchtown silt loam	Fr	n/a	*	*	Silt loam/gravelly-clay loam	*	IIIw-6	Slight	Severe	Moderate	prime [2]	n/a
Glenford silt loam	GfB	2-6	0.37	5	Silt loam/silty clay loam	C	IIe	Slight	Slight	Slight	prime	n/a
Glenford silt loam [1]	GfC	6-12	0.37	5	Silt/clay loam	C	IIIe	Slight	Slight	Slight	n/a	n/a
Haskins loam [1]	HaA	0-2	0.37	4	Loam/clay loam	C	IIw	Slight	Slight	Slight	prime [2]	Hydric components in lower or depressional areas
Holly silt loam, frequently flooded	Ho	n/a	0.28	5	Silt loam/loam/sandy loam	B/D	IIIw	Slight	Severe	Moderate	prime [3]	Hydric [5]
Hornell silt loam	HrB	3-8	*	*	Silt loam/various	*	IIIw-4	Slight	Moderate	Slight	prime	n/a
Jimtowm loam	JtA	0-2	0.10-0.32	4	Loam/sandy clay loam	C	IIw	Slight	Slight	Slight	prime	Hydric components in depressions [5]
Jimtowm loam	JtB	2-6	0.10-0.32	4	Loam/sandy clay loam	C	IIe	Slight	Slight	Slight	prime	Hydric components in depressions [5]
Lakin loam sand	LaB	2-6	0.17	5	Loamy fine sand	A	IIIs	Slight	Moderate	Slight	prime	n/a
Linwood muck	Ld	n/a	*	*	Muck/silt loam/fine sandy loam	*	IIIw-2	n/a	n/a	n/a	prime	n/a
Lorain silty clay loam	Ln, Lo	n/a	0.32	5	Silty clay loam	C/D	IIIw	Slight	Severe	Severe	prime [2]	Hydric [5]
Loudonville silt loam	LoB, LyB	2-6	0.32	4	Silt loam/loam	C	IIe	Slight	Slight	Moderate	prime	n/a
Loudonville silt loam	LoC, LyC	6-12	0.32	4	Silt loam/loam	C	IIIe	Slight	Slight	Moderate	prime	n/a
Loudonville silt loam, moderately eroded	LoC2, LyC2	6-12	0.32	4	Silt loam/loam	C	IIIe	Slight	Slight	Moderate	prime	n/a
Mahoning silt loam	MgA	0-2	0.32-0.43	3	Silt loam/clay loam	D	IIIw	Slight	Slight	Moderate	prime [2]	Hydric components in depressions [5]
Mahoning silt loam	MgB	2-6	0.32-0.43	3	Silt loam/clay loam	D	IIIe	Slight	Slight	Moderate	prime [2]	Hydric components in depressions [5]
Mahoning-Urban land complex, undulating	MnB, MkB	2-6	0.32-0.43	3	Silt loam/clay loam	D	n/a	n/a	n/a	n/a	prime	Hydric components in depressions [5]
Mitiwanga silt loam	MtA	0-2	0.32	4	Silt loam/clay loam	C	IIw	Slight	Slight	Moderate	prime [2]	Hydric components in depressions [5]
Mitiwanga silt loam	MtB	2-6	0.32	4	Silt loam/clay loam	C	IIe	Slight	Slight	Moderate	prime [2]	Hydric components in depressions [5]
Mitiwanga silt loam, moderately well drained variant	MvB	2-6	*	*	Silt loam/silty clay loam	*	IIIe-4	Slight	Slight	Slight	prime	n/a
Orrville silt loam, frequently flooded	Or	n/a	0.37	5	Silt loam/various	C	IIw	Slight	Slight	Slight	prime [3]	Hydric components in depressions and old meander channels [5]

Soil Map Unit	Symbol	Slope (%)	K-factor	T-factor	USDA Texture	Hydrologic Soil Group	Land Use Capability Class	Erosion Hazard	Equipment Limitation	Windthrow Hazard	Prime Farmland Status	Hydric Classification
Oshtemo sandy loam	OsB	2-6	0.1-0.24	5	Sandy loam/various	B	IIIs	Slight	Slight	Slight	prime	n/a
Quarry	Quarry, QU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ravenna silt loam	ReA, RaA	0-2	0.37	3	Silt loam/loam/various	C	IIw	Slight	Slight	Moderate	prime [2]	Hydric components in depressions [5]
Ravenna silt loam	ReB, RaB	2-6	0.37	3	Silt loam/loam/various	C	IIe	Slight	Slight	Moderate	prime [2]	Hydric Components in depressions and drainageways [5]
Remsen silt loam	RmB	2-6	0.28-0.43	3	Silt loam/silty clay/clay	D	IIIw	Slight	Slight	Moderate	prime	Hydric components in depressions [5]
Rittman silt loam	RsB	2-6	0.43	4	Silt loam/silty clay loam	C	IIe	Slight	Slight	Slight	prime	n/a
Rittman silt loam, moderately eroded	RsC2	6-12	*	*	Silt loam/silty clay-clay loam	*	IIIe-2	Slight	Slight	Slight	prime	n/a
Sebring silt loam	Sb	n/a	0.37	5	Silt loam/silty clay loam	B/D	IIIw	Slight	Severe	Severe	prime [2]	Hydric [5]
Sebring silt loam, dark surface variant	Sv	n/a	*	*	Silt loam/silty clay loam	*	IIw-5	Slight	Severe	Severe	prime [2]	n/a
Tioga loam, occasionally flooded	Tg	n/a	0.28-0.37	5	Loam/sandy loam/various	B	IIw	Slight	Slight	Slight	prime [4]	Hydric components in lowest positions of floodplains [5]
Trumbull silt loam	TrA	0-2	*	*	Silt loam/silty clay-clay loam	*	IVw-1	Slight	Severe	Moderate	prime	n/a
Wadsworth silt loam	WaA, WbA	0-2	0.43	4	Silt loam/silty clay loam	C	IIIw	Slight	Slight	Moderate	prime [2]	Hydric components in depressions [5]
Wadsworth silt loam	WaB, WbB	2-6	0.43	4	Silt loam/silty clay loam	C	IIIe	Slight	Slight	Moderate	prime [2]	Hydric components in depressions [5]

Note: Where possible, soil properties, classifications, etc. were extracted from Soil Survey of Trumbull County, Ohio, USDA Soil Conservation service, 1992 in order to employ the most up-to date information available.

n/a = not applicable
* information not available

[1] Soil Mapping Unit present in Trumbull County, but not Portage county
[2] Prime farmland where drained
[3] Prime farmland where drained and protected from flooding or not frequently flooded during growing season
[4] Prime if protected from flooding or if not flooded frequently during growing season
[5] Hydric classification denoted for Trumbull County only

3.6.5 Prime and Unique Farmland

Prime and Unique Farmlands are monitored by the NRCS to ensure preservation of agricultural lands that are of statewide or local importance. Designation of such lands is based on soil type present; soil types qualifying as prime and unique farmlands are identified by the NRCS. Although realistically limited by characteristics detailed in **Section 3.6.4**, nearly all of the RTLS soils are considered to be prime farmland (119,120). However, many of the soils are considered to be prime farmland when drained, or when drained and protected from flooding (i.e., drainage tile systems installed and maintained). As very few, if any, functional drainage systems are present at the RTLS, many of these soils can be functionally excluded from prime farmland status. Prime farmland status for all soils present at the installation is detailed in **Table 3-6**.

3.6.6 Mineral Resources

Mineral resources for the property are largely unexplored and undeveloped (193). The BLM controls the mineral rights for the entirety of the RTLS, and arrangements for exploration and/or development are made through that agency. Federal ownership of the lands allows for public exploration and extraction of mineral resources upon issuance of proper quitclaim deeds. Petroleum resources have been identified within the RTLS, including natural gas and oil (79,97). Currently, two wells are in operation in the southwest corner of the installation (97).

3.7 Ground and Surface Water Resources

3.7.1 Regulatory Framework

Protection and management of water resources at the RTLS is mandated by a number of laws, regulations, and guidances. The primary federal regulations and guidances that govern water resources development, usage, and discharges at federal installations include the following:

- Emergency Planning and Community Right-to-Know Act Of 1986 (EPCRA; 42 USC §11011)
- Federal Water Pollution Control Act of 1972 (FWPCA), as amended by the Clean Water Act of 1977 (CWA; 33 USC §1251 *et seq.*) [5]
- Land and Water Conservation Act of 1976 (16 USC §460)
- National Environmental Policy Act of 1969 (NEPA; 42 USC §4321 *et seq.*) [6]
- National Pollutant Discharge Elimination System Wastewater Permits (NPDES; 33 USC §1342)
- Pollution Prevention Act of 1990 (PPA; 42 USC §13101-13109)
- Safe Drinking Water Act of 1974 (SDWA; 42 USC §300f *et seq.*)

[5] The Federal Water Pollution Control Act of 1972 (FWPCA), as amended by the Clean Water Act of 1977 (CWA; 33 USC §1251 *et seq.*) regulates potential for degradation and actual degradation of the waters of the United States, with the objective of maintaining and restoring their chemical, physical, and biological integrity (113); Guidelines regarding the control or discharge of dredged or fill material in waters of the U.S. including wetlands are included in Sections 401 and 404 of the CWA, as well as 33 USC §1344(b) and §1361(a).

[6] Section 102(2)(H) of NEPA requires that analyses conducted will consider "ecological information" in planning and development. This requirement and ARs 200-1and 200-3 require that analyses conducted pursuant to NEPA investigate potential effects to terrestrial, avian, and aquatic species and habitats. As such, water resources are included in this description.

- Soil and Water Resources Conservation Act of 1977 (16 USC §2001);
- Superfund Amendments and Reauthorization Act of 1986 (SARA; PL 99-499; 40 CFR 300) [7]
- Water quality programs in general (33 USC §1160 *et seq.* and §1251 *et seq.*), (42 USC §300f *et seq.* and §6901 *et seq.*)
- Water Resources Development Act of 1990 (WRDA; 33 USC §2309a, §2316, and §2320)
- Wild and Scenic Rivers Act of 1968 (WSRA; 16 USC §1271 *et seq.*)
- AR 200-1, Environmental Protection and Enhancement
- AR 200-2, Environmental Effects of Army Actions
- AR 200-3, Natural Resources—Land, Forest, and Wildlife Management
- EO 11988, Floodplain Management, 24 May 1977
- EO 11990, Protection of Wetlands, 24 May 1977
- EO 11991, Protection and Enhancement of Environmental Quality, 24 May 1977
- EO 12856, Federal Facilities Compliance with the TRI requirements of Title III, Section 313 of SARA, 3 August 1993

On a state level, ORC Title 61, and specifically ORC Chapter 6111 (Water Pollution Control) regulate control of water pollution in Ohio. Subsequent regulations imposed in OAC Chapter 3745 provide administrative guidance on water quality, and other regulations imposed throughout various areas of the OAC provide guidance on water resources.

Water resources at the RTLS are managed according to these and other applicable environmental laws and ARNG regulations. Overall management of water resources at the installation is outlined in the installation's INRMP. This plan, required under the Sikes Act (16 USC 6§70 *et seq.*), sets forth responsibilities and guidelines for complying with laws applicable to natural resources. The INRMP also provides management strategies with the intent of preserving and protecting the natural environment to the extent possible within the constraints of the installation mission.

3.7.2 Hydrology

3.7.2.1 Ground Water

The sandstone units of the Pottsville formation are the major aquifers in the region. These aquifers exist under artesian conditions, and are typically confined by glacial drift or shale. Within this formation, the Sharon Conglomerate is the most productive of these units, and is the major bedrock aquifer in northeastern Ohio (23). The study performed by Kammer (1982) indicated that of the 71 groundwater wells which penetrated the installation at that time, 57 were penetrating the Sharon Conglomerate. Data from the Kammer study indicated that the thickness of the Sharon Conglomerate ranges from 44 to 177 feet, while the average well depth at the RTLS is approximately 155 feet, with a range between 83 and 261 feet (7,23).

[7] The Superfund Amendments and Reauthorization Act of 1986 (SARA; PL 99-499; 40 CFR 300) – selected portions, specifically Title III, Section 313 require reporting of all discharges to land, air and water for chemicals which exceed applicable thresholds for manufacturing, processing, or 'other' uses (10,000 pounds/year/chemical). Executive Order 12856, made effective on 3 August 1993, requires all Federal facilities to comply with the TRI requirements of Title III, Section 313 of SARA. Some of the substances stored at the RTLS are regulated chemicals under SARA Title III, Section 313. Preliminary review of site discharges indicates that the facility is not likely subject to TRI reporting. However, continued assessment or analysis should be conducted to confirm this preliminary finding.

Throughout the facility, average depth to ground water is approximately 50 feet from the ground surface, with static water levels occurring between 958 and 1,184 feet Above Mean Sea Level (AMSL) (23). Groundwater flows from bedrock highs in the western portion of the property toward stream valleys in the eastern portion; these latter areas act as discharge areas, as indicated by static water levels in monitoring wells across the installation (7,23).

In the region of the RTLS, ground water recharge occurs via surface streams and surface infiltration through sand and gravel within buried valleys. Two large buried valleys occur southwest and northwest of the facility, and can yield up to 1,600 gallons per minute (GPM) from wells penetrating those particular glacial tills. The majority of the property itself, however, is comprised of clay-rich glacial tills with low permeabilities and underlying bedrock formations with extremely variable, but relatively low permeabilities. Typical yields from wells penetrating the Sharon Conglomerate range from 5 to 200 GPM; yields from the overlying unconsolidated sediments are usually considerably lower, and this stratum is mostly undeveloped or unusable as a water source. In addition, the thickness and permeability of the bedrock formation/unit producing the water a the RTLS vary considerably and have a strong effect on well yields, transmissivity, and hydraulic conductivity (23). Records on file at the ODNR-DDAGW indicate that over 3,000 water wells exist with the Mahoning River Basin (97).

3.7.2.2 Surface Water

Surface water features within the RTLS include streams, lakes, ponds, and Federal Emergency Management Agency (FEMA) floodplains. These features are shown on **Figure 3-4**.

The northern and central portions of the property are drained by Sand Creek, with a total drainage area of 9,187 acres. Sand Creek subsequently drains to South Fork Eagle Creek, which has a drainage area of 5,136 acres and runs to the Mahoning River. The southern and western portions of the RTLS drain to Hinkley Creek, a 4,891-acre basin, and subsequently to the West Branch of the Mahoning River. The eastern-most portion of the installation drains to the West Branch of the Mahoning River near its confluence with the main trunk of the Mahoning River. A number of smaller, unnamed creeks drain other areas of the facility. The total combined stream length at the RTLS is approximately 50 linear miles, while average stream width is approximately six feet and average stream depth ranges from one to two feet.

South Fork Eagle Creek and its tributaries (Sand Creek) are classified by OEPA as State Resource Waters. Actions that degrade the existing water quality in these creeks are closely regulated via standards and rules imposed in OAC Chapter 3745-1 (97).

The RTLS currently possesses one NPDES permit (Permit No. OHD981192925), authorized by the OEPA, for discharges from the on-site wash rack at the RTLS UTES to an unnamed tributary of the Mahoning River (see **Section 3.3.5**). This permit specifies compliance conditions for discharges and sets forth specific monitoring conditions.

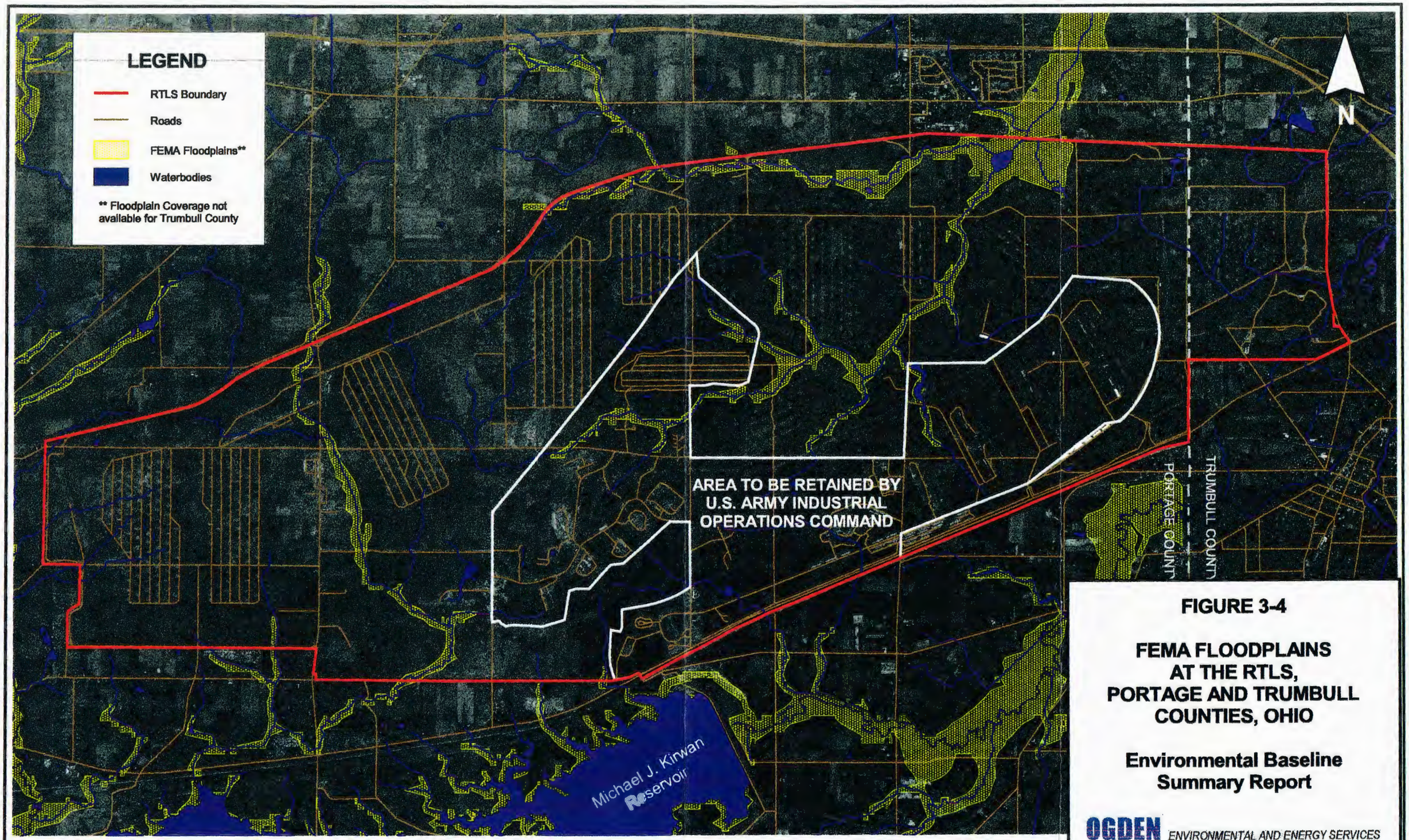


FIGURE 3-4

FEMA FLOODPLAINS AT THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

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3.7.3 Water Quality

3.7.3.1 Ground Water

Local ground water quality is characterized as very hard (i.e., with elevated levels of carbonate ions), with typically excessive amounts of iron and manganese; these constituents can usually be removed by conventional water treatment methods (23,109). The UTES site possesses a drinking water well, but employees typically drink bottled water, due to what many consider to be an unpleasant taste or odor, as is common in northern Ohio groundwater (39).

Several areas with statistically significant levels of groundwater contamination have been found at specific locations within the RTLS. A Non-parametric Analysis of Variance (ANOVA) is typically used to examine the results of ground water data from on-site sampling; this statistical analysis may subsequently indicate contamination with respect to a number of parameters (7). Areas with statistically significant levels of contamination are denoted as AOCs, and further details of individual AOC contamination levels can be found in reports specific to each AOC. Summaries of current AOCs at the RTLS are found in **Section 3.13.5**.

3.7.3.2 Surface Water

No evidence of contamination is apparent in area surface waters (37). Biota in area streams are indicative of good water quality (8).

The permanent and intermediately permanent streams within the RTLS create a large amount of forested riparian habitat, with vegetation existing typically uninterrupted up to the water body in virtually all areas (64). In areas where forested riparian habitat is not typical, herbaceous and other woody vegetation is present, providing for significant streambank erosional stability.

Significant wetlands within the RTLS provide for natural filtering of sediments and other contaminants from the surface and groundwater infiltration systems at the installation (see **Section 3.8.2.2**). Wetland plants are commonly associated with uptake of metals, contaminated sediments, and other organic pollutants. In addition, beaver impoundments and other surface water impoundments throughout the installation provide additional capability for immobilizing potential contaminants.

3.7.4 Sources of Pollution

Ground water migrates very slowly through RTLS soils, which act as a natural filter to remove many contaminants. Potential for ground water pollution is controlled by the hydrogeologic settings of a given area, and higher ground water pollution potential directly corresponds with higher transmissivity and hydraulic conductivity. A map produced by ODNR-DOW indicates that the groundwater pollution potential index for the RTLS ranges from medium to low, with the areas exhibiting a medium pollution potential index corresponding to areas with recent alluvium, as present in the Lower Sand Creek area and in the Eagle Creek/Sand Creek confluence area, as indicated on **Figure 3-5** (23,147).

Based on six hydrogeological studies that have been performed in the region of, and at the RTLS, average transmissivity for the Pottsville aquifers in northeastern Ohio ranges from 2,600 to 5,700 gallons/day/foot, with Kammer's specific study indicating an average transmissivity of 3,600

gallons/day/foot at the RTLS (23). Kammer's study also found that hydraulic conductivities for Pottsville aquifers range from nine to 754 gpd/ft^2, with a 54 gpd/ft^2 average (23).

Specific potential sources of pollution at the RTLS include defined AOCs (see **Section 3.13.5**), explosive ordnance production and storage areas, general soil erosion and sedimentation, landfills, lead-acid battery storage areas, pesticide storage areas, petroleum product tank farms, polychlorinated biphenyl (PCB) storage areas, propellant production and storage areas, solvent storage areas, quarries, areas of previous storage for radiologically-active materials, water treatment facilities, other explosive materiel production and storage areas, and other toxic and hazardous material production and/or storage areas. **Section 3.13** details hazardous and toxic materials and wastes that are, or have been, present at the RTLS. In all cases, these latter issues remain the responsibility of the IOC.

3.7.5 Floodplains

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

EO 11988 (24 May 1977) provides guidance on floodplain management. This EO requires each federal agency to amend existing regulations or procedures to ensure that the potential effects of any action the agency may take in a floodplain are evaluated and that the agency's planning programs and budget requests reflect consideration of flood hazards and floodplain management. Guidance for implementation of EO 11988 is provided in the Floodplain Management Guidelines of the U.S. Water Resources Council (40 CFR 6030, 10 February 1978). It is the intent of this EO and EO 11990 (Protection of Wetlands) that federal agencies implement these requirements through existing procedures, such as those established to implement NEPA. AR 200-2 provides guidance for floodplain management on ARNG properties as a subanalysis of the NEPA process.

Although FEMA 500-year floodplains are not specifically identified within RTLS on currently available mapping, several areas within the property boundaries have been identified as having FEMA 100-year floodplains (138,172). These areas are approximations of lands that would be affected by a 100-year flood event. Typical losses that would be incurred as a result of a 100-year flood event include water damages to man-made structures, agricultural operations and equipment, and utilities located within floodplain boundaries.

One-hundred-year floodplain areas are shown on **Figure 3-4**, and are associated with Hinkley Creek and its tributaries, lower portions of Sand Creek and its tributaries, and South Fork Eagle Creek and its tributaries (including Sand Creek). An area of approximately 185 acres near the confluence of Sand Creek and South Fork Eagle Creek also is considered to be within the 100-year floodplain. Additional 100-year floodplain areas exist along the southern boundary of the installation within unnamed Mahoning River tributary drainages (138,172).

LEGEND

- RTLS Boundary
- Roads
- Rail Lines

Ground Water Pollution Potential (Standard Index)

- 24.5 - 181.75
- 181.75 - 283.333
- 283.333 - 398
- 398 - 829
- 829 - 2765

** Ground Water Pollution Potential Coverage not available for Trumbull County

AREA TO BE RETAINED BY U.S. ARMY INDUSTRIAL OPERATIONS COMMAND

Michael J. Kirwan Reservoir

PORTAGE COUNTY

TRUMBULL COUNTY

N

DOQ_BASE.APR 1/2000 JGM

1 0 1 2 3 4 5 Miles

FIGURE 3-5

GROUND WATER POLLUTION POTENTIAL FOR THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

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3.7.6 Water Districts

Maps prepared by Kent State University for the PCRPC indicate that the RTLS is not included as a "Water Service Area". This designation indicates that no piped potable water service is currently available at the RTLS (134). However, the recently-constructed OHARNG facilities in TA C utilize Newton Falls City water and wastewater lines.

3.7.7 Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968 (WSRA; 16 USC §1271 *et seq.*) established a means of evaluating and protecting selected rivers which have particular scenic, recreational, geologic, fish and wildlife, historical, cultural, or other similar values. A river may be so designated by either the U.S. Congress or by a State legislature. The three administrative classifications include wild river areas, scenic river areas, and recreational river areas.

Federal agencies must consider the significance of these river areas in planning for the use and development of water and land resources, and this potential must be discussed in project plans. Federal agencies are prohibited in assisting in the construction of a project that would adversely affect designated rivers, and must inform and advise either the Secretary of the Interior or the Secretary of Agriculture on proposed projects concerning designated rivers, or rivers under consideration for such designation.

Consultation with ODNR—DNAP has confirmed that there are no designated wild and scenic rivers present in the vicinity of the RTLS, and it is unlikely that any streams within the property would be eligible for such designation (50).

3.8 Biological Resources

3.8.1 Regulatory Framework

Protection and management of biological resources at the RTLS is mandated by a number of laws, regulations, and guidances. The primary statutes, regulations, EOs, and guidances that direct and apply to management of biological resources at the RTLS include the following:

- Endangered Species Act of 1973 (ESA; 16 USC §1531 et seq.) [8]
- Endangered Species Preservation Act of 1966 (16 USC §1531)
- Engle Act of 1958 (10 USC §2671)
- Federal Insecticide, Fungicide, and Rodenticide Act of 1947 (FIFRA; 7 USC §136)
- Federal Noxious Weed Act of 1975 (7 USC §2801)
- Federal Water Pollution Control Act of 1972 (FWPCA), as amended by the Clean Water Act of 1977 (CWA; 33 USC §1251 *et seq.*) [9]

[8] The protection of Federally-listed species is regulated under ESA. Section 7 of the ESA dictates that federal actions should not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. AR 200-3 provides direction for the implementation of the ESA on Army (or ARNG) installations per EO 11990. In addition, NEPA review and consideration of state-listed species is required per Section 5-3(q) of AR 200-2. Furthermore, Section 7(a) of the ESA requires formal consultation with the USFWS whenever a federal proponent anticipates taking any action that may affect a listed species or critical habitat.

[9] The FWPCA regulates the potential for degradation and actual degradation of the waters of the United States, with the objective of maintaining and restoring their chemical, physical, and biological integrity (USACE 1987 wetland delineation manual). The CWA may be applied specifically to deposition of dredged or fill material into "...waters of

- Fish and Wildlife Conservation Act of 1980 (16 USC §2901 et seq.)
- Fish and Wildlife Coordination Act of 1934 (16 USC §661 et seq.)
- Migratory Bird Conservation Act of 1966 (16 USC §715)
- Migratory Bird Treaty Act of 1918 (16 USC §703-711)
- National Environmental Policy Act of 1969 (NEPA; 42 USC §4321 *et seq.*)[10]
- Sikes Act of 1960 (16 USC §670 et seq.)
- 32 CFR Part 33, Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments
- AR 200-1, Environmental Protection and Enhancement
- AR 200-2, Environmental Effects of Army Actions
- AR 200-3, Natural Resources—Land, Forest, and Wildlife Management
- EO 11987, Exotic Organisms, 24 May 1977
- EO 11988, Floodplain Management, 24 May 1977
- EO 11990, Protection of Wetlands, 24 May 1977 [11]
- EO 11991, Protection and Enhancement of Environmental Quality, 24 May 1977

Biological resources at the RTLS are managed according to these and other applicable environmental laws and ARNG regulations. Overall management of all biological resources at the installation is outlined in the installation's INRMP. This plan, required under the Sikes Act (16 USC §670 *et seq.*), sets forth responsibilities and guidelines for complying with laws applicable to natural resources. The INRMP also provides management strategies with the intent of preserving and protecting the natural environment to the extent possible within the constraints of the installation mission.

3.8.2 Local Ecosystems/Communities

3.8.2.1 Terrestrial

The RTLS has a variety of terrestrial habitats, including large tracts of closed-canopy hardwood forest, scrub/shrub open areas, grasslands, open-water ponds and lakes, semi-improved administration areas, and hayfields that are periodically mowed for agricultural production. The past use of the RTLS, which was up to 90 percent agricultural prior to 1940, has changed to a low-intensity managed natural area, with many areas reverting to the forest community types that once covered much of the region. However, though the RTLS may appear to be a large, pristine natural area, on-site forest ecosystems are relatively young, with the vast majority of the installation having been subject to at least some type of disturbance (i.e., agriculture) over the

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the United States, including wetlands." Activities in wetlands for which permits may be required, if there are no feasible avoidance alternatives, include but are not limited to: 1) Placement of fill material; 2) Ditching activities when material is sidecast; 3) Levee and dike construction; 4) Land clearing involving relocation of wetland soil material or removal of hydrophytic vegetation; 5) Land leveling; 6) Most road construction; and 7) Dam construction.

[10] Section 102(2)(H) of NEPA requires that analyses will consider "ecological information" in planning and development of federal actions. This requirement and ARs 200-1and 200-3 require that analyses conducted pursuant to NEPA investigate potential effects to terrestrial, avian, and aquatic species and habitats.

[11] EO 11990 provides guidance on protection of wetlands. This EO requires all federal agencies to issue or amend existing procedures to ensure consideration of wetlands protection in decision-making. It is the intent of this EO and EO 11988 (Floodplain Management) that federal agencies implement these requirements through existing procedures such as those established to implement NEPA. AR 200-2 provides guidance for protection of wetlands on ARNG properties as a subcomponent of the NEPA process.

past 200 years. Only since the 1940s has the area been allowed to revert to at least a semi-natural state. The current status of the property as a modified caretaker facility, as well as the limited public access which is permitted results in only limited management and use of the area. This situation has allowed seral-stage progression on a near-natural basis.

Forest and timber harvesting at the RTLS has occurred on a regular basis, with selective cutting of mature tracts occurring as a means of fire prevention, forest-health management, and regeneration promotion. This selective cutting cycle has effectively prevented forested tracts from maturing to old-growth status, but at the same time has likely increased biodiversity by allowing for seedling regeneration and propagation of shade-intolerant species. This timber management strategy also has allowed for forest communities with both horizontal and vertical spatial structural diversity, providing additional habitat for wildlife and understory plant life (64).

A total of 18 different plant communities have been documented on the property, with approximately 410 native plant species and 11 non-native species identified (37,49). Prior to federal ownership of the property, on-site forested areas totaled approximately 5,000 acres, while current estimates are about 16,000 acres. A discussion of forest and timber management, as well as a listing and description of on-site plant communities, is provided in **Section 3.8.3**.

The numerous plant communities present at the RTLS provide abundant wildlife habitat, allowing for propagation of many wildlife species to levels that require stringent management. Limited hunting provides some control of wildlife populations, but numbers are dynamic and are subject to certain "lag times", as expected with any vertebrate species dependent on a combination of natural and human interventions. This is most apparent in mammalian species, such as white-tailed deer, raccoon, and some species of rodents. However, avian species appear to be extremely robust; fish, amphibian, and reptile populations appear to be very healthy; and invertebrate populations, specifically lepidopterans (butterflies and moths), appear to be reference quality in terms of both overall diversity and sheer abundance. Overall, both game and non-game species populations are healthy, though there is apparent dissention among professionals (49) with regard to their management. Further discussion of RTLS wildlife resources is provided in **Section 3.8.4**.

A number of "special status" species are present at the RTLS, likely a product of both limited public access and use of the area, as well as the comprehensive cataloging and management of the ecology of the RTLS that has occurred over the past several years. Further discussion of special status species is provided in **Section 3.8.5**; further discussion of special habitat areas is provided in **Section 3.8.2.3**.

3.8.2.2 Aquatic/Wetlands

Numerous streams, ponds, and small lakes are present throughout the property. Isolated and associated wetlands, which may potentially account for 70 to 80 percent of the land area of the RTLS, also dominate the landscape. Over 50 miles of streams are present on the installation, providing a great deal of habitat for riverine and riparian species. According to the INRMP, the calculated area of ponds, lakes, and streams within the property totals approximately 171 acres, as shown in **Table 3-2**; wetland acreage has not been calculated. Periodically, additional areas may have impounded water as a result of beaver dam flooding.

Many wetland areas are present throughout the RTLS as a result of the combination of glacial topography and poorly drained soils. A Watershed Management Plan is pending, and is expected to be released in FY 01. However, the USACE is currently performing an initial remote-sensing

study to broadly quantify RTLS wetlands. The OHARNG anticipates that these studies also will provide a management plan for wetlands within the installation, including identification of areas with potential for development, areas recommended for special preservation, and areas with potential for mitigative improvement.

The permanent and intermittent streams at the RTLS provide abundant contiguous forested riparian habitat along most water body fringes (64). In areas where forested riparian habitat is not typical, herbaceous and other woody vegetation is present, providing for significant streambank erosional stability.

Plant communities within aquatic and wetland areas include submergent marsh, floating-leafed marsh, mixed emergent marsh, cat-tail marsh, sedge-grass meadow, mixed shrub swamp, buttonbush shrub swamp, oak-maple swamp forest, mixed swamp forest, and mixed floodplain forest. Two other communities (wet fields and red maple woods) are considered to be transitional wetland to upland plant communities, as detailed in **Section 3.8.3** (49). In addition, beaver impoundments, where allowed, provide additional wetland habitat areas.

The water bodies and wetlands at the RTLS provide habitat for a large number of amphibians, reptiles, and fish, as well as foraging and nesting habitat for large and small mammals, birds, and invertebrates, as further detailed in **Section 3.8.4**.

3.8.2.3 Special Habitat Areas

There are several areas within the RTLS considered to be "Special Habitat Areas." As wetlands typically support high relative biodiversity indices as compared to non-wetland areas, and large portions of the RTLS are covered by wetlands, many areas of the property could potentially be considered as special habitat areas, depending upon what screening criteria are used. However, the 1993 Species and Plant Communities Inventory (49), the 1999 Vascular Plant Survey (16a), and the 1995 INRMP (64) provide recommendations for specific management of a number of special areas. These areas, as shown on **Figure 3-6**, include the following:

- An area of oak-maple swamp forest, located south of the North Perimeter Road, north of Blackberry Road, and east of Snow Road; this forest is an unusual type of forest in northern Ohio. The particular composition is known as Pin Oak-Swamp White Oak-Red Maple-(Northern Pin Oak) Flatwoods Forest, and is considered to have a The Nature Conservancy (TNC) rarity rank of G2, making it the highest-ranking plant community within the property. Anderson (6) stated that no old-growth stands of this type are known to occur. Further information regarding this community and its rarity is presented in **Section 3.8.5** (73);

- Wadsworth Glen, a hemlock ravine area in the South Fork Eagle Creek drainage along the northern boundary of the property. This feature occurs where the South Fork Eagle Creek has exposed and downcut sandstone bedrock ledges, providing what is likely the greatest local relief in the RTLS (i.e., approximately 50 feet). This area contains an extension of northern boreal hardwood forest that is rare in Ohio, the Hemlock-White Pine-Northern Hardwood Forest. This habitat is ranked as a G3 community by TNC. In addition, there are a number of rare and unusual species that occur in this area (see **Section 3.8.5**) (73);

LEGEND

- RTLS Boundary
- IOC Boundary
- Roads
- Rail Lines
- Waterbodies
- NWI Wetlands
- Hemlock Ravine–Wadsworth Glen
- Mixed mature woods
- Mixed swamp forest
- Mixed valuable communities
- Oak/maple swamp forest

N

AREA TO BE RETAINED BY
U.S. ARMY INDUSTRIAL
OPERATIONS COMMAND

Michael J. Kirwan
Reservoir

1 0 1 2 3 4 5 Miles

DOQ_BASE.APR 1/2000 JGM

FIGURE 3-6

SPECIAL HABITAT AREAS AT THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

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- A large area in the north-central portion of the RTLS, extending from Wadsworth Road east to Snow Road, and from the North Perimeter Road south to Smalley Road. This area contains excellent examples of beech-maple forest, submergent marsh, floating-leafed marsh, mixed emergent marsh, buttonbush-swamp, and mixed floodplain forest communities. The beech-maple forest community type is ranked as G3/G4 by TNC (73), and thus should be protected. Although not exceedingly rare, the other community types are typically considered high-value wetlands. Further discussion of the beech-maple community type is included in **Section 3.8.5**;

- An area immediately west of the Trumbull County line, near B&O Wye Road, in the southeastern corner of the property which contains a large number of rare plants and a mature stand of mixed swamp forest. Communities within this area include sphagnum thicket, oak-maple swamp forest, mixed swamp forest, dry fields, buttonbush swamp, wet meadows, cat-tail marsh, and ponds and seeps (16a); and

- An area in the southern portion of the property immediately west of Greenleaf Road between Hinkley and Sand Creeks which contains numerous small wetland areas with a mosaic of plant communities. This area has been subjected to relatively little disturbance, with the exception of selective timbering. Plant communities include mixed swamp forest, oak-maple swamp forest, beech-maple forest, buttonbush swamp, and open marshes.

Several areas with rare and significant plant communities at the RTLS were identified in a 27 March 1997 letter from TNC to the IOC. At that time, these areas harbored approximately 92 percent of the state-listed rare plant species that are known or expected to occur at the RTLS. These areas and plant communities are identified on **Figure 3-6**, are generally included within the above-mentioned special habitat areas, and are further discussed in **Section 3.8.5**.

3.8.3 Vegetation

The vegetation resources at the installation are well-developed, and abundant, diverse vegetation can be found in all areas, including converted agricultural fields, wetlands, and forested areas. When restoring disturbed areas at the RTLS, land reclamation and supplemental seeding for erosion control purposes is accomplished by implementing the guidelines for soil erosion management included in the installation INRMP (64). Supplemental planting and seeding for other purposes is accomplished by specific means outlined in the INRMP (64), and land reclamation/supplemental seeding in OHARNG Training Areas is accomplished through measures outlined in the OHARNG/RTLS Soils Mitigation Plan.

3.8.3.1 Plant Communities

Approximately 18 plant communities occur within the property on unimproved and semi-improved grounds. These plant communities have developed, for the most part, in the past 50 years, as the majority of the property was involved in various types of agriculture prior to federal ownership. As a result, identification of local plant communities in accordance with recognized systems is somewhat difficult. However, in the Species and Plant Communities Inventory (49) for the RTLS, plant communities were defined and delineated to the most practical extent possible. A system developed by Anderson (6) for Ohio was used to classify communities within the installation (49). According to Anderson's classification system, 14 separate mature and well-established plant communities occur within the RTLS. Four additional transitional communities,

as defined by the Species and Plant Communities Inventory (49) also are contained within the property. The plant communities present include: Submergent Marsh; Floating-leaved Marsh; Mixed Emergent Marsh; Cat-tail Marsh; Sedge-Grass Meadow; Mixed Shrub Swamp; Buttonbush Shrub Swamp; Oak-Maple Swamp Forest; Mixed Swamp Forest; Mixed Floodplain Forest; Beech-Sugar Maple Forest; Hemlock-White Pine-Hardwood Forest; Oak-Maple-Tuliptree Forest; Oak-Hickory Forest; Wet Fields-Shrub Thickets; Dry (Upland) Fields-Shrub Thickets; Red Maple Woods; and Ash-Black Cherry-Red Maple Woods. These communities, with nomenclature based on overall dominance or primary association, are shown on **Figure 3-7**, and are described in **Appendix 2**.

Non-native plant species at the RTLS are relatively rare when compared with the majority of areas in Ohio. This is likely attributable to effective management techniques and limited access to the facility. The 1993 Species And Plant Communities Inventory (49) indicated that exotic species such as *Lythrum salicaria* (purple loosestrife), *Lonicera maackii* (Muir honeysuckle), and *Alliaria petiolata* (garlic mustard) were absent, and *Phragmites australis* (giant reed-grass) and *Rhamnus frangula* (European alder buckthorn) were found to be rare and/or limited to small patches. In addition, the relative proportion of non-native plant species to total species was less for the RTLS than for the remainder of Portage County (14).

A large-scale vascular plant survey was conducted for the installation in CY 1998. During this survey, 821 taxa, including 805 species, eight varieties, and eight hybrids were documented, including 17 state-listed species. Of these taxa, 205 (25% of the total) are not considered to be native to Ohio, slightly higher than the national average of 23.8%. Overall, this subsequent survey indicates that approximately 95% of the total vascular plant flora on the installation are now known (16a). Interestingly, the CY 1998 survey also found a single individual specimen of purple loosestrife on the property, thus indicating the presence, but extreme rarity of this noxious weed.

3.8.3.2 Timber Resources

Both recently and in the past, considerable management of timber has occurred at the RTLS. The Installation's Forest Management Plan indicates that immediately after federal acquisition of the property in the 1940's, an on-site sawmill was set up, and approximately 11.5 million board feet of timber were cut in order to provide lumber for construction of RVAAP facilities. Tree planting has been conducted at several times from 1954 until the present, with only marginal success; deer browsing resulted in high mortality to saplings.

In the early 1970's, major tree planting activities were curbed, and cattle grazing and large-scale agricultural leasing were discontinued, resulting in increased levels of natural forest regeneration and the reversion of abandoned pastures and agricultural fields to woodlots. Currently, browsing by deer is the largest single hindrance to forest regeneration. Each year, considerable effort is required to reduce the size of the deer herd to prevent damage, not only to forest regeneration, but to state threatened and endangered plants (36).

From approximately 1965 to the early 1990s, sawtimber and other selective harvesting has been conducted on an annual basis. Timber Stand Improvement (TSI) cutting also has been conducted in order to improve the quality and quantity of timber stands on the installation. Currently, very selective harvesting and TSI are conducted, with attainment of ecosystem management objectives being the driving force for the harvesting that does occur. The total estimated merchantable volume of sawtimber within the RTLS as of the end of the 1994 growing season, as well as the acreage of individual forest components for each forest compartment, are shown in **Table 3-7**.

LEGEND

Forest Formations

- Plantations (planted timber stands, Christmas trees)
- Conical-crowned temperate or subpolar needle-leaved evergreen forest
- Orchards and groves (fruit and nut trees)
- Lowland or submontane cold-deciduous forest
- Temporarily flooded cold-deciduous forest
- Seasonally flooded cold-deciduous forest
- Mixed needle-leaved evergreen - cold-deciduous forest
- Mixed needle-leaved-evergreen - cold-deciduous closed tree canopy

Shrubland Formations

- Temperate cold-deciduous shrubland
- Intermittently flooded cold-deciduous shrubland
- Semipermanently flooded cold-deciduous shrubland
- Saturated cold-deciduous shrubland

Herbaceous Formations (grassland/forbs)

- Perennial grass crops (hayland, pastureland)
- Landscaped urban/suburban/rural (residential yards, nurseries)
- Medium-tall sod temperate or subpolar grassland
- Seasonally flooded temperate or subpolar grassland
- Semipermanently flooded temperate or subpolar grassland
- Tall temperate or subpolar perennial forb vegetation
- Intermittently flooded temperate perennial forb vegetation
- Permanently flooded temperate or subpolar hydromorphic rooted vegetation

Other

- Waterbodies
- Deep water
- Gravel lot
- Non-agriculture disturbed areas
- RTLS Boundary
- Roads

N

TRUMBULL
PORTAGE

Michael J. Kirwan
Reservoir

1 0 1 2 3 4 5 Miles

Fig 3-7 plant communities

FIGURE 3-7

PLANT COMMUNITIES OF THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

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Generally, single-tree and group selection harvesting are used to allow for the periodic harvest of timber while maintaining a continuous forest canopy in harvested woods. Other harvest methods are occasionally used (with the exception of clearcutting), as appropriate. In certain areas, individual treatments are used to meet the needs of rare species. Specific scheduling with regard to timber and other wood harvesting is included in the Installation Forest Management Plan (36).

Table 3-7 Timber Management Areas at the RTLS, Portage and Trumbull Counties, Ohio

Compartment	Sawtimber Volume*	Managed Sawtimber Area (acres)	Poletimber/ Sapling/ Regeneration Area (acres)	Total Forested Area (acres)	Wet and Other Open Area (acres)	Total Acres
1	2,185,000	827	392	1,219	263	1,482
2	1,713,000	641	232	873	48	921
3	3,766,000	1,507	785	2,292	459	2,751
4	3,802,000	1,472	883	2,355	262	2,617
5	3,884,000	1,447	357	1,804	32	1,836
6	2,877,000	691	367	1,058	56	1,114
7	3,611,000	971	524	1,495	30	1,525
8	1,079,000	466	175	641	0	641
9	1,236,000	337	122	459	16	475
10	2,207,000	831	384	1,215	108	1,323
Total	**26,360,000**	**9,190**	**4,221**	**13,411**	**1,274**	**14,685**

* Estimated number of board feet (Doyle Rule) at end of 1994 growing season.

Source: Installation Forest Management Plan (FMP) – Part III of the Integrated Natural Resources Management Plan (INRMP). March 1995.

Overall, three different forest management practices are conducted at the RTLS. The strategies for these activities are as follows:

1) Small, fragmented tracts (less than 100 acres of forest) are the most intensively managed. These tracts are managed for the development of edge habitat and regeneration of shade-intolerant species with both intermediate (single tree, group selection, and crop release) cuttings, final harvest (seed tree and shelterwood) cuttings, and TSI completed, as appropriate. Emphasis is placed on maintaining intermediate and shade-tolerant species.

2) Large, contiguous tracts (more than 100 acres of forest) are managed to maintain a continuous forest canopy. Single-tree selection and limited small group selection cutting are used for harvesting and TSI while minimizing canopy openings and yet maintaining the presence of shade-intolerant species.

3) A large section (1,106 acres) of nearly contiguous forested land in the north-central portion of the RTLS (also as referenced in **Section 3.8.2.3** and **Section 3.8.5**) has been removed from the current cutting cycle. This area is composed mainly of beech-maple forest, with a mixture of other vegetation community types, including bottomland hardwoods, various wetlands, and other high-quality habitat areas.

3.8.3.3 Vegetation Control

The installation INRMP (1995) specifies a number of guidelines for vegetation control, as included in Part II, Section B, as well as other areas of the Plan. These guidelines are abbreviated below.

It is currently RTLS policy to minimize the use of herbicides at the installation. All herbicides used at the RTLS are of the non-restricted type and are applied by (an) individual(s) certified by the State of Ohio in accordance with the Modified Caretaker Contract and all applicable laws and regulations. No herbicides are mixed or stored on the property. Currently, an agreement is in place with an adjacent landowner that allows for off-premises mixing and storage (34,64).

Growth and development of aquatic "weed beds" are encouraged at the RTLS by limiting the application of aquatic herbicides to water bodies, and by terminating the use of grass carp for aquatic weed control efforts. In RTLS water bodies, aquatic weed control is limited to only noxious or exotic species, and is coordinated with ODOW (64). Some areas with wet meadows are mowed periodically to prevent the establishment of woody species.

Currently, terrestrial vegetation control at the RTLS is accomplished in accordance with the Vegetation Control Plan, which is produced on an annual basis by the MCC (34). As per the Vegetation Control Plan, the MCC oversees the control of vegetation by mowing or herbicide application as specified (or as necessary) proximal to the active electrical distribution system, road shoulders, the perimeter fence clear zone, Building 1037, and the earth-covered magazines (igloos). Vegetation on and around the igloos is controlled in accordance with AR 385-64 (34).

Control of nuisance and noxious weeds at the RTLS is accomplished in accordance with Department of the Army (DA), and DoD policies and regulations. In addition, ORC Sections 5579.01-5579.08 provide regulation for control of noxious weeds at the state and local levels. Current vegetation control activities provide for a level of control that surpasses the ORC statutes (64).

Relatively non-specific guidelines for prescribed burning are included in Part I, Section D of the 1995 INRMP. Such burning currently is not conducted at the RTLS as a means of vegetation control or grassland habitat management due to manpower shortages and safety considerations associated with burning near ammunition storage. For the most part, grassland habitat management and woody species control is accomplished through mowing.

3.8.4 Wildlife Resources

Due to the variety and types of habitats available, the RTLS contains a high diversity of wildlife species. The large forested areas and open grasslands provide excellent habitat for a great number of mammalian, avian, and other species, while the many streams, impoundments, and wetlands provide habitat for a variety of aquatic fauna, including amphibians, reptiles, fishes, and invertebrates.

A number of different species of mammals have been observed within the installation. The most abundant species observed include white-tailed deer, raccoon, woodchuck, and fox squirrel. The number of mammals trapped at the installation for the 1993 *Species and Plant Communities Inventory* was less than what would be expected for the installation, but this was likely attributable to the fact that the mammalian inventory was limited to one trapping season. During

the efforts for the 1993 *Inventory*, 26 different species were recorded. A subsequent survey for mammals, conducted in 1998, confirmed the presence of 23 species, and indications of four additional species were observed, for a total of 27 species (12a). However, this number does not include numbers of avian mammals (bats).

A survey for bats was conducted for the property in 1998. In all, a total of five species of bats, totaling 80 individuals were captured during the survey operations. Species captured included Little brown bats, Big brown bats, Northern long-eared bats, Red bats, and Hoary bats (98a). When combined with previous small mammal surveys, the total number of mammalian species observed at the site is 32.

A total of 155 species of birds have been identified at the RTLS. The large areas of closed-canopy timber stands provide optimal habitat for many neotropical migratory birds; the reverting agricultural fields and wetlands are home to many other species of passerines. The diversity and abundance of avian species has been called the "greatest biological attribute" at the RTLS, and some of the neotropical migrant and other species that were considered to be uncommon or rare in northeastern Ohio were found commonly within the installation (49).

At least 31 species of reptiles and amphibians occur at the RTLS, based on past surveys. The large amount of wetlands at the installation provides optimal habitat for many of these reptilian species, which include 10 salamanders, one toad, eight frogs, nine snakes, one lizard, and two turtle species.

Fish observed at the RTLS include 41 recognized species and six hybrids. Species observed in lakes, ponds, and streams within the property include both game and non-game fish, with both warm and cold-water species identified. The 1993 Species and Plant Communities Inventory indicates that RTLS fish populations in general are characteristic of small-to medium-sized streams with healthy habitats and good water quality (49).

As would be expected, the most numerous animals present at the RTLS are invertebrates, likely due to the abundance of wetlands and minimally-impacted habitat. Although a complete taxonomical count for all invertebrate species would be nearly impossible for a property of this size, attempts to quantify some individual taxonomic groups have been made. In aquatic habitats, approximately 58 species of crustaceans and mollusks have been documented. Among insects, orders Odonata (37 species) and Lepidoptera (543 species) have been surveyed (49).

A closely-regulated hunting program controls populations of a number of game species at the RTLS. Deer hunting is allowed at the RTLS on dates scheduled with ODOW approval. A Memorandum of Understanding (MOU) with the ODOW sets forth guidelines by which the annual hunt at the installation is administered. Approximately 1,200 persons are given permission to hunt deer annually on the property via a random drawing conducted by ODOW. Six (6) one-day, firearm-only hunts are conducted, with approximately 200 hunters involved in each session. Waterfowl hunting is controlled in a similar fashion, with a random drawing preceding the hunt period(s) for each year. Controlled trapping is also permitted at the RTLS during the state-established trapping season, with the goal of eliminating known nuisance species or individual animals (78).

3.8.5 Special Status Species

While no federally-listed species are known to exist on the property, a number of 'special status' species are known to occur at the installation. Ogden conducted formal consultation with applicable regulatory agencies with regard to their knowledge of any special status species, special geological features, state or federal nature preserves, scenic rivers, state forests, or wildlife areas within one mile of the RTLS, as outlined below.

A response from the USFWS, dated 16 July 1998, indicated that the agency did not possess any specific knowledge of rare species or critical habitat resources at the installation. However, the USFWS indicated that the property lies within the range of the Indiana bat, clubshell mussel, and Mitchell's satyr butterfly (federally-listed endangered species), and the bald eagle and northern monkshood, which are federally-listed threatened species. The USFWS also provided specific habitat protection suggestions for the Indiana bat (125).

In a response letter dated 27 August 1998, consultation conducted with OEPA—DSW, Ecological Assessment Unit (EAU) indicated that the EAU had performed fisheries sampling at three locations on the South Fork Eagle Creek in 1987. However, only one of these stations was located within the property. The mountain brook lamprey (a state endangered species) was collected at two of these locations, including a single station within the installation. As stated in the EAU response letter, "This species (mountain brook lamprey) has been collected at only a few locations throughout the State of Ohio (53)."

A consultation response received from ODOW dated September 28, 1998 indicated that the agency does not possess any specific information regarding rare species or critical habitat resources at the RTLS or in the immediate area (51).

A response letter dated 3 August 1998 from DNAP indicated that a search of the Natural Heritage database revealed a number of confirmed species, animal communities, and plant communities of special significance located within and in an adjacent one-mile radius of the property boundary. The species resultant from this database search are included in **Table 3-8**. It should be noted that the information in **Table 3-8** is not all-inclusive; that is, other special-status species may be present within the RTLS, but have not been documented. No species of federal significance have been confirmed within RTLS (50). A number of additional special status species are known or believed to exist proximal to the property, but are not included within this document for conciseness purposes.

Additional biological items of interest have also been identified through agency consultation and coordination with installation natural resources personnel. These items include:

- Turkey vulture roosts, located in various areas of the property;
- Great blue heron rookeries, located in various areas of the property; and
- Wild turkey flocks, with sightings scattered, but becoming more common.

In addition to the individual species listed above, several plant communities contained within the RTLS are considered by the TNC and the USFWS to be "rare" (73). The plant communities present at the RTLS shown in **Table 3-9** are listed in order from most rare to least rare. The reader is also referred to **Section 3.8.2.3**.

Table 3-8 State of Ohio Special Status Species at the RTLS, Portage and Trumbull Counties, Ohio

Species/Community		Ohio Status Rank	Ohio Class Code
Common Name	Scientific Name		
Blunt mountain-mint	*Pycnanthemum muticum*	P	SP
Butternut	*Juglans cinera*	P	SP
Closed gentian	*Gentiana clausa*	P	SP
Gray birch	*Betula populifolia*	P	SP
Hobblebush	*Viburnum alnifolium*	P	SP
Large cranberry	*Vaccinium macrocarpon*	P	SP
Long beech-fern	*Phegopteris connectilis*	P	SP
Lurking leskea	*Plagiothecium latebricola*	E	SP
Northern rose azalea	*Rhodendron nudiflorum* var. *roseum*	P	SP
Ovate spikerush	*Eleocharis ovata*	E	SP
Round-leaved sundew	*Drosera rotundifolia*	P	SP
Simple willow-herb	*Epilobium strictum*	T	SP
Straw sedge	*Carex straminea*	P	SP
Shining ladies-tresses	*Spiranthes lucida*	P	SP
Swamp oats	*Sphenopholis pennsylvanica*	P	SP
Tall St. John's wort	*Hypericum majus*	P	SP
Water avens	*Geum rivale*	P	SP
Weak sedge	*Carex debilis* var. *debilis*	P	SP
Woodland horsetail	*Equisetum sylvaticum*	P	SP
American bittern**	*Botaurus lentiginosu*	E	SA
Canada warbler**	*Wilsonia canadensis*	E	SA
Cerulean warbler	*Dendroica cerulea*	SI	SA
Common barn owl	*Tyto alba*	E	SA
Common moorhen	*Gallinula chloropus*	SI	SA
Eastern box turtle	*Carolina carolina*	SI	SA
Four-toed salamander	*Hemidactylium scutatum*	SI	SA
Graceful underwing	*Catocala gracilis*	E	SA
Henslow's sparrow	*Ammodramus henslowii*	SI	SA
Little blue heron**	*Egretta caerulea*	E	SA
Mountain brook lamprey	*Ichthyomyzon greeleyi*	E	SA
Northern harrier	*Circus cyaneus*	E	SA
Osprey**	*Junco hyemalis*	E	SA
Pygmy shrew**	*Soerex hoyi*	SI	SA
Red-shouldered hawk	*Buteo lineatus*	SI	SA
Sharp-shinned hawk	*Accipiter striatus*	SI	SA
Smooth green snake	*Opheodrys vernalis*	SI	SA
Solitary vireo	*Vireo solitarius*	SI	SA
Sora	*Porzana carolina*	SI	SA
Star-nosed mole**	*Condylura cristata*	SI	SA
Trumpeter swan**	*Cygnus buccinator*	E	SA
Virginia rail	*Rallus limicola*	SI	SA
Woodland jumping mouse	*Napaeozapus insignis*	SI	SA
Yellow-bellied sapsucker	*Sphyrapicus varius*	E	SA

LEGEND:

OHIO STATUS CODES:

E State Endangered P Potentially Threatened (Administrative status; not a legal designation)
T State Threatened SI Special Interest (Administrative status; not a legal designation)

OHIO CLASS CODES:

SP Special Plant SA Special Animal

** Suspected or migrant species

SOURCES: 1) Ohio Department of Natural Resources, Division of Natural Areas and Preserves, formal consultation correspondence, 3 August 1998.
2) RVAAP Rare Species List, 3 May 1999.

Table 3-9 The Nature Conservancy (TNC) Special Status Plant Communities at the RTLS, Portage and Trumbull Counties, Ohio

Community	Conservation Status Rank [1]	Conservation Status Rank [2]
Pin Oak Swamp-White Oak-Red Maple-(Northern Pin Oak) Flatwoods Forest	G2	G2
Hemlock-White Pine-Northern Hardwood Forest	G3/G4	G3
Beech-Maple Forest	G4?	G4

RARITY LEGEND [3]:

G2 Imperiled; Imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically six to 20 occurrences or few remaining individuals (1,000 to 3,000).

G3 Vulnerable; Vulnerable globally either because very rare and local throughout its range (even if abundant at some locations), or because of some other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.

G4? Apparently secure, variant inexact numeric rank; Uncommon but not rare, and usually widespread. Possibly cause for long-term concern. Typically more than 100 occurrences globally or more than 10,000 individuals.

SOURCES:
1) 27 March 1997 Letter from Mr. Jeff Knoop, Director of Land Protection, The Nature Conservancy, Ohio Chapter, to Mr. Tim Morgan, Resource Manager, Ravenna Army Ammunition Plant (73).
2) Personal Communication with Marleen Kromer, Director of Science and Stewardship, The Nature Conservancy, Ohio Chapter, 8 December 1998.
3) The Nature Conservancy website, 4 December 1998.

3.8.6 Existing Management Plans and Practices

Biological resources at the RTLS are governed by a variety of management plans. These plans are, for the most part, general plans that have been designed, prepared, and/or implemented by the IOC at the installation. Biological resource management plans for activities conducted at the facility, previously further described in **Section 3.3.5**, include:

- Fish and Wildlife Management Plan (FWMP);
- Integrated Natural Resources Management Plan (INRMP);
- Integrated Pest Management Plan (IPMP);
- Facility-wide Wetland Delineation and Management Plan; and
- Timber/Forestry Management Plan.

3.9 Cultural Resources

3.9.1 Regulatory Framework

Cultural resources are prehistoric and historic sites, structures, districts, or any other physical evidence of human activity considered important to a culture, subculture, or a community for scientific, traditional, and religious reasons (36 CFR part 64). For the purposes of this EBSR, based on statutory requirements, the term cultural resources is defined to include:

1. Historic properties, as defined in the National Historic Preservation Act (NHPA) of 1966, as amended;

2. Cultural items, as defined in the Native American Graves and Repatriation Act (NAGPRA);

3. Archaeological resources, as defined in the Archeological Resources Protection Act (ARPA);

4. Historic and paleontological resources, as defined by the Antiquities Act of 1906, as amended;

5. Sites that are scientifically significant, as defined by the Archeological and Historic Data Preservation Act (AHPA);

6. Sacred sites, as defined in EO 13007, to which access and use is permitted under the American Indian Religious Freedom Act (AIRFA); and

7. Collections, as defined in 36 CFR Part 79, Curation of Federally-Owned and Administered Collections.

NEPA and AR 200-2 require that ARNG proponents ensure that cultural resources, as defined by the above-stated regulations, are fully considered when preparing NEPA analyses. The primary regulatory driver for cultural resources protection, restoration, rehabilitation, and/or reconstruction by the ARNG is the NHPA (16 USC §470), as well as AR 420-40/200-4, the ARNG's interpretation and application of the NHPA.

The NHPA establishes the federal government's policy to provide leadership in the preservation and management of historic properties. Under Section 106 of the NHPA, as well as 36 CFR Part 800, federal agencies are required to identify and protect historic properties included in, or eligible for listing on, the National Register of Historic Places (NRHP). "Historic properties" may be archaeological sites (both prehistoric and historic), buildings, structures, objects, or districts. The federal proponent is responsible for seeking the comments of the Advisory Council on Historic Preservation (ACHP) under 36 CFR Part 800 on projects that affect historic properties. In the State of Ohio, all federal projects are reviewed by the Ohio Historic Preservation Office (OHPO) in accordance with Section 106 of the NHPA, as well as by the ACHP in accordance with 36 CFR 800. In addition, Section 110 of the NHPA, as well as AR 200-4 imposes specific responsibilities on federal agencies regarding historic preservation, including requiring a historic preservation program (i.e., an Installation Cultural Resources Management Plan [CRMP]) to include the identification, evaluation, and nomination of historic properties to the NRHP in consultation with the ACHP, OHPO, local governments, and other interested parties.

The NAGPRA requires that installation commanders summarize, inventory, and repatriate cultural items in the possession or control of the installation to appropriate, lineal descendents or Federally-recognized affiliated tribes, to the extent possible and practicable.

The Antiquities Act of 1906 and the ARPA prohibit the excavation, collection, removal, and disturbance of archaeological resources (as defined by ARPA) and objects of antiquity (as defined in the Antiquities Act) on federally-owned ARNG property, unless permission is granted by the USACE District Real Estate Office or by the installation commander.

The AHPA provides for the survey and recovery of scientifically significant data that might be lost as a result of terrain alteration associated with any Federal action. The AHPA requires incorporation of an installation paleontological resource management program into the Installation CRMP, including policy for limiting the collection and removal of paleontological resources.

Applicable statutes, regulations, and EOs affording protection to cultural resources that occur at the RTLS include the following:

- ACHP, Protection of Historic and Cultural Properties (36 CFR Part 800)
- AHPA of 1974 (PL 93-291; 16 USC §469-469c)
- AIRFA of 1978 (PL 95-341; 42 USC §1996)
- Antiquities Act of 1906 (PL 59-209)
- AR 200-2, Environmental Effects of Army Actions
- AR 200-4/420-40, Cultural Resources Management
- ARPA of 1979 (PL 96-95; 16 USC 470aa-47011)
- DA PAM 200-4, Cultural Resources Management
- EO 13007, Indian Sacred Sites, 24 May 1996
- NAGPRA of 1990 (PL 101-601; 25 USC §3001-3013; *as implemented by* 43 CFR Part 10)
- NEPA of 1969 (PL 91-190; 42 USC 4§321 *et seq.*)
- NHPA of 1966 (PL 95-515; PL 102-575; 16 USC §470)

3.9.2 Existing Cultural Resources Management Plan

In April 1996, the installation CRMP was published following the requirements of AR 200-4/420-4 (17). This comprehensive document, prepared in consultation with the OHPO and the ACHP, provides detailed guidelines and procedures to enable the federal managers of the installation to meet legal responsibilities for the identification, evaluation, and treatment of historic properties under their jurisdiction in accordance with the applicable regulations and statutes referenced above. The CRMP contains four primary sections, including:

- **Section I** – This section consists of an overview that explains the DA's policy toward historic properties, describes the legal requirements necessary for compliance, provides a set of goals to integrate the installation mission with historic resource management, provides a brief review of the local prehistoric and historic chronology, and evaluates installation-specific archaeological data and architectural information gathered to date.

- **Section II** – This section provides a summary of potential prehistoric and historic site locations at the property (i.e., a Cultural Resources Sensitivity Model), outlines procedures for their future inventory and evaluation, and provides a list of recorded sites at the installation, including their NRHP eligibility status.

- **Section III** – This section provides the requirements of the CRMP as mandated by Federal regulations, as well as the treatment plans for those cultural resources that are eligible for or listed on the NRHP.

- **Section IV** – This section identifies the compliance procedures to be followed during all ground-disturbing activities at the installation that have potential to damage historic properties.

In addition, as part of the CRMP, the process of inventorying and assessing the cultural resources at the installation (at that time the RVAAP) for nomination to the NRHP was initiated. While no cultural resources at the installation are currently listed on the NRHP, the CRMP recommends that all of the NRHP-eligible properties at the installation, identified below, be protected, preserved, or mitigated for loss if primary or secondary impact is unavoidable. These actions should be undertaken in accordance with the procedures established within the CRMP. The CRMP also recommends that cultural resources at the installation of unknown NRHP eligibility be protected and preserved until the NRHP evaluation process is completed.

Further, the CRMP provides a Cultural Resources Sensitivity Model for the installation, excluding the 3,884 acres of lands previously disturbed by military site use and the 596 acres of "swamp and poorly drained" areas. The sensitivity model prepared for prehistoric archaeological resources provided in the CRMP, reproduced herein as **Figure 3-8**, identifies areas of high sensitivity for prehistoric cultural resources based on access to water, relatively level topography, and ridge crest locations. Historically documented site locations (1853-1908), synthesized in the CRMP from a body of local informants and historic maps, were transposed onto a modern map, reproduced herein as **Figure 3-9**.

Finally, the CRMP sets forth recommended protocols for further cultural resources surveys (i.e., Phase I surveys) of the remaining portions of the installation, as well as procedures for conducting cultural resource investigations should resources potentially eligible for listing on the NRHP be identified (i.e., Phase II site testing and evaluation for NRHP eligibility and Phase III data recovery as a mitigation measure for NRHP-eligible sites).

The following sections summarize the current body of cultural resource data available for the installation. The reader is referred to the CRMP and the referenced documents for additional, more specific information concerning cultural resources of the property, including prehistoric and historic background of the RTLS vicinity.

3.9.3 Architectural Resources

3.9.3.1 Military Structures

The results of extensive research into the historical record of the RVAAP, dating from approximately 1939 to 1989, were documented in *The World War II Ordnance Department's Government-Owned Contractor-Operated (GOCO) Industrial Facilities: Ravenna Ordnance Plant Historic Investigation* (18). This document describes the history, land procurement, construction, development, and operation of the RVAAP, including the associated impacts on the local region, within this period. The partial purpose of this document was to fulfill mitigation efforts of the 1993 Programmatic Agreement (PAg) among the AMC, the ACHP, and multiple SHPOs concerning a program to cease maintenance, excess, and dispose of certain properties, discussed below. This document provides an excellent review of the history of the RVAAP.

A total of 1,275 buildings and structures were built at the RVAAP during the World War II (WWII) military era (18). As stated in the CRMP, these 1,275 buildings and structures fall under a PAg to Cease Maintenance, Excess, and Dispose of Certain Properties (CEMED) as agreed to

by the AMC, the ACHP, and multiple SHPOs, including the OHPO. As such, the Section 106 compliance responsibilities to manage the installation's WWII-era architectural resources have been met, and all impacts to those architectural resources have been mitigated through implementation of the CEMED PAg. The buildings and structures related to the Cold War era at the property do not meet Criteria Consideration G for exceptional significance applied to buildings less than 50 years in age; therefore, these more recent structures are considered ineligible for NRHP inclusion. Consequently, the CRMP concludes that no further consideration of the military-era architectural resources at the installation is necessary.

3.9.3.2 Pre-military Structures

Two pre-military architectural resources (see **Figure 3-10**), which do not fall under the CEMED PA, are present at the RTLS, as follows:

- The Stone Arch Bridge (POR-288-8) spans the South Fork of Eagle Creek on Wadsworth Road. This bridge, built in the late 19th century prior to the construction of the RVAAP, was of unknown eligibility at the time the CRMP was completed. The CRMP recommended that this structure be considered as potentially eligible for NRHP listing and be managed, protected, and preserved until OHPO concurrence of eligibility was obtained. In correspondence dated 16 June 1998, the OHPO concurred with the DA at the RVAAP that this structure is eligible for NRHP listing (55). The OHPO further stated that neglect or demolition of the bridge would constitute an adverse effect under the NHPA, and that the DA should prepare documentation for consultation with the ACHP under 36 CFR 800 and prepare a Memorandum of Agreement (MOA) stipulating proposed mitigation for this potential adverse effect. The Stone Arch Bridge is a cultural icon in the surrounding communities. The OHARNG's commitment to repair and maintain the bridge demonstrates its intent to honor the historical legacy of the monument for future generations. Subsequently, a nomination to the NRHP is pending.

- The Bolton Farm Milkhouse (a.k.a. Building A-1), used by the military as a communications building, was built in the 19th century as part of a 1,200-acre farm prior to the construction of the RVAAP. This structure was also of unknown eligibility at the time the CRMP was completed. The CRMP recommended that this structure be considered as potentially eligible for NRHP listing and be managed, protected, and preserved until OHPO concurrence of eligibility was obtained. In correspondence dated 5 March 1998, the OHPO concurred with the DA at the RVAAP that this structure is not eligible for listing on the NRHP (54).

No additional architectural resources are present at the installation (17).

LEGEND

- RTLS Boundary
- Rail Lines
- Waterbodies
- Areas with high potential for prehistoric cultural resources
- Buried Valleys
- Archaeologically Sensitive Areas (Blank and Bush 1982)
- Historic recorded site locations
- Prehistoric recorded site locations
- Multicomponent prehistoric and historic recorded site locations
- Rockshelter and others in general area (Blank and Bush 1982)

N

TRUMBULL C

PORTAGE C

Michael J. Kirwan Reservoir

1 0 1 2 3 4 5 Miles

DOQ_BASE.APR 1/2000 JGM

FIGURE 3-8

PREHISTORIC CULTURAL RESOURCES SENSITIVITY MODEL AT THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

Environmental Baseline Summary Report

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

LEGEND

RTLS Boundary

Roads.shp

Waterbodies

Historic Roads

Historic Mill/Factory

Bolton Milkhouse

Historic Site Locations and Roads

1850 Portage County Plat Book
After 1908

1859 Portage County Plat Book

1874 Combination Atlas Map of Trumbull County

1900 Portage County Plat Book
After 1908

1908 USGS Topo Quad

N

TRUMBULL CO

PORTAGE CO

Michael J. Kirwan Reservoir

1 0 1 2 3 4 5 Miles

DOQ_BASE.APR 1/2000 JGM

FIGURE 3-9

HISTORIC CULTURAL RESOURCES AT THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

Environmental Baseline Summary Report

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

LEGEND

- RTLS Boundary
- Archeological Services Consultants survey area (1995)
- Blank & Bush survey transects (1982)
- Riegel survey area (1993)
- Archaeologically Sensitive Areas (Blank and Bush 1982)
- Ravenna Rockshelter Areas (Blank and Bush 1982)
- Historic recorded site locations
- Prehistoric recorded site locations
- Multicomponent prehistoric and historic recorded site locations
- Bolton Milkhouse
- Stone Arch Bridge
- Waterbodies

N

TRUMBULL C

PORTAGE C

Michael J. Kirwan Reservoir

DOQ_BASE.APR 1/2000 JGM

1 0 1 2 3 4 5 Miles

FIGURE 3-10

AREAS OF PHASE I CULTURAL RESOURCES INVESTIGATIONS AT THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

Environmental Baseline Summary Report

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

3.9.4 Archaeological Resources

The CRMP documents a total of 13 archaeological sites that have been recorded as part of three prior Phase I Cultural Resources investigations at the installation (9,17,21,80). At least 43 additional pre-installation historic site locations were also verified, but not formally recorded (9). These three investigations, covering over 923 acres (see **Figure 3-10**), coupled with CRMP-documented archival research, identified:

- Seven (7) prehistoric sites (33Tr153, Tr154, Tr156, Tr157, Tr158, Tr162, and a rockshelter along Eagle Creek;
- Three (3) multi-component sites (Tr151, Tr152, and Tr155);
- Three (3) historic-era sites (Tr159, Tr160, Tr161); and
- A total of approximately 293 potential historic-period archaeological remains, consisting of cemeteries, churches, farmsteads, mill/factories, and schools.

Eleven of these 13 sites, however, have been determined NRHP ineligible. Only two recorded sites, the Ravenna Arsenal Rockshelter and 33Tr161, are currently of unknown NRHP eligibility (see **Table 3-10**). In addition, a total of 43 of the 293 pre-installation historic era sites that were verified for location (9), but not recorded on site forms, are of unknown eligibility. A subsequent archaeological overview and management plan was prepared for the installation in 1984 (96). This plan recommended an archival and field testing program be implemented to evaluate the National Register eligibility of 33Tr161 and the 43 historic sites. The plan further recommended that until this testing program was completed (has not been to date), the sites should be managed as if they were NRHP eligible.

No sites at the RTLS are listed on the NRHP or, with the exception of the Stone Arch Bridge described in **Section 3.9.3.2**, have been identified as eligible for listing on the NRHP. The reader is referred to the CRMP for the installation (17) for additional, more detailed information, as well as to **Figures 3-8 and 3-9** for location of all identified and potential cultural resource sites and to **Table 3-10** for a more detailed description of each site that is of current unknown NRHP eligibility at the RTLS.

Subsequent to publication of the CRMP, *a Phase I Archaeological Reconnaissance Survey of Selected Tracts* (35) was performed on approximately 2,995 acres of land at the installation (see **Figure 3-10**). The survey identified 44 archaeological sites within the project area, including 10 prehistoric sites, 32 historic sites, and two multi-component (historic and prehistoric component) sites. Of these, five prehistoric sites (33PO341, 33PO342, 33PO348, 33PO349, and 33PO350) and four historic sites (33PO344, 33PO345, 33PO346, and 33PO366) appeared to meet eligibility criteria for listing on the NRHP. These sites are identified in **Figure 3-10** and described in greater detail in **Table 3-10**.

Table 3-10 Known Archaeological Resources Sites of Potential Significance at the RTLS, Portage and Trumbull Counties, Ohio

Site #	Period	Site Type	Assemblage	NRHP Eligibility	Reference
33Tr161	Historic 19th and 20th century	Residential; foundation of Bosworth residence and associated features	domestic & architectural debris	Unknown	Hillen *et al.* 1995
Ravenna Rockshelter (no OAI site #)	Unassigned prehistoric	Unknown	unspecified	Unknown	Blank and Bush 1992
33PO341	Unassigned prehistoric	Possible short-term occupation or campsite	Potential intact subsurface features (probable hearth)	Potential	Montgomery Watson 1997
33PO342	Unassigned prehistoric	Possible short-term occupation or campsite	Potential intact subsurface features	Potential	Montgomery Watson 1997
33PO348	Unassigned prehistoric	Unknown – tied to 33PO349 and 350	Lithic scatter	Potential	Montgomery Watson 1997
33PO349	Unassigned prehistoric	Unknown – tied to 33PO348 and 350	Lithic scatter	Potential	Montgomery Watson 1997
33PO350	Unassigned prehistoric	Unknown – tied to 33PO348 and 349	Lithic isolate	Potential	Montgomery Watson 1997
33PO344	Historic; 1920-1940?	Residential; "Shotgun Annie's Place"	Domestic & architectural debris	Potential	Montgomery Watson 1997
33PO345	Historic; 1840-1874	Residential; Kirtland farmstead	Domestic & architectural debris	Potential	Montgomery Watson 1997
33PO346	Historic; Pre-1874	Residential; farmstead	Architectural debris	Potential	Montgomery Watson 1997
33PO366	Historic; 18th century	Maple sugar processing operation	Possible maple sugar production materials & architectural debris	Potential	Montgomery Watson 1997

As the reader may gather from this information, only approximately 4,000 acres of the approximately 21,419 acres of the installation have been thoroughly investigated regarding the presence of archaeological resources through performance of Phase I investigations. These prior investigations identified a total of nine sites as potentially eligible and 44 sites that are of unknown eligibility (see **Table 3-10** and **Figure 3-10**). As stated in **Section 3.9.2**, the CRMP sets forth procedures and requirements for future Phase I investigations, as well as for subsequent evaluation of sites identified as potentially eligible for NRHP listing.

3.9.5 Traditional Cultural Resources

According to the CRMP for the installation (17), no traditional cultural resources have been identified at the installation. In addition, no sacred sites, as defined under the AIRFA, occur

within the property. While there are no identified, federally-recognized Native American tribes who claim cultural patrimony under NAGPRA for the RTLS vicinity, the Delaware and Wyandot are the most likely tribal groups to have such interest. Other tribes include the Seneca, Cuyuga, Oneida, Onondaga, Mohawk, Mahican, Ottawa, Abenaki, and Ojibwa. A survey of these groups would be necessary to identify any potential traditional cultural resources at the RTLS (17).

In 1995, the USACE prepared *A Collections Summary for Ravenna Army Ammunition Plant, Ohio* as part of the U.S. Army NAGPRA Compliance Project (112). Through archival research and telephonic interviews, the USACE identified that two archaeological surveys conducted at the installation since 1982 (9,21) included the collection of artifacts. This effort identified a total of 27 cubic feet of boxed archaeological materials and associated documentation from the installation that were collectively warehoused at the Anthropology Department of Cleveland State University. In the opinion of the USACE, no NAGPRA-related materials were included in this collection; however, the USACE conditioned this opinion as subject to "further consultation with culturally affiliated Native American tribes according to the definitions and restrictions specified in NAGPRA." This Collections Summary provides additional detailed information on the Native American tribes who may claim cultural patrimony under NAGPRA, including names, addresses, and telephone numbers, and the procedures to initiate such dialogue (112).

3.9.6 Paleontological Resources

Based on available information contained in the CRMP and other documents consulted as part of preparation of the EBSR, no paleontological resources protected under the Antiquities Act and the AHPA are known to occur within the RTLS or the region surrounding the RTLS.

3.10 Socioeconomics

The following subsections identify and describe the socioeconomic conditions surrounding the RTLS. This data is presented in order to provide an understanding of the socioeconomic forces that have shaped, and continue to shape, the area. Socioeconomic areas of discussion include local demographics, regional and installation economy, local housing, local schools, local medical facilities, local service facilities, local recreational facilities, and associated issues of health and safety to the surrounding communities as related to activities conducted at the RTLS.

This setting description is intended to provide the framework necessary to determine the significance of the estimated socioeconomic effects from any proposed OHARNG activity at the RTLS. Once the OHARNG has fashioned the detailed definition and extent of proposed OHARNG activities at the RTLS, the NEPA analysis will address impacts to each of these socioeconomic areas. Using the DA's Economic Impact Forecast System (EIFS), a computer model available through the U.S. Army Environmental Policy Institute (USAEPI), the analysis will identify the anticipated extent of socioeconomic impact to the RTLS Region of Influence (ROI).

Using a functional area concept, or defining the RTLS ROI as the geographic area affected by RTLS activities in the form of commuting or trading, the RTLS ROI can be defined to include all of Portage and Trumbull Counties, Ohio. This ROI includes all of the socioeconomic factors, including local businesses, local government, and local population, that may be affected by changes in activities at the RTLS. This assumption is founded on the fact that, since the RTLS is situated within a relatively rural setting with few proximate "large" cities, such as Ravenna and

Warren, the majority of RTLS personnel live, work, and shop within these two counties, and travel less than 25 miles to and from work.

3.10.1 Demographics

This section discusses population density and trends for the areas surrounding the RTLS, including Portage and Trumbull Counties, the townships that the RTLS is located within in both counties, and the cities of Ravenna and Newton Falls. The information displayed in **Table 3-11** indicates that the demographics for the region surrounding the RTLS are typical for a great deal of Ohio, with widely-varying growth rates and population typically centered around urban areas.

In addition to actual data from the U.S. Census Bureau, federal, state, and local agencies have prepared population and other demographic projections for many areas, including those around the RTLS. These projections are based on documented ingress/egress rates, building and home construction rates, employment rates, and quality-of-life ratings. Population projections for areas surrounding the RTLS are shown in **Table 3-12.**

Table 3-11 Regional Population for Areas Peripheral to the RTLS, Portage and Trumbull Counties, Ohio

Area	1980	1990	Change, 1980-1990 (%)	Urban Population (%)	Rural Population (%)
State of Ohio	10,797,630	10,847,115	+0.5	74.1	25.9
County					
Portage	135,856	142,585	+5.0	55.8	44.2
Trumbull	241,863	227,813	-5.8	72.0	28.0
Township					
Charlestown	***	1,920	***	—	100.0
Freedom	***	2,441	***	—	100.0
Windham	***	4,987	***	61.5	38.5
Paris	***	1,768	***	—	100.0
Braceville	***	2,936	***	—	100.0
Newton	***	9,577	***	51.9	48.1
City					
Newton Falls	***	4,973	***	100.0	—
Ravenna	***	12,069	***	100.0	—

*** Data not available

SOURCES: 1) 1990 Census of Population and Housing, U.S. Census Bureau. http://www.venus.census.gov.
2) Ohio County Profiles. Office of Strategic Research, Ohio Department of Development. http://www.ohio.odod.gov.

Table 3-12 Regional Population Projections for Areas Peripheral to the RTLS, Portage and Trumbull Counties, Ohio

Area	1990	1995	2000	2005	2010	Projected Change, 1990-2010 (%)
State of Ohio	10,847,115	11,134,032	11,288,760	11,518,970	11,738,930	+8.2
County						
Portage	142,585	148,171	150,700	153,800	157,600	+10.5
Trumbull	227,813	227,368	231,400	234,500	235,700	+3.5
Township*						
Charlestown	1,920	2,024	2,043	2,103	2,165	+12.8
Freedom	2,441	2,691	2,695	2,759	2,820	+15.5
Windham	4,987	4,953	5,001	5,058	5,107	+2.4
Paris	1,768	1,899	1,904	1,957	2,003	+13.3
Braceville	2,936	—	—	—	—	—
Newton	9,577	—	—	—	—	—
City*						
Newton Falls	4,973	—	—	—	—	—
Ravenna	12,069	11,906	12,691	12,992	13,291	+10.1

* Limited statistics available; methods of population projections, and thus results, vary from state and county figures.

SOURCES: 1) 1990 Census of Population and Housing, U.S. Census Bureau. http://www.venus.census.gov.
2) Ohio County Profiles. Office of Strategic Research, Ohio Department of Development. http://www.ohio.odod.gov.
3) Population Projections – Building Permit Projection Method. Portage County Regional Planning Commission.

3.10.2 Regional Economy

Although the land immediately surrounding the RTLS is generally agricultural, the majority of local workers are employed in the manufacturing industry, with trade industries, service industries, and government following in sequential order. Most persons living in the vicinity of the property commute to work, with one-way travel times averaging between 20 and 30 minutes. Major employers include electric equipment manufacturers, aluminum products manufacturers, medical care facilities, several educational administration centers and facilities, government (state, city, and county), and various other manufacturers. Additional employers include other types of manufacturing, construction, transportation and utilities, wholesale and retail trade, finance, insurance and real estate, and mining (48).

Statistics from the Ohio Department of Development indicate that per capita income is increasing at a moderate rate for both Portage and Trumbull Counties, with per capita income increasing at a slightly higher rate for Trumbull County. However, this may be attributable to Trumbull County's current negative growth rate. According to data from the 1990 Census, median household income for Portage County was $30,253, while Trumbull County was $28,186. The national median household income was $37,579. Median household income and per capita income are shown in **Table 3-15** (48).

In 1996, as derived from a household survey of the civilian labor force, Portage County documented an unemployment rate of 4.4%, 64th among Ohio's 88 counties, and 9.1% below the

overall state average unemployment rate of 4.9%. In the same 1996 survey, Trumbull County had an unemployment rate of 5.8%, 38th in the State and 20.2% above the overall state average (48).

3.10.3 Installation Economy

Current IOC staff levels at the installation consist of four federal government personnel and approximately 25 MCC personnel. The average annual economic benefit due to government salaries, fringe benefits, and incidentals from IOC facilities is approximately $260,000. The MCC receives approximately $1.3M/year to operate the facility (64).

Projected impacts on the local economy from OHARNG presence at the RTLS were outlined in the *Environmental Assessment for Phased Construction and Continued Use of Ravenna Army Training Area* (97). Construction of the components outlined in the EA and maintenance of full-time staffing levels (eight military and one civilian employees, for a total of 9 full-time OHARNG staff) has resulted in approximately $380,000 per year due to salaries of personnel overseeing the armory and TSSF. Construction of the proposed general maintenance facility, with 60 full-time personnel, was projected to result in approximately $1.8M in additional salary contributions. Furthermore, troop spending during training cycles is likely to result in approximately $67,500 per year in contributions to local businesses. As such, the OHARNG presence at the RTLS is projected to have an economic benefit of approximately $2.0M/year to the surrounding areas during normal years and up to $11.0M/year during heavy construction years (178).

3.10.4 Housing

No on-site housing is available at the RTLS, with the exception of a 240-person TSSF/education facility located within OHARNG TA C (not permanent housing). The TSSF does not provide long-term housing, but does provide extended-term housing for OHARNG personnel during training episodes. Most of the OHARNG personnel who use the facility are limited to a few days per year, with heaviest use occurring on weekends.

Area housing is in plentiful supply, with the proportion of housing units occupied to those available slightly higher for Portage and Trumbull Counties than for the State of Ohio overall. **Table 3-13** presents selected housing characteristics for the areas surrounding the installation.

Table 3-13 Selected Housing Characteristics, Portage and Trumbull Counties, Ohio

Area	Housing Units Available	Occupied (%)	Owner-Occupied (%)	Median Value*	Renter-Occupied (%)	Median Contract Rent
State of Ohio	4,371,945	93.5	63.1	$63,500	30.4	$296
Portage County	52,299	94.1	66.0	$69,200	28.2	$331
Trumbull County	90,533	95.1	69.5	$53,300	25.6	$269

* Of owner-occupied homes

SOURCES: 1) 1990 Census of Population and Housing, U.S. Census Bureau. http://www.venus.census.gov.
2) Ohio County Profiles. Office of Strategic Research, Ohio Department of Development. http://www.ohio.odod.gov.

3.10.5 Schools

No on-site schools are currently available at the RTLS, and none are planned within the foreseeable future. In the area immediately surrounding the RTLS, public primary and secondary schools are available in Newton Falls, Ravenna, Warren, and Windham. Windham High School is located immediately north of the northern boundary of the installation. A number of collegiate-level schools are available in the areas around the installation, including Kent State University, Hiram College, the University of Akron, and the Northeast Ohio Universities College of Medicine (48).

In Portage County, 79.3% of those persons 25 years and older are high school graduates, with 21.9% of those graduates possessing at least some type of post-secondary school degree. Of the same age group (25 years and older), 5.4% possess an educational attainment level of less than ninth grade (48).

In Trumbull County, 7.9% of those persons 25 years and older have an educational attainment level of less than ninth grade. High school graduates total 75.2%, and 15.6% of those graduates have a post-high school degree. For comparison purposes, statistics for the State of Ohio overall indicate that 75.7% of persons 25 years and older are high school graduates, 7.9% have an educational level of less than ninth grade, and 22.3% possess a post-high school degree (48).

3.10.6 Medical Facilities

No on-site medical facilities are currently available at the RTLS. The OHARNG, IOC, and MCC personnel, as well as other on-site contractors, typically utilize local civilian medical facilities when necessary. Local EMS is used for emergency medical situations. Hospitals are available in Ravenna, Warren, and Akron.

3.10.7 Shops and Services

No on-site shops and services currently exist at the RTLS. Area shops and services may be found in Ravenna, Newton Falls, Windham, and neighboring areas. With the exception of minimal equipment repair facilities available in the IOC administration area, all services are contracted to local businesses.

The OHARNG has equipment repair facilities at the UTES in TA C. These facilities are limited by lack of space and overall adequacy, but are used to perform maintenance on tracked vehicles and other military equipment (41).

3.10.8 Recreational Facilities

No on-site recreation facilities exist at the RTLS, with the exception of closely-controlled hunting programs, as coordinated the ODOW and RTLS personnel (see **Section 3.8.4**).

The RTLS is bordered on the south by West Branch State Park, which contains areas for picnicking, horseback riding, boating, and other assorted outdoor activities. Local anglers enjoy fishing in Michael J. Kirwan Reservoir and the West Branch Mahoning River, as well as in area streams and tributaries.

3.10.9 Public and Occupational Health and Safety

As the current overall mission of the IOC portions of the installation is of a storage capacity, potential for accidents is relatively low. In addition, the IOC and OHARNG have established strict procedures by which access to hazardous areas is limited. Adherence to these safety and access procedures has historically resulted in no health and safety impacts to the public, including proximate private residents, due to IOC and OHARNG activities.

Potential fire hazards are limited at the installation, as live-fire activities are currently not conducted. In addition, the presence of explosives in many areas of the installation generally precludes the use of flame-producing equipment in many areas. Open burning/open detonation (OB/OD) activities may occasionally be conducted following established strict safety procedures, but have not historically resulted in any health and safety impacts to the public. Local fire departments from Ravenna and Newton Falls are under agreement to provide equipment and personnel to handle any fire or other training emergency that may occur at the installation.

3.10.10 Protection of Children

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997), directs each federal agency to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children. The EO also directs each federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks.

Currently, there are seldom children present at the RTLS as visitors, and no children reside at the installation. As part of the NEPA analysis of any proposed OHARNG activities at the RTLS, the OHARNG will take precautions to ensure the health and safety of future proposed children who may be on-site, if any, including implementation of measures such as fencing, limitations on access to certain areas (e.g., AOCs), and provision of adult supervision. Potential off-site disproportionate health and safety risks to local children will also be considered in the subsequent NEPA review as part of the environmental and socioeconomic effects analyses.

3.11 Environmental Justice

3.11.1 Regulatory Framework

EO 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*, dated 11 February 1994, requires federal agencies to identify and address disproportionately high and adverse effects to human health and the environment as a result of its activities on minority and low income populations in the United States. Private residences in the vicinity of the RTLS are primarily rural in nature, and are not known to be minority or low income.

3.11.2 Geographic Distribution of Minority Populations

Based upon the 1990 U.S. Census, 227,813 individuals are residents of Portage County and 142,585 individuals are residents of Trumbull County, as represented by all races. Among the two counties, 95.5% of all residents are white, whereas for the State of Ohio overall, 87.7% of residents are white. For the most part, minority populations in the areas surrounding the RTLS are low. Relative African-American populations are considerably lower for these areas than for the

rest of the State of Ohio, while relative proportions of persons of Hispanic origin (who may be of any race) are slightly lower than the State average. Relative proportions for the other races detailed in the 1990 U.S. Census, including 'American Indian, Eskimo, or Aleut', 'Asian or Pacific Islander', and other races were relatively similar to overall State figures (118). **Table 3-14** presents regional demographics by race for the areas surrounding the RTLS.

For the townships in which the RTLS lies, and those for which statistics were readily available, reported ancestries included, in descending order: German (36.5%), Irish (24.7%), English (16.9%), 'Other' ancestries (9.6%), and United States or American (7.0%). Additional moderately-often reported ancestries included, in no specific order: Dutch, Italian, Hungarian, Scotch-Irish, Slovak, and Polish (118).

Table 3-14 Percent of Regional Population by Race for Areas Peripheral to the RTLS, Portage and Trumbull Counties, Ohio

Area	White	African-American	American Indian, Eskimo, or Aleut	Asian or Pacific Islander	Other Race	Hispanic Origin*
State of Ohio	87.7	11.1	0.2	1.0	—	1.4
County						
Portage	96.1	2.7	0.2	0.8	0.2	0.7
Trumbull	92.5	6.7	0.2	0.4	0.2	0.5
Township						
Charlestown	99.0	0.8	0.2	—	—	—
Freedom	99.4	0.6	—	—	—	0.3
Windham	97.4	1.4	0.2	0.8	0.2	0.3
Paris	98.2	0.5	—	1.3	—	—
Braceville	94.3	5.4	0.3	—	—	0.4
Newton	99.1	0.2	0.7	—	—	0.3
City						
Newton Falls	98.6	—	1.4	—	—	0.5
Ravenna	94.9	4.3	0.4	0.2	0.1	0.9

* Persons of Hispanic origin may be of any race

SOURCES: 1) 1990 Census of Population and Housing, U.S. Census Bureau. http://www.venus.census.gov.
2) Ohio County Profiles. Office of Strategic Research, Ohio Department of Development. http://www.ohio.odod.gov.

3.11.3 Geographic Distribution of Low-Income Populations

Based upon the 1990 U.S. Census, 370,398 individuals are residents of Portage and Trumbull Counties, collectively. Of this total, approximately 11.2 percent of the population was determined to exist at or below the poverty level. Estimates provided by the Ohio Department of Development regarding 1993 income information indicate that the percentage of persons below the poverty level in Portage County had decreased to 10.0%, while the percentage of persons below the poverty level in Trumbull County had increased to 13.3% (48). **Table 3-15** presents detailed information regarding income for residents of Portage and Trumbull Counties, as determined from the 1990 U.S. Census.

3.11.4 Consumption Patterns

Based on socioeconomic data consulted and referenced in the above sections, no populations or local groups in the vicinity of the RTLS (i.e., within the defined RTLS ROI) currently principally rely on fish or wildlife for subsistence. As such, no group of this type would be affected by any proposed activities at the RTLS.

Table 3-15 Regional Income Information for Areas Peripheral to the RTLS, Portage and Trumbull Counties, Ohio

Area	Number of Households	Median Household Income (dollars)	Per Capita Income (dollars)	Percent of Population Below Poverty Level
State of Ohio	4,087,546	$30,897	$19,725	13.7
County				
Portage	49,359	$30,253	$12,509	11.9
Trumbull	85,921	$28,186	$12,899	11.4
Township				
Charlestown	697	$27,161	$11,314	12.3
Freedom	834	$28,141	$10,846	9.0
Windham	1,606	$26,367	$9,485	16.3
Paris	563	$37,659	$11,468	6.8
Braceville	985	$33,885	$12,240	6.4
Newton	3,618	$27,750	$12,039	9.3
City				
Newton Falls	2,051	$22,014	$11,637	11.8
Ravenna	5,005	$22,999	$11,920	13.9

SOURCES: 1) 1990 Census of Population and Housing, U.S. Census Bureau. http://www.venus.census.gov.
2) Ohio County Profiles. Office of Strategic Research, Ohio Department of Development. http://www.ohio.odod.gov.

3.12 Infrastructure

The following section addresses utilities and support infrastructure for the RTLS.

3.12.1 Potable Water Supply

Within the installation, potable water is supplied by a number of means. In the administration area, IOC facilities use a standard residential well for Building 1037, and one MCC facility (i.e., the front gate security building) uses a second standard residential well for water supply (194).

OHARNG facilities utilize two water supplies, with a standard residential well providing water to the UTES area. This well, although functional, is not used to provide drinking water, as personnel have indicated that water from the well has a strong sulfur odor. Drinking water to the UTES is supplied by bottled water. The OHARNG Armory and TSSF in TA C utilize Newton Falls city water (178).

3.12.2 Wastewater Treatment

Among the IOC facilities, Building 1037 in the administration area has a sanitary sewer with a septic tank for wastewater disposal, while the front gate security building utilizes a sand drain field for wastewater disposal. All other IOC-controlled facilities on the installation had been disconnected (in terms of sanitary sewer service) prior to 1993 from the installation wastewater treatment facilities (194).

OHARNG facilities utilize a number of means for wastewater disposal. The UTES area has a sanitary sewer with septic tank disposal, while the armory/TSSF facilities use Newton Falls city sewer lines as a means of wastewater disposal. Within the training areas, portable toilets are used in peripheral locations, while TA G and the training areas in the eastern portion of the facility utilize semi-permanent facilities, each with an above-ground, 500-gallon, gray water holding tank. All septic systems and gray water tanks are periodically emptied by local sanitation contractors (178).

3.12.3 Solid Waste Disposal

Due to the inactive status of the installation, factors considered in solid waste management planning include primarily the applicable regulatory requirements, general environmental considerations, and economic considerations. Waste characterization (solid or hazardous) is accomplished through accepted means by the MCC (30) as per the ISWMP, prepared in accordance with AR 420-47. This regulation dictates that each Army and ARNG installation develop and implement an ISWMP for their solid waste management activities. The purpose of the ISWMP is to accomplish solid waste management at the installation cost-effectively, efficiently, and in a manner protective of human health and the environment. Within the confines of the ISWMP, this is accomplished by: 1) Complying with all federal, state, local, and Army solid waste management regulations; 2) Reducing the rate of solid waste generation at the installation to meet national, DoD, and Army waste reduction goals to the maximum extent possible; and 3) Re-using or recycling elements of the solid waste stream to the maximum extent possible (30).

Several categories of wastes are generated at the installation at this time:

- **Commercial** solid waste is generated from office operations in the active administration areas. The estimated total amount of commercial waste generated in these areas is less than one ton per week (30).
- **Industrial** (non-hazardous) wastes are generated from vehicle, equipment, and plant maintenance activities. Although the amount of this type of waste generation varies seasonally with vehicle maintenance activity levels, the estimated total amount of this type of waste is approximately 500 pounds per year (30).
- **Special** wastes are non-hazardous wastes that are generated from time to time at the installation, and may include asbestos wastes, ash residues from open burning operations, and septic tank wastes. These wastes are generated infrequently, and current estimates for these types of wastes total approximately 100 pounds per year. Solid wastes are collected from the installation by licensed private contractors on a regular basis (30).

Source reduction programs at the installation consist primarily of minimizing wastes from explosive storage activities by offering waste explosives and packing/storage materials for re-sale or re-use through the Defense Re-Utilization Marketing Service. Resource recovery programs on

the property include, for the most part, a recycling program for office paper and metal cans, fluorescent light bulbs, waste oil/filters, and tires, which are taken to local area recycling facilities. The OHARNG UTES maintenance facilities store waste oil in 55-gallon drums, which are periodically removed and disposed of by a private contractor.

The installation also has an PPP, which is used in conjunction with the ISWMP. The PPP places emphasis on meeting national and state pollution prevention goals, reducing long-term liabilities of waste disposal, saving money by reducing raw material purchases and waste treatment and disposal costs, and protecting public health and the environment. The PPP for the facilities was previously summarized in **Section 3.3.5**.

OHARNG facilities use standard commercial solid waste disposal means, with local contractors providing disposal services.

3.12.4 Energy Sources

3.12.4.1 Electricity

Electrical service is provided on a cost-per-usage basis to the RTLS by local electrical service providers. All unused electrical infrastructure has been sold and removed. Several substations are used and/or available for use within the installation, but would need considerable maintenance and/or upgrades in order to meet current power supply standards.

OHARNG facilities utilize four separate feeds from the local electrical service provider, one each for the Readiness Center/TSSF, UTES area facilities, the gunnery training course with pop-up targets, and one for the two groups of CHP warehouses.

In addition, the MCC is required to (and does) maintain an electrical backup system to maintain radio service in times of power failures or other emergencies (178).

3.12.4.2 Fossil Fuels

Within the IOC administration and ~~HE~~ storage areas, heat is provided via on-site propane tanks for Building 1037 and for the front gate security building (194).

For the OHARNG facilities, the tank training course simulator building utilizes propane for heating purposes, while the armory/TSSF utilizes natural gas provided by a local service company. Temporary RTLS administration buildings within the UTES area utilize electricity for heating office space, while maintenance shops and maintenance offices are heated with a fuel-oil fired system (178).

3.12.5 Transportation

A bridge inspection report was completed in 1996 for 10 major bridges at the installation. This report indicated that 9 out of 10 of those bridges are in satisfactory condition and adequate for their design loading. However, one bridge, the railroad bridge PO-5-207 over SR 5, was damaged in a traffic accident several years ago. This bridge was found to be inadequate for use (8).

3.12.5.1 Local Roadways and Use

Interstate 80, located directly north of the RTLS, is the most heavily traveled road in the immediate area, receiving 30,550 vehicles average daily traffic (ADT). SR 303, which runs parallel to and just south of Interstate 80, receives 3,700 vehicles ADT. SR 5, which runs southwest-northeast and is actually within the diagonal southern boundary of the RTLS, receives 8,050 vehicles ADT. SR 88, which runs on a southwest-northeast diagonal and is located just west of the RTLS, receives 6,300 vehicles ADT. Newton Falls Road, just south of the RTLS, receives approximately 950 vehicles ADT. Roadways within the RTLS receive a very small overall amount of traffic. Traffic use is dependent upon status of OHARNG training activities, MCC use, IOC use, and status of other subcontractor activities within the property (133). On-site roads are paved in the IOC administration area, and gravel or dirt throughout the rest of the installation. A tracked vehicle network is also presently maintained in TAs A, B, and C.

3.12.5.2 Rail Access and Service

The installation has one active rail access point, which is available for use by the OHARNG and IOC. One-hundred five (105) miles of interior railway have either been removed and salvaged as scrap (or are planned for removal and salvage by the spring of CY 2000), while 15 miles of rail line remain intact for use on an as-needed basis by the OHARNG.

3.12.5.3 Airspace and Use

Various types of military aircraft (both rotary-wing and fixed-wing) use the airspace above the RTLS for a variety of purposes, including training, transportation of personnel and equipment, and various other purposes. Commercial and civilian flights occasionally operate in these air spaces, with small amounts of private air travel and high-altitude commercial air travel to area airports.

Specifically, installation airspace is used by the 910th Tactical Airlift Group (TAG), USAFR out of the Youngstown Municipal Airport in Vienna, Ohio. TA J at the installation is used by the 910th TAG for C-130B Drop Zone (DZ) training, which is conducted during the day at 600 to 1,100 feet above ground level (68). A portion of OHARNG training activities utilize rotary-wing aircraft, with usage varying according to training needs. Rotary-wing flights are primarily limited to the interior of the RTLS, with a 400-meter no-fly zone imposed administratively around the boundary of the facility.

As detailed above, air space above the RTLS generally is available for both military and civilian flight operations. Army regulations impose a 3,500-foot safety arc for active ammunition storage facilities, which prohibits any armed aircraft from entering that restricted air space (DoD 6055.9). Currently, this type of restriction does not apply at the RTLS, as armed aircraft do not operate in the area.

3.13 Hazardous and Toxic Materials/Wastes

Hazardous materials are defined within several laws and regulations to have certain meanings. For this document, a hazardous material is any one of the following: any substance designated pursuant to Section 311(b)(2)9A0 of the CWA; any element, compound, mixture, solution, or substance designated pursuant to Section 102 of CERCLA; any hazardous waste having the characteristics identified under RCRA; any toxic pollutant listed under TSCA; any hazardous air

pollutant listed under Section 122 of the CAA; or any imminently hazardous chemical substance or mixture with respect to which the EPA Administrator has taken action pursuant to Subsection 7 of TSCA.

The present status of the RTLS in terms of hazardous materials and wastes does not represent immediate compliance issues for the installation. Hazardous materials use and waste generation minimization is implemented by the proactive management activities of IOC, MCC, and OHARNG personnel. Spill prevention measures supplement minimization efforts to accomplish the mission of the facility with the least impact to the environment and human health possible.

The IOC at the RTLS currently stores large quantities of HE. The USEPA recently published its final Military Munitions Rule (MMR; 40 CFR Part 260 *et seq.;* 12 August 1997), which identifies when conventional and chemical military munitions become hazardous waste subject to RCRA. Under the new USEPA rule, unused military munitions such as those stored at the installation become waste military munitions (WMM), and must be managed accordingly, when:

- Declared a waste by authorized military official;
- Abandoned or disposed of by being: buried, landfilled, or dumped at sea; burned; detonated, the exception is when detonated as a consequence of intended use; incinerated; or treated prior to disposal;
- Removed from a storage facility for disposal or treatment prior to disposal; or,
- Damaged or deteriorated to a point they cannot be made serviceable or recycled for other purposes (as determined by qualified personnel).

3.13.1 Regulatory Framework

CERCLA, RCRA, and AR 200-1, *Environmental Protection and Enhancement*, are the three primary regulations that govern ARNG hazardous material use, handling, and remediation at military installations. In general terms:

- **AR 200-1** – defines Army policy and procedures for managing solid and hazardous waste, including resource recovery, recycling, waste reduction, and training programs.

- **RCRA** – regulates the management of hazardous waste, including storage, handling, transportation, treatment, and disposal.

- **CERCLA** – regulates the cleanup of releases or threats of releases of hazardous substances, pollutants, and contaminants.

Under AR 200-1, open burning/open detonation (OB/OD) of unserviceable or obsolete explosive ordnance, propellants, or other explosive materiel must be performed in an environmentally-sensitive manner, under conditions approved by the USEPA and appropriate air pollution control agencies. For explosive materiel treatment, detonation/disposal, or storage that is considered waste management, permits may be required from the USEPA pursuant to RCRA. However, the MMR states that OB/OD activities are not waste management if the activities are conducted as part of training, research, development, testing, evaluation, or certain range clearance operations. HQDA is currently preparing policy and guidance for implementation of 40 CFR Part 260 *et seq.*

RCRA, as amended, and the resulting regulations, published in 1980, provides for the control of hazardous waste from generation through final disposal. RCRA provides regulatory agencies with

a wide range of enforcement powers, and violators of these regulations may face monetary penalties and/or imprisonment.

The installation has been assigned USEPA Identification Number OH5210020736 for the generation, storage, and treatment of hazardous waste. Specific hazardous wastes generated at this installation at any one time vary according to the specific operation being conducted. The installation is presently in a Modified Caretaker status, with storage being the only active mission. However, the RTLS may, in special instances, be requested to assist the U.S. Army Explosive Ordnance Detachment (EOD) or the U.S. Bureau of Alcohol, Tobacco, and Firearms (ATF) in the storage or treatment of explosive hazardous wastes.

CERCLA, commonly known as the "Superfund" Act, was passed by Congress in response to a growing national concern about the release of hazardous substances to the environment. These concerns were directed primarily at inactive sites, but also included actively managed facilities which are not subject to RCRA.

CERCLA was established to provide a mechanism of response for the immediate cleanup of hazardous waste contamination from accidental spills or from abandoned hazardous waste disposal sites that may result in long term damage. The goal of CERCLA is to compel those parties responsible for a non-permitted release to pay for the cleanup of that release. Removals, remedial actions, and enforcement actions are the three basic types of responses that may be taken under CERCLA.

In general, if a release to the environment is considered a "Federally permitted release" it is not subject to CERCLA-reporting requirements. Release is defined as any spill, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment. This includes the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance, pollutant, or contaminant.

The National Priorities List (NPL) is a list of sites that present the greatest danger to public health or welfare of the environment. The list is promulgated by the USEPA in Section 105(a)(8) of CERCLA. The sites on the NPL are prioritized according to the Hazard Ranking System (HRS). The cleanup of sites must conform to EPA's National Contingency Plan (NCP). This plan comprises the operating rules for Superfund cleanups promulgated by EPA under Section 105(a)(8)(B) of CERCLA. No sites at the installation are currently included on the NPL; IOC has retained responsibility for the voluntary clean-up of contaminated areas at the installation.

On a state level, solid and hazardous wastes are regulated under ORC Chapter 3734. These statutes provide guidelines for the management of solid and hazardous wastes at all locations within the State of Ohio. Under ORC Chapter 3734, authority is granted to certain state agencies for the regulation of such wastes, including waste generation, disposal, and remediation of contaminated sites.

3.13.2 Storage and Handling Areas

The Installation Hazardous Waste Management Plan (IHWMP) addresses standard operating procedures (SOPs) for handling, storing, generating, and disposing of hazardous wastes, such as spent solvent, hypo solution, POLs, pesticides, explosives, lead-acid batteries, used oil, PCBs, antifreeze, and asbestos, in accordance with RCRA (40 CFR Parts 260-281) (24). The status of the installation as a generator of hazardous wastes (large-quantity/small-quantity/conditionally

exempt) varies from year-to-year, according to the types of remediation activities programmed. According to the IHWMP for the installation, treatment and storage facilities include:

- A heat deactivation furnace (presently being formally closed under RCRA);
- An open burning area (scheduled to begin formal closure under RCRA);
- An open detonation area (presently being formally closed under RCRA);
- A Hazardous Waste Container Storage Unit (Building 1601), for less than 90-day storage of spent activated carbon and explosive ash residue from open burning operations (presently being formally closed under RCRA); and
- Two buildings for less than 90-day storage of hazardous wastes: X232 for explosive-type wastes and W221 for wastes incompatible with explosives.

Operational procedures for the generation, accumulation, and storage of hazardous wastes at the installation are set forth in Procedure ENV-001 (Appendix 2 of IHWMP).

3.13.3 Waste Disposal Methods and Sites

The responsibilities of installation organizations and personnel in generating, transporting, treating and storage of hazardous wastes are set forth in the applicable SOP or Work Safety Plan (WSP) for that activity. Procedures for the inspection of hazardous waste units for malfunctions, deterioration, operator errors, and discharges are set forth in Procedures ENV-002 through ENV-005 (Appendix 3 of IHWMP) (24).

All employees and supervisors involved in hazardous waste handling are to be properly trained on the SOPs and WSPs relating to their jobs. Environmental training requirements are monitored by the MCC Health and Safety Specialist.

The IOC previously submitted a RCRA Part B Interim Permit application to the USEPA and OEPA to cover operation on an interim basis of the installation's interim RCRA disposal sites. During the third quarter of FY94, the IOC determined that closure of the sites was necessary, and the permit application was withdrawn. No RCRA-regulated active hazardous waste disposal sites currently exist at the RTLS.

Off-site disposal of hazardous wastes is arranged by the MCC Environmental Specialist when on-site treatment, re-use, recycling, sale or transfer to the Defense Re-Utilization Mobilization Organization (DRMO) is not feasible. The Environmental Specialist coordinates the collection of information, including arranging for analytical testing if needed, required for characterizing wastes for disposal.

The IOC and OHARNG portions of the installation utilize properly regulated and labeled satellite accumulation areas for hazardous waste accumulation in workplaces. Satellite accumulation containers are utilized until full, and remain in the workplace for a period no longer than 72 hours after becoming full, at which time they are transported to approved storage areas (i.e. central accumulation points) or transported off-site for contractor disposal.

3.13.4 Installation Restoration Program

The purpose of the Army's Installation Restoration Program (IRP) is to identify and investigate chemically contaminated sites at military installations, as regulated under CERCLA (amended by SARA). The need for remedial action or long term monitoring at these sites is be based on the

results of such investigations. As a portion of the IRP, each installation must prepare an Installation Action Plan (IAP) according to a specific format provided in guidance material from the U.S. Army Environmental Center. The IAP for the installation is summarized from a plan level in **Section 3.13.11**. SARA requires the USEPA to identify hazardous waste sites at federal facilities, and to establish the NPL of the most dangerous hazardous waste sites requiring priority for remedial action. Should a federal facility be listed on the NPL, the jurisdictional agency has a six-month period to conduct a Remedial Investigation/Feasibility Study (RI/FS) in consultation with the USEPA to characterize the extent of contamination and to develop appropriate remedial solutions (114). The 20 February 1998 version of the RVAAP IAP indicates that no sites at the installation are eligible for the NPL (28).

The IOC previously submitted a RCRA Part B Interim Permit application to the applicable regulatory agencies to cover operation of the installation's RCRA disposal sites, including Demolition Area #2 (Open Detonation Area), the Hazardous Waste Container Storage Unit (Building 1601), and the open burn trays in the Winklepeck Burning Grounds. During the third quarter of FY 1994, the IOC determined that closure of the sites was necessary, and the permit application was withdrawn. Since that time, building 1601 and the burn trays have been closed under OEPA guidance. The third site, Open Demolition Area #2 will begin RCRA closure pending approval of a revised closure plan (82).

Upon investigation, it was determined that one additional area of concern (AOC), the Deactivation Furnace Area, should undergo closure pursuant to RCRA. This site began closure per its approved closure plan (94) in 1998.

The installation has a total of 51 AOCs, including the four prior-mentioned AOCs, to date. The sites include OB/OD areas, dilution/settling ponds, waste water treatment tanks, landfills/land disposal sites, and other miscellaneous sites. Explosives and metals are the primary contaminants of concern at the property. A RCRA Facility Assessment – Preliminary Review and Visual Site Inspection was performed at the RVAAP in 1989. The draft report of the Facility Assessment identified 31 solid waste management units. A total of 20 additional AOCs have since been added to the list of 31, bringing the total number of AOCs to 51 (106). The areas are identified on **Figure 3-11**. Within these AOCs, contaminated media include soils, ground water, surface water, and sediment. **Table 3-16** presents summary information for the current AOCs at the installation.

The remediation of the areas identified in **Table 3-16** is ongoing, and the remediation status of each site is variable. According to the FY 1998 IAP for the installation, the major remediation activities which have been completed include closure of the Ramsdell Quarry Landfill, removal of a number of underground storage tanks (USTs) (28), and closure of the aforementioned RCRA units, pesticide building, and PCB storage unit.

Past IRP activities or projects include Phase I Remedial Investigations (RI) at eleven of the High-Priority Areas of Concern listed in **Table 3-16**, a Phase II Remedial Investigation (RI) at the Winklepeck Burning Grounds, Relative Risk Site Evaluations (RRSE) of unrated AOCs, and long-term monitoring (LTM) at the closed Ramsdell Quarry Landfill (82). The Phase I RI field sampling for the NACA Test Area (RVAAP-38), Open Demolition Area #1 (RVAAP-03), and the Erie Burning Grounds (RVAAP-02) was completed during the summer and fall of 1999.

Remedial Investigations are proposed for 36 of the 38 AOCs regulated under CERCLA. Winklepeck Burning Grounds (RVAAP-05) and the Mustard Agent Burial Site (RVAAP-28) are currently undergoing Feasibility Studies.

3.13.5 Installation Spill Contingency Plan (ISCP)

As required by the Federal Water Pollution Control Act of 1972 (33 USC §1251 *et seq.*), federal agencies are required to develop a plan for the responsible clean-up of oil and hazardous material discharges. To fulfill this mandate, ISCP has been prepared (29). The ISCP is updated every two years, and includes methodology for response actions to spill and reporting requirements as required under CERCLA (40 CFR 300, 302), CWA (40 CFR 110, 112, 116, 117), and RCRA (40 CFR Part 264, Subpart D). The purpose of the ISCP is to: 1) Clearly outline the responsibilities of on-site management and personnel; 2) List the available resources; and 3) Establish suitable and effective SOPs to be used, to prevent, or to contain and clean up any and all accidental leaks and spills of petroleum products, hazardous materials or hazardous wastes. The ISCP for the installation outlines procedures and responsibilities for implementing accidental discharge responses. These procedures/responsibilities include:

- Notification (by the discoverer) of the appropriate parties in the event of a spill or release;
- Remedial action by the discoverer;
- Activation of the response team;
- Installation On-Scene Coordinator confirmation of a spill or release;
- IOSC direction of initial response;
- IOSC investigation of cause and extent;
- Containment and Countermeasures (the deployment of spill response containment and recovery materials and equipment);
- Clean-up, mitigation, and disposal;
- Post-emergency equipment maintenance and response plan critique;
- Reporting and recording requirements;
- Training requirements; and
- Entry into coordination agreements for emergency services.

The ISCP also includes a Hazardous Material Inventory, indicating the type of material, amount, location(s), reportable quantities (RQs), U.S. Department of Transportation (USDOT) response guide number, and availability of Material Safety Data Sheets (MSDSs). Additional methodologies are specifically outlined for pesticide spill events, and for the construction of earthfill dams and other barriers in the event of a major or acutely hazardous/toxic release. Response actions to spills involve methods and materials identified in emergency response guides, including National Institute for Occupational Safety and Health/Occupational Safety and Health Administration (NIOSH/OSHA) pocket guides and Chemical Hazard Response Information System (CHRIS) guides (DA 1990b).

The purpose of the SPCC plan, which complements the ISCP, is to prevent the accidental discharge of oil or hazardous materials into surface waters and to identify measures to be implemented in the case of an accidental discharge of such materials (32). The requirements for the SPCC plan are mandated and found in Section 311(J)(1)(C) of the CWA and codified under 40 CFR 112. Also addressed are the requirements of RCRA (for hazardous waste), and the RQs of CERCLA for the discharge of hazardous materials.

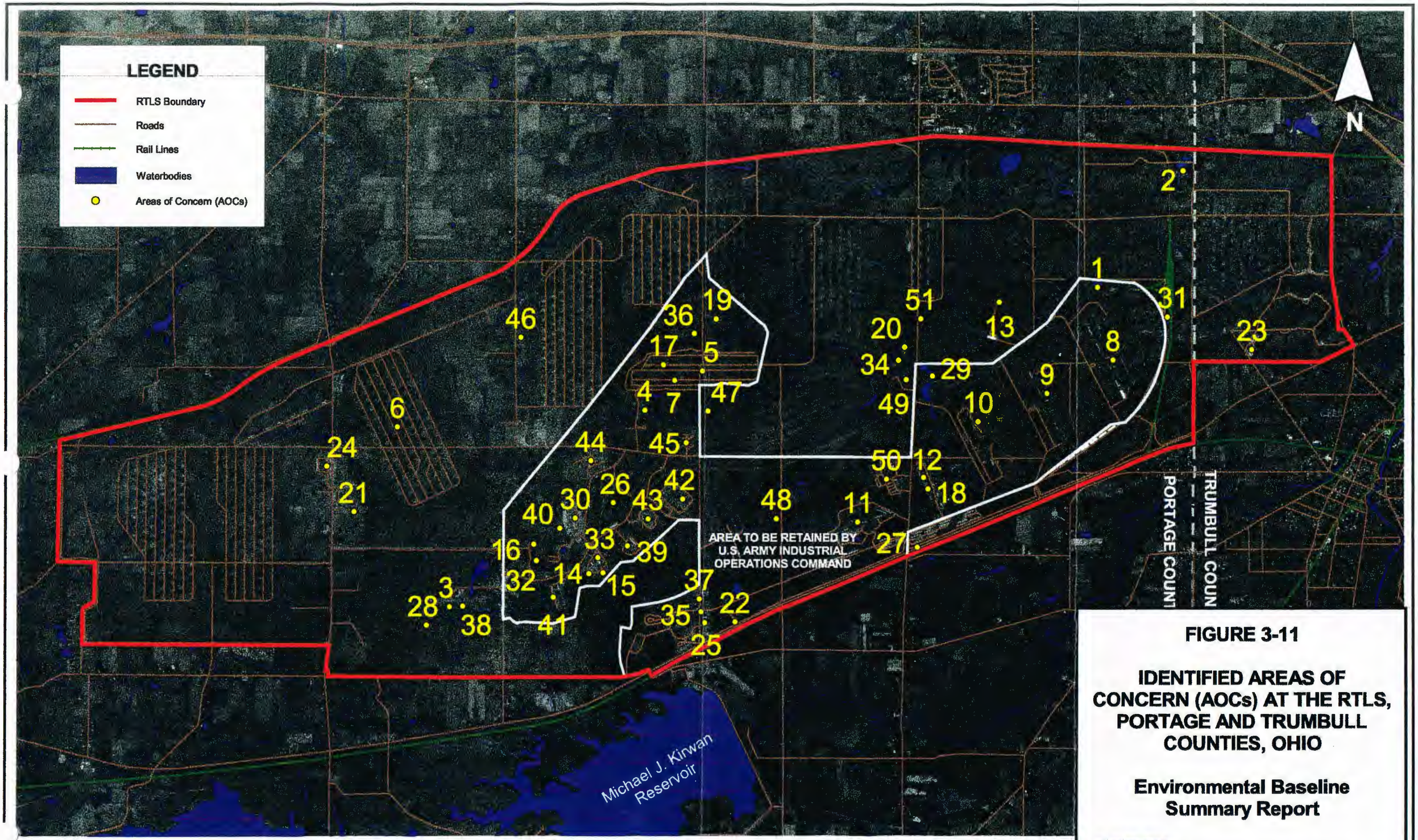

FIGURE 3-11

IDENTIFIED AREAS OF CONCERN (AOCs) AT THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

Environmental Baseline Summary Report

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

Table 3-16 Identified Areas of Concern (AOCs) at the RTLS/RVAAP, Portage and Trumbull Counties, Ohio

AOC Number	Name	Priority Status/ Other	Description, Media of Concern	Potential Contaminant(s)	Regulatory Grouping
01	Ramsdell Quarry Landfill	(a)	Landfill(s), Soils	Explosives, Metals	OEPA, Division of Solid and Infectious Waste
02	Erie Burning Ground	1	Burning Ground(s), Soils	Explosives, Metals	CERCLA
03	Demolition Area #1	1	Burning Ground(s), Soils	Explosives, Metals	CERCLA
04*	Demolition Area #2	1	Burning Ground(s), Soils	Explosives, Metals	CERCLA, RCRA
05*	Winklepeck Burning Grounds	1	Burning Ground(s), Soils	Explosives, Metals, Laboratory Chemicals, Waste Oil	CERCLA, RCRA
06	C Block Quarry	3	Landfill(s), Soils	Metals	CERCLA
07	Hazardous Waste Container Storage Unit (Building 1601)	(a)	Building(s)	Explosives, Metals	RCRA
08	Load Line 1 and Dilution/Settling Pond	1	Surface Impoundment(s), Soils, Sediment(s), Groundwater	Explosives, Metals	CERCLA
09	Load Line 2 and Dilution/Settling Pond	1	Surface Impoundment(s), Soils, Sediment(s), Groundwater	Explosives, Metals	CERCLA
10	Load Line 3 and Dilution/Settling Pond	1	Surface Impoundment(s), Soils, Sediment(s)	Explosives	CERCLA
11	Load Line 4 and Dilution/Settling Pond	1	Surface Impoundment(s), Soils, Sediment(s), Groundwater	Explosives, Metals	CERCLA
12	Load Line 12 and Dilution/Settling Pond	1	Surface Impoundment(s), Soils, Sediment(s)	Explosives, Metals	CERCLA
13	Building 1200 Dilution/Settling Pond	2	Surface Impoundment(s), Soils, Sediment(s)	Explosives, Metals	CERCLA
14	Load Line 6 Evaporation Unit	(a)	Surface Impoundment(s)	Explosives, Metals	CERCLA
15	Load Line 6 Treatment Plant	(a)	Building(s)	Explosives, Metals	NPDES
16	Quarry Landfill	1	Surface Impoundment(s)	Explosives, Metals	CERCLA
17	Deactivation Furnace Area	(a)	Building(s), soils	Explosives, Metals	RCRA
18	Load Line 12 Pink Wastewater Treatment Plant	1	Building(s)	Explosives	NPDES
19	Landfill North of Winklepeck Burning Ground	2	Landfill(s), Soils, Sediment(s), Groundwater	Explosives, Metals	CERCLA
20	Sand Creek Sewage Treatment Plant	(a)	Building(s)	Metals	NPDES
21	Depot Sewage Treatment Plant	(a)	Building(s)	Metals	NPDES
22	George Road Sewage Treatment Plant	(a)	Building(s)	Explosives, Metals	NPDES
23	UTES Waste Oil Tank	2	Tank(s)	Waste Oil	CERCLA, (RCRA if active)
24	Reserve Unit Maintenance Area Waste Oil Tank	3	Tank(s)	Waste Oil	CERCLA, (RCRA if active)
25	Building 1034 Motor Pool AST	3	Tank(s)	Waste Oil	Undefined
26	Fuze and Booster Area Settling Tanks	2	Tank(s)	Explosives, Metals	CERCLA
27	Building 854 PCB Storage	(a)	Building(s)	PCBs	TSCA
28	Mustard Agent Burial Site	3	Landfill(s), Soils	Mustard Agent	CERCLA
29	Upper and Lower Cobbs Pond	1	Surface Impoundment(s), Sediment(s), Groundwater	Explosives, Metals, Aluminum Chloride	CERCLA
30	Load Line 7 Pink Wastewater Treatment Plant	(a)	Building(s)	Explosives	NPDES
31	Ore Pile Retention Pond	(a)	Surface Impoundment(s)	Explosives, Manganese	NPDES
32	40 & 60 MM Firing Range	2	Landfill(s), Soils	Explosives, Metals	CERCLA
33	Firestone Test Facility	1	Soils	Explosives, Metals	CERCLA
34	Sand Creek Disposal Road Landfill	1	Landfill(s), Soils	Asbestos, Metals	CERCLA

AOC Number	Name	Priority Status/ Other	Description, Media of Concern	Potential Contaminant(s)	Regulatory Grouping
35	Building 1037 – Laundry Waste Water Tank	2	Tank(s)	Explosives	CERCLA
36	Pistol Range	2	Landfill(s), Soils	Metals	CERCLA
37	Pesticide Building S-4452	(a)	Building(s)	Synthetic Organic Compounds	RCRA, OEPA, Division of Solid and Infectious Waste, FIFRA of 1972 (40 CFR 165)
38	NACA Test Area	2	Landfill(s)	Petroleum Hydrocarbons	CERCLA
39	Load Line 5/Fuze Line 1	2	Tank(s), Building(s), Soils, Other	Explosives, Propellants	CERCLA
40	Load Line 7/Booster Line 1	2	Tank(s), Building(s), Soils, Other	Explosives, Propellants	CERCLA
41	Load Line 8/Booster Line 2	2	Tank(s), Building(s), Soils, Other	Explosives, Propellants	CERCLA
42	Load Line 9/Detonator Line	2	Tank(s), Building(s), Soils, Other	Explosives, Propellants	CERCLA
43	Load Line 10/Percussion Element	2	Tank(s), Building(s), Soils, Other	Explosives, Propellants, Metals	CERCLA
44	Load Line 11/Artillery Primer	1	Tank(s), Building(s), Soils, Other	Explosives, Propellants	CERCLA
45	Wet Storage Area	2	Building(s), Soils	Explosives, Metals	CERCLA
46	Buildings F-15 and F-16	1	Buildings, Soils	Explosives, Propellants	CERCLA
47	Building T-5301 (Decontamination)	1	Building(s), Soils	Explosives, Propellants	CERCLA
48	Anchor Test Area	2	Soils	Explosives, Propellants, Metals	CERCLA
49	Central Burn Pits	1	Soils	Solvents, Hydraulic Oils, PCBs, Degreasers, Semivolatiles, Metals	CERCLA,
50	Atlas Scrap Yard	2	Soils	Hydraulic Oils, PCBs, PCPs, Degreasers, Semivolatiles, Metals	CERCLA
51	Dump Along Paris-Windham Road	1	Landfill(s)	Asbestos, Metals	CERCLA

NOTES:
*site has both RCRA- and CERCLA-designated components.
1 High-Priority Area of Concern
2 Medium-Priority Area of Concern
3 Low-Priority Area of Concern
(a) Long-term monitoring area/Other area not eligible for IRP funding

A SWPPP has been prepared for all industrial activities at the installation. The plan addresses non-transportation-related activities subject to the NPDES program, such as production, storage, processing, refining, handling, transferring, and distributing hazardous materials. The plan, which is updated every two years, is required by the OEPA through a general stormwater discharge permit. The purpose of this plan is to ensure that BMPs have been developed and implemented to control potential discharge of pollutants, other than sediments, into receiving waters.

3.13.6 Materials and Wastes Present

3.13.6.1 Asbestos

Asbestos is a naturally occurring mineral primarily used in the manufacture of soundproofing, fireproofing, or other interior finishing material. Now considered a hazardous material based on

linkage to asbestosis (lung lining disease), lung cancer, and other diseases, asbestos is regulated under the Asbestos Hazard Emergency Response Act (AHERA), which regulates asbestos in schools and other public facilities, and the National Emission Standards for Hazardous Air Pollutants (NESHAP) program under the CAA which, under USEPA guidelines, regulates emissions from manufacturing operations, building demolitions/renovations, and waste disposal. Asbestos-containing materials previously were heavily used at the RVAAP, as fireproofing was imminently necessary during the periods that the installation was mass-producing explosives.

Pursuant to a site-wide survey for asbestos-containing material (ACM) conducted in CYs 1989 and 1990, all known asbestos-containing materials at the installation have either been specifically documented, sufficiently encapsulated so as not to pose a risk to human health or welfare, or removed from the premises in accordance with state and federally-regulated abatement procedures. Documented areas of ACM have subsequently been prioritized for removal, as detailed in the Installation Asbestos Management Plan for the installation (24). The following management plan is currently used with regard to asbestos removal and management procedures:

Installation Asbestos Management Plan (IAMP) – The IAMP for the installation is part of a combined Installation Hazardous Waste Management Plan and Asbestos Management Plan prepared by the MCC for the facility (24). The development and implementation of the IAMP is required by AR 200-1, with the goal of ensuring that all asbestos repair, removal, and disposal of asbestos is conducted in accordance with all federal, state, and Army regulations through established asbestos management procedures (24). These procedures are detailed in the IAMP, and have been prepared pursuant to: 40 CFR Part 61, Subpart M; OAC 3745-20-01 through 3745-20-08, Occupational Safety and Health Administration (OSHA) regulations; and OAC 3701-34, as well as applicable local asbestos regulations. Annual follow-up inspections to identify and report damage and/or deterioration of ACM at the RTLS are performed pursuant to AR 200-1.

3.13.6.2 Radon

The Radon Gas and Indoor Air Quality Research Act of 1986 (42 USC §7401) underlies USEPA regulations on indoor levels of radon affecting air quality. The Army Radon Reduction Program (ARRP) outlines radon monitoring guidelines established by the EPA, and calls for radon abatement procedures when radon levels are higher than the established limit.

A radon gas survey has never been completed for the structures at the RTLS (194). It is recommended that such a survey be completed, and a radon gas management plan based on the survey findings be prepared in the near future. Such a plan should be complied with prior to and during renovations to occupied, or potentially to-be occupied, structures.

3.13.6.3 Lead Paint

A lead abatement survey has never been completed for the structures at the RTLS (194). As most structures are WWII-era, it is expected that many will have significant quantities of lead-based paint. It is recommended that such a survey be completed, and a lead-based paint management plan based on survey findings be prepared pursuant to the Lead Contamination Control Act of 1988 (42 USC § 300j-21 to 300j-25) and the Lead Exposure Reduction Act of 1992 (15 USC §2681 *et seq.*). Such a plan should be adhered to prior to and during renovations to occupied, or potentially to-be occupied, structures. Subsequent renovation wastes should be properly disposed of after determination (through laboratory analysis) of the quantity of lead in the paint.

3.13.6.4 Polychlorinated Biphenyls (PCBs)

Pursuant to TSCA, PCBs previously have been identified at the RTLS in certain electrical equipment, typically transformers. However, it is on-going policy to survey potentially PCB-contaminated areas and to remove confirmed PCBs in areas or in electrical equipment. Transformers are sampled and generally are removed if they are classified as PCB transformers (1,000 parts per million [ppm] of PCBs in the cooling fluid). PCB-contaminated transformers (500 ppm of PCBs, or cooling fluid half-filled with PCBs) are usually retrofitted if the transformers are leaking or are in need of repair (24).

All known in-use PCB equipment at the RTLS, including transformers, either have been taken out of service or replaced with non-PCB equipment prior to 31 December 1996, as indicted in a memorandum prepared by the MCC dated 3 June 1997. The memorandum also indicated that an on-site PCB storage area was thoroughly cleaned and contaminated materials were disposed of by transportation to an off-site disposal facility (67).

The USEPA conducted a PCB compliance inspection, pursuant to TSCA and applicable regulations, of the installation on 6 November 1995. No violations of federal PCB regulations were identified at the time of the inspection. The OHARNG's policy is to place top priority for PCB surveys on those buildings which they intend to occupy in the immediate future.

3.13.6.5 Radioisotopes

Use and disposal of radioactive materials, as well as remediation of radiologically-contaminated areas, is regulated primarily in accordance with 10 CFR 0-199 under the jurisdiction of the Nuclear Regulatory Commission (NRC), 40 CFR 190-192 under the jurisdiction of the USEPA, and 49 CFR 171-179 under the jurisdiction of the U.S. Department of Transportation.

In correspondence dated 25 July 1990, the IOC provided information to the USEPA regarding the use and fate of radiological materials which had been used and/or stored at the facility. The correspondence indicates that there were two time periods when radiological materials were stored and/or used at the RVAAP. During the first period, from 1969 to 1972, a total of three Cobalt-60, solid radiographic sources were used for quality assurance processes to determine uniformity of solidified explosives following melt pour into military projectiles. During the second period, from the late 1950's or early 1960's until June 1974, the General Services Administration (GSA) stored monazite ore at the RVAAP. The ore was a low specific-activity material which generated a radiological characteristic from the naturally-contained thorium constituents contained within (72).

The three Cobalt-60 sources were returned to their licensed owner upon discontinuance of their use at the RVAAP. After being declared excess by the GSA, the monazite ore was removed from the property and exported to Holland under an Atomic Energy Commission (AEC)-licensed transaction. The storage containers at the property were subsequently decontaminated, with products of contamination removed from the premises and shipped off-site to an approved disposal facility (72).

3.13.7 Ordnance Use and Disposal

With the current IOC mission, the facility stores considerable quantities of propellants, high explosives, and pyrotechnics. There are approximately 1,000 ammunition storage bunkers located at the RTLS.

The installation is presently in a Modified Caretaker status, with storage being the only active mission. However, the RTLS may, in special instances, be requested to assist the U.S. Army EOD or the ATF in the storage or treatment of explosive hazardous wastes. Such treatments may involve demilitarizing, disarming, or deactivating explosive devices by OB/OD.

OB/OD is used as a means of demilitarizing explosive items, decontaminating large metal objects, and reducing most combustibles to a smaller volume. OB/OD is normally the safest method currently available for the effective destruction, decontamination, and treatment of explosives and explosive wastes.

Such activities are conducted according to strict procedural guidelines at established burning grounds or disposal areas. The *Final Report - Air Pollution Emission Statement for Ravenna Army Ammunition Plant, Ohio*, dated 23 September 1994 (19) states that open burning was conducted in 1993. Review of Table N-1 in that document provides information on the dates, materials, and quantities burned at the facility during that time period. Hazardous materials generated by OB/OD are disposed of in accordance with installation policy and RCRA regulations.

3.13.8 Aboveground Storage Tanks (ASTs)

In correspondence dated 10 April 1996, the MCC for the RVAAP indicated that five ASTs were present in IOC-controlled portions of the property (74). In addition, one AST is currently used at the OHARNG UTES for storage of fuel oil for heating purposes. This tank has been determined to be in compliance with applicable regulations (178). No AST-related contamination is currently known in either the IOC or OHARNG-controlled portions of the facility, and thus no remediation is pending.

3.13.9 Underground Storage Tanks (USTs)

Between 4 June and 15 November 1991, a private contractor removed USTs from various power stations, fire stations, and fueling stations throughout the property. The tanks previously had been used to store gasoline, #2 fuel oil and #5 heating oil. The tanks were removed according to standard UST removal procedures. On-site soil sampling and subsequent analysis was conducted, and 1,457.4 tons of contaminated soils were disposed of between the dates of 15 August 1991 and 20 November 1991 according to applicable regulations (43).

In correspondence dated 10 April 1996, the MCC for the property indicated that a single UST, as regulated under 40 CFR 280 (requirements for the design, performance, and monitoring of both new and existing USTs), remained in the IOC-controlled portions of the facility (74). This UST was scheduled for removal prior to the 22 December 1998 deadline mandated in 40 CFR Part 280.

One 1,000-gallon fuel oil tank is currently utilized at the UTES facility in TA C. This tank has been determined to be in compliance with applicable regulations (178).

No existing UST-related contamination is currently known at the RTLS, and at this time, all known USTs on-site not in compliance with 40 CFR Part 280 have been removed.

3.13.10 Pollution Prevention Programs and Plans

Pollution Prevention is an extension of the Army's Hazardous Waste Minimization (HAZMIN) Program, covering ARNG activities such as manufacturing, testing, maintenance, research and development, and medical surveillance. Pollution prevention encompasses a broader spectrum than HAZMIN, striving to reduce all types of waste from installations. Applicable regulations include:

- ***Pollution Prevention Act of 1990 (PPA; 42 USC §13101-9)*** – establishes a national policy that, wherever feasible, source reduction must be used as the primary method of preventing pollution. Where not possible, recycling pollutants, treating pollutants, and disposing of pollutants must be considered sequentially.

- ***Emergency Planning and Community Right to Know Act OF 1986 (EPCRA; 42 USC §11011) (or Title III of SARA; 40 CFR Parts 300, 370-373)/EO 12856 (3 August 1993)*** – the four sections of EPCRA establish programs to provide the public with information on the hazardous and toxic chemicals in their communities and requires emergency planning and notification programs to protect the public in the event of a potentially dangerous release. EPCRA also requires certain facilities to prepare an annual report that lists the amount of certain chemicals treated/recycled on-site, transferred off-site, or released to the environment. Under EPCRA, the ARNG must reduce, using source reduction practices, by 50 percent the total releases and off-site transfer of toxic chemicals by 31 December 1999 from CY 94 levels.

- ***DA/ARNG Program*** – policy that pollution be prevented or reduced at the source, where possible, or follow the pollution prevention hierarchy of the PPA, as appropriate. Chapter 10 of AR 200-1 also addresses pollution prevention by emphasizing use and contamination reduction and resource conservation. Under these policies, all Army and ARNG installations are required to:

  - develop a pollution prevention program;
  - develop, implement, and update a pollution prevention plan; and
  - proactively consider cost-effective pollution prevention in all planning.

In relation to achieving the required pollution prevention goals as outlined above, the OHARNG will incorporate the principles, techniques, and mechanisms of pollution prevention into the scoping and planning stages of any action considered at the RTLS, as well as components of mitigation. The overall goal will be to minimize pollution generated by or in association with any project the OHARNG may consider in accordance with the PPA, EPCRA, and ARNG policy (i.e., AR 200-1). The following management plans are and/or may be used in the administration of pollution control/prevention and hazardous waste program administration; plans previously summarized in this document are referenced by title only:

Pollution Prevention Plan (PPP)

Environmental Management Plan (EMP)

Installation Action Plan (IAP)

Installation Asbestos Management Plan (IAMP)

Installation Hazardous Waste Management Plan (IHWMP)

Installation Hazardous Waste Minimization (IHWM) Plan – The IHWM Plan for the installation was produced in 1994, as part of a joint hazardous waste minimization plan and pollution prevention plan by the MCC (34a). The purpose of this joint plan was to provide the installation with a specific plan of action to: 1) reduce the installation's generation of hazardous wastes, and; 2) to reduce pollution releases from the installation. The plan covers all hazardous wastes regulated by RCRA regulations and state equivalent rules, multi-media pollution releases, and all used oils not destined for recycling that have been generated as a result of activities at the property.

Installation Spill Contingency Plan (ISCP)

Integrated Solid Waste Management Plan (ISWMP)

Ramsdell Quarry Landfill Groundwater Monitoring Plan – This monitoring plan was prepared in 1992 for the closed Ramsdell sanitary landfill, located in the northeast section of the property (115). The purpose of this plan is to describe the appropriate action that should be taken in the event that leachate or leachate-derived materials are detected in statistically-significant levels in the groundwater present in Ramsdell Quarry landfill monitoring wells. As such, a portion of this plan is an action plan, to be implemented only under certain conditions. The other portion of this plan defines the specific measures required for properly monitoring the water in the wells. The wells are currently monitored semiannually for a suite of parameters pursuant to the monitoring plan and OAC 3745-27-10 (D) (1) and Appendix I of OAC 3745-27-10.

Stormwater Pollution Prevention Plan (SWPPP)

Spill Prevention Control and Countermeasures (SPCC) Plan

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4.0 SUMMARY OF FINDINGS

The completion of this EBSR constitutes fulfillment of Phase I of the OHARNG's three-phased approach to the long-term planning of military training at the RTLS. This phased approach is in full compliance with NEPA; CEQ Regulations; and ARs 200-1 and 200-2. Phases II and III will include: development and definition of a specific set of proposed actions, drawn from the RPMP and RDP recommendations, that will allow the conduct of required OHARNG training at the installation while minimizing environmental impact; and preparation of a consequent Environmental Assessment (EA) that identifies and documents the potential environmental, cultural, and socioeconomic impacts associated with the implementation of the proposed actions.

The overall goal for this product was to provide the OHARNG with the information necessary to prepare and evaluate the most environmentally-sensitive long-range plan possible, while still achieving mission and planning objectives. The data contained in this EBSR will serve as the foundation for this future environmental review and analysis.

4.1 Key Environmental Issues, Opportunities, and Constraints

The RDP for the RTLS initially identified four key items that limit OHARNG use of the RTLS. These key items are:

- Lack of areas available for live-fire training;
- Overall presence of numerous HE storage areas;
- Presence of wetlands over a great deal of the installation; and
- Potential for soil erosion.

During preparation of this EBSR, Ogden identified additional key items that have the potential to limit the use of the installation for military training. Items identified during Ogden's review include:

- Special Status Species
- Wetlands
- Cultural Resources
- HE Storage Areas
- AOCs

Fulfillment of Phase II for long-term planning at the RTLS includes development and definition of a specific set of proposed actions that will allow the conduct of required OHARNG training at the RTLS while minimizing environmental impact. For the fulfillment of this subsequent phase, it is necessary to implement an effective environmental resources constraints analysis, including production of constraints mapping. However, in order to conduct an adequate constraints analysis, several of the identified key items limiting development first require further study.

It should be emphasized that accurate and thorough coverage of these items on a primary level is critical in order to allow for: 1) efficient secondary analysis during planning phases (i.e., production of constraints mapping), and 2) reliable and effective tertiary analysis during the NEPA process.

Although the limiting items which have been identified may potentially be difficult to avoid, accurate constraints analysis planning, as well as close coordination between OHARNG environmental personnel and trainers, will likely identify opportunities for conducting effective, quality military training while minimizing environmental impact. These limiting items, as well as suggested courses of action to address them, are summarized below:

- **Special Status Species**

While no federally-listed species have specifically been documented to exist at the RTLS, a number of 'special status' species are known to occur at the installation. Should the designation of such 'special status' species be upgraded to federal protection under the ESA, management of these species would need to be specifically addressed pursuant to applicable requirements. The ESA dictates that federal actions should not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. In addition, NEPA review and consideration of state-listed species (i.e., 'special status' species) is required per Section 5-3(q) of AR 200-2.

If federally-listed threatened or endangered species are discovered at the installation, a threatened and endangered species management plan must be prepared for the facility.

Impacts to special status species and potential habitats are often difficult to mitigate, and should be avoided if possible. With the above considerations in mind, it is imperative that special status species, as well as all known and potential habitats for such species, be thoroughly and accurately documented and mapped for the RTLS in order to conduct effective planning and constraints analyses, as well as to maintain the integrity of subsequent NEPA analyses.

- **Wetlands**

As wetlands are believed to occur over a great deal of the installation, ability to conduct certain types of military training may be compromised in some areas. Heavy maneuver training, road-building, and other types of training involving land clearing activities or excavation are not conducive to maintaining wetlands. Strict wetland management is mandated by Sections 401 and 404 of the CWA, EOs 11988 and 11990, and AR 200-2.

Impacts to wetlands are typically difficult and costly to mitigate, and should be avoided if at all possible. It is essential that the pending facility-wide wetland delineation and management plan be completed, as accurately and thoroughly as possible. Accurate data on wetland locations at the installation, as well as an effective management plan and habitat ranking system will be necessary to conduct constraints, planning, and NEPA analyses. This data will also allow for efficient short-term, small-scale planning and actual in-field training with regard to wetland recognition and avoidance.

- **Cultural Resources**

Cultural resources are present in various areas throughout the property. In order to produce a sufficient database to conduct constraints analysis, areas of cultural resources must be documented and preserved as appropriate. In assuming management responsibility for portions of the installation, the OHARNG should adopt, in its entirety, the CRMP prepared for the RVAAP (17), as the CRMP is to be used by the OHARNG in managing cultural resources at the RTLS in accordance with applicable regulations.

The CRMP provides a number of recommendations for screening of areas being considered for development at the installation. These recommendations include: 1) Use of the prehistoric cultural resource sensitivity model and the mapping of known historic sites provided in the CRMP as a planning or screening tool when proposing new earth-disturbing activities at the property; 2) Adhering to the recommendations for further survey, testing, and mitigation of archaeological resources set forth in the CRMP (in accordance with applicable regulations) prior to initiating earth-disturbing activities in areas potentially containing cultural resources; and 3) On OHARNG managed lands, progressing the eligibility determinations, and potentially mitigation, of previously identified archaeological sites and consult with the OHPO and ACHP, as appropriate, prior to initiating earth-disturbing activities in these areas. Further recommendations for implementation of the CRMP are included in **Section 4.2**.

It should be emphasized that although a comprehensive Phase I cultural resource investigation of all 21,419 acres of property at the installation is likely not cost-effective, preliminary constraints analyses using the prehistoric cultural resources sensitivity model and other existing cultural resources data will help to determine areas where cultural resource surveys are needed.

- **HE Storage Areas**

The presence of HE storage areas over certain portions of the installation likely will limit the types of training that the OHARNG will be able to conduct at the RTLS. Certain regulations prohibit various types of activities around or near areas of explosives storage. For example, Department of Defense Explosives Safety Board (DDESB) specifications mandate that a 0.5-mile unoccupied safety radius be maintained around ammunition and explosives storage areas (DoD 6055.9). In addition, Army (and ARNG) regulations impose a 3,500-foot safety arc for active ammunition storage facilities, which prohibits any armed aircraft from entering that restricted air space (DoD 6055.9). Currently, this type of restriction does not apply at the RTLS, as armed aircraft do not operate in the area. However, it should be noted that while ammunition storage facilities continue to be active at the installation, armed aircraft will continue to be prohibited within the safety arc, subsequently eliminating the potential at this point for a live-fire air-to-ground range.

Other live-fire activities, such as small arms ranges, may potentially be feasible for establishment at the RTLS. However, analysis of all applicable regulations and safety considerations regarding ammunition and explosives storage should be conducted during the planning process for establishment of such live-fire areas, as well as prior to construction of structures in the vicinity of these storage sites.

Figure 4-1 provides a graphical summary of the quantity-distance (QD) arcs currently in place at the installation. In the utilization of the QD relationship, the usable distance within certain radii of HE storage areas is dependent upon the quantity of HE stored in those areas. Subsequently, only certain activities may take place within certain radii (arcs). The maximum QD radius at the installation if 3,150 feet. QD arcs at the RTLS are defined below:

- Inhabited Building Distance (IBD) – No occupied buildings or bivouacking permitted within IBD; unprotected training permitted outside of IBD and inside IBD outside of Public Traffic Route Distance (PTRD);
- PTRD – Only training within armored vehicles is permitted between PTRD and Unbarricaded Intraline Distance (UID);
- UID – No training is permitted within UID.

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LEGEND

- RTLS Boundary.shp
- Roads.shp
- Rail Lines
- Inhabited Building Distance
- Public Traffic Route Distance
- Unbarricaded Intraline Distance

AREA TO BE RETAINED BY
U.S. ARMY INDUSTRIAL
OPERATIONS COMMAND

Michael J. Kirwan Reservoir

rtlsbase.apr 1/2000 JGM

1 0 1 2 3 4 5 Miles

FIGURE 4-1

QUANTITY-DISTANCE RELATIONSHIPS FOR EXPLOSIVES STORAGE AREAS THE RTLS, PORTAGE AND TRUMBULL COUNTIES, OHIO

Environmental Baseline Summary Report

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

- **AOCs**

The presence of 51 known AOCs at the installation, as well as the potential for discovery of future AOCs, is a limiting factor for development of OHARNG training areas at the installation.

AOCs may prevent training in certain areas for reasons of general contamination, risks to health and safety, compromising of remediation status, or risk of spreading contamination to other areas.

Any proposed OHARNG training area(s) should be screened for potential contamination, using procedures established in the Installation Restoration Program IAP, site health and safety plans, and other guidance materials for the RTLS. In the interim, the IAP should continue to be followed for discovering additional AOCs and for remediation of areas of known contamination.

Information collected regarding presence or absence of contaminants should be incorporated into the screening and constraints analyses for development of OHARNG training areas at the RTLS, as applicable.

4.2 Existing Data Needs and Recommended Future Actions/Studies

The following action items are recommended for implementation by the OHARNG. Completion of these action items will facilitate transition of property management at the RTLS, as well as facilitate future planning and analyses. It should be noted that this list is not all-inclusive; other items may arise during preparation of subsequent NEPA documents for the RTLS.

4.2.1 Compliance Action Items

- **Air Quality – Prepare a Risk Management Plan**

A separate portion of the CAAA required the USEPA to produce regulations to prevent accidental releases of regulated substances and reduce the severity of those releases that do occur. The final rule for the Accidental Release Prevention Requirements: Risk Management Programs under CAAA Section 112(r)(7) was published in 1996. The intent of Section 112(r) is to prevent accidental releases to the air and to mitigate the consequences of such releases by focusing prevention measures on chemicals that pose the greatest risk to the public and the environment. Under these requirements, industry (and government) has an obligation to prevent accidents and operate safely. Information is summarized to fulfill these requirements in a Risk Management Plan (RMP). Facilities are required to file RMPs by June 1999. As a federal facility, the RTLS may be subject to Section 112(r)(7) requirements. An assessment of the RTLS facilities and operations with respect to these requirements should be initiated in the near future.

- **Noise – Prepare an Environmental Noise Management Plan (ENMP)**

The IOC produced an ICUZ study for the RVAAP in 1988 and the OHARNG is currently in the process of producing an ENMP, as required by military regulations. The ENMP program requires quantification of the existing and future noise environment; coordination with state, regional, and local planning and zoning agencies; and exploration of possible mitigation measures to reduce noise impacts. The existing ICUZ study conducted in 1988 for the RVAAP indicates that a number of noise generating sources exist at the installation, as detailed in **Section 3.5.2**. However, the existing ICUZ is not likely compatible with potential future OHARNG actions at

the installation. As such, it is recommended that the pending ENMP for the RTLS be completed in the near future, and include potential future OHARNG activities.

- **Radon – Conduct a Radon Gas Survey and Prepare a Radon Gas Management Plan**

A radon gas survey pursuant to 42 USC §7401 and ARRP guidelines has never been completed for the structures at the RTLS. It is recommended that such a survey be completed, and a radon gas management plan based on the survey findings be prepared in the near future. Such a plan should be complied with prior to and during renovations to occupied, or potentially to-be occupied, structures.

- **Lead – Complete a Lead Abatement Survey and Prepare a Lead-based Paint Management Plan**

A lead abatement survey has never been completed for the structures at the RTLS. As most structures are WWII-era, it is expected that many will have significant quantities of lead-based paint. It is recommended that such a survey be completed, and a lead-based paint management plan based on survey findings be completed pursuant to the Lead Contamination Control Act of 1988 (42 USC § 300j-21 to 300j-25) and the Lead Exposure Reduction Act of 1992 (15 USC §2681 *et seq.*). Such a plan should be adhered to prior to and during renovations to occupied, or potentially to-be occupied, structures. Subsequent renovation wastes should be properly disposed of after determination (through laboratory analysis) of the quantity of lead in the paint.

4.2.2 Natural and Cultural Resource Inventory and Management Action Items

- **Soils – Prepare a Soils Mitigation Plan**

Land reclamation and supplemental seeding for erosion control purposes is currently accomplished by implementing the guidelines for soil erosion management included in the installation INRMP (64), as well as a generic soils mitigation plan included as an appendix to an EA produced by the OHARNG in 1997 (47a). Supplemental planting and seeding for other purposes is accomplished by means outlined in Part II, Section B of the INRMP (1995). It is recommended that an OHARNG-specific soil erosion minimization plan/soils mitigation plan, with appropriate BMPs specific for OHARNG activities, be prepared for the RTLS. It is also understood that a digital update to NRCS soil survey information for the RTLS is pending; this information will greatly enhance resource protection and conservation measures at the installation.

- **Aquatic Biology – Complete Pending Studies**

Aquatic biological resources have been identified, to a minimal extent, during surveys by the OEPA–DSW–EAU. However, many of the streams, lakes, and other aquatic areas within the installation have not been characterized in terms of aquatic biological resources. Preparation of an Invertebrate Community Index for selected streams and aquatic areas has been completed; other components of aquatic community characterization at the RTLS are still pending. It is recommended that the OHARNG ensure that these studies are completed, and their associated reports are produced.

- **Wetlands – Complete Pending Watershed Management Plan**

As wetlands are a dominant feature of the landscape at the RTLS, and may potentially account for 70 to 80 percent of the land area, it is extremely important that accurate wetland mapping is completed and wetland acreage calculated. Strict wetland quantification and management is mandated by Sections 401 and 404 of the CWA, EOs 11988 and 11990, and AR 200-2. As such, a facility-wide watershed management plan is pending. The OHARNG anticipates that in addition to wetland quantification, the study will provide a management plan for wetlands within the installation, including identification of areas with potential for development, areas recommended for special preservation, and areas with potential for mitigative improvement. It is recommended that the OHARNG ensure preparation of the watershed management plan is completed, placing special emphasis on accuracy of ground-truthing, integrity of GIS work products, and construction of management guidelines which present scientifically-valid value or quality ratings for wetland habitat areas.

- **Cultural Resources – Implement Cultural Resources Management Plan**

The OHARNG should, in assuming responsibility for portions of the property: 1) Adopt and/or update, in its entirety, the CRMP prepared for the RVAAP (17), as the CRMP is to be used by the OHARNG in managing cultural resources at the RTLS in accordance with applicable regulations; 2) Use the prehistoric cultural resource sensitivity model and the mapping of known historic sites provided in the CRMP as a planning or screening tool when proposing new earth-disturbing activities at the RTLS; 3) Adhere to the recommendations for further survey, testing, and mitigation of archaeological resources set forth in the CRMP (in accordance with applicable regulations) prior to initiating earth-disturbing activities in areas potentially containing cultural resources; 4) On OHARNG managed lands, progress the eligibility determinations, and potentially mitigation, of previously identified archaeological sites and consult with the OHPO and ACHP, as appropriate, prior to initiating earth-disturbing activities in these areas; 5) Follow the recommendations for NAGPRA consultation as specified in the Collections Summary for Ravenna Army Ammunition Plant, Ohio (112) should traditional cultural resources be identified on OHARNG managed lands at the RTLS; and 6) Work with the IOC, or allow the IOC to proceed independently, in addressing and resolving outstanding issues with the OHPO and the ACHP related to the Stone Arch Bridge (POR-288-8).

4.2.3 Data Management Action Items

- **Develop a Comprehensive Geographic Information System (GIS) Database**

Construction of a comprehensive GIS database would greatly enhance the efficiency of planning-level activities at the RTLS. It is understood that the OHARNG currently maintains a GIS database at OHARNG headquarters in Columbus, Ohio; however, an analogous GIS system for operations at the RTLS would allow for close coordination with training activities and minimization of impacts to environmental resources. It is also recommended that the OHARNG ensure the all future environmental resources work products include production of usable and accurate GIS data; accuracy of information should be emphasized to contractors and/or preparers.

4.2.4 Plan Adoption Action Items

- **Adoption of IOC Documents/Plans Specific to Land Use, Environmental Compliance, and Resource Management**

Many of the IOC-prepared documents detailed in **Section 3.3.5** and elsewhere in this EBSR will continue to be applicable, though control of most areas of the property has been transferred to the OHARNG. It is recommended that the OHARNG adopt the following documents/plans, whole or in part (recommended modifications are footnoted):

- Agricultural Lease Program (ALP)
- Cultural Resources Management Plan (CRMP)
- Environmental Management Plan (EMP)
- Fish and Wildlife Management Plan (FWMP)
- Installation Asbestos Management Plan (IAMP)
- Installation Action Plan (IAP)
- Installation Hazardous Waste Management Plan (IHWMP)
- Installation Hazardous Waste Minimization (IHWM) Plan
- Installation Spill Contingency Plan (ISCP) [12]
- Integrated Natural Resources Management Plan (INRMP)
- Integrated Pest Management Plan (IPMP)
- Integrated Solid Waste Management Plan (ISWMP)
- Pollution Prevention Plan (PPP)
- Spill Prevention Control and Countermeasures (SPCC) Plan [13]
- Stormwater Pollution Prevention Plan (SWPPP)
- Timber/Forestry Management Plan [14]

4.2.5 Intergovernmental and Interagency Cooperation Action Items

- **Further identification/delineation of AOCs**

Although it is understood that the investigation of potential AOCs, as well as the characterization and remediation of existing AOCs will continue to fall under the jurisdiction of the IOC, the OHARNG should cooperate fully with such efforts in regard to AOC access, scheduling of military training, and establishment of existing and future procedures for AOC management.

- **Coordination with local planning agencies/jurisdictional authorities**

The OHARNG should coordinate its planning for future activities with local planning agencies, regulatory agencies, and jurisdictional authorities to the extent possible, in order to minimize potential conflicts with adjacent landowners and the general public.

[12] The existing IOC-prepared ISCP Plan should be revised to include OHARNG activities, and should more thoroughly address ARNG, federal, state, and local regulatory drivers.

[13] The existing IOC-prepared SPCC Plan should be revised to include OHARNG activities, and should more thoroughly address ARNG, federal, state, and local regulatory drivers.

[14] The Timber/Forestry Management Plan for the RVAAP/RTLS should continue be comprehensively updated regularly, as required by AR 200-3.

4.3 Conclusion

Since accountability for a large portion of the property has been transferred from IOC to the OHARNG, the continuation of responsible management of the property, in terms of providing quality military training while operating among valuable environmental resources, is a matter of preeminent importance. As this EBSR constitutes fulfillment of the first phase of the OHARNG's three-phased approach to the long-term planning of military training at the RTLS, the importance of Phases II and III should be emphasized, and the proper conduct and implementation of the NEPA process will allow for sufficient and objective evaluation of long-range planning with regard to environmental resources.

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173	U.S. Department of the Interior, Fish and Wildlife Service. National Wetlands Inventory. Set of 3 mylar maps – Ravenna, OH, Windham, OH, and Newton Falls, OH. Scale 1:80,000. April 1977.
174	U.S. Department of the Interior, Fish and Wildlife Service. National Wetlands Inventory. Set of 3 blueline maps – Ravenna, OH, Windham, OH, and Newton Falls, OH. Scale 1:80,000. April 1977.
175	United States Geological Survey. 7.5 minute quadrangle maps (set of 3). Ravenna, OH, Windham, OH, Newton Falls, OH. Scale 1:24,000. Circa 1977-1979.
176	United States Geological Survey. Mylar composite of USGS 7.5 minute quadrangle maps – Ravenna, Windham, Newton Falls. Scale 1:24,000. Circa 1979.
177	Wilson Surveying and Mapping. Ravenna Arsenal Lands. Property Encroachments. Scale 1"=400'. Orig. – August 1994. Rev. 22 August 1997.

5.3 Agencies, Organizations, and Individuals Contacted

178	Ohio Army National Guard. Personal Communications with LTC Thomas A Tadsen. July 1998-January 2000.
179	Ohio Department of Natural Resources, Division of Wildlife. 1840 Belcher Drive, Columbus, Ohio 43224-1329. Mr. Michael J. Budzik, Chief. Mr. Robert Fletcher, Environmental Specialist.
180	Braceville Township Zoning Commission. Personal communication with Eugene Henry, Braceville Township Zoning Commission Chairman. 8 October 1998.
181	Ravenna Township Zoning Commission. Personal communication with George Blineberry, Ravenna Township Zoning Inspector. 14 October 1998.
182	Ohio Environmental Protection Agency, Division of Surface Water, Ecological Assessment Unit. 1685 Westbelt Drive, Columbus, Ohio 43228. Mr. Dennis Mishne, Aquatic Biologist.
183	Ohio Environmental Protection Agency, Division of Drinking and Ground Waters, Northeast District Office. 2110 East Aurora Road, Twinsburg, Ohio 44087. Ms. Leslie Otten. Ms. Eileen Moore.
184	Ohio Environmental Protection Agency, Division of Air Pollution Control. Northeast District Office. 2110 East Aurora Road, Twinsburg, Ohio 44087. Mr. Bob Goulish.
185	Ohio Department of Natural Resources, Department of Natural Areas and Preserves. 1889 Fountain Square, Columbus, Ohio 43224. Mr. Donald C. Anderson, Director. Ms. Treva J. Knasel, Ecological Analyst.
185a	Ohio Emergency Management Agency, Columbus, Ohio. Personal Communication with Mr. Steve Rosner. 7 January 2000.
186	United States Department of the Interior, Fish and Wildlife Service, Ecological Services. 6950 Americana Parkway, Suite H, Reynoldsburg, Ohio, 43068-4132. Mr. Kent E. Kroonemeyer, Supervisor.
187	Trumbull County Planning Commission, Trumbull County, Ohio. 347 North Park Ave.,

	Room 201, Warren, Ohio 44481. Mr. Ed Lander, Deputy Director.
188	Portage County Regional Planning Commission, Portage County, Ohio. 128 North Prospect Street, Ravenna, Ohio 44266. Ms. Lynne Erickson, Director. Ms. Tracy Dillman Kulikowski, Comprehensive Planner.
189	Akron Metropolitan Area Transportation Study. 806 CitiCenter/146 S. High Street, Akron, Ohio 44308-1423. Mr. Thomas G. Koch, Planner.
190	U.S. Army Corps of Engineers, Louisville District. 600 Martin Luther King, Jr. Place, Louisville, KY 40201-0059. Personal Communications with Mr. John Jent, P.E., Civil-Environmental Engineer.
191	U.S. Army Corps of Engineers, Pittsburgh District. William S. Moorhead Building, 1000 Liberty Avenue, Pittsburgh, Pennsylvania 15222-4186. Mr. George Kusko.
192	U. S. Department of Agriculture, Natural Resources Conservation Service, Portage County, Ohio. 6970 State Route 88, Ravenna, Ohio 44266. Mr. Edward G. Moon, District Conservationist.
193	U.S. Army Industrial Operations Command, Ravenna Army Ammunition Plant. 8451 State Route 5, Ravenna, Ohio 44266-9297. Personal communication with Mr. Tim Morgan, Natural Resources Manager.
194	U.S. Army Industrial Operations Command, Ravenna Army Ammunition Plant. 8451 State Route 5, Ravenna, Ohio 44266-9297. Personal communication with Mr. Mark Patterson, Environmental Coordinator.

6.0 APPENDICES

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APPENDIX 1 – Copies of Formal Consultation Letters

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OHIO
Department of Natural Resources

Division of Wildlife

George V. Voinovich • Governor
Donald C. Anderson • Director

1840 Belcher Drive, Columbus, Ohio 43224-1329 • 614-265-6300 • Michael J. Budzik, Chief

RECEIVED
BY JM DATE 9/30/98

September 28, 1998

John McMillen
Ogden Environmental & Energy Services
38 Triangle Park Dr., Suite 3805
Cincinnati, OH 45246

RE: Consultation for Ravenna Army Ammunition Plant
Portage & Trumbull Counties, Ohio

Dear Mr. McMillen:

As a follow-up to our recent conversation, this letter is to inform you the Division of Wildlife does not have any additional information to assist you with your project.

Sincerely,

Robert Fletcher
Environmental Specialist

RF:jam

cc: J. Marshall

We are dedicated to conserving and improving the fish and wildlife resources and their habitats, and promoting their use and appreciation by the public so that these resources continue to enhance the quality of life for all Ohioans.

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

38 Triangle Park Drive
Suite 3805
Cincinnati, OH 45246
513 772 8580
Fax 513 772 6666

July 9, 1998

Mr. John Marshall
Environmental Section Coordinator
Division of Wildlife
Ohio Department of Natural Resources
1840 Belcher Drive
Columbus, OH 43224

Re: Natural Resources Consultation for the Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Dear Mr. Marshall:

Ogden Environmental and Energy Services Company, Inc. is initiating an Environmental Assessment (EA) involving proposed actions on an approximate 22,000-acre parcel of land, currently known as the Ravenna Army Ammunition Plant (RVAAP), located in Portage and Trumbull Counties, Ohio (see enclosed map). The RVAAP is currently owned and operated by the Army Material Command (AMC). Approximately 2,300 acres of the RVAAP property currently is licensed to the Ohio Army National Guard (OHARNG) for use as a multi-purpose training area. The OHARNG is seeking a license for approximately 17,000 to 19,000 acres of land within the boundaries of the RVAAP to provide additional land for military training exercises.

The mission of the OHARNG requires the OHARNG, as an agent for the National Guard Bureau (NGB), to manage the land and natural resources necessary for units to conduct and sustain quality military training. The OHARNG, as part of the land and natural resources management program, is initiating a three-phased approach to the long-term planning of military training at the RVAAP. This phased approach is in full compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508); and Army Regulations (AR) 200-1 and 200-2.

As the first phase of this EA, Ogden has been tasked with the identification of environmental resources, issues, constraints, and opportunities at the facility. This data gathering phase will provide input to and direct the future planning of environmentally-sensitive projects and actions at the RVAAP, which will be contemplated in the EA.

As part of the first phase associated with preparation of this EA, Ogden is requesting information of any threatened or endangered species, any species proposed for such listing, or critical habitat for such species, which may occur within a one-mile radius around the project area. Ogden is also interested in information concerning parks, nature preserves, conservation areas, migratory bird habitats, wildlife issues of concern, and related natural resources data within a one-mile radius. In addition, if you are aware of other representative(s) of ODNR or other natural resource agency

who may possess information or knowledge with respect to this project area, please include this information in your response. We have contacted the ODNR Division of Natural Areas and Preserves (DNAP) requesting similar data.

Should your office possess natural resources data, such as sensitive wildlife data, that would supplement the data provided by ODNR DNAP for this project area, please forward this information to us. In addition, we understand that Mr. Jack Henry of your office may possess GIS data (e.g., wetlands data) for the subject project area. If possible, please forward a copy of this request to Mr. Henry for his review and input.

Your response on or before August 1, 1998 will enable us to complete this phase of the project within the scheduled timeframe. If you have any questions concerning this request, please do not hesitate to contact us at (513) 772-8580. If preferable, you may fax your response to us at (513) 772-6666. We, in cooperation with the OHARNG, look forward to your involvement and participation in the proactive planning of future projects at the RVAAP, and in the on-going stewardship of the natural resources present therein.

Sincerely,

Brian W. Boose

Brian W. Boose
Program Manager

Vincent J. Attardi
Natural Resources Manager

Enclosures

/cf

LEGEND

Project Boundary

USGS 7.5 minute quadrangle boudary

SCALE 1:48,000

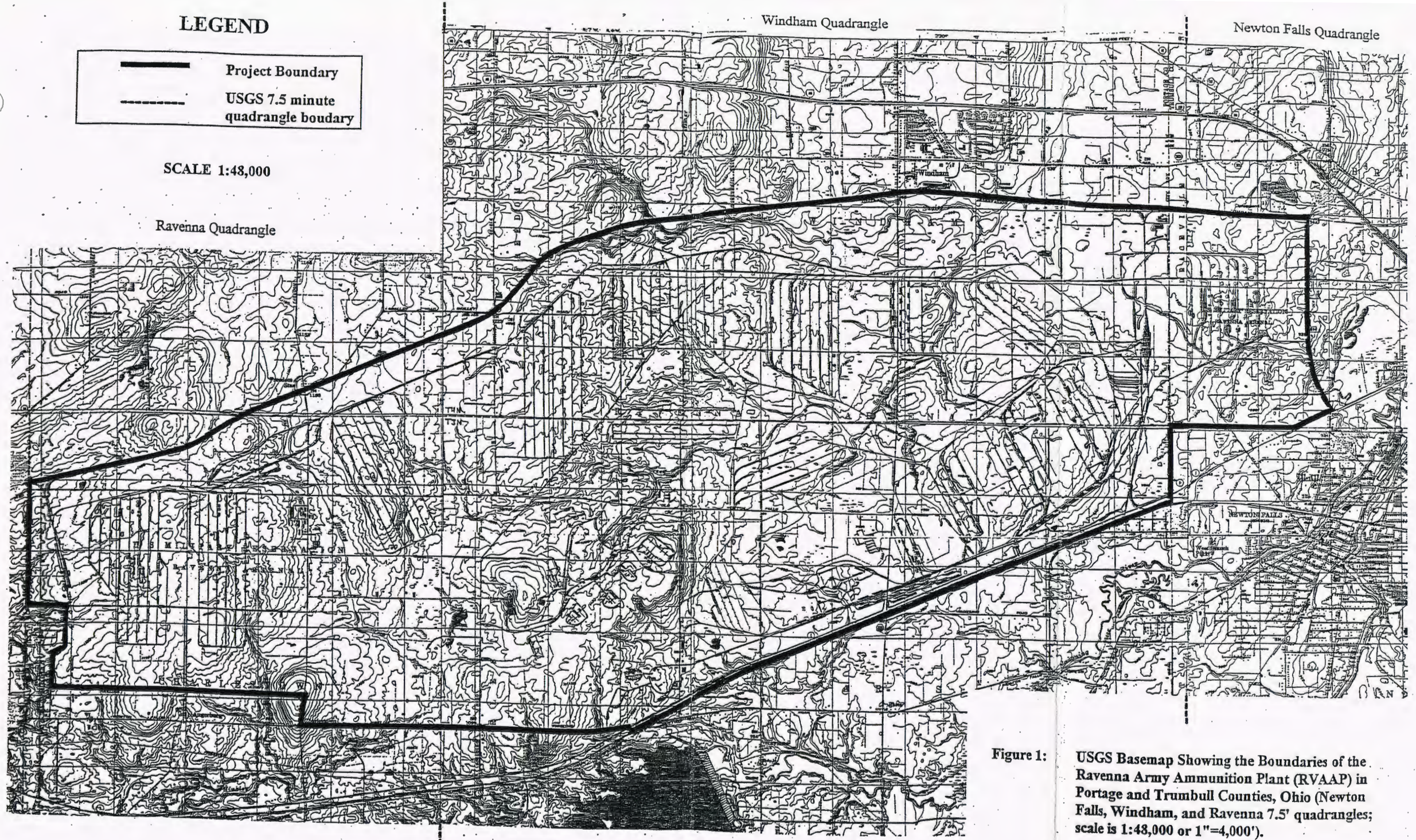


Figure 1: **USGS Basemap Showing the Boundaries of the Ravenna Army Ammunition Plant (RVAAP) in Portage and Trumbull Counties, Ohio (Newton Falls, Windham, and Ravenna 7.5' quadrangles; scale is 1:48,000 or 1"=4,000').**

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

7/8/98 JGM

RECEIVED
BY JM DATE 8/27

August 27, 1998

Dennis Mishne
Ohio EPA
1685 Westbelt Drive
Columbus, Ohio 43228

Brian Boose
Ogden Environmental and Energy Services
38 Triangle Park Drive
Cincinnati, Ohio 45246

Dear Mr. Boose,

I received your request for biological information from the area near the Ravenna Arsenal. I apologize for the long delay in getting this to you. I have been assigned to full-time field work doing fish sampling, and I have very little time in the office to respond to data requests. I did a scan of our database and found 3 sites on the South Fork of Eagle Creek which flows along the Northeast portion of the project area. The Ohio EPA sampled 3 locations back in 1987. Unfortunately there are no recent collections from the area. I noticed that there was one endangered fish species (Mountain Brook Lamprey) collected at 2 of the locations. This species has been collected at only a few locations throughout the state of Ohio.

If you have any data requests in the future, feel free to contact me at the above address. I will be back in the office full-time after October 15. I can also be reached by phone at (614) 728-3393.

Sincerely,

Dennis Mishne

Dennis Mishne
Aquatic Biologist
Ecological Assessment Unit

Post-it® Fax Note 7671	Date 8/27	# of pages ▶ 4
To Brian Boose	From Dennis Mishne	
Co./Dept. Ogden	Co. Ohio EPA	
Phone # 772-8580	Phone # (614) 728-3393	
Fax # 772-6666	Fax # (614) 728-3380	

Species List

River Code: 18-043	Stream: South Fork Eagle Creek	Sample Date: 1987
River Mile: 3.90	Basin: Mahoning River	Date Range: 10/14/87
	Time Fished: 1980 sec Drain Area: 9.3 sq mi	
	Dist Fished: 0.12 km No of Passes: 1	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
MNT. BROOK LAMPREY [E]		F	N	S	5	12.50	1.98			
GRASS PICKEREL		P	M	P	7	17.50	2.77			
NORTHERN HOG SUCKER	R	I	S	M	10	25.00	3.95			
WHITE SUCKER	W	O	S	T	99	247.50	39.13			
BLACKNOSE DACE	N	G	S	T	1	2.50	0.40			
CREEK CHUB	N	G	N	T	27	67.50	10.67			
STRIPED SHINER	N	I	S		9	22.50	3.56			
BLUNTNOSE MINNOW	N	O	C	T	1	2.50	0.40			
CENTRAL STONEROLLER	N	H	N		14	35.00	5.53			
YELLOW BULLHEAD		I	C	T	4	10.00	1.58			
BLACK BULLHEAD		I	C	P	3	7.50	1.19			
WHITE CRAPPIE	S	I	C		1	2.50	0.40			
LARGEMOUTH BASS	F	C	C		8	20.00	3.16			
WARMOUTH SF	S	C	C		7	17.50	2.77			
GREEN SUNFISH	S	I	C	T	16	40.00	6.32			
BLUEGILL SUNFISH	S	I	C	P	5	12.50	1.98			
PUMPKINSEED SUNFISH	S	I	C	P	2	5.00	0.79			
B'GILL X PUMPKINSEED					1	2.50	0.40			
GREEN SF X BLUEGILL					2	5.00	0.79			
BLACKSIDE DARTER	D	I	S		1	2.50	0.40			
JOHNNY DARTER	D	I	C		13	32.50	5.14			
GREENSIDE DARTER	D	I	S	M	1	2.50	0.40			
FANTAIL DARTER	D	I	C		16	40.00	6.32			
Mile Total					253	632.50				
Number of Species					21					
Number of Hybrids					2					

Ravenna Arsenal

Species List

River Code: 18-043	Stream: South Fork Eagle Creek	Sample Date: 1987
River Mile: 2.30	Basin: Mahoning River	Date Range: 10/14/87
	Time Fished: 1740 sec Drain Area: 23.5 sq mi	
	Dist Fished: 0.11 km No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
MNT. BROOK LAMPREY [E]		F	N	S	1	2.73	1.01			
GRASS PICKEREL		P	M	P	1	2.73	1.01			
NORTHERN HOG SUCKER	R	I	S	M	10	27.27	10.10			
WHITE SUCKER	W	O	S	T	27	73.64	27.27			
BLACKNOSE DACE	N	G	S	T	1	2.73	1.01.			
CREEK CHUB	N	G	N	T	7	19.09	7.07			
SILVERJAW MINNOW	N	I	M		1	2.73	1.01			
BLUNTNOSE MINNOW	N	O	C	T	8	21.82	8.08			
CENTRAL STONEROLLER	N	H	N		2	5.46	2.02			
WHITE CRAPPIE	S	I	C		1	2.73	1.01			
GREEN SUNFISH	S	I	C	T	1	2.73	1.01			
BLACKSIDE DARTER	D	I	S		1	2.73	1.01			
JOHNNY DARTER	D	I	C		10	27.27	10.10			
GREENSIDE DARTER	D	I	S	M	28	76.36	28.28			
Mile Total					99	270.00				
Number of Species					14					
Number of Hybrids					0					

St. Rt. 303

Species List

River Code: 18-043	Stream: South Fork Eagle Creek	Sample Date: 1987
River Mile: 0.80	Basin: Mahoning River	Date Range: 10/14/87
	Time Fished: 1320 sec Drain Area: 25.3 sq mi	
	Dist Fished: 0.10 km No of Passes: 1	Sampler Type: D

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
GRASS PICKEREL		P	M	P	3	9.00	4.23			
NORTHERN HOG SUCKER	R	I	S	M	8	24.00	11.27			
WHITE SUCKER	W	O	S	T	42	126.00	59.15			
COMMON CARP	G	O	M	T	1	3.00	1.41			
CREEK CHUB	N	G	N	T	5	15.00	7.04			
YELLOW BULLHEAD		I	C	T	1	3.00	1.41			
ROCK BASS	S	C	C		1	3.00	1.41			
LARGEMOUTH BASS	F	C	C		4	12.00	5.63			
GREEN SUNFISH	S	I	C	T	1	3.00	1.41			
BLUEGILL SUNFISH	S	I	C	P	1	3.00	1.41			
GREEN SF X BLUEGILL					1	3.00	1.41			
JOHNNY DARTER	D	I	C		1	3.00	1.41			
GREENSIDE DARTER	D	I	S	M	2	6.00	2.82			
Mile Total					71	213.00				
Number of Species					12					
Number of Hybrids					1					

St. R 1. 82

DWD

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

38 Triangle Park Drive
Suite 3805
Cincinnati, OH 45246
513 772 8580
Fax 513 772 6666

July 9, 1998

Mr. Dennis Mishne
Division of Water, Ecological Assessment
Ohio Environmental Protection Agency (OEPA)
1685 Westbelt Drive
Columbus, OH 43228

Re: Natural Resources Consultation for the Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Dear Mr. Mishne:

Ogden Environmental and Energy Services Company, Inc. is initiating an Environmental Assessment (EA) involving proposed actions on an approximate 22,000-acre parcel of land, currently known as the Ravenna Army Ammunition Plant (RVAAP), located in Portage and Trumbull Counties, Ohio (see enclosed map). The RVAAP is currently owned and operated by the Army Material Command (AMC). Approximately 2,300 acres of the RVAAP property currently is licensed to the Ohio Army National Guard (OHARNG) for use as a multi-purpose training area. The OHARNG is seeking a license for approximately 17,000 to 19,000 acres of land within the boundaries of the RVAAP to provide additional land for military training exercises.

The mission of the OHARNG requires the OHARNG, as an agent for the National Guard Bureau (NGB), to manage the land and natural resources necessary for units to conduct and sustain quality military training. The OHARNG, as part of the land and natural resources management program, is initiating a three-phased approach to the long-term planning of military training at the RVAAP. This phased approach is in full compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508); and Army Regulations (AR) 200-1 and 200-2.

As the first phase of this EA, Ogden has been tasked with the identification of environmental resources, issues, constraints, and opportunities at the facility. This data gathering phase will provide input to and direct the future planning of environmentally-sensitive projects and actions at the RVAAP, which will be contemplated in the EA.

As part of the first phase associated with preparation of this EA, Ogden is requesting information related to natural resources located within, or in the vicinity of, the referenced project area. Per our conversation, this information may include data on surface water, ground water, invertebrates, and/or fisheries available from your agency. The project area, shown on the enclosed map, contains the following major drainages: Sand Creek, South Fork Eagle Creek, and Hinkley Creek.

We have also contacted the ODNR Division of Natural Areas and Preserves (DNAP), ODNR Division of Wildlife, and the U.S. Fish and Wildlife Service (USFWS) requesting data on Federal and State protected species having potential to occur within the project area. If you are aware of any other representative(s) of OEPA or other natural resource agency who may possess information or knowledge with respect to this project area, please include this information in your response.

Should your office possess natural resources data, such as water quality data, for this site or vicinity, please forward this information to us. Your response on or before August 1, 1998 will enable us to complete this phase of the project within the scheduled timeframe. If you have any questions concerning this request, please do not hesitate to contact us at (513) 772-8580. If preferable, you may fax your response to us at (513) 772-6666. We, in cooperation with the OHARNG, look forward to your involvement and participation in the proactive planning of future projects at the RVAAP, and in the on-going stewardship of the natural resources present therein.

Sincerely,

Brian W. Boose
Program Manager

Vincent J. Attardi
Natural Resources Manager

Enclosures

/cf

OHIO Department of Natural Resources

DIVISION OF NATURAL AREAS & PRESERVES
1889 Fountain Square, Columbus, OH 43224
(614) 265-6456 phone; (614) 267-3096 fax

George V. Voinovich • *Governor*
Donald C. Anderson • *Director*

August 3, 1998

RECEIVED
JM 8/17

Brian W. Boose
Ogden Environmental & Energy Services, Inc.
38 Triangle Park Dr., Ste. 3805
Cincinnati, OH 45246

Dear Mr. Boose:

I have reviewed our Natural Heritage maps and files for records within one mile of the Ravenna Army Ammunition Plant. This property spans across the Ravenna, Windham, and Newton Falls Quads. in Portage County. A total of forty records along with one state park occur within this project area. We are unaware of any geological features, state nature preserves, scenic rivers, state forests, or wildlife areas within this range. The enclosed maps and computer printout provide additional details regarding this heritage information.

The computer printout gives the scientific name, common name, federal status, state status, class code, occurrence number, current year, latitude, and longitude of these Natural Heritage Records. The red numbers on the computer printout correspond with the red numbers on the appropriate quadrangle map. A circle represents an exact location; a triangle represents a location within a square mile; and a square represents a location greater than a square mile. The arrows accompanying map #33 on the Windham Quad. represent collection points. An endangerment/class code list along with a rare plant and animal list are also enclosed for your reference.

Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that site. Please note that we inventory only high-quality plant communities and do not maintain an inventory of all Ohio wetlands. Jack Henry with the Division of Wildlife has a *statewide* wetland inventory that can give you additional data. His phone number is (614) 265-7046. Jim Given with the Office of Real Estate & Land Management handles information regarding the *national* wetland inventory. He can be reached at (614) 265-6770. In addition, the Division of Natural Areas and Preserves is conducting a biological survey of the Ravenna Arsenal. Contact Dan Rice at (614) 265-6469 with any questions regarding this survey.

Please contact me at (614)265-6409 if I can be of further assistance.

Sincerely,

Treva J. Knasel
Ecological Analyst
Division of Natural Areas & Preserves

Enclosures

OHIO DEPARTMENT OF NATURAL RESOURCES PAGE: 1 30 JUL 1998
DIVISION OF NATURAL AREAS & PRESERVES
RAVENNA ARSENAL: RARE PLANT & ANIMAL SPECIES

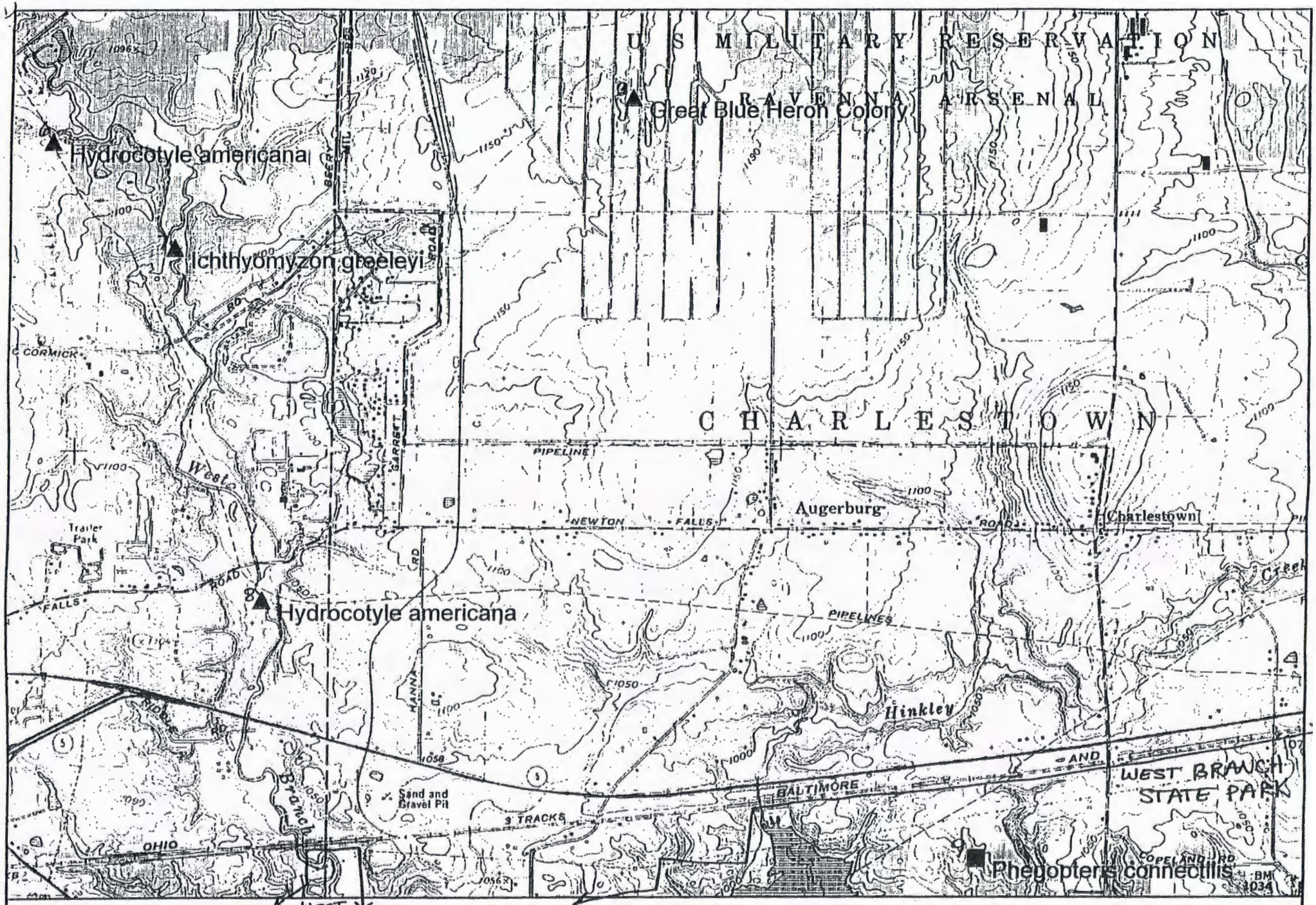
QUAD	FEDERAL STATUS	OHIO STATUS	CL	MAP#	SCIENTIFIC NAME	COMMON NAME	OCC#	YEAR	LATITUDE	LONGITUDE
RAVENNA										
		S	SA	1	NAPAEOZAPUS INSIGNIS	WOODLAND JUMPING MOUSE	003	1993	411207N	0810920W
			OT	2	TURKEY VULTURE ROOST Also on Windham Quad.		035	1973	411149N	0810730W
			OT	3	GREAT BLUE HERON COLONY		099	1993	411056N	0811032W
		S	SA	4	NAPAEOZAPUS INSIGNIS	WOODLAND JUMPING MOUSE	004	1993	411139N	0810854W
		S	SA	5	HEMIDACTYLIUM SCUTATUM	FOUR-TOED SALAMANDER	021	1993	411033N	0810735W
WINDHAM										
		S	SA	10	NAPAEOZAPUS INSIGNIS	WOODLAND JUMPING MOUSE	008	1993	411119N	0810358W
		E	SA	11	ICHTHYOMYZON GREELEYI	MOUNTAIN BROOK LAMPREY	006	1993	411313N	0810226W
		P	SP	12	PHEGOPTERIS CONNECTILIS	LONG BEECH-FERN	020	1978	411338N	0810449W
		P	SP	13	DROSERA ROTUNDIFOLIA	ROUND-LEAVED SUNDEW	037	1993	411142N	0810043W
		S	SA	14	HEMIDACTYLIUM SCUTATUM	FOUR-TOED SALAMANDER	018	1993	411347N	0810133W
		S	SA	15	NAPAEOZAPUS INSIGNIS	WOODLAND JUMPING MOUSE	006	1993	411144N	0810655W
			SA	12	VIREO SOLITARIUS	SOLITARY VIREO	062	1993	411338N	0810449W
			OT	16	GREAT BLUE HERON COLONY		092	1993	411208N	0810412W
			SA	17	OPHEODRYS VERNALIS	SMOOTH GREEN SNAKE	012	1993	411102N	0810510W
		P	SP	18	PYCNANTHEMUM MUTICUM	BLUNT MOUNTAIN-MINT	025	1993	411139N	0810038W
		S	SA	19	NAPAEOZAPUS INSIGNIS	WOODLAND JUMPING MOUSE	007	1993	411128N	0810651W
		S	SA	20	NAPAEOZAPUS INSIGNIS	WOODLAND JUMPING MOUSE	005	1993	411258N	0810638W
		E	SA	21	CATOCALA GRACILIS	GRACEFUL UNDERWING	005	1993	411158N	0810014W
		P	SP	22	BETULA POPULIFOLIA	GRAY BIRCH	034	1993	411335N	0810522W
		S	SA	23	RALLUS LIMICOLA	VIRGINIA RAIL	006	1993	411341N	0810014W
		E	SA	24	SPHYRAPICUS VARIUS	YELLOW-BELLIED SAPSUCKER	006	1993	411332N	0810343W
		S	SA	25	ACCIPITER STRIATUS	SHARP-SHINNED HAWK	036	1993	411256N	0810556W
		P	SP	26	RHODODENDRON NUDIFLORUM VAR. ROSEUM	NORTHERN ROSE AZALEA	017	1980	411346N	0810334W
		P	SP	27	PYCNANTHEMUM MUTICUM	BLUNT MOUNTAIN-MINT	011	1993	411202N	0810012W
		E	SA	28	CIRCUS CYANEUS	NORTHERN HARRIER	012	1993	411029N	0810710W
			PC	29	HEMLOCK-HARDWOOD FOREST		003	1981	411333N	0810516W
		E	SP	30	PLAGIOTHECIUM LATEBRICOLA	LURKING LESKEA	004	1993	411326N	0810308W
		P	SP	31	GENTIANA CLAUSA	CLOSED GENTIAN	025	1993	411330N	0810544W
		P	SP	12	VIBURNUM ALNIFOLIUM	HOBBLEBUSH	012	1978	411338N	0810449W

QUAD	FEDERAL STATUS	OHIO STATUS	CL	MAP#	SCIENTIFIC NAME	COMMON NAME	OCC#	YEAR	LATITUDE	LONGITUDE
			SA	32	OPHEODRYS VERNALIS	SMOOTH GREEN SNAKE	011	1993	411231N	0810025W
		E	SA	33	ICHTHYOMYZON GREELEYI	MOUNTAIN BROOK LAMPREY	005	1993	411347N	0810221W
		S	SA	23	PORZANA CAROLINA	SORA	009	1993	411341N	0810014W
		P	SP	34	VACCINIUM MACROCARPON	LARGE CRANBERRY	037	1993	411142N	0810040W
		P	SP	35	JUGLANS CINEREA	BUTTERNUT	040	1992	411343N	0810235W

34 Records Processed

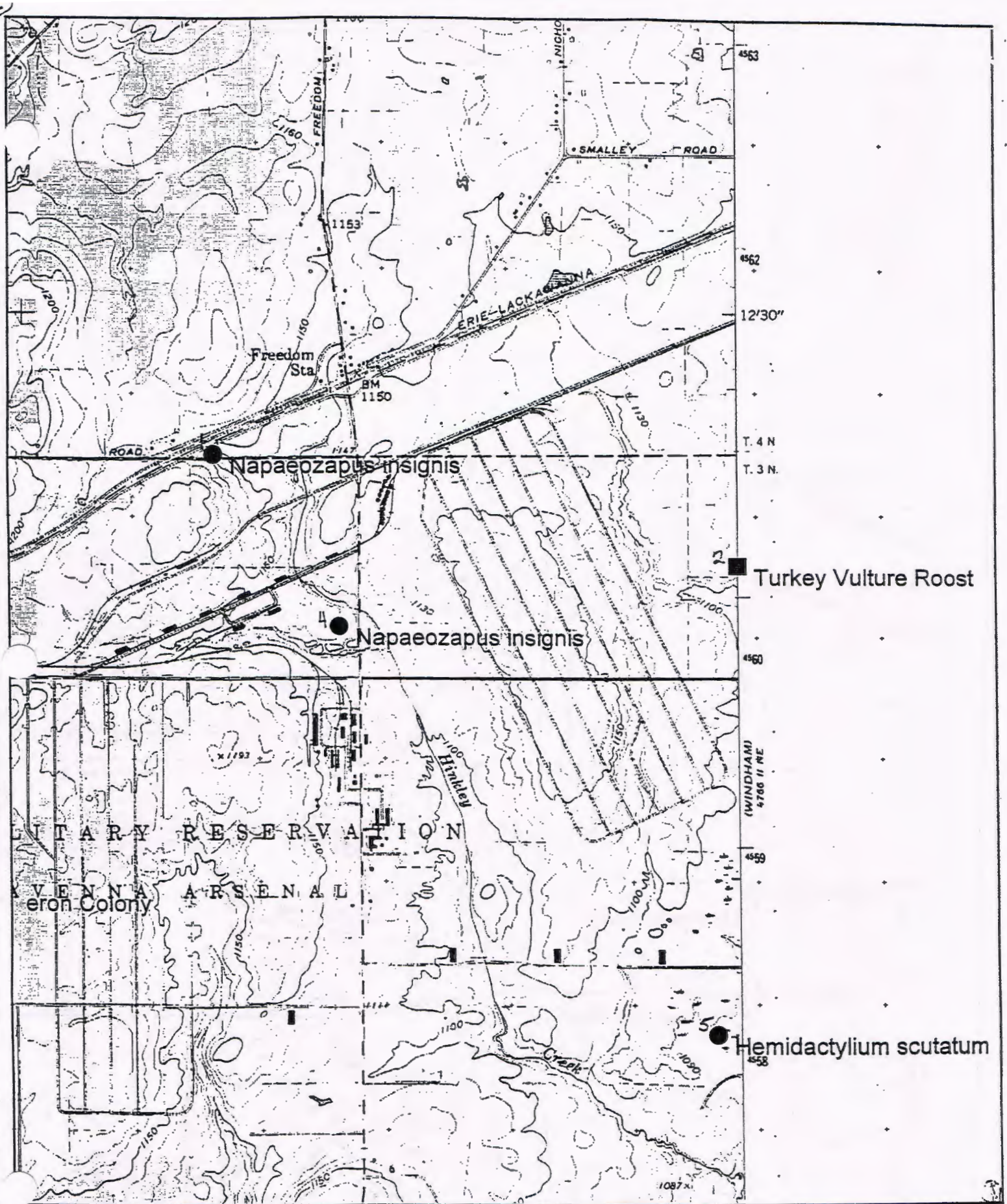
RECORDS OUTSIDE OF & WITHIN 1 MILE OF RAVENNA ARSENAL

Ravenna									
	P	SP	6	Hydrocotyle americana	American Water-Pennywort	012	1978	410752N	0811235W
	E	SA	7	Ichthyomyzon greeleyi	Mountain Brook Lamprey	001	1968	411032N	0811209W
	P	SP	8	Hycrocotyle americana	American Water-Pennywort	011	1959	410935N	0811150W
West Branch State Park(outlined on map)									
	P	SP	9	Phegopteris connectilis	Long Beech-Fern	008	1975	410854N	0810918W
Windham									
		SA	36	Hirundo pyrrhonota	Cliff Swallow	041	1986	410901N	0810432W
		PC	37	Floodplain Forest		004	1981	411108N	0810040W



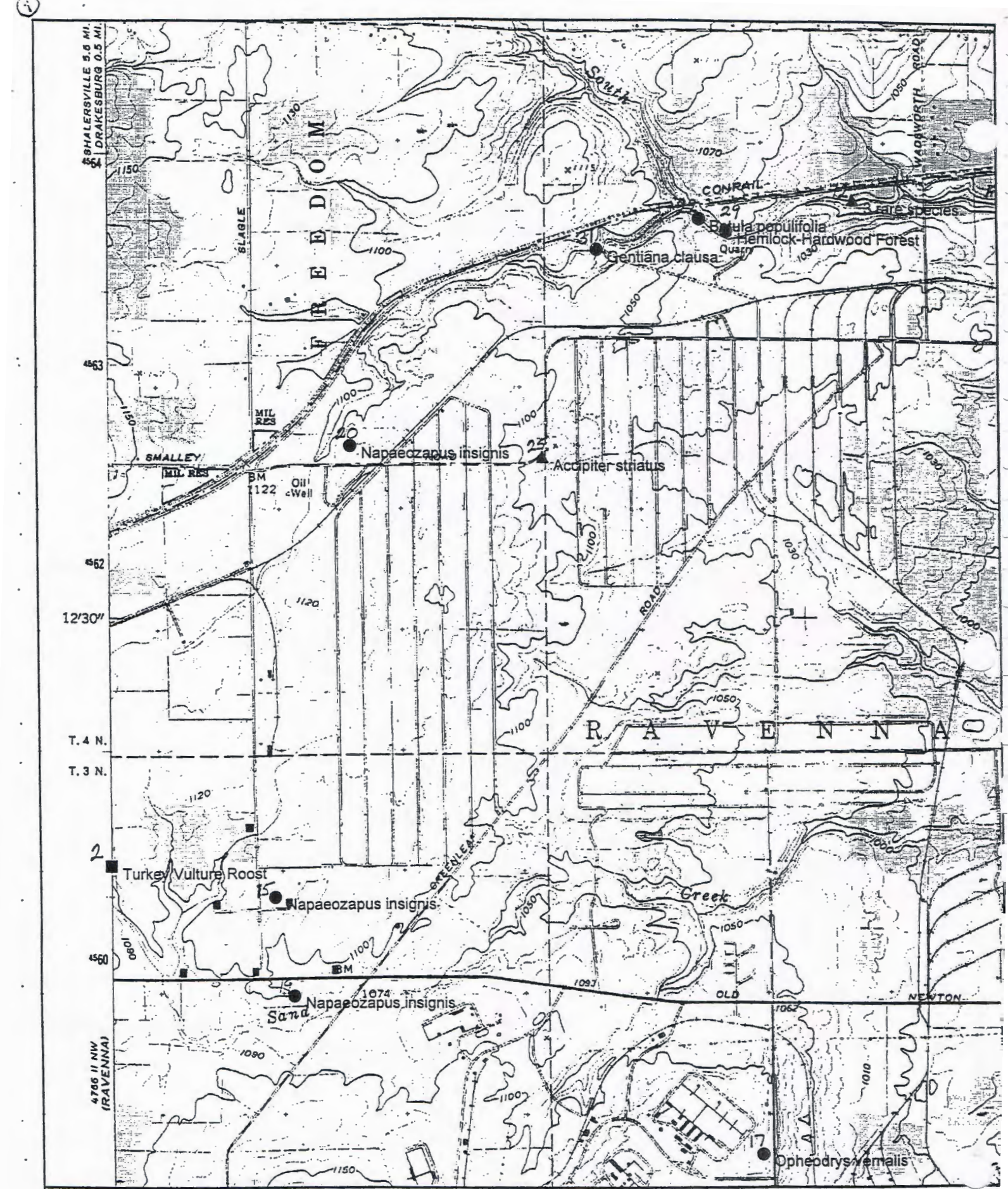
Name: RAVENNA
Date: 7/28/98
Scale: 1 inch equals 2000 feet

Location: 041° 09' 59.4" N 081° 10' 26.8" W
Caption: Ravenna Arsenal



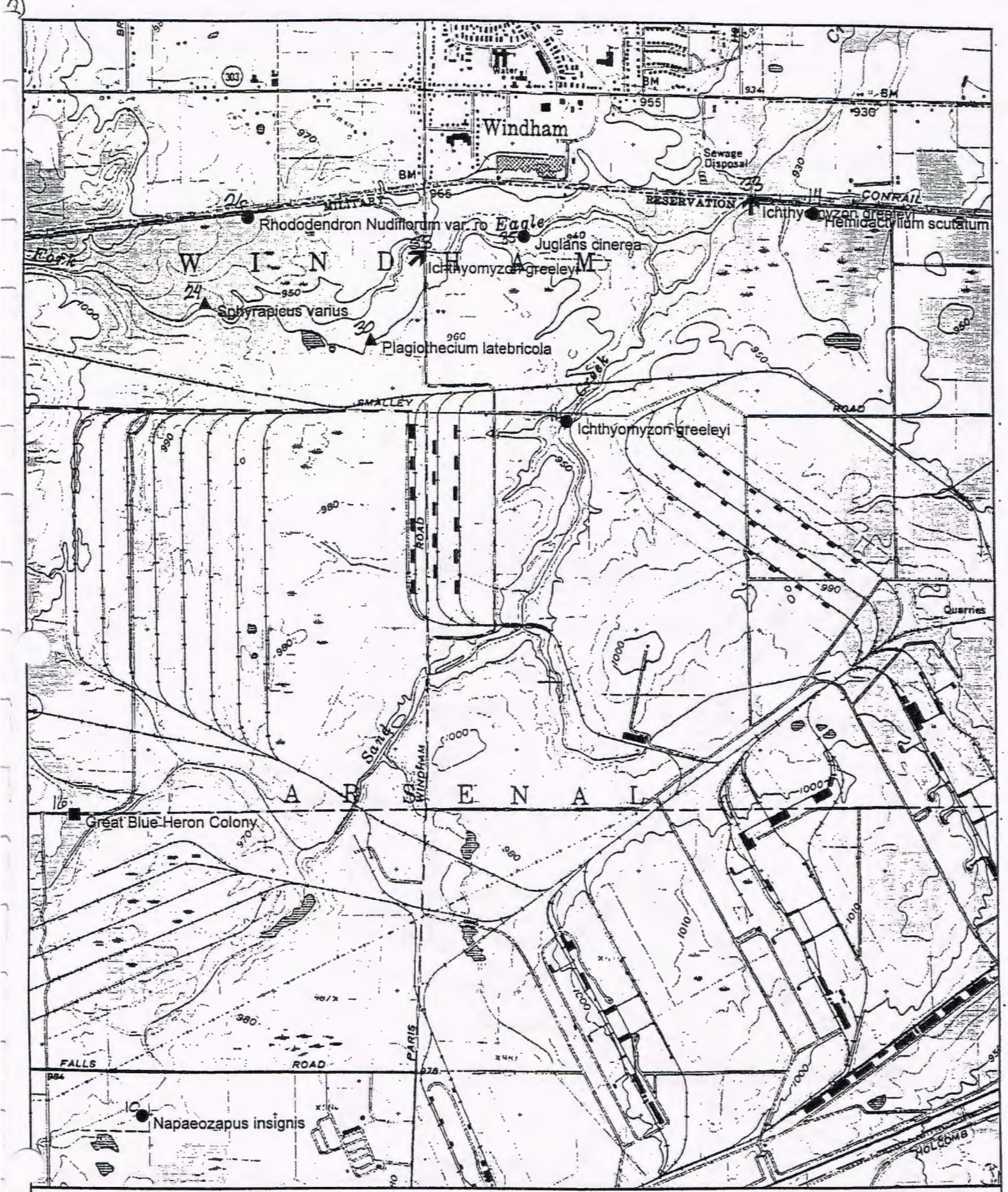
Name: RAVENNA
Date: 7/28/98
Scale: 1 inch equals 2000 feet

Location: 041° 11' 41.2" N 081° 08' 19.3" W
Caption: Ravenna Arsenal



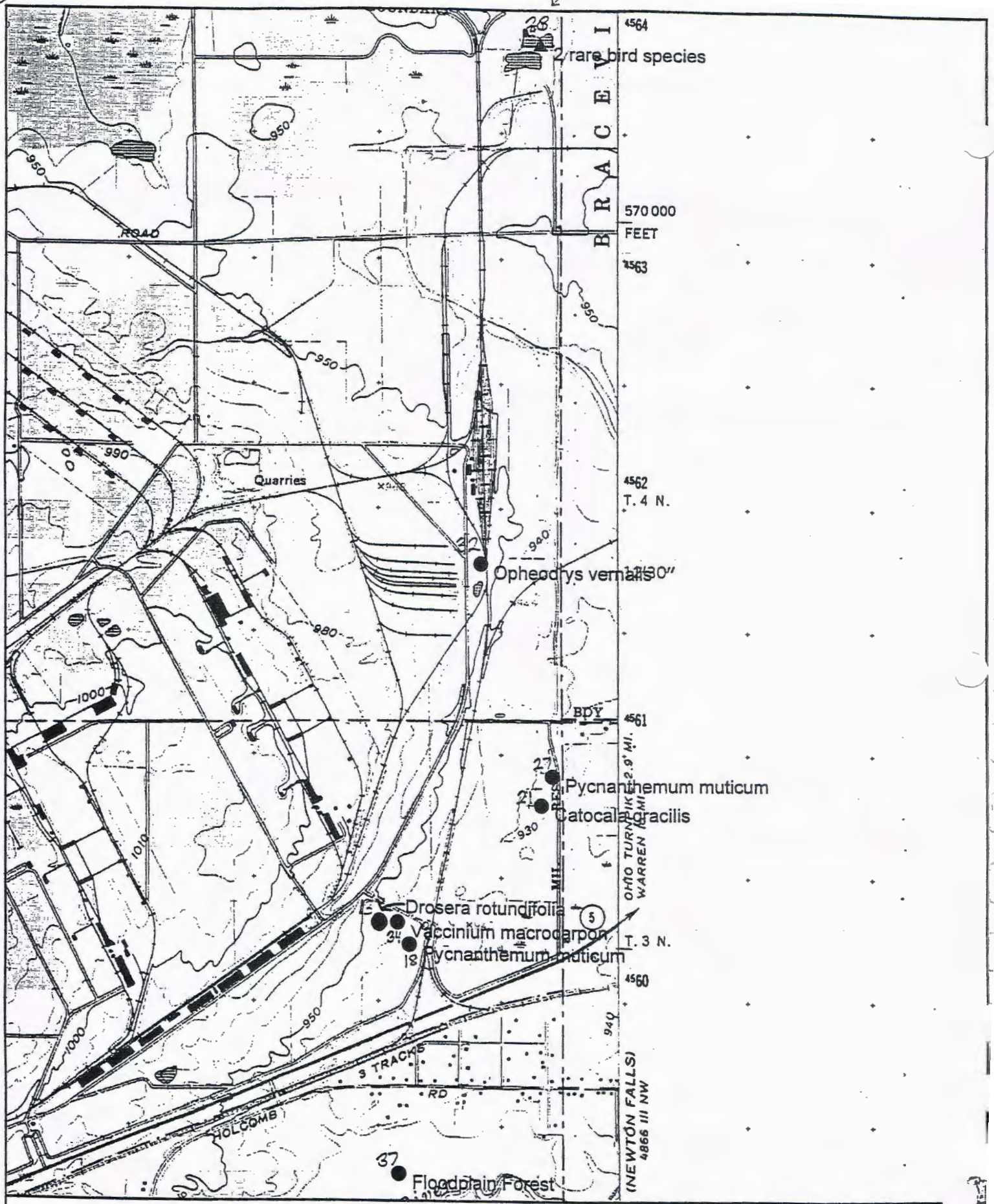
Name: WINDHAM
Date: 7/28/98
Scale: 1 inch equals 2000 feet

Location: 041° 12' 31.8" N 081° 06' 01.7" W
Caption: Ravenna Arsenal



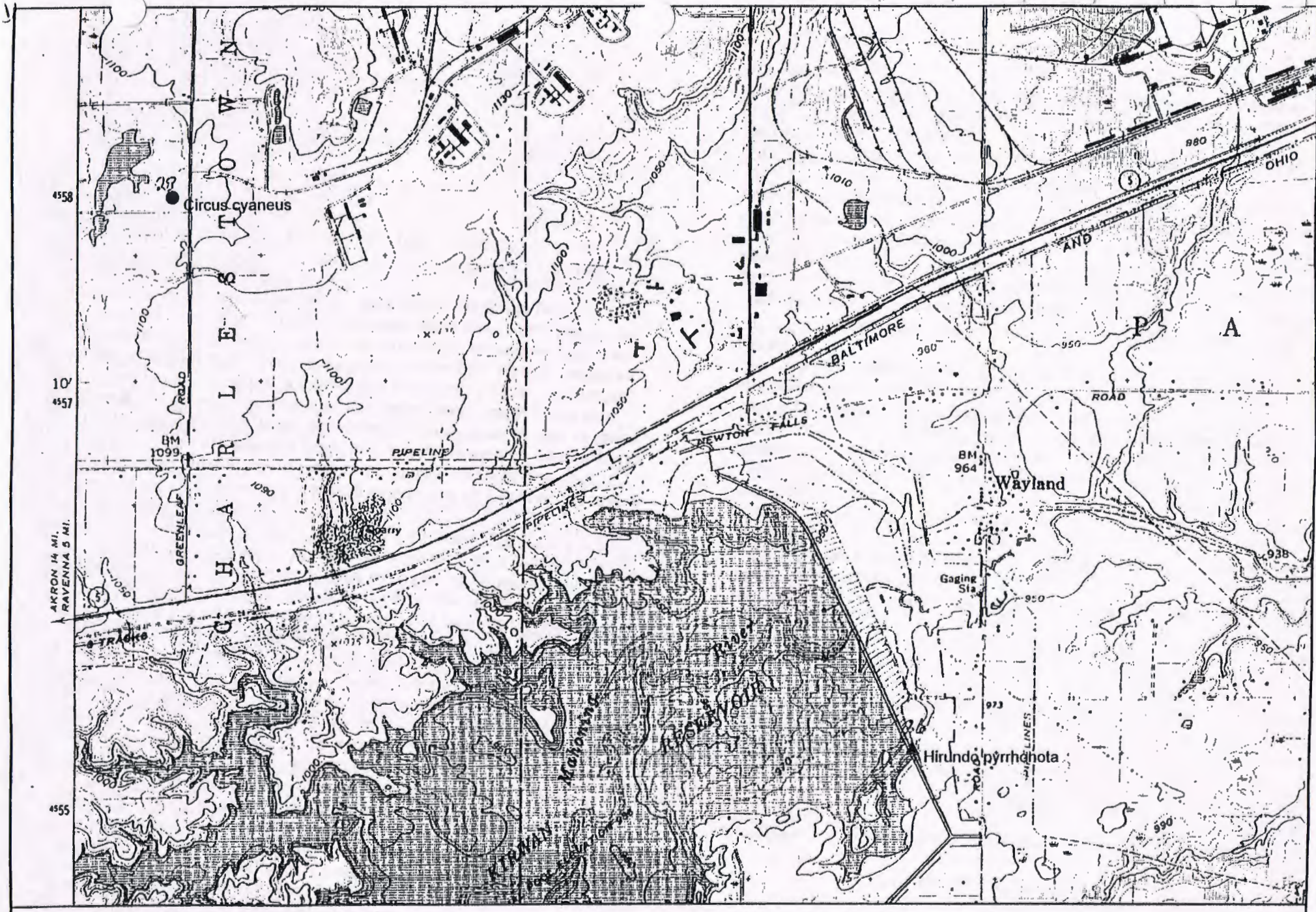
Name: WINDHAM
Date: 7/28/98
Scale: 1 inch equals 2000 feet

Location: 041° 12' 42.4" N 081° 02' 38.2" W
Caption: Ravenna Arsenal



Name: WINDHAM
Date: 7/29/98
Scale: 1 inch equals 1694 feet

Location: 041° 12' 25.0" N 081° 00' 21.8" W
Caption: Ravenna Arsenal



Name: WINDHAM
Date: 7/29/98
Scale: 1 inch equals 2000 feet

Location: 041° 09' 48.1" N 081° 05' 26.4" W
Caption: Ravenna Arsenal

(6) Assurance that a final or annual report will be filed with the Division, prior to the first day of February of each year following the calendar year during which plants were collected, containing a clear statement of the final disposition of each individual plant collected. A copy of any published papers resulting from the study of these plants shall also be filed with the Division as soon as it is available.

(B) A permit shall be valid for a period not to exceed one year, but may be renewed or revoked at the discretion of the Chief.

(C) Persons failing to provide full information required in paragraph (A) of this rule to the satisfaction of the Chief shall be denied a permit.

(D) Failure to meet the requirements of the permit at the conclusion of the project shall be reason for the Chief not to issue future permits to the person failing to comply.

(E) A permit must be displayed upon demand to any law enforcement officer having jurisdiction or to the owner or person in lawful control of the land upon which plants are collected.

1501:18-2-04 Legally Obtained Plants. Any nurseryman, dealer, or individual who has legally obtained any native species of wild plants listed as endangered or threatened in Rule 1501:18-1-03 of the Administrative Code from another state or commercial propagator shall provide proof upon demand that said plants were legally acquired.

1501:18-2-05 Exceptions. Nothing herein shall be interpreted in such a manner as to prevent any nurseryman or dealer who is licensed under Chapter 927 of the Revised Code from selling, offering for sale, shipping, or otherwise disposing of any endangered or threatened species of plants or parts thereof when such plants have been commercially grown by a licensed nursery or legally imported into this state. Furthermore, nothing herein shall prohibit a person from willfully rooting up, injuring, destroying, removing, taking, or possessing an endangered or threatened plant from his property or from the property of another when said person has written permission of the owner, lessee, or other person entitled to possession.

Prior Effective Dates: 7/14/1980, 3/29/1982, 4/27/1984, 7/18/1986, 7/11/1988, 9/24/1990, 7/10/1992, 6/10/1994, 6/27/1996

Current Effective Date: 6/13/1998

ADMINISTRATIVE RULES
for
Ohio Revised Code Chapter 1518
OHIO ENDANGERED PLANT LAW

These rules implement Ohio Revised Code Chapter 1518 which became effective on August 23, 1978 after passage of Amended Substitute House Bill No. 908 on April 25, 1978. Rule 1501:18-1-03 identifies the species designated as endangered and threatened and is available separately from these rules. The species list may be requested from the Division of Natural Areas and Preserves, Ohio Department of Natural Resources, 1889 Fountain Square, Columbus, Ohio 43224.

1501:18-1-01. Definitions. As used in rules 1501:18-1-01 to 1501:18-2-0 of the Administrative Code:

(A) "Commercial Purposes" means with intent to sell or trade for gain or profit.

(B) "Commercially Grown" means grown under cultivation in tilled plots or in a greenhouse.

(C) "Division" means the Ohio Department of Natural Resources, Division of Natural Areas and Preserves.

(D) "Endangered Species" means a native Ohio plant species whose natural population(s) are in immediate danger of extirpation from Ohio, and/or any federal endangered plant species in Ohio.

(E) "Chief" means Chief of the Division of Natural Areas and Preserves.

(F) "Federal Endangered Species" means all species native to this state which are listed as endangered on the United States list of endangered and threatened wildlife and plants pursuant to the Endangered Species Act of 1973, 87 Stat. 884, 16 U.S.C. 1531, as amended.

(G) "Federal Threatened Species" means all species native to this stat which are listed as threatened on the United States list of endangered and threatened wildlife and plants pursuant to the Endangered Species Act of 1973, 87 Stat. 884, 16 U.S.C. 1531, as amended.

(H) "Native Habitat" means the environment in which a species could exist as a natural population.

(I) "Native Species" means a species which, by accepted scientific evidence, was present in Ohio immediately prior to European exploration and settlement.

DIVISION OF NATURAL AREAS & PRESERVES
OHIO DEPARTMENT OF NATURAL RESOURCES

ENDANGERMENT CODES

Federal Status Codes

FE = Federal Endangered (same as LE = Legally Endangered)
FT = Federal Threatened (same as LT = Legally Threatened)
PT = Proposed Threatened

Ohio Status Codes

Animals (Assigned by the *Ohio Division of Wildlife*)

E = State Endangered
*T = Threatened
*S = Special Interest
*X = Extirpated from Ohio
no status listed - Animals without an Ohio status are included in the Natural Heritage inventory, but have not been assigned a state status by the *Division of Wildlife.*

Statuses for birds are based on *nesting* records and do not include migrating or wintering individuals.

Plants (Assigned by the *Division of Natural Areas & Preserves*)

E = State Endangered
T = State Threatened
*P = Potentially Threatened
*A = A species recently added to the inventory and/or a status has not yet been determined.
*X = Presumed Extirpated - a species which has not been recorded from Ohio in the last 20 years.

* Administrative Statuses - these are not legal designations

Class Codes

SP = Special Plant
SA = Special Animal
GF = Geographic Feature
PC = Plant Community
OT = Other Things

Ohio Department of Natural Resources
Division of Natural Areas & Preserves
1889 Fountain Square Court
Columbus, Ohio 43224
(614) 265-6453 ⋄ (614) 267-3096 (FAX)
http://www.dnr.state.oh.us/odnr/dnap/dnap.html

RARE NATIVE OHIO PLANTS
1998-99 Status List

The attached list of Ohio endangered, threatened, potentially threatened, and presumed extirpated native plant taxa was determined by the Division of Natural Areas and Preserves with the advice and guidance of the Ohio Rare Plant Advisory Committee. The list was compiled pursuant to Ohio Revised Code Chapter 1518 which directs the Chief of the Division of Natural Areas and Preserves to adopt criteria for listing and to compile lists of plants that are endangered and threatened in Ohio. This list replaces the 1996-97 status list.

The list is divided into six phylogenetic groups: Lichens, Bryophytes, Pteridophytes, Gymnosperms, Monocotyledons, Dicotyledons. Within each group, families and their associated taxa are arranged in alphabetic order. Taxonomy and nomenclature of vascular plants generally follow Gleason and Cronquist (1991). A taxon can be located in Gleason and Cronquist by the listed name or by the synonym in parentheses. Vascular taxa not included in Gleason and Cronquist are so identified and followed by a specific reference. Taxonomy and nomenclature of the non-vascular plants follow Anderson, Crum and Buck (1990) and Anderson (1990) for bryophytes and Hale (1979) for lichens. The numbers in the "Count Guide" column refer to features on the criteria list for measuring plant population size. The columns marked "OH" and "US" indicate status of the taxon as assigned by the Ohio Division of Natural Areas and Preserves (Ohio Administrative Rules 1501:18-1-01 through 1501:18-2-05) and by the U.S. Fish and Wildlife Service.

The 1998-99 plant list was formally revised by administrative rule-making procedure in June, 1998, based upon information in the Natural Heritage data base as of January, 1998. This list will be revised again in 2000. The 1998-99 list contains 103 presumed extirpated, 233 endangered, 153 threatened and 148 potentially threatened taxa, plus 5 plant taxa with no assigned status. Only data from 1978 through January, 1998 were considered in assigning endangerment status.

Information on these 642 plants is contained in the Division's Natural Heritage data base and is generally accessible for research or environmental review through the Data Services Program. A request form can be obtained on our web site or by contacting the Division. Upon request, the Division can also provide a completely alphabetic status list of rare Ohio plants.

In the last two years, several presumed extirpated plants, and many additional locations of other rare plants, have been discovered by Ohio's professional and amateur botanists and naturalists. These discoveries help the Division make preservation and land acquisition decisions. Field work leading to improvements in this list was supported in part by the Ohio Income Tax Checkoff Program. The Division would appreciate additional information that would improve the accuracy of this list, including information on newly discovered occurrences of these plants and current sizes of known populations. Please contact the Division of Natural Areas and Preserves if you have questions or information concerning these species.

FEDERAL LISTED OHIO PLANT SPECIES

Source: March 31, 1998 Special Reprint. U.S. Fish & Wildlife Service, "Endangered and Threatened Wildlife and Plants," 50 CFR 17.11 & 17.12.

Ohio-selected scientific and common names are listed first. Federal-selected names are shown in parentheses if they differ from the names on the Ohio list.

E = Federal endangered

T = Federal threatened

NOTE: Lists and information about federal listed, proposed and candidate species can be obtained from the U.S. Fish & Wildlife Service web site at http://www.fws.gov/r9endspp/endspp.html. At this time, there are no Ohio plants designated as either proposed for listing or on the federal candidate species list.

US Status	OH Status	Scientific Name	Common Name(s)
T	E	Aconitum noveboracense	Northern Monkshood (Northern Wild Monkshood)
T	E	Hymenoxys herbacea	Lakeside Daisy
T	E	Isotria medeoloides	Small Whorled Pogonia
T	T	Platanthera leucophaea	Prairie Fringed Orchid (Eastern Prairie Fringed Orchid)
T	E	Spiraea virginiana	Appalachian Spiraea (Virginia Spiraea)
E	E	Trifolium stoloniferum	Running Buffalo Clover

Gleason, H.A. and A. Cronquist. 1991. Manual of vascular plants of the northeastern United States and adjacent Canada. Second ed. The New York Botanical Garden, Bronx, N.Y. 910 pp.

Godfrey, R. and J. Wooten. 1979. Aquatic and wetland plants of the southeastern United States. Monocotyledons, The University of Georgia Press, Athens, GA. 712 pp.

Hale, M.E. 1979. How to know the lichens. Second ed. Wm. C. Brown Co., Dubuque, IA. 246 pp.

Hitchock, A.S. 1971. Manual of the grasses of the United States. 2 vols., Second ed., Dover Publications, Inc., New York, N.Y. 1051 pp.

Pryer, K.M. and C.H. Haufler. 1993. Isozymic and chromosomal evidence for the allotetraploid origin of Gymnocarpium dryopteris (Dryopteridaceae). Systematic Botany, 18(1): 150-172.

Radford, A.E., H.E. Ahles and C.R. Bell. 1968. Manual of the vascular flora of the Carolinas. The University of North Carolina Press, Chapel Hill, N.C. 1183 pp.

Voss, E.G. 1972. Michigan flora, Part I, Gymnosperms and Monocots. Cranbrook Inst. of Sci. Bull. 55 and Univ. of Michigan Herbarium, Ann Arbor, MI. 488 pp.

Wagner, W.H., Jr. and J.M. Beitel. 1993. Lycopodiaceae Mirbel, Club-moss Family. In: Flora of North America, Vol. 2, Oxford University Press, New York, N.Y. 475 pp.

DIVISION OF NATURAL AREAS AND PRESERVES
RARE NATIVE OHIO PLANTS
1998 - 1999 STATUS LIST

Lichens

	Count Guide	Status OH	US
BAEOMYCETACEAE.			
Baeomyces absolutus, Pink Dot Lichen	(6)	E	
COLLEMATACEAE.			
Collema bachmanianum, Bachman's Pulp Lichen	(6)	E	
Collema coccophorum, Soil Pulp Lichen	(6)	E	
Collema conglomeratum, Dotted Pulp Lichen	(6)	E	
Collema crispum, Crinkled Pulp Lichen	(6)	X	
Collema fuscovirens (C. tuniforme), Dusky Jelly Lichen	(6)	E	
PARMELIACEAE.			
Canoparmelia texana (Pseudoparmelia texana), Buzzardroost Rock Lichen	(6)	E	
Parmotrema madagascariaceum, Madagascar Shield Lichen	(6)	E	
Punctelia perreticulata (Parmelia perreticulata), Reticulate Shield Lichen	(6)	E	
RAMALINACEAE.			
Ramalina farinacea, Dotted Twig Lichen	(6)	X	
Ramalina intermedia, Sandstone Twig Lichen	(6)	E	
Ramalina petrina, Appalachian Trail Lichen	(6)	T	
Ramalina pollinaria, Powdery Twig Lichen	(6)	E	
STICTACEAE.			
Sticta weigelii, Weigel's Leather Lichen	(6)	E	
VERRUCARIACEAE.			
Catapyrenium lachneum (Dermatocarpon lachneum), Liver Lichen	(6)	E	

Bryophytes

AMBLYSTEGIUM.			
Scorpidium scorpioides, Turgid Brown Worm Moss	(6)	X	
ANDREAEACEAE.			
Andreaea rupestris var. rupestris, Black Rock Moss	(6)	X	
ANOMODONTACEAE.			
Anomodon viticulosus, Long Tail Moss	(6)	A	

	Count Guide	Status OH US
BRACHYTHECIACEAE.		
Tomentypnum nitens, Fuzzy Hypnum Moss	(6)	E
BRYACEAE.		
Anomobryum filiforme, Common Silver Moss	(6)	X
BUXBAUMIACEAE.		
Buxbaumia minakatae, Ethereal Elf Cap Moss	(6)	E
DIPHYSCIACEAE.		
Diphyscium cumberlandianum, Cumberland Grain O' Wheat Moss	(6)	E
FISSIDENTACEAE.		
Fissidens hyalinus, Filmy Fissidens	(6)	E
PLAGIOTHECIACEAE.		
Plagiothecium latebricola, Lurking Leskea	(6)	E
POTTIACEAE.		
Barbula indica var. indica. Twisted Teeth Moss	(6)	A
Tortella inclinata, Curved Tortella	(6)	E
Weissia sharpii, Sharp's Green-cushioned Moss	(6)	A
PTYCHOMITRIACEAE.		
Campylostelium saxicola, Rock-loving Swan-necked Moss	(6)	E
Ptychomitrium drummondii, Drummond's Ptychomitrium	(6)	E
SPHAGNACEAE.		
Sphagnum bartlettianum, Bartlett's Peat Moss	(6)	E
Sphagnum riparium, Shore-growing Peat Moss	(6)	E
THUIDIACEAE.		
Thuidium allenii, Allen's Fern Moss	(6)	X
Pteridophytes		
ASPLENIACEAE. Spleenwort Family		
Asplenium bradleyi, Bradley's Spleenwort	(5)	T
Asplenium resiliens, Black-stem Spleenwort	(5)	X
Asplenium ruta-muraria, Wall-rue	(5)	T
Cystopteris tennesseensis (not in Gleason and Cronquist 1991, see Cranfill 1980), Tennessee Bladder Fern	(3)	P
Dryopteris clintoniana, Clinton's Wood Fern	(2)	T

	Count Guide	Status OH US
ASPLENIACEAE. Spleenwort Family (Cont'd.)		
Gymnocarpium appalachianum (not in Gleason and Cronquist 1991, see Pryer and Haufler 1993), Appalachian Oak Fern	(2)	X
Gymnocarpium dryopteris, Oak Fern	(3)	T
Phegopteris connectilis (Thelypteris phegopteris), Long Beech-fern	(3)	P
Woodsia ilvensis, Rusty Woodsia	(1)	X
BLECHNACEAE. Deer-fern Family		
Woodwardia areolata, Netted Chain-fern	(3)	P
DENNSTAEDTIACEAE. Bracken Family		
Pteridium aquilinum var. pseudocaudatum, Tailed Bracken	(6)	A
EQUISETACEAE. Horsetail Family		
Equisetum sylvaticum, Woodland Horsetail	(3)	P
Equisetum variegatum, Variegated Scouring-rush	(3)	T
HYMENOPHYLLACEAE. Filmy Fern Family		
Trichomanes boschianum, Appalachian Filmy Fern	(6)	E
ISOETACEAE. Quillwort Family		
Isoetes echinospora, Spiny-spored Quillwort	(5)	X
Isoetes engelmannii, Appalachian Quillwort	(5)	E
LYCOPODIACEAE. Clubmoss Family		
Lycopodiella margueritae (not in Gleason and Cronquist 1991, see Wagner and Beitel 1993), Northern Prostrate Clubmoss	(6)	E
Lycopodiella subappressa (not in Gleason and Conquist 1991, see Wagner and Beitel 1993), Southern Clubmoss	(5)	E
OPHIOGLOSSACEAE. Adder's-tongue Family		
Botrychium biternatum, Sparse-lobe Grape-fern	(2)	T
Botrychium lanceolatum, Triangle Grape-fern	(2)	X
Botrychium multifidum, Leathery Grape-fern	(2)	T
Botrychium simplex, Least Grape-fern	(2)	E
Ophioglossum engelmannii, Limestone Adder's-tongue	(1)	E
POLYPODIACEAE. Polypody Family		
Polypodium polypodioides, Little Gray Polypody	(6)	T

	Count Guide	Status OH US
SELAGINELLACEAE. Selaginella Family		
Selaginella eclipes (S. apoda in part, see Buck 1977), Midwest Spikemoss	(6)	T
SELAGINELLACEAE. Selaginella Family (Cont'd.)		
Selaginella rupestris, Rock Spikemoss	(6)	E
Gymnosperms		
CUPRESSACEAE. Cypress Family		
Juniperus communis, Ground Juniper	(6)	T
Thuja occidentalis, Arbor Vitae	(1)	P
PINACEAE. Pine Family		
Larix laricina, Tamarack	(1)	P
Angiosperms - Monocotyledons		
AGAVACEAE. Agave Family		
Agave virginica, American Aloe	(1)	T
ALISMATACEAE. Water-plantain Family		
Echinodorus rostratus (E. berteroi var. lanceolatus), Bur-head	(2)	E
Lophotocarpus calycinus (Sagittaria calycina), Southern Wapato	(2)	T
Sagittaria australis, Long-beaked Arrowhead	(2)	P
Sagittaria cuneata, Wapato	(2)	E
Sagittaria graminea, Grass-leaf Arrowhead	(2)	E
Sagittaria platyphylla (not in Gleason and Conquist 1991, see Godfrey and Wooten 1979), Elliptic-leaved Arrowhead	(2)	A
Sagittaria rigida, Deer's-tongue Arrowhead	(2)	T
ARACEAE. Arum Family		
Calla palustris, Wild Calla	(6)	P
CYPERACEAE. Sedge Family		
Carex abscondita, Southern Leafy Wood Sedge	(5)	P
Carex alata, Broad-winged Sedge	(5)	P
Carex albolutescens, Pale Straw Sedge	(5)	T
Carex alopecoidea, Northern Fox Sedge	(6)	E
Carex aquatilis, Leafy Tussock Sedge	(5)	T
Carex arctata, Drooping Wood Sedge	(2)	E
Carex argyrantha, Silvery Sedge	(2)	P
Carex atherodes, Wheat Sedge	(4)	P

	Count Guide	Status OH US
CYPERACEAE. Sedge Family (Cont'd.)		
Carex atlantica var. capillacea, Howe's Sedge	(5)	P
Carex aurea (sensu Voss 1972), Golden-fruited Sedge	(5)	P
Carex bebbii, Bebb's Sedge	(5)	P
Carex bicknellii, Bicknell's Sedge	(5)	T
Carex brunnescens, Brownish Sedge	(5)	T
Carex bushii, Bush's Sedge	(6)	E
Carex cephaloidea (C. sparganioides var. cephaloidea), Thin-leaf Sedge	(5)	E
Carex conoidea, Field Sedge	(6)	T
Carex crawei, Crawe's Sedge	(4)	P
Carex crus-corvi, Raven-foot Sedge	(5)	T
Carex cryptolepis, Little Yellow Sedge	(5)	P
Carex debilis var. debilis, Weak Sedge	(2)	P
Carex decomposita, Cypress-knee Sedge	(5)	E
Carex deweyana, Dewey's Sedge	(5)	X
Carex diandra, Lesser Panicled Sedge	(5)	P
Carex disperma, Two-seeded Sedge	(5)	E
Carex echinata (C. cephalantha), Little Prickly Sedge	(2)	E
Carex flava, Yellow Sedge	(5)	P
Carex formosa, Handsome Sedge	(4)	X
Carex garberi (sensu Voss 1972), Garber's Sedge	(2)	E
Carex haydenii, Hayden's Sedge	(5)	X
Carex juniperorum (not in Gleason and Cronquist 1991, see Catling et al. 1993), Juniper Sedge	(2)	T
Carex lasiocarpa, Slender Sedge	(5)	P
Carex limosa, Mud Sedge	(4)	E
Carex longii, Long's Sedge	(5)	E
Carex louisianica, Louisiana Sedge	(4)	E
Carex lucorum, Fire Sedge	(2)	E
Carex lupuliformis, False Hop Sedge	(4)	T
Carex merritt-fernaldii (C. brevior in part, see Voss 1972), Fernald's Sedge	(6)	E
Carex mesochorea (C. cephalophora var. mesochorea), Midland Sedge	(5)	T
Carex oligosperma, Few-seeded Sedge	(4)	T
Carex pallescens, Pale Sedge	(2)	T
Carex peckii, Peck's Sedge	(2)	X
Carex projecta, Necklace Sedge	(5)	T
Carex pseudocyperus, Northern Bearded Sedge	(6)	E
Carex purpurifera, Purple Wood Sedge	(5)	E
Carex radiata, Radiate Sedge	(5)	P
Carex retroflexa var. retroflexa, Reflexed Sedge	(5)	P
Carex retrorsa, Reflexed Bladder Sedge	(5)	E

	Count Guide	Status OH	US
CYPERACEAE. Sedge Family (Cont'd.)			
Carex richardsonii, Richardson's Sedge	(2)	X	
Carex sartwellii, Sartwell's Sedge	(4)	P	
Carex siccata, Hay Sedge	(6)	E	
Carex sprengelii, Sprengel's Sedge	(2)	T	
Carex sterilis, Fen Sedge	(5)	P	
Carex straminea, Straw Sedge	(5)	P	
Carex striatula, Lined Sedge	(5)	E	
Carex styloflexa, Lowland Wood Sedge	(5)	X	
Carex tenuiflora, Thin-flowered Sedge	(1)	X	
Carex viridula, Little Green Sedge	(5)	P	
Cladium mariscoides, Twig-rush	(6)	P	
Cyperus acuminatus, Pale Umbrella-sedge	(5)	E	
Cyperus diandrus, Low Umbrella-sedge	(5)	P	
Cyperus dipsaciformis (C. retrofractus), Teasel-sedge	(2)	E	
Cyperus houghtonii, Houghton's Umbrella-sedge	(2)	X	
Cyperus lancastriensis, Many-flowered Umbrella-sedge	(2)	E	
Cyperus refractus, Reflexed Umbrella-sedge	(2)	E	
Cyperus schweinitzii, Schweinitz's Umbrella-sedge	(2)	P	
Eleocharis caribaea, Caribbean Spikerush	(5)	E	
Eleocharis compressa, Flat-stem Spikerush	(5)	T	
Eleocharis engelmannii (E. ovata in part), Engelmann's Spikerush	(5)	E	
Eleocharis olivacea (E. flavescens var. olivacea), Olivaceous Spikerush	(5)	T	
Eleocharis ovata, Ovate Spikerush	(2)	E	
Eleocharis parvula, Least Spikerush	(2)	E	
Eleocharis pauciflora, Few-flowered Spikerush	(5)	T	
Eleocharis quadrangulata, Four-angled Spikerush	(5)	P	
Eleocharis wolfii, Wolf's Spikerush	(5)	E	
Eriophorum gracile, Slender Cottongrass	(2)	X	
Eriophorum virginicum, Tawny Cottongrass	(2)	P	
Eriophorum viridicarinatum, Green Cottongrass	(2)	P	
Lipocarpha drummondii (Hemicarpha micrantha var. aristulata), Drummond's Dwarf Bulrush	(1)	E	
Lipocarpha micrantha (Hemicarpha micrantha var. micrantha), Dwarf Bulrush	(5)	T	
Rhynchospora alba, White Beak-rush	(5)	P	
Rhynchospora globularis, Grass-like Beak-rush	(5)	E	
Scirpus expansus, Woodland Bulrush	(2)	T	
Scirpus purshianus (sensu Fernald 1950), Pursh's Bulrush	(5)	P	
Scirpus smithii, (sensu Fernald 1950), Smith's Bulrush	(5)	E	
Scirpus subterminalis, Swaying Rush	(6)	E	
Scirpus torreyi, Torrey's Bulrush	(5)	X	

	Count Guide	Status OH	US
CYPERACEAE. Sedge Family (Cont'd.)			
Scleria oligantha, Tubercled Nut-rush	(5)	E	
Scleria pauciflora, Few-flowered Nut-rush	(4)	T	
Scleria triglomerata, Tall Nut-rush	(5)	P	
Scleria verticillata, Low Nut-rush	(5)	P	
ERIOCAULACEAE. Pipewort Family			
Eriocaulon septangulare (E. aquaticum), White-buttons	(5)	E	
IRIDACEAE. Iris Family			
Iris brevicaulis, Leafy Blue Flag	(1)	E	
Iris verna, Dwarf Iris	(5)	T	
Sisyrinchium atlanticum, Atlantic Blue-eyed-grass	(2)	E	
Sisyrinchium montanum, Northern Blue-eyed-grass	(2)	E	
Sisyrinchium mucronatum, Narrow-leaved Blue-eyed-grass	(2)	E	
JUNCACEAE. Rush Family			
Juncus alpinus (J. alpinoarticulatus), Alpine Rush	(5)	P	
Juncus balticus (J. arcticus in part), Baltic Rush	(4)	P	
Juncus diffusissimus, Diffuse Rush	(5)	E	
Juncus greenei, Greene's Rush	(5)	E	
Juncus interior (J. tenuis in part), Inland Rush	(5)	T	
Juncus platyphyllus (J. tenuis in part), Flat-leaved Rush	(5)	E	
Juncus secundus, One-sided Rush	(5)	T	
Luzula bulbosa, Southern Woodrush	(5)	T	
JUNCAGINACEAE. Arrow-grass Family			
Triglochin maritimum, Seaside Arrow-grass	(2)	T	
Triglochin palustre, Marsh Arrow-grass	(2)	P	
LEMNACEAE. Duckweed Family			
Wolffiella gladiata (W. floridana), Wolffiella	(6)	T	
LILIACEAE. Lily Family			
Clintonia borealis, Bluebead-lily	(5)	E	
Clintonia umbellulata, Speckled Wood-lily	(5)	T	
Disporum maculatum, Nodding Mandarin	(2)	T	
Erythronium rostratum (not in Gleason and Cronquist 1991, see Braun 1967), Goldenstar	(4)	E	
Lilium philadelphicum, Wood-lily	(2)	T	
Lilium superbum, Turk's-cap Lily	(2)	P	
Melanthium virginicum, Bunchflower	(2)	T	
Nothoscordum bivalve, False Garlic	(2)	T	

	Count Guide	Status OH	US
LILIACEAE. Lily Family (Cont'd.)			
Smilacina trifolia, Three-leaved Solomon's-seal	(2)	X	
Stenanthium gramineum, Feather-bells	(2)	T	
Streptopus roseus, Rose Twisted-stalk	(2)	E	
Tofieldia glutinosa, False Asphodel	(2)	T	
Trillium cernuum, Nodding Trillium	(2)	X	
Trillium nivale, Snow Trillium	(2)	P	
Trillium recurvatum, Prairie Wake-robin	(2)	P	
Trillium undulatum, Painted Trillium	(2)	T	
Veratrum woodii, Wood's Hellebore	(1)	T	
Zigadenus elegans var. glaucus, Wand-lily	(2)	P	
NAJADACEAE. Water-nymph Family			
Najas gracillima, Thread-like Naiad	(6)	E	
ORCHIDACEAE. Orchid Family			
Arethusa bulbosa, Dragon's-mouth	(2)	E	
Calopogon tuberosus, Grass-pink	(2)	T	
Coeloglossum viride (Habenaria viridis), Long-bracted Orchid	(2)	E	
Corallorhiza maculata, Spotted Coral-root	(2)	P	
Corallorhiza trifida, Early Coral-root	(2)	E	
Corallorhiza wisteriana, Spring Coral-root	(2)	T	
Cypripedium calceolus var. parviflorum, Small Yellow Lady's-slipper	(2)	E	
Cypripedium calceolus var. pubescens, Large Yellow Lady's-slipper	(2)	P	
Cypripedium candidum, White Lady's-slipper	(2)	T	
Cypripedium reginae, Showy Lady's-slipper	(2)	T	
Goodyera tesselata, Checkered Rattlesnake-plantain	(5)	X	
Hexalectris spicata, Crested Coral-root	(4)	T	
Isotria medeoloides, Small Whorled Pogonia	(1)	E	T
Listera cordata, Heartleaf Twayblade	(2)	X	
Malaxis unifolia, Green Adder's-mouth	(2)	P	
Platanthera blephariglottis (Habenaria blephariglottis), White Fringed Orchid	(2)	E	
Platanthera ciliaris (Habenaria ciliaris), Yellow Fringed Orchid	(2)	T	
Platanthera flava (Habenaria flava), Tubercled Rein-orchid	(2)	P	
Platanthera grandiflora (Habenaria psycodes var. grandiflora), Large Purple Fringed Orchid	(2)	X	
Platanthera hookeri (Habenaria hookeri), Hooker's Orchid	(2)	X	

	Count Guide	Status OH	US
ORCHIDACEAE. Orchid Family (Cont'd.)			
Platanthera hyperborea (Habenaria hyperborea), Tall Northern Green Orchid	(2)	X	
Platanthera leucophaea (Habenaria leucophaea), Prairie Fringed Orchid	(2)	T	T
Platanthera orbiculata (Habenaria orbiculata), Large Round-leaved Orchid	(2)	P	
Platanthera psycodes (Habenaria psycodes var. psycodes), Small Purple Fringed Orchid	(2)	E	
Pogonia ophioglossoides, Rose Pogonia	(2)	T	
Spiranthes lucida, Shining Ladies'-tresses	(2)	P	
Spiranthes magnicamporum, Great Plains Ladies'-tresses	(2)	P	
Spiranthes ovalis, Lesser Ladies'-tresses	(2)	P	
Spiranthes romanzoffiana, Hooded Ladies'-tresses	(2)	T	
Triphora trianthophora, Three-birds-orchid	(2)	T	
POACEAE. Grass Family			
Agrostis elliottiana, Elliott's Bent-grass	(5)	X	
Ammophila breviligulata, American Beach Grass	(6)	T	
Andropogon virginicus var. abbreviatus, Bushy Beardgrass	(5)	E	
Aristida necopina (A. longespica var. geniculata), False Arrow-feather	(2)	E	
Aristida purpurascens, Purple Triple-awned Grass	(6)	P	
Calamagrostis porteri spp. insperata, (C. insperata), Bartley's Reed Bent Grass	(5)	E	
Cinna latifolia, Northern Wood-reed	(5)	E	
Deschampsia caespitosa, Tufted Hairgrass	(5)	P	
Deschampsia flexuosa, Crinkled Hairgrass	(5)	P	
Digitaria filiformis, Slender Finger-grass	(5)	X	
Elymus trachycaulus, Bearded Wheat Grass	(5)	T	
Glyceria acutiflora, Sharp-glumed Manna-grass	(5)	E	
Glyceria borealis, Northern Manna-grass	(5)	X	
Glyceria grandis, Tall Manna-grass	(6)	P	
Gymnopogon ambiguus, Beardgrass	(5)	X	
Koeleria macrantha (K. pyramidata), Junegrass	(5)	E	
Leersia lenticularis, Catchfly Grass	(4)	E	
Melica nitens, Three-flowered Melic	(5)	E	
Muhlenbergia capillaris, Hairgrass	(5)	X	
Muhlenbergia cuspidata, Plains Muhlenbergia	(5)	E	
Oryzopsis asperifolia, Large-leaved Mountain-rice	(5)	E	
Oryzopsis racemosa, Mountain-rice	(5)	E	
Panicum bicknellii (sensu Fernald 1950), Bicknell's Panic-grass	(5)	T	

	Count Guide	Status OH	US
POACEAE. Grass Family (Cont'd.)			
Panicum boreale (sensu Fernald 1950), Northern Panic-grass	(5)	T	
Panicum calliphyllum (sensu Fernald 1950), Tall Green Panic-grass	(5)	X	
Panicum commonsianum, Commons' Panic-grass	(5)	E	
Panicum laxiflorum, Pale Green Panic-grass	(5)	P	
Panicum leibergii, Leiberg's Panic-grass	(5)	E	
Panicum lindheimeri (P. languinosum var. lindheimeri), Lindheimer's Panic-grass	(5)	E	
Panicum longifolium, Long-leaved Panic-grass	(5)	X	
Panicum meridionale (P. leucothrix), Southern Hairy Panic-grass	(5)	E	
Panicum perlongum (P. depauperatum and P. linearifolium in part), Long-panicled Panic-grass	(5)	E	
Panicum philadelphicum (sensu Hitchcock 1971), Philadelphia Panic-grass	(4)	T	
Panicum praecocius (P. villosissimum in part, see Hitchcock 1971), Early Panic-grass	(5)	E	
Panicum spretum, Narrow-headed Panic-grass	(5)	E	
Panicum tuckermanii (P. philadelphicum in part, see Hitchcock 1971), Tuckerman's Panic-grass	(4)	E	
Panicum verrucosum, Warty Panic-grass	(5)	E	
Panicum villosissimum (sensu Hitchcock 1971), Villous Panic-grass	(5)	X	
Panicum yadkinense, Spotted Panic-grass	(5)	E	
Paspalum fluitans, Riverbank Paspalum	(6)	P	
Piptochaetium avenaceum, Blackseed Needle Grass	(5)	X	
Poa languida, Weak Spear-grass	(5)	P	
Poa paludigena, Marsh Spear-grass	(5)	T	
Poa saltuensis, Pasture Bluegrass	(5)	E	
Poa wolfii, Wolf's Bluegrass	(5)	X	
Saccharum alopecuroideum (Erianthus alopecuroides), Silver Plume Grass	(5)	X	
Schizachne purpurascens, False Melic	(5)	E	
Schizachyrium scoparium var. littorale, Coastal Little Bluestem	(5)	E	
Sphenopholis obtusata var. obtusata, Prairie Wedgegrass	(2)	T	
Sphenopholis pensylvanica, Swamp Oats	(5)	P	
Sporobolus cryptandrus, Sand Dropseed	(5)	P	
Sporobolus heterolepis, Prairie Dropseed	(5)	T	
Stipa spartea, Porcupine Grass	(5)	T	
Triplasis purpurea, Purple Sand-grass	(5)	P	
Zizania aquatica, Wild Rice	(2)	T	

	Count Guide	Status OH	Status US
PONTEDERIACEAE. Water-hyacinth Family			
Heteranthera reniformis, Mud-plantain	(6)	E	
POTAMOGETONACEAE. Pondweed Family			
Potamogeton filiformis, Filiform Pondweed	(6)	X	
Potamogeton friesii, Fries' Pondweed	(6)	E	
Potamogeton gramineus, Grass-like Pondweed	(6)	E	
Potamogeton hillii, Hill's Pondweed	(6)	E	
Potamogeton natans, Floating Pondweed	(6)	P	
Potamogeton perfoliatus, Red-head Pondweed	(6)	X	
Potamogeton praelongus, White-stem Pondweed	(6)	E	
Potamogeton pulcher, Spotted Pondweed	(6)	T	
Potamogeton richardsonii, Richardson's Pondweed	(6)	P	
Potamogeton robbinsii, Robbins' Pondweed	(6)	E	
Potamogeton spirillus, Spiral Pondweed	(6)	E	
Potamogeton strictifolius, Straight-leaved Pondweed	(6)	X	
Potamogeton tennesseensis (not in Gleason and Cronquist 1991, see Braun 1967), Tennessee Pondweed	(6)	E	
Potamogeton vaseyi, Vasey's Pondweed	(6)	X	
Potamogeton zosteriformis, Flat-stem Pondweed	(6)	P	
SCHEUCHZERIACEAE. Scheuchzeria Family			
Scheuchzeria palustris, Scheuchzeria	(1)	E	
SMILACACEAE. Catbrier Family			
Smilax herbacea var. lasioneura, Pale Carrion-flower	(6)	T	
Smilax herbacea var. pulverulenta, Downy Carrion-flower	(2)	E	
SPARGANIACEAE. Bur-reed Family			
Sparganium androcladum, Keeled Bur-reed	(2)	P	
Sparganium chlorocarpum, Small Bur-reed	(2)	E	
XYRIDACEAE. Yellow-eyed-grass Family			
Xyris difformis, Carolina Yellow-eyed-grass	(5)	E	
Xyris torta, Twisted Yellow-eyed-grass	(5)	E	

	Count Guide	Status OH	US
Angiosperms - Dicotyledons			
ACANTHACEAE. Acanthus Family			
Ruellia caroliniensis, Carolina Ruellia	(2)	P	
ACERACEAE. Maple Family			
Acer pensylvanicum, Striped Maple	(1)	E	
AMARANTHACEAE. Amaranth Family			
Froelichia floridana, Cottonweed	(1)	E	
ANACARDIACEAE. Cashew Family			
Rhus aromatica var. arenaria, Beach Sumac	(2)	X	
Toxicodendron rydbergii, Northern Poison-ivy	(6)	E	
APIACEAE. Carrot Family			
Eryngium yuccifolium, Rattlesnake-master	(1)	P	
Hydrocotyle americana, American Water-pennywort	(6)	P	
Hydrocotyle umbellata, Navelwort	(6)	E	
Ligusticum canadense, American Lovage	(2)	X	
Perideridia americana, Perideridia	(2)	X	
APOCYNACEAE. Dogbane Family			
Apocynum sibiricum, Clasping-leaf Dogbane	(2)	E	
ARALIACEAE. Ginseng Family			
Aralia hispida, Bristly Sarsaparilla	(1)	E	
ASCLEPIADACEAE. Milkweed Family			
Asclepias amplexicaulis, Bluntleaf Milkweed	(1)	P	
Asclepias variegata, White Milkweed	(2)	P	
Asclepias viridiflora, Green Milkweed	(2)	P	
Asclepias viridis, Spider Milkweed	(2)	P	
Matelea obliqua, Angle-pod	(6)	P	
ASTERACEAE. Aster Family			
Antennaria virginica, Shale Barren Pussy-toes	(6)	T	
Artemisia campestris, Beach Wormwood	(2)	T	
Aster acuminatus, Mountain Aster	(4)	X	
Aster drummondii, Drummond's Aster	(2)	T	
Aster dumosus, Bushy Aster	(2)	T	
Aster oblongifolius, Shale Barren Aster	(2)	T	
Aster ontarionis, Bottomland Aster	(5)	T	
Aster solidagineus, Narrow-leaved Aster	(5)	T	

	Count Guide	Status OH	US
ASTERACEAE. Aster Family (Cont'd.)			
Aster surculosus, Creeping Aster	(5)	X	
Cacalia plantaginea, Fen Indian-plantain	(1)	P	
Chrysogonum virginianum, Golden-knees	(6)	T	
Chrysopsis graminifolia, Silkgrass	(5)	E	
Cirsium carolinianum, Carolina Thistle	(2)	T	
Conyza ramosissima, Bushy Horseweed	(2)	E	
Eupatorium album, White Thoroughwort	(2)	T	
Eupatorium aromaticum, Small White Snakeroot	(2)	T	
Eupatorium hyssopifolium, Hyssop Thoroughwort	(1)	E	
Eupatorium incarnatum, Pink Thoroughwort	(2)	P	
Euthamia remota, Great Lakes Goldenrod	(4)	T	
Gnaphalium viscosum (G. macounii), Winged Cudweed	(2)	X	
Helianthus mollis, Ashy Sunflower	(2)	T	
Helianthus occidentalis, Western Sunflower	(2)	P	
Hieracium canadense (H. kalmii var. fasciculatum), Canada Hawkweed	(2)	T	
Hieracium longipilum, Long-bearded Hawkweed	(4)	E	
Hymenoxys herbacea, Lakeside Daisy	(1)	E	T
Krigia dandelion, Potato-dandelion	(1)	T	
Krigia virginica, Dwarf Dandelion	(2)	T	
Lactuca hirsuta, Hairy Tall Lettuce	(2)	X	
Liatris cylindracea, Slender Blazing-star	(2)	T	
Liatris squarrosa, Scaly Blazing-star	(2)	P	
Megalodonta beckii (Bidens beckii), Water-marigold	(5)	X	
Pluchea camphorata, Camphorweed	(2)	E	
Prenanthes aspera, Rough Rattlesnake-root	(2)	E	
Prenanthes crepidinea, Nodding Rattlesnake-root	(2)	E	
Prenanthes racemosa, Prairie Rattlesnake-root	(2)	P	
Prenanthes trifoliolata, Gall-of-the-earth	(2)	E	
Senecio pauperculus, Balsam Squaw-weed	(2)	T	
Silphium laciniatum, Compass-plant	(1)	E	
Solidago arguta, Cut-leaf Goldenrod	(2)	X	
Solidago odora, Sweet Goldenrod	(1)	T	
Solidago ohioensis, Ohio Goldenrod	(2)	P	
Solidago ptarmicoides, White Upland Goldenrod	(2)	X	
Solidago puberula, Dusty Goldenrod	(4)	E	
Solidago sphacelata, False Goldenrod	(4)	E	
Solidago squarrosa, Leafy Goldenrod	(2)	P	
Verbesina helianthoides, Hairy Wing-stem	(2)	P	
Verbesina occidentalis, Yellow Crownbeard	(2)	E	
Vernonia fasciculata, Prairie Ironweed	(2)	P	
Vernonia missurica, Missouri Ironweed	(2)	E	
Vernonia noveboracensis, New York Ironweed	(2)	X	

	Count Guide	Status OH US
BETULACEAE. Birch Family		
Betula populifolia, Gray Birch	(1)	P
Betula pumila, Swamp Birch	(1)	T
Corylus cornuta, Beaked Hazel	(1)	X
BIGNONIACEAE. Trumpet-creeper Family		
Bignonia capreolata, Cross-vine	(6)	P
BORAGINACEAE. Borage Family		
Cynoglossum virginianum var. boreale, Northern Wild Comfrey	(2)	X
Hackelia deflexa, Northern Stickseed	(2)	X
Lithospermum caroliniense (L. croceum), Plains Puccoon	(2)	T
Onosmodium hispidissimum (O. molle var. hispidissimum), False Gromwell	(2)	P
BRASSICACEAE. Mustard Family		
Arabis divaricarpa, Limestone Rock-cress	(2)	E
Arabis drummondii, Drummond's Rock-cress	(2)	E
Arabis hirsuta var. adpressipilis, Southern Hairy Rock-cress	(2)	P
Arabis hirsuta var. pycnocarpa, Western Hairy Rock-cress	(2)	E
Arabis lyrata, Lyre-leaf Rock-cress	(2)	T
Arabis patens, Spreading Rock-cress	(2)	E
Armoracia lacustris, Lake-cress	(2)	T
Cakile edentula, Inland Sea-rocket	(2)	P
Cardamine dissecta, Narrow-leaved Toothwort	(4)	P
Cardamine pratensis var. palustris, American Cuckoo-flower	(2)	E
Descurainia pinnata, Tansy-mustard	(2)	T
Draba brachycarpa, Little Whitlow-grass	(2)	E
Draba cuneifolia, Wedge-leaf Whitlow-grass	(2)	T
Draba reptans, Carolina Whitlow-grass	(2)	T
Erysimum arkansanum (E. asperum), Western Wall-flower	(2)	E
Leavenworthia uniflora, Michaux's Leavenworthia	(2)	T
CACTACEAE. Cactus Family		
Opuntia humifusa, Prickly Pear	(6)	P
CALLITRICHACEAE. Water-starwort Family		
Callitriche verna (C. palustris), Water-starwort	(6)	T

	Count Guide	Status OH US
CALYCANTHACEAE. Strawberry-shrub Family		
Calycanthus fertilis (C. floridus var. glaucus), Sweet-shrub	(1)	X
CAMPANULACEAE. Bellflower Family		
Campanula rotundifolia, Harebell	(2)	T
CAPRIFOLIACEAE. Honeysuckle Family		
Linnaea borealis, American Twinflower	(5)	X
Lonicera flava, Pale Yellow Honeysuckle	(2)	X
Lonicera oblongifolia, Swamp Fly-honeysuckle	(2)	X
Lonicera reticulata (L. prolifera), Grape Honeysuckle	(6)	P
Lonicera villosa (L. caerulea var. villosa), Mountain Fly-honeysuckle	(2)	X
Symphoricarpos albus var. albus, Snowberry	(2)	X
Viburnum alnifolium, Hobblebush	(1)	P
Viburnum molle, Soft-leaved Arrow-wood	(1)	E
Viburnum opulus var. americanum, Highbush-cranberry	(1)	T
Viburnum rufidulum, Southern Black-haw	(1)	P
CARYOPHYLLACEAE. Pink Family		
Arenaria lateriflora, Grove Sandwort	(2)	P
Arenaria patula, Spreading Sandwort	(2)	E
Arenaria stricta, Rock Sandwort	(5)	P
Sagina decumbens, Southern Pearlwort	(5)	X
Silene caroliniana var. pensylvanica, Carolina Catchfly	(5)	T
Silene caroliniana var. wherryi (not in Gleason and Cronquist 1991, see Fernald 1950), Wherry's Catchfly	(5)	E
Silene nivea, Snowy Campion	(4)	T
Silene regia, Royal Catchfly	(2)	P
Silene rotundifolia, Round-leaved Catchfly	(5)	P
CELASTRACEAE. Staff-tree Family		
Paxistima canbyi, Cliff-green	(6)	E
CHENOPODIACEAE. Goosefoot Family		
Chenopodium capitatum, Strawberry-blite	(2)	X
Chenopodium leptophyllum, Slender Goosefoot	(2)	X
CISTACEAE. Rockrose Family		
Helianthemum bicknellii, Plains Frostweed	(2)	T
Helianthemum canadense, Canada Frostweed	(2)	P
Hudsonia tomentosa, Beach-heather	(6)	E

	Count Guide	Status OH US
CISTACEAE. Rockrose Family (Cont'd.)		
Lechea intermedia, Round-fruited Pinweed	(2)	T
Lechea minor, Thyme-leaf Pinweed	(2)	T
Lechea pulchella, Leggett's Pinweed	(2)	P
Lechea tenuifolia, Narrow-leaved Pinweed	(2)	T
Lechea villosa (L. mucronata), Hairy Pinweed	(2)	T
CLUSIACEAE. Mangosteen Family		
Hypericum boreale, Northern St. John's-wort	(2)	T
Hypericum canadense, Canadian St. John's-wort	(2)	T
Hypericum denticulatum, Coppery St. John's-wort	(1)	E
Hypericum ellipticum, Few-flowered St. John's-wort	(4)	T
Hypericum gymnanthum, Least St. John's-wort	(2)	E
Hypericum kalmianum, Kalm's St. John's-wort	(2)	T
Hypericum majus, Tall St. John's-wort	(2)	P
Triadenum tubulosum, Marsh St. John's-wort	(2)	T
Triadenum walteri, Walter's St. John's-wort	(2)	E
CORNACEAE. Dogwood Family		
Cornus canadensis, Bunchberry	(3)	T
Cornus rugosa, Round-leaved Dogwood	(2)	P
CUSCUTACEAE. Dodder Family		
Cuscuta compacta, Sessile Dodder	(6)	X
Cuscuta coryli, Hazel Dodder	(6)	E
Cuscuta glomerata, Glomerate Dodder	(6)	T
Cuscuta pentagona, Five-angled Dodder	(6)	X
DROSERACEAE. Sundew Family		
Drosera intermedia, Spathulate-leaved Sundew	(2)	E
Drosera rotundifolia, Round-leaved Sundew	(1)	P
ELAEAGNACEAE. Oleaster Family		
Shepherdia canadensis, Canadian Buffalo-berry	(1)	P
ELATINACEAE. Waterwort Family		
Elatine triandra, Elatine	(6)	X
ERICACEAE. Heath Family		
Andromeda glaucophylla, Bog-rosemary	(3)	X
Arctostaphylos uva-ursi, Bearberry	(6)	X
Chamaedaphne calyculata, Leather-leaf	(5)	P
Gaultheria hispidula, Creeping Snowberry	(6)	X

	Count Guide	Status OH	US
ERICACEAE. Heath Family (Cont'd.)			
Ledum groenlandicum, Labrador-tea	(6)	E	
Lyonia ligustrina, Maleberry	(3)	X	
Rhododendron calendulaceum, Flame Azalea	(2)	E	
Rhododendron maximum, Great Rhododendron	(6)	T	
Rhododendron nudiflorum var. nudiflorum (R. periclymenoides), Pinxter-flower	(2)	T	
Rhododendron nudiflorum var. roseum (R. prinophyllum), Northern Rose Azalea	(2)	P	
Vaccinium macrocarpon, Large Cranberry	(6)	P	
Vaccinium myrtilloides, Velvet-leaf Blueberry	(6)	T	
Vaccinium oxycoccos, Small Cranberry	(6)	T	
EUPHORBIACEAE. Spurge Family			
Acalypha virginica var. deamii (A. deamii), Deam's Three-seeded Mercury	(2)	X	
Croton glandulosus, Northern Croton	(2)	E	
Euphorbia polygonifolia, Seaside Spurge	(6)	P	
Euphorbia purpurea, Glade Spurge	(5)	E	
Euphorbia serpens, Roundleaf Spurge	(6)	E	
Phyllanthus caroliniensis, Carolina Leaf-flower	(2)	E	
FABACEAE. Pea or Bean Family			
Astragalus neglectus, Cooper's Milk-vetch	(2)	E	
Baptisia australis, Blue False Indigo	(2)	E	
Baptisia lactea, Prairie False Indigo	(2)	P	
Clitoria mariana, Butterfly-pea	(1)	P	
Dalea purpurea, Purple Prairie-clover	(2)	X	
Desmodium illinoense, Prairie Tick-trefoil	(2)	X	
Desmodium pauciflorum, Few-flowered Tick-trefoil	(2)	P	
Desmodium sessilifolium, Sessile Tick-trefoil	(2)	E	
Galactia volubilis, Milk-pea	(6)	E	
Lathyrus japonicus (L. maritimus), Inland Beach-pea	(2)	T	
Lathyrus ochroleucus, Yellow Vetchling	(2)	T	
Lathyrus venosus, Wild Pea	(1)	E	
Lupinus perennis, Wild Lupine	(1)	P	
Orbexilum pedunculatum, False Scurf-pea	(4)	P	
Phaseolus polystachios, Wild Kidney Bean	(6)	P	
Trifolium reflexum, Buffalo Clover	(1)	E	
Trifolium stoloniferum, Running Buffalo Clover	(5)	E	E

	Count Guide	Status OH	Status US
FAGACEAE. Beech Family			
Castanea dentata, American Chestnut[1]	(2)	P	
Quercus falcata, Spanish Oak	(1)	E	
Quercus marilandica, Blackjack Oak	(1)	P	
FUMARIACEAE. Fumitory Family			
Adlumia fungosa, Mountain-fringe	(6)	T	
Corydalis sempervirens, Rock-harlequin	(2)	P	
GENTIANACEAE. Gentian Family			
Gentiana alba (G. flavida), Yellowish Gentian	(2)	T	
Gentiana clausa, Closed Gentian	(2)	P	
Gentiana puberulenta, Prairie Gentian	(1)	E	
Gentiana saponaria, Soapwort Gentian	(2)	E	
Gentiana villosa, Sampson's Snakeroot	(2)	E	
Gentianopsis crinita, Fringed Gentian	(2)	P	
Gentianopsis procera, Small Fringed Gentian	(2)	P	
GERANIACEAE. Geranium Family			
Geranium bicknellii, Bicknell's Crane's-bill	(1)	E	
GROSSULARIACEAE. Gooseberry Family			
Ribes glandulosum, Skunk Currant	(2)	X	
Ribes missouriense, Missouri Gooseberry	(2)	E	
Ribes triste, Swamp Red Currant	(6)	E	
HALORAGACEAE. Water-milfoil Family			
Myriophyllum heterophyllum, Two-leaved Water-milfoil	(6)	E	
Myriophyllum sibiricum, American Water-milfoil	(6)	T	
Myriophyllum verticillatum, Green Water-milfoil	(6)	E	
HYDROPHYLLACEAE. Waterleaf Family			
Phacelia bipinnatifida, Fern-leaf Scorpion-weed	(2)	P	
Phacelia dubia, Small-flowered Scorpion-weed	(2)	X	
Phacelia ranunculacea, Blue Scorpion-weed	(2)	E	
JUGLANDACEAE. Walnut Family			
Juglans cinerea, Butternut	(1)	P	
LAMIACEAE. Mint Family			
Calamintha arkansana (Satureja glabella var. angustifolia), Limestone Savory	(2)	T	

[1]Includes only fruiting trees.

	Count Guide	Status OH US
LAMIACEAE. Mint Family (Cont'd.)		
Collinsonia verticillata, Early Stoneroot	(2)	E
Hedeoma hispidum, Rough Pennyroyal	(2)	T
LAMIACEAE. Mint Family (Cont'd.)		
Monarda punctata, Dotted Horsemint	(2)	E
Pycnanthemum muticum, Blunt Mountain-mint	(2)	P
Pycnanthemum verticillatum var. pilosum, Hoary Mountain-mint	(4)	E
Scutellaria integrifolia, Hyssop Skullcap	(2)	P
Scutellaria saxatilis, Rock Skullcap	(2)	P
Scutellaria serrata, Showy Skullcap	(2)	P
Trichostema dichotomum var. lineare (T. setaceum), Narrow-leaved Bluecurls	(2)	E
LENTIBULARIACEAE. Bladderwort Family		
Utricularia cornuta, Horned Bladderwort	(2)	E
Utricularia geminiscapa, Two-scaped Bladderwort	(6)	E
Utricularia intermedia, Flat-leaved Bladderwort	(2)	T
Utricularia minor, Lesser Bladderwort	(2)	P
LINACEAE. Flax Family		
Linum sulcatum, Grooved Flax	(2)	P
MAGNOLIACEAE. Magnolia Family		
Magnolia macrophylla, Bigleaf Magnolia	(1)	E
Magnolia tripetala, Umbrella Magnolia	(1)	P
MALVACEAE. Mallow Family		
Sida hermaphrodita, Virginia Mallow	(6)	P
MELASTOMATACEAE. Melastome Family		
Rhexia virginica, Virginia Meadow-beauty	(2)	P
MENYANTHACEAE. Buckbean Family		
Menyanthes trifoliata, Buckbean	(3)	T
MYRICACEAE. Bayberry Family		
Comptonia peregrina, Sweet-fern	(6)	T
Myrica pensylvanica, Bayberry	(1)	E
NYMPHAEACEAE. Water-lily Family		
Nuphar variegata, Bullhead Lily	(2)	E

	Count Guide	Status OH	Status US
OLEACEAE. Olive Family			
Chionanthus virginicus, Fringe-tree	(2)	T	
ONAGRACEAE. Evening-primrose Family			
Epilobium angustifolium, Fireweed	(2)	E	
Epilobium strictum, Simple Willow-herb	(2)	T	
Oenothera clelandii, Cleland's Evening-primrose	(2)	E	
Oenothera oakesiana (O. parviflora in part, see Dietrich et al., 1997), Oakes' Evening-primrose	(2)	E	
Oenothera parviflora (in part, see Dietrich et al. 1977), Small-flowered Evening-primrose	(2)	E	
OROBANCHACEAE. Broom-rape Family			
Orobanche ludoviciana, Louisiana Broom-rape	(2)	X	
OXALIDACEAE. Wood-sorrel Family			
Oxalis montana (O. acetosella), White Wood-sorrel	(2)	E	
PASSIFLORACEAE. Passion-flower Family			
Passiflora incarnata, Passion-flower	(6)	T	
PLANTAGINACEAE. Plantain Family			
Plantago cordata, Heart-leaf Plantain	(1)	E	
Plantago patagonica, Woolly Plantain	(1)	E	
PODOSTEMACEAE. Riverweed Family			
Podostemum ceratophyllum, Riverweed	(1)	E	
POLEMONIACEAE. Phlox Family			
Phlox latifolia (P. ovata), Mountain Phlox	(2)	E	
POLYGALACEAE. Milkwort Family			
Polygala cruciata, Cross-leaved Milkwort	(2)	E	
Polygala curtissii, Curtiss' Milkwort	(2)	E	
Polygala incarnata, Pink Milkwort	(2)	T	
Polygala paucifolia, Gay-wings	(6)	E	
Polygala polygama, Racemed Milkwort	(2)	T	
POLYGONACEAE. Smartweed Family			
Polygonum careyi, Carey's Smartweed	(2)	X	
Polygonum cilinode, Mountain Bindweed	(6)	T	
Polygonum robustius, Coarse Smartweed	(1)	T	

	Count Guide	Status OH	US
POLYGONACEAE. Smartweed Family (Cont'd.)			
Polygonum setaceum var. interjectum (not in Gleason and Conquist 1991, see Fernald 1950), Bristly Smartweed	(6)	E	
PRIMULACEAE. Primrose Family			
Androsace occidentalis, Western Rock Jasmine	(6)	T	
Hottonia inflata, Featherfoil	(6)	X	
PYROLACEAE. Shinleaf Family			
Chimaphila umbellata, Pipsissewa	(4)	T	
Moneses uniflora, One-flowered Wintergreen	(2)	E	
Orthilia secunda (P. secunda), One-sided Wintergreen	(4)	X	
Pyrola chlorantha, Green-flowered Wintergreen	(2)	E	
RANUNCULACEAE. Buttercup Family			
Aconitum noveboracense, Northern Monkshood	(3)	E	T
Aconitum uncinatum, Southern Monkshood	(1)	E	
Actaea rubra, Red Baneberry	(2)	T	
Anemone cylindrica, Prairie Thimbleweed	(2)	T	
Clematis occidentalis, Purple Virgin's-bower	(2)	X	
Delphinium exaltatum, Tall Larkspur	(2)	P	
Ranunculus fascicularis, Early Buttercup	(2)	P	
Ranunculus pusillus, Low Spearwort	(2)	E	
Trollius laxus, Spreading Globe-flower	(5)	E	
RHAMNACEAE. Buckthorn Family			
Ceanothus herbaceus (C. ovatus), Prairie Redroot	(1)	E	
ROSACEAE. Rose Family			
Amelanchier sanguinea, Rock Serviceberry	(2)	E	
Crataegus brainerdii, Brainerd's Hawthorn	(2)	X	
Crataegus uniflora, Dwarf Hawthorn	(2)	E	
Dalibarda repens, Robin-run-away	(5)	T	
Geum rivale, Water Avens	(2)	P	
Porteranthus trifoliatus, Bowman's-root	(2)	P	
Potentilla arguta, Tall Cinquefoil	(2)	E	
Potentilla palustris, Marsh Fivefinger	(4)	P	
Potentilla paradoxa, Bushy Cinquefoil	(2)	T	
Prunus mexicana, Bigtree Plum	(1)	X	
Prunus nigra, Canada Plum	(2)	X	
Prunus pumila var. cuneata (P. susquehanae), Sand Cherry	(1)	T	
Prunus pumila var. pumila, Great Lakes Sand Cherry	(2)	X	
Pyrus angustifolia, Narrow-leaved Crab	(2)	X	

	Count Guide	Status OH	US
ROSACEAE. Rose Family (Cont'd.)			
Rosa arkansana, Arkansas Rose	(2)	X	
Rosa blanda, Smooth Rose	(1)	T	
Rubus setosus, Small Bristleberry	(6)	X	
Rubus trivialis, Southern Dewberry	(2)	X	
Sorbus decora, Western Mountain-ash	(2)	E	
Spiraea alba var. latifolia, Northern Meadow-sweet	(2)	X	
Spiraea virginiana, Appalachian Spiraea	(3)	E	T
RUBIACEAE. Madder Family			
Galium labradoricum, Bog Bedstraw	(2)	E	
Galium palustre, Marsh Bedstraw	(6)	E	
Hedyotis nigricans, Narrow-leaved Summer Bluets	(2)	P	
Spermacoce glabra, Smooth Buttonweed	(6)	P	
SALICACEAE. Willow Family			
Populus balsamifera, Balsam Poplar	(3)	E	
Populus heterophylla, Swamp Cottonwood	(3)	P	
Salix candida, Hoary Willow	(2)	T	
Salix caroliniana, Carolina Willow	(2)	T	
Salix cordata, Sand-dune Willow	(5)	X	
Salix myricoides, Blue-leaved Willow	(5)	P	
Salix pedicellaris, Bog Willow	(5)	E	
Salix petiolaris, Slender Willow	(2)	T	
Salix serissima, Autumn Willow	(2)	P	
SARRACENIACEAE. Pitcher-plant Family			
Sarracenia purpurea, Pitcher-plant	(1)	P	
SAXIFRAGACEAE. Saxifrage Family			
Heuchera longiflora, Long-flowered Alumroot	(2)	X	
Heuchera parviflora, Small-flowered Alumroot	(6)	P	
Heuchera villosa, Hairy Alumroot	(6)	T	
Sullivantia sullivantii, Sullivantia	(6)	P	
SCROPHULARIACEAE. Figwort Family			
Agalinis auriculata, Ear-leaf Foxglove	(1)	E	
Agalinis gattingeri, Gattinger's Foxglove	(2)	X	
Agalinis purpurea var. parviflora, Small Purple Foxglove	(2)	E	
Agalinis skinneriana, Skinner's Foxglove	(2)	E	
Aureolaria pedicularia var. ambigens, Prairie Fern-leaf False Foxglove	(2)	E	
Aureolaria pedicularia var. pedicularia, Woodland Fern-leaf False Foxglove	(2)	E	

	Count Guide	Status OH US
SCROPHULARIACEAE. Figwort Family (Cont'd.)		
Besseya bullii, Besseya	(1)	X
Buchnera americana, Bluehearts	(2)	T
Gratiola virginiana, Round-fruited Hedge-hyssop	(6)	P
Gratiola viscidula, Short's Hedge-hyssop	(6)	P
Linaria canadensis, Old-field Toadflax	(2)	E
Melampyrum lineare, Cow-wheat	(5)	T
Penstemon canescens, Gray Beard-tongue	(2)	T
Penstemon laevigatus, Smooth Beard-tongue	(2)	E
Penstemon pallidus, Downy White Beard-tongue	(2)	T
Penstemon tubaeflorus, White-wand Beard-tongue	(2)	X
SOLANACEAE. Nightshade Family		
Physalis virginiana, Virginia Ground-cherry	(4)	X
STYRACACEAE. Storax Family		
Halesia carolina (H. tetraptera), Silverbell	(2)	X
Styrax americanus, Snowbell	(2)	X
Styrax grandifolius, Bigleaf Snowbell	(2)	X
ULMACEAE. Elm Family		
Celtis tenuifolia, Dwarf Hackberry	(1)	P
Ulmus thomasii, Rock Elm	(2)	T
URTICACEAE. Nettle Family		
Urtica chamaedryoides, Spring Nettle	(2)	E
VALERIANACEAE. Valerian Family		
Valeriana ciliata (V. edulis var. ciliata), Prairie Valerian	(2)	E
Valeriana uliginosa, Swamp Valerian	(2)	X
VIOLACEAE. Violet Family		
Viola lanceolata, Lance-leaved Violet	(2)	P
Viola missouriensis (V. sororia in part, see Fernald 1950), Missouri Violet	(2)	E
Viola nephrophylla, Northern Bog Violet	(2)	E
Viola pedata, Bird-foot Violet	(2)	T
Viola pedatifida (V. palmata var. pedatifida), Prairie Violet	(2)	E
Viola primulifolia, Primrose-leaved Violet	(2)	E
Viola tripartita var. glaberrima (not in Gleason and Cronquist 1991, see Radford et al. 1968), Wedge-leaf Violet	(2)	E

	Count Guide	Status OH	US
VIOLACEAE. Violet Family (Cont'd.)			
Viola tripartita var. tripartita (not in Gleason and Cronquist 1991, see Radford et al. 1968), Three-parted Violet	(2)	X	
Viola walteri, Walter's Violet	(4)	E	
VITACEAE. Grape Family			
Vitis cinerea, Pigeon Grape	(6)	P	

Inservice Note 718
September 1997

Wildlife That are Considered to be Endangered, Threatened, of Special Interest, Extirpated, or Extinct in Ohio

September 1997

The Division of Wildlife's mission is to conserve and improve the fish and wildlife resources and their habitats, and promote their use and appreciation by the public so that these resources continue to enhance the quality of life for all Ohioans. The Division has legal authority over Ohio's fish and wildlife, which includes about 56 species of mammals, 348 species of birds, 84 species and subspecies of amphibians and reptiles, 166 species of fish, and 79 species of mollusks. In addition, there are thousands of species of insects and other invertebrates which fall under the Division's jurisdiction. Furthermore, Ohio law grants authority to the chief of the Division to adopt rules restricting the taking or possession of native wildlife threatened with statewide extirpation and to develop and periodically update a list of endangered species (Ohio Revised Code 1531.25).

The first list of Ohio's endangered species was adopted in 1974 and included 71 species. In 1990, 108 species were listed, and included for the first time were butterflies, moths, and beetles. In 1996, as part of our comprehensive management plan, the Division initiated a reevaluation of the endangered species list. An extensive examination of the list is conducted every five years. The Division seeks input from our staff along with other noted professional and amateur wildlife experts across Ohio.

The status of native wildlife species is very important to the Division. While the listing process identifies individual wildlife species needing protection, it also serves as a powerful tool in the Division's planning process. It provides direction for the allocation of personnel time and funds in Division programs and projects. In addition to endangered, the Division uses four other categories, threatened, special interest, extirpated, and extinct, to further define the status of selected wildlife.

Definitions of these categories, a summary of the numbers of species and subspecies in each category and the list of species and subspecies in each category follow:

DEFINITIONS

ENDANGERED - A native species or subspecies threatened with extirpation from the state. The danger may result from one or more causes, such as habitat loss, pollution, predation, interspecific competition, or disease.

THREATENED - A species or subspecies whose survival in Ohio is not in immediate jeopardy, but to which a threat exists. Continued or increased stress will result in its becoming endangered.

SPECIAL INTEREST - A species or subspecies which might become threatened in Ohio under continued or increased stress. Also, a species or subspecies for which there is some concern but for which information is insufficient to permit an adequate status evaluation.

EXTIRPATED - A species or subspecies that occurred in Ohio at the time of European settlement and that has since disappeared from the state.

EXTINCT - A species or subspecies that occurred in Ohio at the time of European settlement and that has since disappeared from its entire range.

Table 1. Number of Species in Major Taxa Classified as Endangered, Threatened, of Special Interest, Extirpated, or Extinct in Ohio, September 1997.

Taxon	Endangered	Threatened	Special Interest	Extirpated	Extinct
Mammals	5	0	8	10	0
Birds	29	3	20	4	2
Reptiles	4	2	10	0	0
Amphibians	5	0	2	0	0
Fishes	23	13	9	5	2
Mollusks	27	4	6	11	5
Crayfishes	0	1	2	0	0
Isopods	0	0	2	0	0
Pseudoscorpions	0	0	1	0	0
Dragonflies	8	0	0	0	0
Damselflies	2	0	0	0	0
Crickets	0	0	1	0	0
Butterflies	7	1	3	1	0
Moths	14	4	26	0	0
Beetles	3	2	5	0	0
Total	127	30	95	31	9

Table 2. Species Classified as Endangered, Threatened, of Special Interest, Extirpated, or Extinct in Ohio, September 1997.

ENDANGERED

TAXON	SPECIES
MAMMALS	
Indiana myotis *E	*Myotis sodalis*
Allegheny woodrat *M	*Neotoma magister*
River otter	*Lutra canadensis*
Bobcat	*Felis rufus*
Black bear	*Ursus americanus*
BIRDS	
American bittern	*Botaurus lentiginosus*
Least bittern	*Ixobrychus exilis*
Yellow-crowned night-heron	*Nyctanassa violacea*
Bald eagle *T	*Haliaeetus leucocephalus*
Northern harrier	*Circus cyaneus*
Peregrine falcon *E	*Falco peregrinus*
King rail	*Rallus elegans*
Sandhill crane	*Grus canadensis*
Piping plover *E	*Charadrius melodus*
Common tern *M	*Sterna hirundo*
Black tern *M	*Chlidonias niger*
Barn owl	*Tyto alba*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Bewick's wren *M	*Thryomanes bewickii*
Winter wren	*Troglodytes troglodytes*
Sedge wren	*Cistothorus platensis*
Hermit thrush	*Catharus guttatus*
Loggerhead shrike *M	*Lanius ludovicianus*
Golden-winged warbler	*Vermivora chrysoptera*
Magnolia warbler	*Dendroica magnolia*
Kirtland's warbler	*Dendroica kirtlandii*
Northern waterthrush	*Seiurus noveboracensis*
Canada warbler	*Wilsonia canadensis*
Lark sparrow	*Chondestes grammacus*
Dark-eyed junco	*Junco hyemalis*
Osprey	*Pandion haliaetus*
Trumpeter swan	*Cygnus buccinator*
Snowy egret	*Egretta thula*
Little blue heron	*Egretta caerulea*
REPTILES	
Copperbelly water snake *PT	*Nerodia erythrogaster neglecta*
Eastern plains garter snake	*Thamnophis radix radix*
Timber rattlesnake	*Crotalus horridus horridus*
Eastern massasauga *M	*Sistrurus catenatus*
AMPHIBIANS	
Eastern hellbender *M	*Cryptobranchus alleganiensis alleganiensis*
Blue-spotted salamander	*Ambystoma laterale*
Green salamander	*Aneides aeneus*
Cave salamander	*Eurycea lucifuga*
Eastern spadefoot	*Scaphiopus holbrookii*

FISHES	
Ohio lamprey	*Ichthyomyzon bdellium*
Northern brook lamprey	*Ichthyomyzon fossor*
Mountain brook lamprey	*Ichthyomyzon greeleyi*
Lake sturgeon *M	*Acipenser fulvescens*
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Spotted gar	*Lepisosteus oculatus*
Shortnose gar	*Lepisosteus platostomus*
Cisco (or Lake herring)	*Coregonus artedi*
Goldeye	*Hiodon alosoides*
Speckled chub	*Macrhybopsis aestivalis*
Pugnose minnow	*Opsopoeodus emiliae*
Blackchin shiner	*Notropis heterodon*
Blacknose shiner	*Notropis heterolepis*
Mississippi silvery minnow	*Hybognathus nuchalis*
Blue sucker *M	*Cycleptus elongatus*
Longnose sucker	*Catostomus catostomus*
Blue catfish	*Ictalurus furcatus*
Mountain madtom	*Noturus eleutherus*
Northern madtom	*Noturus stigmosus*
Scioto madtom *E	*Noturus trautmani*
Pirate perch	*Aphredoderus sayanus*
Western banded killifish	*Fundulus diaphanus menona*
Spotted darter *M	*Etheostoma maculatum*
MOLLUSKS	
Snuffbox	*Epioblasma triquetra*
Ebonyshell	*Fusconaia ebena*
Fanshell *E	*Cyprogenia stegaria*
Butterfly	*Ellipsaria lineolata*
Elephant-ear	*Elliptio crassidens crassidens*
Purple catspaw *E	*Epioblasma o. obliquata*
White catspaw *E	*Epioblasma obliquata perobliqua*
Northern riffleshell *E	*Epioblasma torulosa rangiana*
Long-solid	*Fusconaia maculata maculata*
Pink mucket *E	*Lampsilis orbiculata*
Ridged pocketbook	*Lampsilis ovata*
Yellow sandshell	*Lampsilis teres*
Eastern pondmussel	*Ligumia nasuta*
Washboard	*Megalonaias nervosa*
Hickorynut	*Obovaria olivaria*
Ring pink	*Obovaria retusa*
White wartyback	*Plethobasus cicatricosus*
Sheepnose	*Plethobasus cyphyus*
Clubshell *E	*Pleurobema clava*
Ohio pigtoe	*Pleurobema cordatum*
Pyramid pigtoe	*Pleurobema rubrum*
Rabbitsfoot	*Quadrula cylindrica cylindrica*
Monkeyface	*Quadrula metanevra*
Wartyback	*Quadrula nodulata*
Purple lilliput	*Toxolasma lividus*
Rayed bean	*Villosa fabalis*
Little spectaclecase	*Villosa lienosa*
DRAGONFLIES	
Hine's emerald *E	*Somatochlora hineana*
Mottled darner	*Aeshna clepsydra*
Plains clubtail	*Gomphurus externus*
American emerald	*Cordulia shurtleffi*

Uhler's sundragon	*Helocordulia uhleri*
Frosted whiteface	*Leucorrhinia frigida*
Elfin skimmer	*Nannothemis bella*
Canada darner	*Aeshna canadensis*
Tiger spiketail	*Cordulegaster erronea*
DAMSELFLIES	
Seepage dancer	*Argia bipunctulata*
BUTTERFLIES	
Persius dusky wing	*Erynnis persius*
Frosted elfin	*Incisalia irus*
Karner blue *E	*Lycaeides melissa samuelis*
Purplish copper	*Lycaena helloides*
Swamp metalmark	*Calephelis muticum*
Regal fritillary *M	*Speyeria idalia*
Mitchell's satyr *E	*Neonympha mitchellii*
MOTHS	
Unexpected cycnia	*Cycnia inopinatus*
Graceful underwing	*Catocala gracilis*
	Spartiniphaga inops
	Hypocoena enervata
	Papaipema silphii
	Papaipema beeriana
	Lithophane semiusta
	Trichoclea artesta
	Tricholita notata
	Melanchra assimilis
Pointed sallow	*Epiglaea apiata*
	Ufeus plicatus
	Ufeus satyricus
Hebard's noctuid moth *M	*Erythroecia hebardi*
BEETLES	
Kramer's cave beetle *M	*Pseudanophthalmus krameri*
Ohio cave beetle *M	*Pseudanophthalmus ohioensis*
American burying beetle *E	*Nicrophorus americanus*

THREATENED

BIRDS	
Upland sandpiper	*Bartramia longicauda*
Cattle egret	*Bubulcus ibis*
Black crowned night heron	*Nycticorax nycticorax*
REPTILES	
Lake Erie water snake *PT	*Nerodia sipedon insularum*
Kirtland's snake *M	*Clonophis kirtlandii*
FISHES	
Brook trout	*Salvelinus fontinalis*
Bigeye shiner	*Notropis boops*
Tonguetied minnow	*Exoglossum laurae*
Greater redhorse *M	*Moxostoma valenciennesi*
Channel darter	*Percina copelandi*
American eel	*Anguilla rostrata*
Paddlefish *M	*Polyodon spathula*
Rosyside dace	*Clinostomus funduloides*

Bigmouth shiner	*Notropis dorsalis*
Lake chubsucker	*Erimyzon sucetta*
River darter	*Percina shumardi*
Bluebreast darter	*Etheostoma camurum*
Tippecanoe darter	*Etheostoma tippecanoe*
MOLLUSKS	
Black sandshell	*Ligumia recta*
Threehorn wartyback	*Obliquaria reflexa*
Fawnsfoot	*Truncilla donaciformis*
Pondhorn	*Uniomerus tetralasmus*
CRAYFISHES	
Sloan's crayfish	*Orconectes sloanii*
BUTTERFLIES	
Silver-bordered fritillary	*Boloria selene*
MOTHS	
Wayward nymph	*Catocala antinympha*
	Spartiniphaga panatela
	Fagitana littera
The pink-streak	*Faronta rubripennis*
BEETLES	
	Cicindela hirticollis
Cobblestone tiger beetle *M	*Cicindela marginipennis*

SPECIAL INTEREST

MAMMALS	
Pygmy shrew	*Sorex hoyi*
Star-nosed mole	*Condylura cristata*
Eastern small-footed bat *M	*Myotis subulatus*
Rafinesque's big-eared bat *M	*Corynorhinus rafinesquii*
Southern red-backed vole	*Clethrionomys gapperi*
Woodland jumping mouse	*Napaeozapus insignis*
Badger	*Taxidea taxus*
Ermine	*Mustela erminea*
BIRDS	
American black duck	*Anas rubripes*
Sharp-shinned hawk	*Accipiter striatus*
Northern goshawk *M	*Accipiter gentilis*
Double-crested cormorant	*Phalacrocorax auritus*
Black vulture	*Coragyps atratus*
Red-shouldered hawk	*Buteo lineatus*
Virginia rail	*Rallus limicola*
Sora	*Porzana carolina*
Black rail *M	*Laterallus jamaicensis*
Common snipe	*Gallinago gallinago*
Long-eared owl	*Asio otus*
Short-eared owl	*Asio flammeus*
Northern saw-whet owl	*Aegolius acadicus*
Chuck-will's-widow	*Caprimulgus carolinensis*
Purple martin	*Progne subis*
Marsh wren	*Cistothorus palustris*
Henslow's sparrow *M	*Ammodramus henslowii*
Cerulean warbler *M	*Dendroica cerulea*

Bachman's sparrow *M	*Aimophila aestivalis*
Common moorhen	*Gallinula chloropus*
REPTILES	
Eastern box turtle	*Carolina carolina*
Spotted turtle	*Clemmys guttata*
Blanding's turtle *M	*Emydoidea blandingii*
False map turtle *M	*Graptemys pseudogeographica*
Coal skink	*Eumeces anthracinus*
Black king snake	*Lampropeltis getula nigra*
Eastern garter snake (melanistic)	*Thamnophis sirtalis sirtalis*
Shorthead garter snake *M	*Thamnophis brachystoma*
Rough green snake	*Opheodrys aestivus*
Eastern fox snake	*Elaphe vulpina gloydi*
AMPHIBIANS	
Four-toed salamander	*Hemidactylium scutatum*
Mud salamander	*Pseudotriton montanus*
FISHES	
Lake trout	*Salvelinus namaycush*
Lake whitefish	*Coregonus clupeaformis*
Burbot	*Lota lota*
Muskellunge	*Esox masquinongy*
River redhorse	*Moxostoma carinatum*
Eastern sand darter *M	*Ammiocrypta pellucida*
Least darter	*Etheostoma microperca*
Iowa darter	*Etheostoma exile*
Spoonhead sculpin	*Cottus ricei*
MOLLUSKS	
Flat floater	*Anodonta suborbiculata*
Purple wartyback	*Cyclonaias tuberculata*
Wavy-rayed lampmussel	*Lampsilis fasciola*
Round pig-toe	*Pleurobema sintoxia*
Salamander mussel	*Simpsonaias ambigua*
Deertoe	*Truncilla truncata*
CRAYFISHES	
Great Lakes crayfish	*Orconectes propinquus*
Northern crayfish	*Orconectes virilis*
ISOPODS	
Fern cave isopod	*Caecidotea filicispelunċae*
Frost cave isopod	*Caecidotea rotunda*
PSEUDOSCORPIONS	
Buckskin cave	*Pseudanophthalmus krameri*
CRICKETS	
Laricis tree cricket	*Oecanthus laricis*
BUTTERFLIES	
Grizzled skipper	*Pyrgus centaureae wyandot*
Olympia marblewing	*Euchloe olympia*
Two-spotted skipper	*Euphyes bimacula*

MOTHS	
Looper moth *M	*Euchlaena milnei*
Buck moth	*Hemileuca maia*
One-eyed sphinx	*Smerinthus cerisyi*
Slender clearwing	*Hemaris gracilis*
Precious underwing *M	*Catocala pretiosa*
	Macrochilo bivittata
	Phalaenostola hanhami
	Paectes abrostolella
	Capis curvata
	Tarachidia binocula
	Apamea mixta
	Agroperina lutosa
Subflava sedge borer moth	*Archanara subflava*
Columbine borer	*Papaipema leucostigma*
Bracken borer moth	*Papaipema pterisii*
Osmunda borer moth	*Papaipema speciosissima*
	Chytonix sensilis
	Amolita roseola
Goat sallow	*Homoglaea hircina*
	Brachylomia algens
Purple arches	*Polia purpurissata*
Scurfy quaker	*Homorthodes f. furfurata*
	Protorthodes incincta
	Trichosilia manifesta
	Euchlaena milnei
	Agonopterix pteleae
BEETLES	
Six-banded longhorn beetle *M	*Dryobius sexnotatus*
	Cicindela ancocisconensis
	Cicindela cursitans
	Cicindela cuprascens
	Cicindela macra

EXTIRPATED

MAMMALS	
Snowshoe hare	*Lepus americanus*
Rice rat	*Oryzomys palustris*
Porcupine	*Erethizon dorsatum*
Timberwolf	*Canis lupus*
Marten	*Martes americanus*
Fisher	*Martes pennanti*
Mountain lion	*Felis concolor*
Lynx	*Felis canadensis*
Wapiti	*Cervus canadensis*
Bison	*Bison bison*
BIRDS	
American swallow-tailed kite	*Elanoides forficatus*
Greater prairie chicken	*Tympanuchus cupido*
Ivory-billed woodpecker	*Campephilus principalis*
Common raven	*Corvus corax*
FISHES	
Alligator gar	*Lepisosteus spatula*
Pugnose shiner	*Notropis anogenus*
Longhead darter	*Percina macrocephala*

Gilt darter	*Percina evides*
Crystal darter	*Ammocrypta asprella*
MOLLUSKS	
Orange-footed pearly mussel	*Plethobasus cooperianus*
Rough pigtoe	*Pleurobema plenum*
Fat pocketbook	*Potamilus capax.*
Winged mapleleaf	*Quadrula fragosa*
Mucket	*Actinonaias ligamentina*
Rock pocketbook	*Arcidens confragosus*
Spectaclecase	*Cumberlandia monodonta*
Western sand shell	*Ligumia subrostrata*
Ellipse	*Venustaconcha e. ellipsiformis*
Tubercled blossom	*Epioblasma t. torulosa*
Cracking pearly mussel	*Hemistena lata*
BUTTERFLIES	
Mustard white	*Pieris napi*

EXTINCT

BIRDS	
Passenger pigeon	*Ectopistes migratorius*
Carolina parakeet	*Conuropis carolinensis*
FISHES	
Harelip sucker	*Lagochila lacera*
Blue pike	*Stizostedion vitreum glaucum*
MOLLUSKS	
Leafshell	*Epioblasma flexuosa*
Forkshell	*Epioblasma lewisi*
Round snuffbox	*Epioblasma personata*
Cincinnati riffleshell	*Epioblasma phillipsi*
Scioto pigtoe	*Pleurobema bournianum*

Federal status codes:
E - Endangered
T - Threatened
M - Monitored in Ohio
PT - Proposed to be listed as threatened

INVOICE

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF NATURAL AREAS & PRESERVES
NATURAL HERITAGE DATA SERVICES
1889 FOUNTAIN SQUARE COURT
COLUMBUS, OHIO 43224-1331
(614) 265-6453

User Identification

Name: Ogden Environmental & Energy Services, Inc.
Contact: Brian Boose
Address: 38 Triangle Park Dr., Ste. 3805
Cincinnati, OH 45246

Payment due by: September 2, 1998

Billing Date: August 3, 1998	**Invoice Number:** Nº 3955	
Project(s):	**Heritage Services:**	**Cost:**
Ravenna Army Ammunition Plant Ravenna, Windham & Newton Falls Quads., Portage Co.	Manual & Computer Search 6 hrs. @ $25.00/½ hr.	$300.00
	TOTAL	$300.00

Please remit check or money order payable to "Division of Natural Areas & Preserves" within 30 days. If the invoice is not paid within 30 days, the amount will be certified with the Ohio Attorney General. Return one copy of invoice with payment.

DNR 5216

DWB

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

38 Triangle Park Drive
Suite 3805
Cincinnati, OH 45246
513 772 8580
Fax 513 772 6666

July 9, 1998

Heritage Data Services
Division of Natural Areas and Preserves (DNAP)
Ohio Department of Natural Resources (ODNR)
1889 Fountain Square, Building F
Columbus, OH 43224

Re: Protected Species Consultation for the Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Dear Information Specialist:

Ogden Environmental and Energy Services Company, Inc. is initiating an Environmental Assessment (EA) involving proposed actions on an approximate 22,000-acre parcel of land, currently known as the Ravenna Army Ammunition Plant (RVAAP), located in Portage and Trumbull Counties, Ohio (see enclosed map). The RVAAP is currently owned and operated by the Army Material Command (AMC). Approximately 2,300 acres of the RVAAP property currently is licensed to the Ohio Army National Guard (OHARNG) for use as a multi-purpose training area. The OHARNG is seeking a license for approximately 17,000 to 19,000 acres of land within the boundaries of the RVAAP to provide additional land for military training exercises.

The mission of the OHARNG requires the OHARNG, as an agent for the National Guard Bureau (NGB), to manage the land and natural resources necessary for units to conduct and sustain quality military training. The OHARNG, as part of the land and natural resources management program, is initiating a three-phased approach to the long-term planning of military training at the RVAAP. This phased approach is in full compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508); and Army Regulations (AR) 200-1 and 200-2.

As the first phase of this EA, Ogden has been tasked with the identification of environmental resources, issues, constraints, and opportunities at the facility. This data gathering phase will provide input to and direct the future planning of environmentally-sensitive projects and actions at the RVAAP, which will be contemplated in the EA.

As part of the first phase associated with preparation of this EA, Ogden is requesting information of any threatened or endangered species, any species proposed for such listing, or critical habitat for such species, which may occur within a one-mile radius around the project area. Ogden is also interested in information concerning parks, nature preserves, conservation areas, migratory bird habitats, or other special natural resources within a one-mile radius. In addition, if you are aware of other representative(s) of ODNR or other natural resource agency who may possess information or knowledge with respect to this project area, please include this information in your response.

As required by your agency, we have enclosed a figure depicting the location of the project area on USGS 7.5' topographic maps, as well as a completed form requesting this data. Your response on or before August 1, 1998 will enable us to complete this phase of the project within the scheduled timeframe. If you have any questions concerning this request, please do not hesitate to contact us at (513) 772-8580. If preferable, you may fax your response to us at (513) 772-6666. We, in cooperation with the OHARNG, look forward to your involvement and participation in the proactive planning of future projects at the RVAAP, and in the on-going stewardship of the natural resources present therein.

Sincerely,

Brian W. Boose
Program Manager

Vincent J. Attardi
Natural Resources Manager

Enclosures

/cf

DATA REQUEST

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF NATURAL AREAS AND PRESERVES
HERITAGE DATA SERVICES
1889 FOUNTAIN SQUARE COURT, BUILDING F-1
COLUMBUS, OHIO 43224
PHONE: 614-265-6453; FAX: 614-267-3096

INSTRUCTIONS:
Please fill out both sides of this data request form, sign it and return it to the address or fax number listed above along with: (1) a letter formally requesting data and describing your project, and (2) a map detailing the boundaries of your study area. A photocopy from the pertinent portion of a USGS 7.5 minute topographic map is preferred but other maps are acceptable. Our turnaround time is two weeks, although we can often respond more quickly.

FEES:
Fees are determined by the amount of time it takes to complete your project. The charge is $25.00 per ½ hour with a ½ hour minimum. We can perform a data search manually or by computer. The Heritage Data Services staff will determine the most cost-efficient method of doing your search. A cost estimate can be provided upon request. Unless otherwise specified, an invoice will accompany the data services response.

This request is being submitted by: ☐ fax ☒ mail ☐ both

Date: July 13, 1998

Your Agency/Organization: Ogden Environmental & Energy Services Inc.

Your Name/Title: Brian W. Boose / Program Manager

Address: 38 Triangle Park Drive, Suite # 3805

City/State/Zip: Cincinnati, Ohio 45246

Phone/Fax: (513) 772-8580 (P) / (513) 772-6666 (Fax)

Project Name/Number: OHARNG- Ravenna Army Ammunition Plant Environmental Assessment

Project is located on the following USGS 7.5 minute topographic map(s): Ravenna, Windham, & Newton Falls, OH

If there is a program or contracting agency requiring this information, please give the name and phone number of a contact person:

Cpt Thomas Daugherty, OHARNG Env. Dept., (614) 336-7095

DNR 5203
REV 9/97

The Natural Heritage Data Base contains records for the categories of species and features listed below. Check the appropriate boxes to indicate your selection.

PLANTS:
- ☐ Federal Status Only
- ☐ State Legal Status Only
- ☐ Rare (non-legal status)
- ☒ All of the above

ANIMALS:
- ☐ Federal Status Only
- ☐ State Legal Status Only
- ☐ Rare (non-legal status)
- ☒ All of the above

PLANT COMMUNITIES:
- ☒ All
- ☐ Wetlands Only
- ☐ Other_____

OTHER FEATURES:
- ☐ Geologic Features
- ☐ Breeding/Non-breeding Animal Concentrations
- ☐ Champion Trees
- ☐ State Nature Preserves and Natural Areas
- ☐ State Wild, Scenic and Recreational Rivers
- ☐ State Parks, Forests, Wildlife Areas
- ☒ All of the above
- ☐ Other_____

Besides name, location and status, specify any additional information you need:

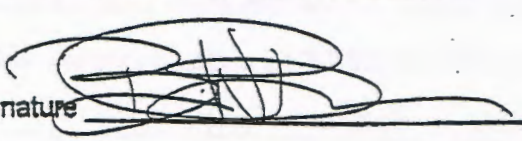
- for special status species, info on identification guard (as appropriate) + current survey protocol
- any additional ODNR representatives (name, telephone #) who may have info w/ respect to natural resources on the site.

The area you want searched:
- ☒ study area as outlined on the map
- ☐ study area plus ½ mile radius
- ☒ study area plus 1 mile radius
- ☐ other - pls. differentiate between on-site + proximate occurrences.

How will the information be used:

To prepare an Environmental Assessment (EA-NEPA document) on the ~23,000-acre project area.

The information supplied above is complete and accurate. Any material supplied by the Natural Heritage Data Base will not be published without prior written permission and without crediting the Division of Natural Areas and Preserves as the source of the material.

Your Signature 

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
6950 Americana Parkway, Suite H
Reynoldsburg, Ohio 43068-4132
(614) 469-6923/FAX (614) 469-6919

July 16, 1998

Brian W. Boose
Ogden Environmental and Energy Services
38 Triangle Park Drive
Suite 3805
Cincinnati, OH 45246

Dear Mr. Boose:

This is in response to your July 9, 1998 letter requesting information we may have regarding the occurrence or possible occurrence of Federally-listed threatened or endangered species, or other comments relating to the fish and wildlife resources within the vicinity of the 22,000-acre parcel of land, known as the Ravenna Army Ammunition Plant (RVAAP), Portage and Trumbull Counties, Ohio.

In general, we would recommend that proposed developments minimize water quality impacts and impacts to high quality fish and wildlife habitat, such as forests, streams, and wetlands. If streams and wetlands would be impacted, the Buffalo District of the Corps of Engineers should be contacted for possible need of a Section 404 permit.

ENDANGERED SPECIES COMMENTS: The RVAAP lies within the range of the Indiana bat (Myotis sodalis), a Federally listed endangered species. Summer habitat requirements for the species are not well defined but the following are thought to be of importance:

1. Dead trees and snags along riparian corridors especially those with exfoliating bark or cavities in the trunk or branches which may be used as maternity roost areas.

2. Live trees (such as shagbark hickory) which have exfoliating bark.

3. Stream corridors, riparian areas, and nearby woodlots which provide forage sites.

Considering the above items, we recommend that if trees with exfoliating bark (which could be potential roost trees) are encountered in the project area, they and surrounding trees should be saved wherever possible. If they must be cut, they should not be cut between April 15 and September 15.

If desirable trees are present and if the above time restriction is unacceptable, mist net or other surveys should be conducted to determine if bats are present. The survey should be designed and conducted in coordination with the endangered species coordinator for this office, Mr. Buddy Fazio. The survey should be conducted in June or July since the bats would only be expected in the project area from approximately April 15 to September 15.

The proposed project also lies within the range of the clubshell mussel (Pleurobema clava) in Trumbull County and the Mitchell's satyr butterfly (Neonympha mitchellii mitchellii) in Portage County, both Federally-listed endangered species; and the bald eagle (Haliaeetus leucocephalus) in Portage and Trumbull Counties, and the northern monkshood (Aconitum noveboracense) in Portage County, both Federally-listed threatened species. Due to the project location, the project, as proposed, will have no effect on these species. This precludes the need for further action on this project as required by the 1973 Endangered Species Act, as amended. Should the project be modified, or if new information becomes available that indicates listed or proposed species may be affected, consultation should be initiated.

This technical assistance letter is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act of 1973, as amended, and is consistent with the intent of the National Environmental Policy Act of 1969, the U. S. Fish and Wildlife Service's Mitigation Policy.

If you have questions, or if we may be of further assistance in this matter, please contact Ken Lammers at extension 15 in this office.

Sincerely,

Ken Lammers

for Kent E. Kroonemeyer
Supervisor

cc: ODNR, Div. of Wildlife, Environmental Section, Columbus, OH
ODNR, Div. of Real Estate and Land Management, Columbus, OH

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

38 Triangle Park Drive
Suite 3805
Cincinnati, OH 45246
513 772 8580
Fax 513 772 6666

July 9, 1998

Mr. Kent E. Kroonemeyer, Supervisor
United States Fish and Wildlife Service
6950-H Americana Parkway
Reynoldsburg, OH 43068

Re: Protected Species Consultation for the Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Dear Mr. Kroonemeyer:

Ogden Environmental and Energy Services Company, Inc. is initiating an Environmental Assessment (EA) involving proposed actions on an approximate 22,000-acre parcel of land, currently known as the Ravenna Army Ammunition Plant (RVAAP), located in Portage and Trumbull Counties, Ohio (see enclosed map). The RVAAP is currently owned and operated by the Army Material Command (AMC). Approximately 2,300 acres of the RVAAP property currently is licensed to the Ohio Army National Guard (OHARNG) for use as a multi-purpose training area. The OHARNG is seeking a license for approximately 17,000 to 19,000 acres of land within the boundaries of the RVAAP to provide additional land for military training exercises.

The mission of the OHARNG requires the OHARNG, as an agent for the National Guard Bureau (NGB), to manage the land and natural resources necessary for units to conduct and sustain quality military training. The OHARNG, as part of the land and natural resources management program, is initiating a three-phased approach to the long-term planning of military training at the RVAAP. This phased approach is in full compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508); and Army Regulations (AR) 200-1 and 200-2.

As the first phase of this EA, Ogden has been tasked with the identification of environmental resources, issues, constraints, and opportunities at the facility. This data gathering phase will provide input to and direct the future planning of environmentally-sensitive projects and actions at the RVAAP, which will be contemplated in the EA.

As part of the first phase associated with preparation of this EA, Ogden is requesting information of any threatened or endangered species, any species proposed for such listing, or critical habitat for such species, which may occur within a one-mile radius around the project area. Ogden is also interested in information concerning parks, nature preserves, conservation areas, migratory bird habitats, or other special natural resources within a one-mile radius. We have made similar requests related to this project area of the Ohio Department of Natural Resources (ODNR) Division of Wildlife, ODNR Division of Natural Areas and Preserves (DNAP), and the Ohio Environmental Protection Agency (OEPA).

Your response on or before August 1, 1998 will enable us to complete this phase of the project within the scheduled timeframe. If you have any questions concerning this request, please do not hesitate to contact us at (513) 772-8580. If preferable, you may fax your response to us at (513) 772-6666. We, in cooperation with the OHARNG, look forward to your involvement and participation in the proactive planning of future projects at the RVAAP, and in the on-going stewardship of the natural resources present therein.

Sincerely,

Brian W. Boose
Program Manager

Vincent J. Attardi
Natural Resources Manager

Enclosures

/cf

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

38 Triangle Park Drive
Suite 3805
Cincinnati, OH 45246
513 772 8580
Fax 513 772 6666

July 20, 1998

Mr. Ed Lander, Deputy Director
Trumbull County Planning Commission
347 North Park Ave., Room 201
Warren, OH 44481

Re: Local Agency Data Gathering for the Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Dear Mr. Lander:

Ogden Environmental and Energy Services Company, Inc. is initiating an Environmental Assessment (EA) involving proposed actions on an approximate 22,000-acre parcel of land, currently known as the Ravenna Army Ammunition Plant (RVAAP), located in Portage and Trumbull Counties, Ohio (see Figure 1). In an effort to gather information from local agencies that may affect future planning and proposed actions at the RVAAP, we are submitting this initial data request to your agency. As discussed below, we are planning to visit your offices in the near future to collect this data, if possible.

The RVAAP is currently owned and operated by the Army Materiel Command (AMC). Approximately 2,300 acres of the RVAAP property currently is licensed to the Ohio Army National Guard (OHARNG) for use as a multi-purpose training area. The OHARNG is seeking a license for approximately 17,000 to 19,000 acres of land within the boundaries of the RVAAP to provide additional land for military training exercises.

The mission of the OHARNG requires the OHARNG, as an agent for the National Guard Bureau (NGB), to manage the land and natural resources necessary for units to conduct and to sustain quality military training. The OHARNG, as part of the land and natural resources management program, is initiating a proactive three-phased approach to the long-term planning of military training at the RVAAP. This phased approach is in full compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508); and Army Regulations (AR) 200-1 and 200-2.

As the first phase of this process, Ogden has been tasked with the identification of environmental resources, issues, constraints, and opportunities at the facility, including local, State, and Federal regulations and policies that may affect future use of the RVAAP. This phase will provide the OHARNG's decision-makers with a proactive, comprehensive identification of the existing environment of the RVAAP. In this manner, the data gathering phase will provide input to and direct the future planning of environmentally-sensitive projects and actions at the RVAAP, which will be contemplated in the EA. As part of the subsequent EA process, local citizens, groups, and agencies, among others, will have ample opportunity to review and comment on the OHARNG's proposed activities at the RVAAP as part of the NEPA process, prior to initiation of any activity.

As part of the first phase associated with preparation of this EA, Ogden is requesting information from your agency regarding any specific local information pertaining to:

- State or local statutes or regulations that may affect the NEPA process or planning at the RVAAP;
- Zoning regulations, including maps at or within a one-mile radius of the RVAAP;
- Land Use Master Plans, Traffic/Transportation Master Plans prepared for the area or region;
- Land use and land development regulations, restrictions, and/or planning maps that may be applicable within a one-mile radius of the RVAAP;
- Local ordinances or regulations pertaining to light and glare, noise, nuisance dust, open burning, traffic, etc. within a one-mile radius of the RVAAP;
- Potable water well locations within a one-mile radius of the RVAAP;
- Known areas of environmental contamination within a one-mile radius of the RVAAP, if known;
- Property conflicts/disputes concerning or directly adjacent to the RVAAP; and,
- Census data and other socioeconomic data (e.g., population studies, trends, or forecasts) for all local communities within your jurisdiction in the vicinity of the RVAAP.

We have made similar requests related to this project area to the Trumbull County Planning Commission in order to ascertain what information is available within their jurisdiction.

Ogden will be conducting a site visit to the RVAAP in late July 1998. We would like to coordinate this RVAAP site visit with a visit to your offices at that time, and we request that, if at all possible, the above-referenced information be made concurrently available for reproduction. We will contact you in the near future to confirm the availability and location(s) of the above-referenced information.

If you have any questions concerning this request, please do not hesitate to contact us.

Sincerely,

Brian W. Boose
Program Manager

Jonathon G. McMillen
Project Manager

Enclosure

APPENDIX 2 – Plant Communities of the Ravenna Training and Logistics Site

These community descriptions have been taken from Andreas (1993), in Species and Plant Communities Inventory, Ravenna Army Ammunition Plant, and Anderson (1982), Plant Communities of Ohio: A Preliminary Classification and Description, unless otherwise indicated.

Nomenclature of communities 1-14 is based on Anderson, 1982. These are also considered to be mature, well-established plant associations. Communities 15-18 are considered to be seral transitional communities, developing on former agricultural properties or other disturbed areas. For these, nomenclature is based on dominant species observed by Andreas, 1989 and 1993. The table below presents a summary of the plant communities at the RTLS, with detailed descriptions following.

Community Name	Dominant Component	Seral stage	Indicator Status
Submergent Marsh	Herbaceous	Mature	Wetland
Floating-leaved Marsh	Herbaceous	Mature	Wetland
Mixed Emergent Marsh	Herbaceous	Mature	Wetland
Cat-tail Marsh	Herbaceous	Mature	Wetland
Sedge-Grass Meadow	Herbaceous	Mature	Wetland
Mixed Shrub Swamp	Woody	Mature	Wetland
Buttonbush Shrub Swamp	Shrub	Mature	Wetland
Oak-Maple Swamp Forest	Woody	Mature	Wetland
Mixed Swamp Forest	Woody	Mature	Wetland
Mixed Floodplain Forest	Woody	Mature	Wetland
Beech-Sugar Maple Forest	Woody	Mature	Upland
Hemlock-White Pine-Hardwood Forest	Woody	Mature	Upland
Oak-Maple-Tuliptree Forest	Woody	Mature	Upland
Oak-Hickory Forest	Woody	Mature	Upland
Wet Fields-Shrub Thickets	Herbaceous/ Shrub	Transitional	Transitional-Wetland
Dry (Upland) Fields-Shrub Thickets	Woody/Shrub	Transitional	Transitional-Upland
Red Maple Woods	Woody	Transitional	Transitional-Wetland
Ash-Black Cherry-Red Maple Woods	Woody	Transitional	Transitional

1. **Submergent Marsh** – As indicated by its name, this plant community occurs below the water surface in most open bodies of water, and is considered to be a wetland (FICWD, 1989). At the RTLS, this community occurs in some of the older, well-established ponds and beaver impoundments at depth. As the water becomes more shallow, this community grades into Floating-leaved Marsh.

Dominant species observed at the RTLS include *Ceratophyllum demersum* (coontail), *Najas minor* (eutrophic water-nymph), *Elodea canadensis* (waterweed), *Utricularia vulgaris* (bladderwort), *Potamogeton foliosus* (leafy pondweed), *Potamogeton epihydrus* (ribbon-leaved pondweed), and *Potamogeton diversifolius* (diverse-leaved pondweed).

2. Floating-leaved Marsh – This community occurs in the shallows of bodies of water at the RTLS, is considered to be a wetland, and is associated as occurring at water depths between the deeper-water Submergent Marsh and the very shallow water Emergent Marsh.

Dominant species in this community include *Nuphar advena* (spatter-dock), diverse-leaved pondweed, *Potamogeton epihydrus* (ribbon-leaved pondweed), *Lemna minor* (lesser duckweed), *Spirodela polyrhiza* (greater duckweed), and *Wolffia* spp. (water-meal).

3. Mixed Emergent Marsh – This plant community occurs in conjunction with very shallow areas of open water that grade into drier shrub thickets, or ephemeral open-water areas, and is typically classified as a wetland.

Dominant species observed at the RTLS include *Glyceria striata* (fowl manna grass), *Eleocharis* spp. (spikerush), *Pilea pumila* (clearweed), *Carex comosa* (bearded sedge), *Carex lurida* (shallow sedge), *Polygonum amphibium* (water smartweed), *Thelypteris palustris* (marsh fern), *Typha latifolia* (cat-tail), *Sparganium* spp. (bur-reed), *Acorus calamus* (sweet-flag), *Alisma subcordatum* (water plantain), *Saggitaria latifolia* (arrow-head), *Juncus* spp. (rushes), spatter-dock, *Verbena hastata* (blue vervain), *Asclepias incarnata* (swamp milkweed), *Aster* spp. (asters), and *Bidens* spp. (beggar-ticks).

4. Cat-tail Marsh – The cat-tail marsh community is closely correspondent with the mixed emergent marsh community, and is also usually considered to be a wetland. Within the RTLS, cat-tails (*Typha latifolia* and *Typha angustifolia*) often occur in pure stands or may be associated with a few other species highlighted in the mixed emergent marsh community. Often, cat-tails are found in wet areas where the soils have been significantly disturbed.

5. Sedge-Grass Meadow – This community is typically associated with glacially-based fens and hydric soils at the RTLS, often occurring in areas with moist swales in fields or areas where beaver impoundments may have persisted. This community also occurs in areas where the original vegetation has been removed or the topsoil stratification has been altered, such as ditches or road and road or power line cuts. The Sedge-Grass Meadow community may blend with other communities, depending upon soil moisture present. It is typically considered to be a wetland.

Dominant species associated with this community at the RTLS include *Sphagnum* spp., occurring in hummocks, *Carex* spp. (sedges), marsh fern, bur-reed, *Phalaris arundinaceae* (reed canarygrass), spike-rushes, *Scirpus* spp. (bulrushes), *Juncus* spp. (rushes), asters, swamp milkweed, blue vervain, and *Solidago* spp. (goldenrods).

6. Mixed Shrub Swamp – This wetland community typically occurs in backwater and edge areas of open water systems at the RTLS, such as beaver impoundments, naturally-occurring ponds, springs/seeps, and open wetland swales or woodland depressions. This community may be associated with both well-drained, but typically saturated alluvium or outwash and saturated organic bog soils.

Dominant woody species in this community for the RTLS include *Salix* spp. (willows), *Rosa palustris* (swamp rose), *Spiraea alba* (meadow-sweet), *Cornus amomum* (silky dogwood), *Sambucus canadensis* (common elder), and *Viburnum dentatum* (northern arrow-wood). Herbaceous species include reed canarygrass, *Leersia oryzoides* (rice cut-grass), *Lycopus virginicus* (water-horehound), *Polygonum sagittatum* (arrow-leaf tearthumb), *Onoclea sensibilis* (sensitive fern), and sedges.

7. Buttonbush Shrub Swamp – Within the RTLS, this community type usually occurs in wetland areas typically too small to effectively map without specialized equipment. It can be found in swales (low, shallow depressions), often within beech-maple or oak-maple swamp forests. Occasionally this community type may be observed grading into other types of mixed shrub swamp or cat-tail swamp.

Dominant woody species at the RTLS for this community include *Cephalanthus occidentalis* (buttonbush), *Ilex verticillata* (winterberry), *Acer rubrum* (red maple), common elder, and northern arrow-wood. Herbaceous species include beggar-ticks, water horehound, *Osmunda cinnamomea* (cinnamon fern), *Boehmeria cylindrica* (false nettle), *Cinna arundinaceae* (wood reed-grass), *Agrimonia parviflora* (small-flowered agrimony), *Geum* spp. (avens), *Scutellaria lateriflora* (mad-dog skullcap), and sedges, as well as *Sphagnum* spp. hummocks. In some areas, *Lindera benzoin* (spicebush) may act as an analog to buttonbush,

and in some of the areas with *Sphagnum* spp. hummocks, several species of ferns may be observed growing on the hummocks.

8. Oak-Maple Swamp Forest – This wetland community is typically composed of oaks, soft maples, and ashes, occurring in forested depressions which have mesic components. Prior to infestation of Dutch Elm disease, American elm (*Ulnus americana*) was also a common component.

Within the RTLS, dominant tree species include *Quercus bicolor* (swamp white oak), and *Quercus palustris* (pin oak). Additional major-component tree species include red maple and *Acer saccharinum* (silver maple). Understory species in this community include spicebush, *Rhus radicans* (poison ivy), northern arrow-wood, *Ulnus rubra* (slippery elm), wood reed-grass, *Leersia virginica* (white grass), several species of sedges, *Arisaema triphyllum* (jack-in-the-pulpit), *Caltha palustris* (marsh marigold), *Symplocarpus foetidus* (skunk cabbage), and sensitive fern.

9. Mixed Swamp Forest Community – Although this community is typically classified as a wetland, *Carya ovata* (shagbark hickory), an upland tree, often occurs within its confines in the RTLS. This community is frequently associated with shrub swamps, and frequently contains immature American elm as an associate. This community also often grades into the Oak-Maple Swamp Forest community.

Dominant tree species in this community include pin oak, swamp white oak, American elm, red maple, *Nyssa sylvatica* (black gum), *Populus tremuloides* (quaking aspen), shagbark hickory, *Prunus serotina* (black cherry), *Tilia americana* (basswood), and Quercus rubra (red oak). Understory species include spicebush, poison ivy, northern arrow-wood, slippery elm, wood reed-grass, white grass, several species of sedges, jack-in-the-pulpit, marsh marigold, skunk cabbage, and sensitive fern.

10. Mixed Floodplain Forest – As the name indicates, this usually wetland community is typically associated with deep, well-drained alluvial floodplains within the RTLS. It typically grades into mixed shrub communities when grading towards streams, and into upland areas away from streams. This community type is also often referred to as "Bottomland Hardwood Forest".

Dominant woody species include *Fraxinus americana* (white ash), *Fraxinus pennsylvanica* (green ash), American elm, *Carya cordiformis* (bitternut hickory), *Platanus occidentalis* (sycamore), *Juglans nigra* (black walnut), swamp white oak, *Populus deltoides* (cottonwood), *Salix nigra* (black willow), red maple, silver maple, northern arrow-wood, silky dogwood, and common elder. Herbaceous understory species include *Cardamine rhomboidea* (spring cress), *Senecio aureus* (golden ragwort), *Verbesina alternifolia* (wingstem), sensitive fern, *Galium aparine* (cleavers), *Arisaema dracontium* (green dragon), sedges, *Asimina triloba* (paw-paw), *Allium canadense* (wild onion), *Viola striata* (creamy violet), *Elymus hystrix* (bottle-brush squirreltail), *Impatiens capensis* (jewelweed), and *Polygonum virginanium* (jumpseed).

11. Beech-Sugar Maple Forest – This transitional or upland community is typically located on gently rolling topography, and grades into all types of communities, specifically into transitional red maple forest within the RTLS. Small vernal pools, isolated Buttonbush Shrub Swamp communities, and small patches dominated by pin oak are often found within Beech-Sugar Maple Forest.

Dominant overstory species include *Fagus grandifolia* (American beech), *Acer saccharum* (sugar maple), red oak, shagbark hickory, *Liriodendron tulipifera* (tuliptree), red maple, and black cherry. The woody species component of the understory is typically composed of black cherry and sugar maple saplings, with additional species including spicebush, *Carpinus caroliniana* (American hornbeam/musclewood). The herbaceous understory components include *Podophyllum peltatum* (mayapple), *Epifagus virginiana* (beech-drops), *Maianthemum canadense* (Canada mayflower), and several species of ferns, sedges, goldenrods, and asters.

12. Hemlock-White Pine-Hardwood Forest – This rare community type occurring within the RTLS is associated with the steep slopes and Sharon Conglomerate rock outcrops near the South Fork Eagle Creek drainage in the area known as Wadsworth Glen. This community contains a number of rare species and grades into beech-maple forest.

Dominant overstory species for this community type include *Pinus strobus* (white pine), *Tsuga canadensis* (eastern hemlock), American beech, American hornbeam/musclewood, and red maple. Understory species include *Lonicera canadensis* (fly honeysuckle), *Viburnum alnifolium* (hobblebush), *Acer spicatum* (mountain maple), Viola rotundifolia (round-leaved yellow violet), *Thelypteris phegopteris* (long beech fern), *Lycopodium lucidulum* (shining clubmoss), and sedges.

13. Oak-Maple-Tuliptree Forest – This a secondary successional community type, with mixed dominant species which grade into several other forest types.

Overstory species are typically composed of sugar maple, black cherry, red oak, tuliptree, white ash, shagbark hickory, and bitternut hickory. Understory species include mayapple, beech-drops, Canada mayflower, and several species of ferns, sedges, goldenrods, and asters.

14. Oak-Hickory Forest – This community type occurs on well-drained soils, and thus infrequently within the RTLS. It typically grades into the Oak-Maple-Tuliptree, Beech-Sugar Maple, or young Red Maple Woods communities.

Dominant overstory species include shagbark hickory, bitternut hickory, red oak, white oak, and occasionally American beech, black cherry, and sugar maple. Other, more understory-oriented species include American hornbeam/musclewood, *Cornus florida* (flowering dogwood), *Gaultheria procumbens* (wintergreen), and *Mitchella repens* (partridge berry). Herbaceous species are infrequent in mature stands of this forest type, and include jack-in-the-pulpit, *Thelypteris noveboracensis* (New York fern), sedges, violets, *Chimaphila maculata* (spotted wintergreen), *Conopholis americana* (squaw-root), and *Panicum* spp. (panic-grass).

15. Wet Fields-Shrub Thickets – This community type is found frequently, primarily in low areas in the eastern half of the RTLS, and typically on abandoned agricultural property that has been maintained to some extent by mowing in the past. It is a transitional community, dominated by herbaceous or shrubby vegetation.

The infrequently-found tree species associated with this community type include red maple, American elm, and pin oak. Shrub species include northern arrow-wood, silky dogwood, *Hypericum prolificum* (shrubby St. John's-wort), and *Vaccinium corymbosum* (highbush blueberry). Herbaceous species include *Juncus effusus* (soft rush), goldenrod, *Anthoxanthum odoratum* (sweet vernal grass), *Penstemon digitalis* (beard's-tongue), reed canary-grass, *Agrostis gigantea* (red-top), fowl manna-grass, *Potentilla simplex* (field cinquefoil), sedges, and *Geum* spp. (avenses).

16. Dry (Upland) Fields-Shrub Thickets – This frequently-occurring, transitional community type is found in many areas of the RTLS, specifically in locations of previous disturbance, such as building or construction sites and agricultural fields. This is also the most common edge-effect community type in the RTLS, occurring along roads, power lines, fencelines, and railroad right-of-ways.

The strongly dominant herbaceous layer consists of goldenrods, *Rudbeckia hirta* (black-eyed susan), sweet vernal grass, *Fragaria virginiana* (wild strawberry), *Rumex acetosella* (sheep sorrel), *Holcus lanatus* (velvet grass), *Achillea millefolium* (white yarrow), *Hieracium* spp. (hawkweed), *Prunella vulgaris* (self-heal), *Trifolium pratense* (red/purple clover), *Taraxacum officinale* (dandelion), *Dactylis glomerata* (orchard grass), *Apocynum cannabinum* (dogbane), *Barbarea vulgaris* (yellow rocket), and *Glechoma hederacea* (ground ivy).

Although strongly sub-dominant, tree species associated with this community type include red maple, black cherry, *Robinia pseudoacacia* (black locust), and white ash. Shrub species include *Cornus racemosa* (gray dogwood), *Rubus allegheniensis* (blackberry), black raspberry, *Rubus flagellaris* (dewberry), *Rosa multiflora* (multiflora rose), *Rubus canina* (dog rose), and *Crataegus* spp. (hawthorn).

On areas of cut-and-fill soils, a different type of community often occurs, dominated by woody species that include highbush blueberry, *Spiraea tomentosa* (hardhack), *Rubus hispidus* (small dewberry), and red maple. Herbaceous species include *Andropogon virginicus* (broom-sedge), sweet vernal grass, and *Lycopodium complanatum* (ground pine).

17. Red Maple Woods – This transitional-wetland woody community type occurs commonly throughout the RTLS, often as a near-monoculture. Typically, this type of forest is even-aged, with immature to semi-mature trees having a Diameter at Breast Height (DBH) of less than ten inches. Due to the typically closed canopy, understory shrubs and herbaceous species seldom occur.

18. White Ash-Wild Black Cherry-Red Maple Woods – This transitional woody community is often a more advanced stage of the Red Maple Woods Community, usually developing and occurring on drier sites.

Common woody species include white ash, black cherry, red maple, and black locust, which occurs on stand edges in near-monocultures. Herbaceous layers are consistent with the Dry (Upland) Fields-Shrub Thickets community, and include goldenrods, black-eyed susan, sweet vernal grass, wild strawberry, sheep sorrel, velvet grass, white yarrow, hawkweed, self-heal, red/purple clover, dandelion, orchard grass, dogbane, yellow rocket, and ground ivy. Shrub layers include gray dogwood, blackberry, black raspberry, dewberry, multiflora rose, dog rose, and hawthorn).

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