

In cooperation with the
Ohio Army National Guard, Ravenna Training and Logistics Site

Watershed Inventory, Ravenna Training and Logistics Site, Ohio

Open-File Report 02-495





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C



D

Photos by John Tertuliani, USGS

Cover photos:

- A. Wadsworth Road bridge over South Fork Eagle Creek.
- B. Pond along south side of North Patrol Road.
- C. Pond along south side of Demolition Road.
- D. Quarry along north side of North Patrol Road.

U.S. Department of the Interior
U.S. Geological Survey

Watershed Inventory, Ravenna Training and Logistics Site, Ohio

By Chad J. Ostheimer and John S. Tertuliani

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U.S. Department of the Interior
Gale A. Norton, Secretary

U.S. Geological Survey
Charles G. Groat, Director

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For additional information write to:

District Chief
U.S. Geological Survey
6480 Doubletree Avenue
Columbus, OH 43229-1111

Copies of this report can be purchased from:

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Branch of Information Services
Box 25286
Denver, CO 80225-0286

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CONTENTS

Abstract..... 1

Introduction 1

 Purpose and scope..... 1

 Study methods..... 3

Description of the study area..... 3

 Geology..... 3

 Soils..... 4

 Topography 4

 Land use and cover 5

 Water supply 5

 Climate..... 6

Watershed inventory: description of natural resources..... 7

 Surface water..... 7

 Streams 7

 Ponds, lakes, and wetlands 8

 Monitoring stations..... 9

 Floodplains and floodways..... 10

 Discharge estimates 10

 Ground water..... 10

 Biological resources..... 10

 Wetland plant alliances and communities 10

 Animals..... 11

 Special status species..... 12

Summary and conclusions..... 14

References cited..... 14

Digital data references..... 15

Appendix 25

 1. Description of digital data layers 25

FIGURES

1-10. Maps showing selected characteristics of the area contained in and adjacent to the major and selected smaller drainage basins of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio.

1. General site map..... 2

2. Lithologies. 4

3. Generalized soil types. 5

4. Slope (in percent) of the land..... 6

5. Land-cover types..... 7

6. Streams..... 8

7. Ponds, Lakes, and wetlands. 9

8. One-hundred year floodplains..... 11

9. Generalized ground-water resources..... 12

10. Plant communities. 13

TABLES

1. Discharge estimates for the major and selected smaller streams draining the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio.	16
2. Basin characteristics for the major and selected smaller streams draining the Ravenna obtained Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio.	18
3. Wetland plant communities at the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio.	20
4. Known habitat of rare plants and animals identified at the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio.	21

CONVERSION FACTORS, DATUMS, AND ABBREVIATIONS

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
millimeter (mm)	0.03937	inch
micrometer (μm)	0.00003937	inch
square inch (in ²)	6.452	square centimeter
square foot (ft ²)	0.09290	square meter
square mile (mi ²)	2.590	square kilometer
acre	0.4047	hectare
cubic foot per second (ft ³ /s)	0.02832	cubic meter per second
gallons per minute (gal/min)	0.002228	cubic foot per second
gallons per day (gal/d)	0.002228	cubic foot per day
pound (lb)	0.4536	kilogram

Temperature is given in degrees Fahrenheit (°F), which can be converted to degrees Celsius (°C) by use of the following equation:

$$^{\circ}\text{F} = 1.8(^{\circ}\text{C}) + 32$$

State Plane Coordinates: The grid for the maps in this report is the Ohio state plane coordinate system of 1983, one of the systems of plane rectangular coordinates established by the United States Department of Commerce for defining and stating the positions or locations of points on the surface of the earth. Coordinates are expressed in feet.

WGS 84: The World Geodetic System of 1984 (WGS 84) system was defined by the National Imagery and Mapping Agency and is used by the Department of Defense for all its mapping, charting, surveying, navigation, and Global Positioning System needs. This is a complete datum incorporating both vertical and horizontal components.

UTM: Universal Transverse Mercator (UTM) coordinates are a rectangular coordinate system developed by the National Imagery and Mapping Agency. In this system the world is divided into 60 north-south zones, each covering a strip 6° wide in longitude. Coordinates are expressed in meters.

NAD 27: The North American Datum of 1927 (NAD 27) is a coordinate system based upon the Clarke Spheroid of 1866. It uses zone constants which include false northings and eastings so that negative coordinates do not result. Coordinates are expressed in feet.

NAD 83: The North American Datum of 1983 (NAD 83) is a coordinate system based upon a newer spheroid called the Geodetic Reference System of 1980 (GRS 80). The most notable change is that different values were assigned for the zone constants (the false northings and eastings). Coordinates are expressed in feet.

Abbreviations used in this report:

DLG	Digital Line Graph
DOQQ	Digital Orthophoto Quarterquadrangles
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GRS80	Geodetic Reference System 1980
MAC	Munitions and Armament Command
MCC	Modified Caretaker Contractor
MUID	Map Unit Identification
NAD 27	North American Datum of 1927
NAD 83	North American Datum of 1983
NASA	National Aeronautic and Space Administration
NGB	National Guard Bureau
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
OGRIP	Ohio Geographically Referenced Information Program
OHARNG	Ohio Army National Guard
OSC	Operations Support Command
RTLS	Ravenna Training and Logistics Site
RVAAP	Ravenna Army Ammunition Plant
STATSGO	State Soil Geographic Database
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
WES	Waterways Experiment Station
WGS 84	World Geodetic System of 1984

Watershed Inventory Ravenna Training and Logistics Site, Ohio

By Chad J. Ostheimer and John S. Tertuliani

ABSTRACT

The Ohio Army National Guard (OHARNG) conducts training activities on the lands it manages to fulfill its primary mission of maintaining combat readiness. One of the training areas OHARNG manages is the Ravenna Training and Logistics Site (RTLS). This facility is co-located with the Ravenna Army Ammunition Plant (RVAAP) in Portage and Trumbull Counties, Ohio.

Training activities can subject watersheds to various effects. Although environmental effects from training activities cannot be completely avoided, OHARNG is actively seeking for ways to minimize such effects in accordance with Federal, State, and local laws and regulations.

This report presents the results of a study by the U.S. Geological Survey (USGS), in cooperation with the OHARNG, to inventory current conditions of the watersheds that drain the RTLS/RVAAP facility. As part of the inventory, a digital geographic database was developed.

INTRODUCTION

The primary mission of the Ohio Army National Guard (OHARNG) is to maintain combat readiness. The primary method to maintain combat readiness is through training. Training activities, such as troop and vehicle movements, can subject watersheds to various effects. Although training-related effects on watersheds cannot be completely avoided, OHARNG is actively seeking for ways to minimize such effects in order to comply with Federal, State, and local laws and regulations.

One facility operated by OHARNG for training use is the Ravenna Training and Logistics Site (RTLS), co-located with the Ravenna Army Ammunition Plant (RVAAP) (fig. 1). The RVAAP part of the facility is controlled by the Muni-

tions and Armament Command / Operations Support Command (MAC/OSC). The RTLS/RVAAP is in northeastern Ohio within Portage and Trumbull Counties (fig. 1). It covers approximately 21,419 acres (approximately 3.5 mi north-south by 11 mi east-west). The facility is bounded by State Route 5 to the south and Interstate 80 to the north. Three cities are within 3 mi of the site: Newton Falls to the east, Ravenna to the west, and Windham to the north.

Currently, OHARNG controls approximately 93 percent of the facility. Plans are to transfer control of additional lands from the RVAAP to the RTLS as environmental restoration is completed. OHARNG plans to use the entire 21,419 acres as a training site.

The plans for expansion of training activities require that a baseline natural-resources inventory and hydrologic analysis of the RTLS/RVAAP be completed. In July of 2000, the U.S. Geological Survey (USGS), in cooperation with OHARNG, began a study to describe water resources and biological resources of the facility; emphasis in the study was on knowledge needed to evaluate current and future training-related effects on the watersheds within the RTLS/RVAAP.

Purpose and scope

This report presents the results of an inventory of the current watershed conditions of the RTLS/RVAAP. The inventory provides baseline data that will be compared to future watershed conditions after training has started.

The U.S. Geological Survey (USGS) summarized previous studies done by various Federal, State, and private organizations for OHARNG at the RTLS/RVAAP and developed and compiled digital information for inclusion in a Geographic Information System (GIS) database maintained by OHARNG. The USGS also estimated the mean annual, mean monthly, and 100-year peak discharges for the major and selected smaller streams within the RTLS/RVAAP.

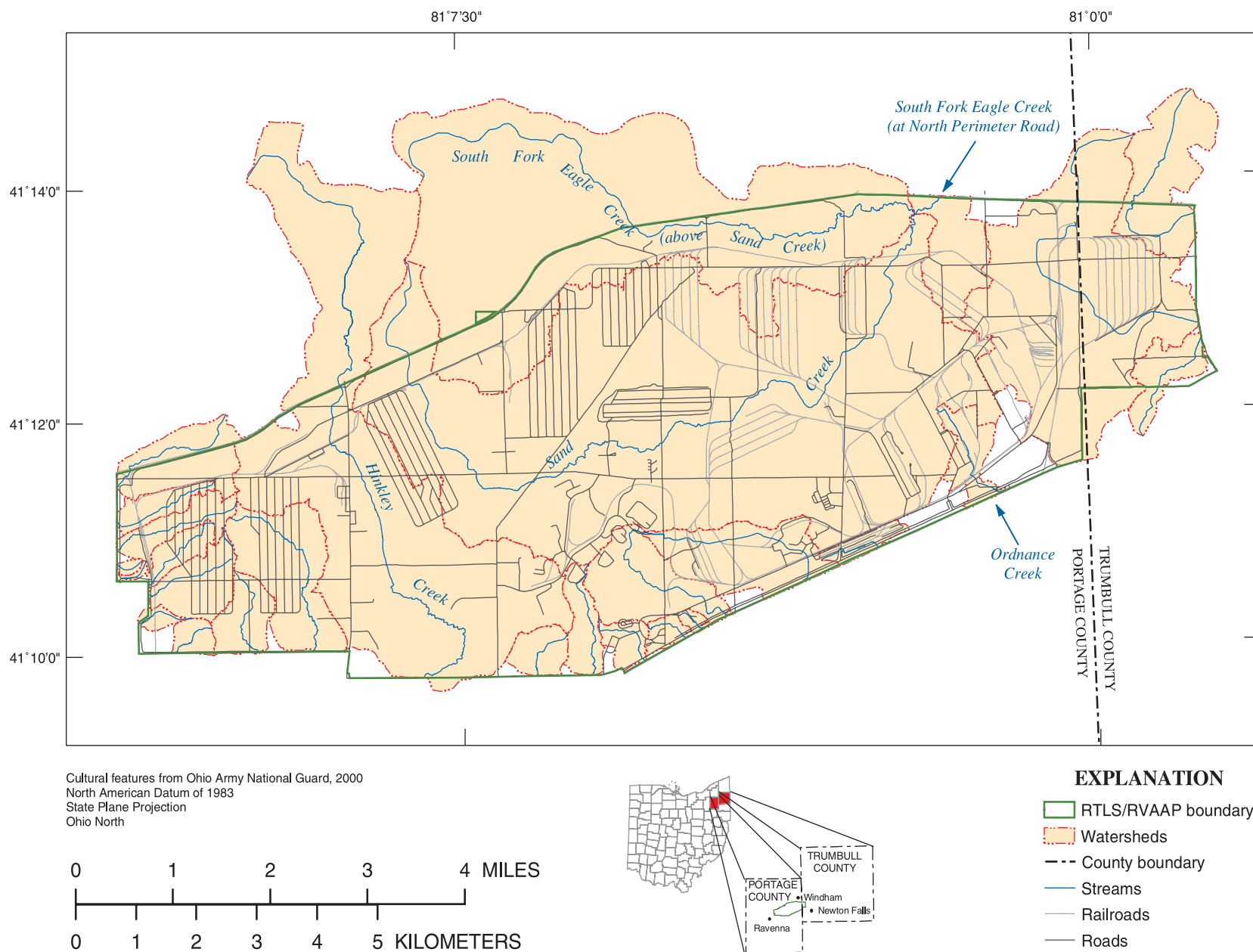


Figure 1. General site map of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant (RTL/RVAAP), Ohio. (Streams and watershed boundaries digitized from Ohio Army National Guard and U.S. Geological Survey topographic maps.)

Study methods

The first part of the watershed inventory involved a literature search to determine the available sources of information concerning the watersheds of the RTLS/RVAAP. The search included reports published through October 2001 and resulted in many sources of information among Federal and State agencies, universities, and private organizations. Individuals or organizations in this identified group had done studies of the RTLS/RVAAP and the surrounding area as part of graduate work, work contracted by OHARNG, or, in the case of Federal or State agencies, as part of a mandated objective.

The second part of the watershed inventory was a hydrologic analysis in which the USGS generated various discharge estimates for selected streams within the RTLS/RVAAP. Estimates of 100-year peak discharges were computed by use of a regression equation presented in Koltun and Roberts (1990). The data required for the use of this equation are drainage area, main channel slope, and storage area in percent of total drainage area. The basin-characteristics data were obtained from USGS 7.5-minute series topographic maps.

Estimates of the mean annual and mean monthly discharges were computed by use of regression equations presented in Koltun and Whitehead (2002). The report presents two methods, drainage-area-only and best-fit equations, for computing the mean annual and mean monthly discharges. The data presented in this report were computed by use of the best-fit equations. The data required for the use of the equations are drainage area, percentage of contributing drainage area covered by forest, percentage of contributing drainage area covered by water or wetlands, mean annual precipitation at the basin centroid, streamflow-variability index at the streamflow-gaging station, latitude of the basin centroid, and longitude of the basin centroid. The basin characteristics were obtained from USGS data sets and 7.5-minute series topographic maps, as recommended by Koltun and Whitehead (2002).

The third part of the watershed inventory was a set of GIS tasks in which data layers for inclusion in OHARNG's digital geographic database were compiled from available sources (Federal, State, and private organizations). Data layers available by individual county were appended into one comprehensive data set. The data layers extending beyond the study area were clipped, and all were projected to a common coordinate system. Additional layers were developed by the USGS. Descriptions of the layers are included in Appendix 1.

DESCRIPTION OF THE STUDY AREA

The RTLS/RVAAP occupies land purchased in 1939 and 1940 by the War Department from 223 separate and privately owned parcels primarily devoted to agriculture

(AMEC Earth and Environmental, 2001). The facility originally consisted of two areas: the Ravenna Ordnance Plant for munitions manufacturing and the Portage Ordnance Depot for munitions storage. The original purpose of the facility was to aid the war effort in Europe during World War II. In 1943, the two areas were combined, and the facility as a whole underwent a series of name changes over the coming years, including the Ravenna Ordnance Center, the Ravenna Arsenal, and the Ravenna Army Ammunition Plant. Although the facility was owned by the U.S. Government, the operations were contracted out to several privately owned companies.

When active, operations consisted of munitions manufacturing, fertilizer production, and munitions demilitarization. In 1993, the production areas of the facility were declared excess to the needs of the Army, and all nonessential infrastructure and buildings were closed or abandoned. The facility was placed in the care of a Modified Caretaker Contractor (MCC) for security and maintenance (AMEC Earth and Environmental, 2001).

OHARNG began its involvement with the RTLS in the 1950s, and in the 1970s was issued a license by the Department of the Army to use 2,494 acres for training. The Air Force Reserve was also granted a license in the 1980s to use 338 acres as a dropzone. On May 6, 1999, OHARNG, through the National Guard Bureau (NGB), received accountability of 16,164 acres, approximately 75 percent of the total facility. This area included the dropzone (still licensed to the Air Force Reserve), the area originally licensed to OHARNG in the 1970s, and munitions storage areas. On May 13, 2002, accountability for an additional 3,774 acres was transferred to OHARNG, bringing the total acreage of the RTLS to 19,938 acres. The remaining 1,481 acres, still known as the RVAAP, remained under the control of the MAC/OSC.

The MAC/OSC is responsible for addressing issues of safety and security associated with munitions storage, overseeing the MCC, and funding and managing the environmental restoration program for the entire 21,419 acres of the facility. Plans are to transfer an additional 3,774 acres of the RVAAP to the NGB in the future. The final tracts of the RTLS and RVAAP will be 19,938 acres and 1,481 acres, respectively.

Geology

A veneer of glacial till, consisting of a mixture of sand, silt, clay, and few cobbles and boulders, was deposited over the entire site of the RTLS/RVAAP facility during two separate glacial advances (Science Applications International Corporation, 1996). The till ranges in thickness from 3 to 45 ft (Ogden Environmental and Energy Services, 2000). The bedrock underlying the glacial till consists of sandstones and shales of Pennsylvanian-age in the western part of the

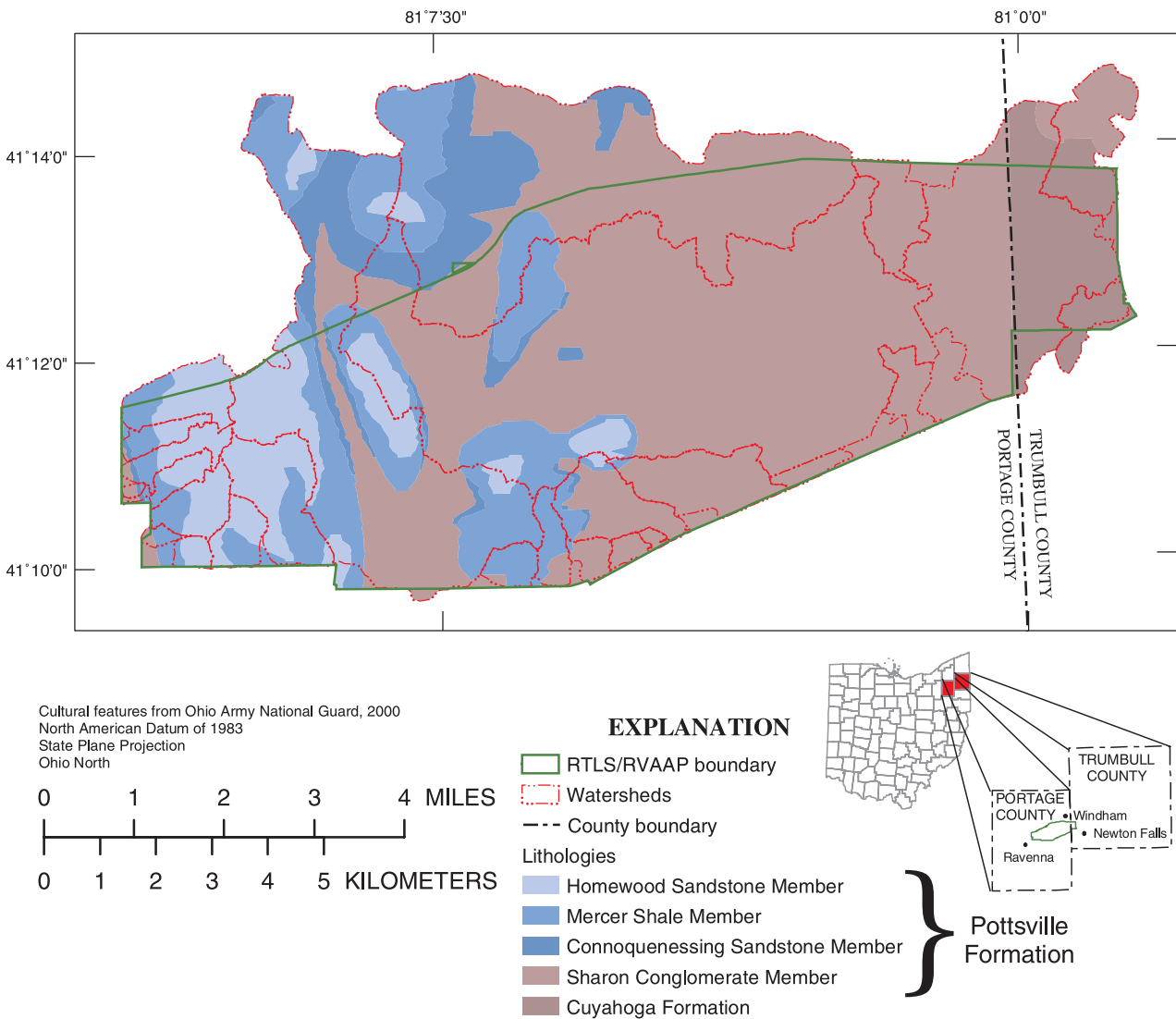


Figure 2. Lithologies of the area contained in and adjacent to the major and selected smaller watersheds of the Ravensburg Training and Logistics Site / Ravensburg Army Ammunition Plant (RTL/RVAAP), Ohio. (The discrepancy along county line is due to classification difference in original bedrock surveys for each county.) (Bedrock geology from Ohio Department of Natural Resources, 1980.)

facility and of Mississippian-age in the eastern part of the facility (fig. 2). The bedrock units in the Pennsylvanian are all in the Pottsville Formation: Homewood Sandstone Member, Mercer Shale Member, Connoquenessing Sandstone Member, and Sharon Conglomerate Member (Science Applications International Corporation, 1996). Mississippian rocks are members of the Cuyahoga Formation (Meadville Shale, Sharpsville Sandstone, and Orangeville Shale).

Soils

Soils on the RTL/RVAAP are mostly silt loams. The soil series most common to the RTL/RVAAP is the Mahoning-

Ellsworth association (Schalk and others, 1999). Other soil associations present at the RTL/RVAAP include: Remsen-Geeburg-Trumbull, Fitchville-Haskins-Sebring, Canfield-Wooster-Ravenna, and Rittman-Wadsworth-Orrville (fig. 3). Details concerning the soils on the RTL/RVAAP can be found in Ritchie and others (1978) and Williams (1992).

Topography

The RTL/RVAAP is in the Southern New York Section of the Appalachian Plateaus Physiographic Province. The relief across the facility is about 290 ft; the highest point is in the northwest corner at about 1,220 ft above sea level, and the

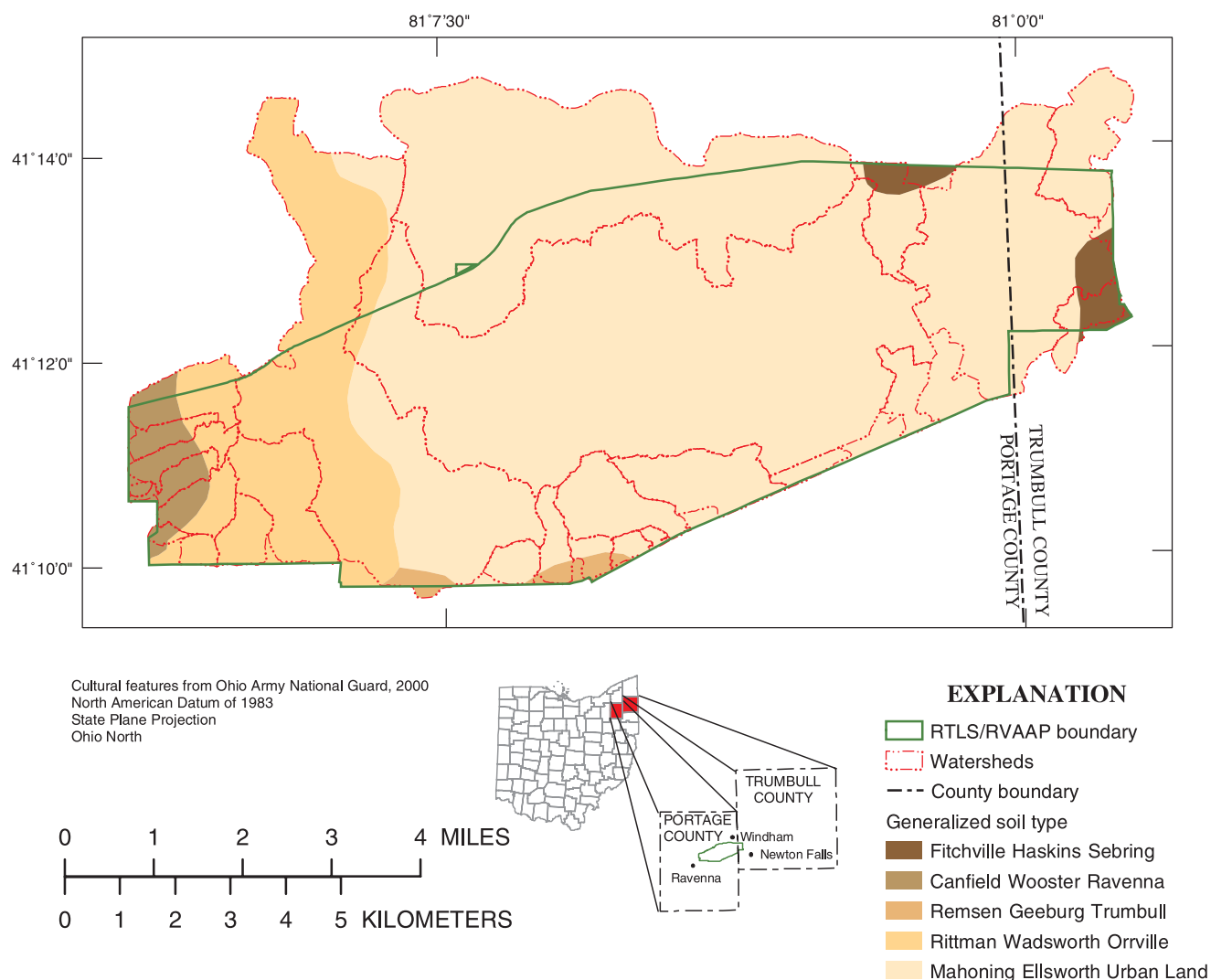


Figure 3. Generalized soil types of the area contained in and adjacent to the major and selected smaller watersheds of the Ravens Training and Logistics Site / Ravens Army Ammunition Plant (RTLRS/RVAAP), Ohio. (Soil types from U.S. Department of Agriculture, 1991, State Soil Geographic Database (STATSGO).)

lowest point is in the southeast corner at about 930 ft above sea level. The terrain of the RTLRS/RVAAP is best described as gently rolling (Schalk and others, 1999). A slope map, generated as part of the GIS database used in this study, is shown in figure 4.

Land use and cover

Most lands within the RTLRS/RVAAP are postsuccessional agricultural lands, with the exception of a few areas of large mature forest and areas that were considered too wet to farm (Ogden Environmental and Energy Services, 2000). It has been estimated that approximately 90 percent of the RTLRS/RVAAP facility had been cleared or disturbed at one time (Ogden Environmental and Energy Services, 2000).

Currently, approximately 87 percent of the facility is classified as forest, with existing grasslands likely being a remnant of agriculture (fig. 5).

Water supply

Potable water from two wells is pumped to three service buildings on the west side of the RTLRS/RVAAP. A third potable-water well is at former Unit Training Equipment Site #1, although water from this well is generally not used by the employees. The City of Newton Falls provides potable water and sewage service for the east side of the RTLRS/RVAAP in Trumbull County. The city water supply is drawn from East Branch Mahoning River below Milton Reservoir.

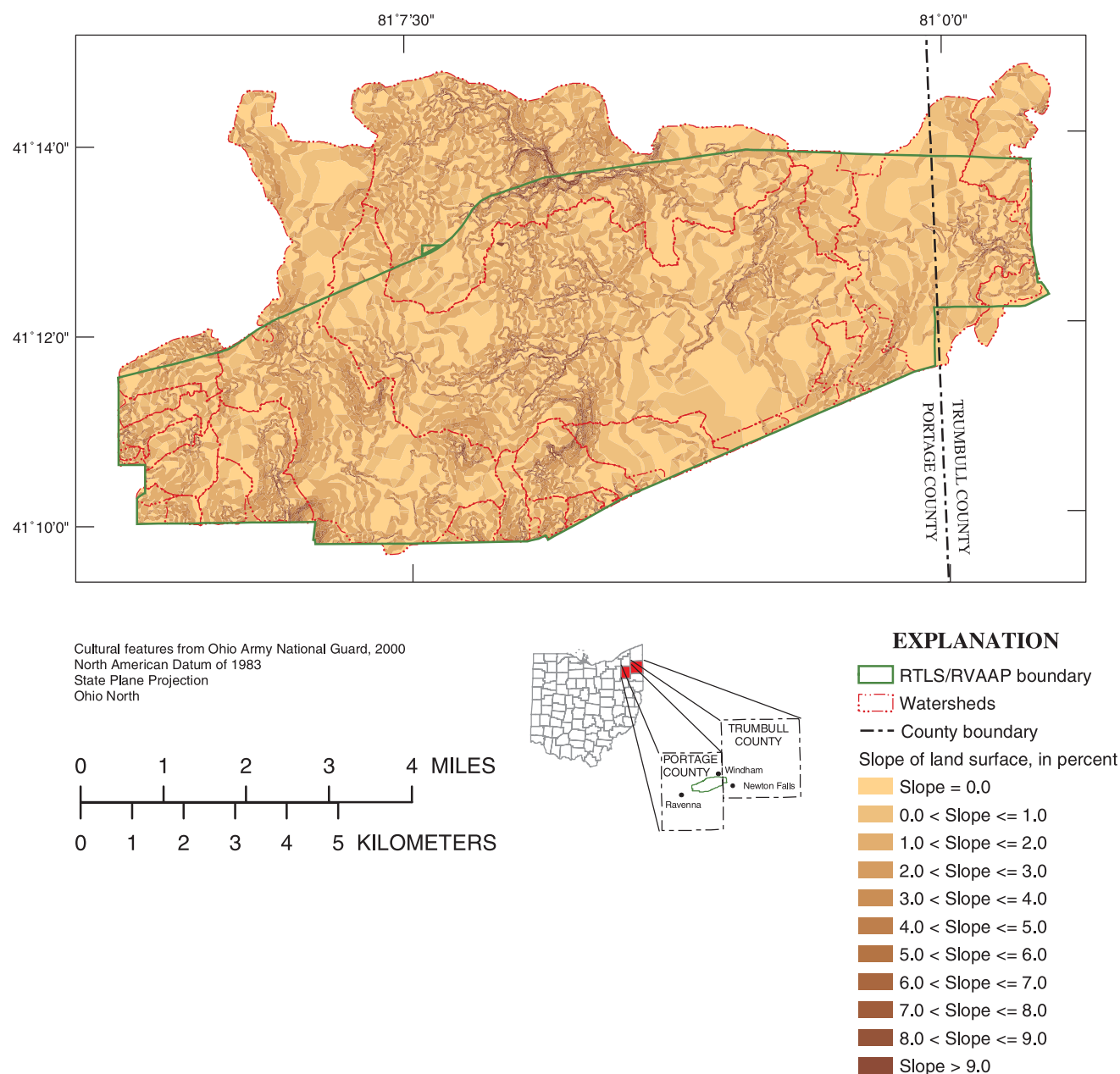


Figure 4. Slope (in percent) of land contained in and adjacent to the major and selected smaller watersheds of the Ravensburg Training and Logistics Site / Ravensburg Army Ammunition Plant (RTL/RVAAP), Ohio. (Land slope generated from U.S. Geological Survey topographic maps.)

Climate

The general climate of the RTL/RVAAP is continental, with moderately warm and humid summers, reasonably cold and cloudy winters, and wide variations in precipitation from year to year (Science Applications International Corporation, 1996). On the basis of precipitation records from 1961 to 1991, an average of 37 in. of precipitation per year falls on the RTL/RVAAP, including approximately 54 in. of snow (National Oceanic and Atmospheric Administration, 1992).

Average temperature ranges from 24.8°F in January to 71.9°F in July. The average growing season is 165 days, from about April 28 to October 18 (Schalk and others, 1999). The prevailing wind is from the southwest.

WATERSHED INVENTORY: DESCRIPTION OF NATURAL RESOURCES

Surface water

Streams

Numerous streams, some of which are perennial, drain the RTLS (fig. 6). The four major streams (South Fork Eagle Creek, Sand Creek, Ordnance Creek, and Hinkley Creek) drain approximately 65 percent of the facility.

The central and northeastern areas (including Sand Creek) drain into South Fork Eagle Creek, which in turn drains into Eagle Creek and finally the Mahoning River. The

eastern areas drain into the West Branch Mahoning River. The western areas drain into the West Branch Mahoning River above Michael J. Kirwan Reservoir. The southern areas drain directly into Michael J. Kirwan Reservoir.

South Fork Eagle Creek and Sand Creek were designated as State Resource Water in 1978 (Robert Heitzman, Ohio Environmental Protection Agency (OEPA), oral commun., 2002). State Resource Water is water within park systems, scenic rivers, wetlands, and other areas having ecological importance. The OEPA policy on antidegradation protects State Resource Water from lowering the existing water quality. The pollutant loadings permitted for State Resource Water are less than those for other water designations in the Ohio River Basin (Ohio Environmental Protection Agency, 2002c).

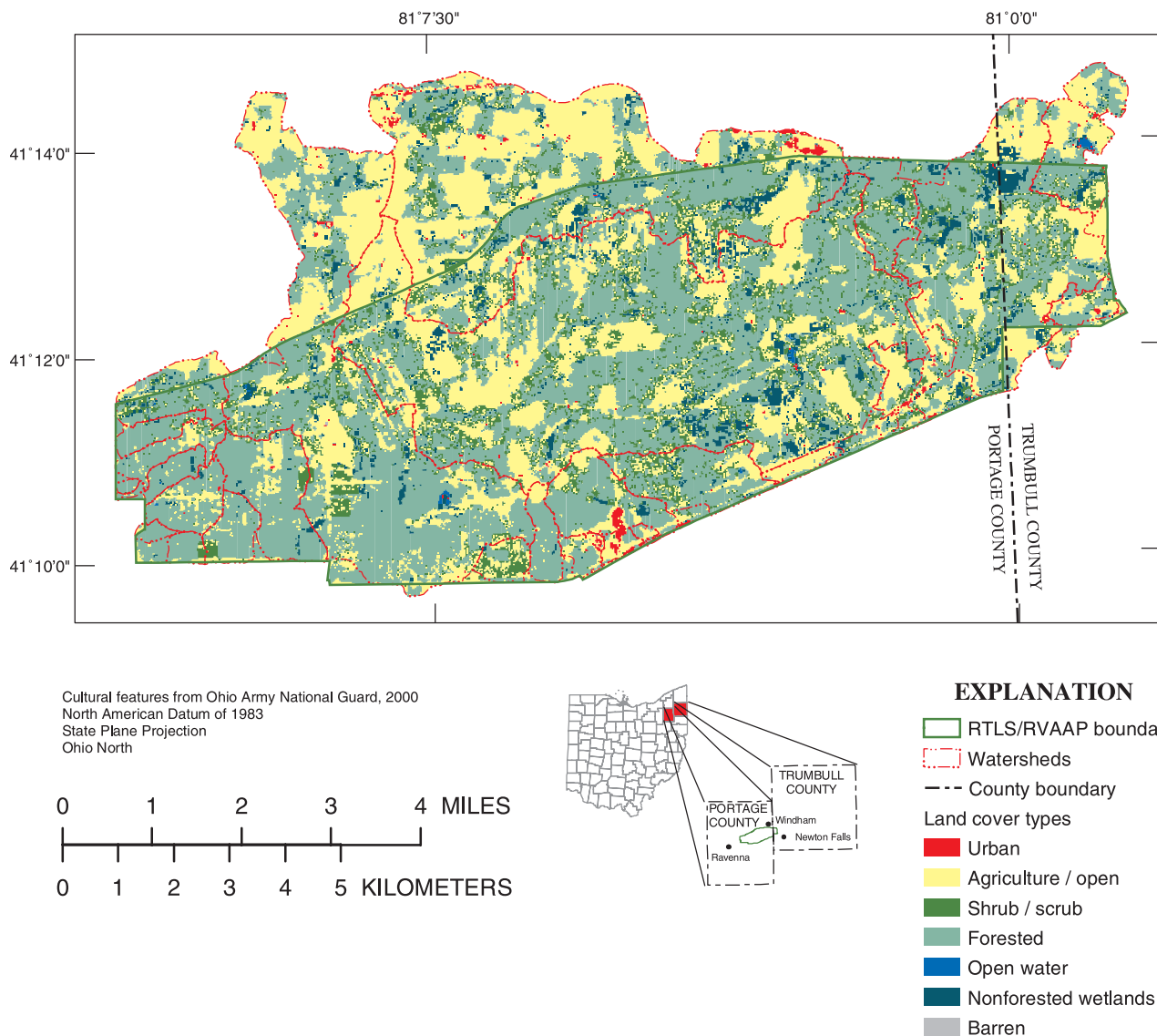


Figure 5. Land-cover types of the area contained in and adjacent to the major and selected smaller watersheds of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant (RTLS/RVAAP), Ohio. (Land-cover data from the Ohio Department of Natural Resources, 1994.)

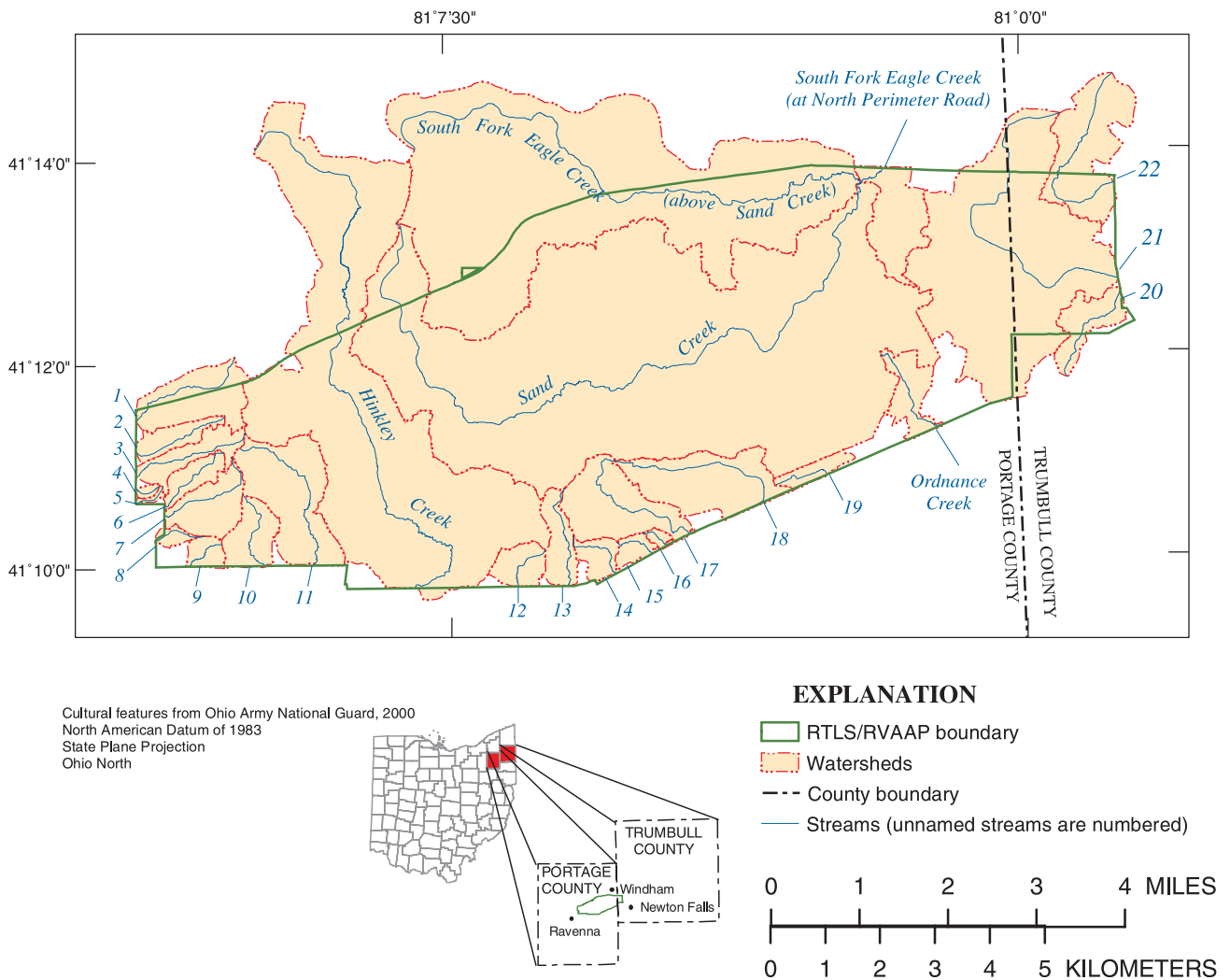


Figure 6. Streams draining the major and selected smaller watersheds of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant (RTL/RVAAP), Ohio. (Streams and watershed boundaries digitized from Ohio Army National Guard and U.S. Geological Survey topographic maps.)

Since 1978, the State Resource Water designation has been redefined to include four levels of high-quality water: (1) General High-Quality Water, (2) Superior High-Quality Water, (3) State Resource Water, and (4) Outstanding National Resource Water. South Fork Eagle Creek has been redesignated Superior High-Quality Water because of the endangered mountain brook lamprey (*Ichthyomyzon greeleyi*) collected there in 1987 and 1999 (Ohio Environmental Protection Agency, 2002b). Sand Creek and South Fork Eagle Creek are additionally designated as Warm Water Habitat, Agricultural Water Supply, Industrial Water Supply, and Primary Contact Recreation. Hinkley Creek is not designated as State Resource Water but is designated as Warm Water Habitat, Agricultural Water Supply, Industrial

Water Supply, and Primary Contact Recreation (Ohio Environmental Protection Agency, 2002a).

Ponds, lakes, and wetlands

Ponds, lakes, and wetlands at the RTL/RVAAP are numerous (fig. 7). The lakes and ponds were created and used for multiple purposes, including industrial water supply, recreation, and sediment control. The wetlands are natural and are not used for any human activity.

The U.S. Army Corps of Engineers (USACE) and the USEPA define wetlands as areas inundated by surface water or ground water often enough to support vegetation adapted to living in saturated soils. Wetlands include marshes,

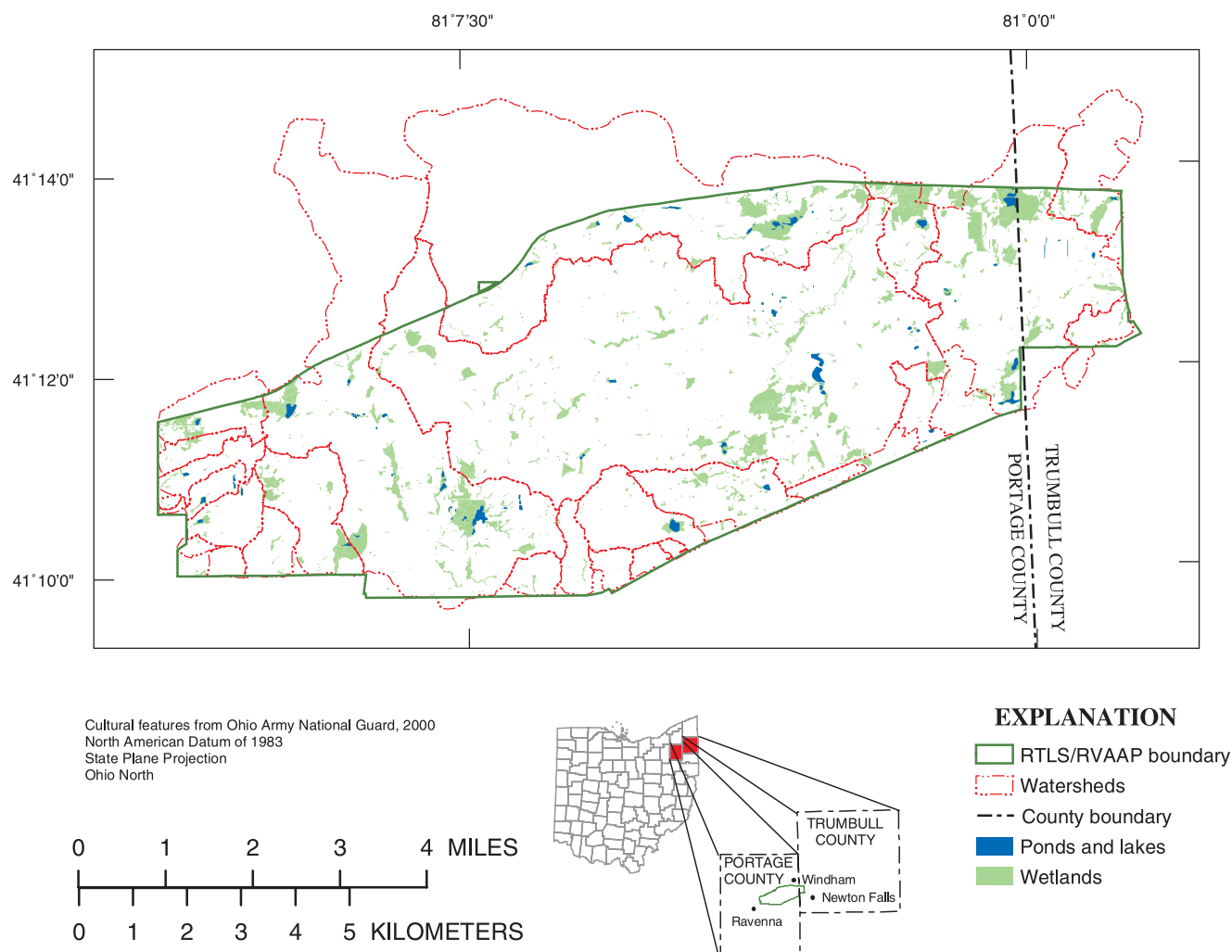


Figure 7. Ponds, lakes, and wetlands within the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant (RTL/RVAAP), Ohio. (Wetlands from U.S. Army Corps of Engineers Waterways Experiment Station (WES); ponds digitized from Ohio Army National Guard aerial photography.)

swamps, bogs, fens, and similar areas. Characteristic indicators of wetlands are hydrophytic species of vegetation, hydric soils, and wetland hydrology (U.S. Army Corps of Engineers, Environmental Laboratory, 1987). The wetlands shown in figure 7 were surveyed by the USACE as part of the Waterways Experiment Station (WES) project. This survey was done as part of a planning-level survey, not as a jurisdictional delineation. It has also been estimated that as much as one-third of the facility may meet the USACE criteria to be classified as a wetland (Morgan, 1995).

Monitoring stations

No surface-water monitoring stations are operating at the RTL/RVAAP. An abandoned gage house with a flume stands along an unnamed stream (stream 21, fig. 6). Located above where the stream exits the facility, the origin of this structure is unknown and the gage is no longer used. A second abandoned monitoring station was constructed on Hinkley Creek just upstream from the point at which it exits the facility. A concrete structure is in place, but no gage house or instruments remain. No record of ownership or historical data for the monitoring stations is available.

Flood plains and floodways

Flood plains are the areas adjacent to streams, rivers, lakes, and ponds that carry the waters that overtop streambanks during periods of high flow (Ogden Environmental and Energy Services, 2000). Areas designated as a 100-year flood plain fall under the jurisdiction of the Federal Emergency Management Agency (FEMA). FEMA defines the 100-year flood as a flood that has a 1 percent probability (1 in 100) of being equaled or exceeded in any year. Within the RTLS/RVAAP (fig. 8), 100-year flood plains have been delineated for Sand Creek and its tributaries, South Fork Eagle Creek and its tributaries (including Sand Creek), Hinkley Creek and its tributaries, and two unnamed streams (numbers 11 and 13 in fig. 6) in the southwest part of the facility (Ogden Environmental and Energy Services, 2000).

The floodway is defined as the channel of a river or other watercourse and the adjacent lands that must be reserved in order to pass the base flood without cumulatively increasing the water-surface elevation by more than a designated height (a surcharge) (Federal Emergency Management Agency, 1995). Floodways also fall under the jurisdiction of FEMA. The State of Ohio, in accordance with FEMA's default maximum allowable surcharge, has set its surcharge limit at 1.0 ft. This default surcharge may be also limited by local legislation. Within the floodway, any increase in or impedance to the flow above the natural conditions due to buildings, fences, walls, bridges, and other structures is prohibited without approval from FEMA. At this time, no 100-year floodways have been defined within the RTLS/RVAAP.

Discharge estimates

As part of the RTLS/RVAAP watershed inventory, the USGS did hydrologic analyses for the major and selected smaller watersheds draining the facility (a total of 27 streams) (fig. 6). Specifically, the USGS estimated the 100-year-recurrence-interval peak flood, mean annual discharge, and mean monthly discharge for each stream location. All discharge estimates are based on regional regression equations, because no historical discharge-gaging data are available for the streams. The results of the hydrologic analyses are presented in table 1; basin characteristics used in the analyses are presented in table 2.

Ground water

A buried glacial valley filled with glacial outwash (gravel and sand) is near the center of the facility, oriented southwest-northeast. This buried valley is favorably suited to receive recharge by way of infiltration from streams and precipitation and therefore is a productive aquifer. Yields from wells completed in this aquifer are as high as 1,600 gal/min (Science Applications International Corporation, 1996).

Bedrock sources of ground water in the RTLS/RVAAP area are primarily the sandstones and the conglomerate members of the Pottsville Formation (Science Applications International Corporation, 1996). The Sharon Conglomerate within the Pottsville Formation is the more productive unit, with typical well yields of 5 to 200 gal/min. (Ogden Environmental and Energy Services, 2000). This conglomerate is confined by a layer of relatively impermeable Sharon Shale (Science Applications International Corporation, 1996). Wells in the remaining aquifers of the Pottsville Formation, the Connoquenessing Sandstone and the Homewood Sandstone, yield less than wells in the Sharon Conglomerate, but may still provide significant quantities of water (Science Applications International Corporation, 1996). Generalized well yields are shown in figure 9.

Ground-water flow at the RTLS/RVAAP is generally from west to east. Average depth to ground water is approximately 50 ft from the ground surface (Ogden Environmental and Energy Services, 2000). A study of the Pottsville aquifers by Kammer (1982) indicated an average transmissivity of 3,600 gal/d/ft and hydraulic conductivities ranging from 9 to 754 gal/d/ft², the average being 54 gal/d/ft² (Ogden Environmental and Energy Services, 2000). With regard to chemical quality, the ground water is hard and typically contains nuisance concentrations of iron and manganese (Ogden Environmental and Energy Services, 2000).

Biological resources

Wetland plant alliances and communities

Several surveys of wetland plants have been done at the RTLS/RVAAP. The results from a 1992 survey, summarized in Andreas (1993), are shown in figure 10. The Andreas survey used a classification system developed by Anderson (1982).

Wetland plants were last investigated at the RTLS/RVAAP as part of a basewide floral survey in 1998 and 1999. The Ohio Department of Natural Resources, Department of Natural Areas and Preserves, surveyed the flora of the RTLS/RVAAP. Science Applications International Corporation (SAIC) then categorized the plant populations as communities and alliances (Science Applications International Corporation, 1999; Ohio Department of Natural Resources, 1999). This latest survey is the current standard that OHARNG is required to use.

Ecologists with SAIC investigated the RTLS/RVAAP in two phases. During the first phase, they collected data by examining aerial photographs and maps and by reviewing previous studies (Ohio Department of Natural Resources, 1993, 1999). Having reviewed the data, the ecologists then inspected these areas to verify the plant populations at these sites. The plant populations that did not fit

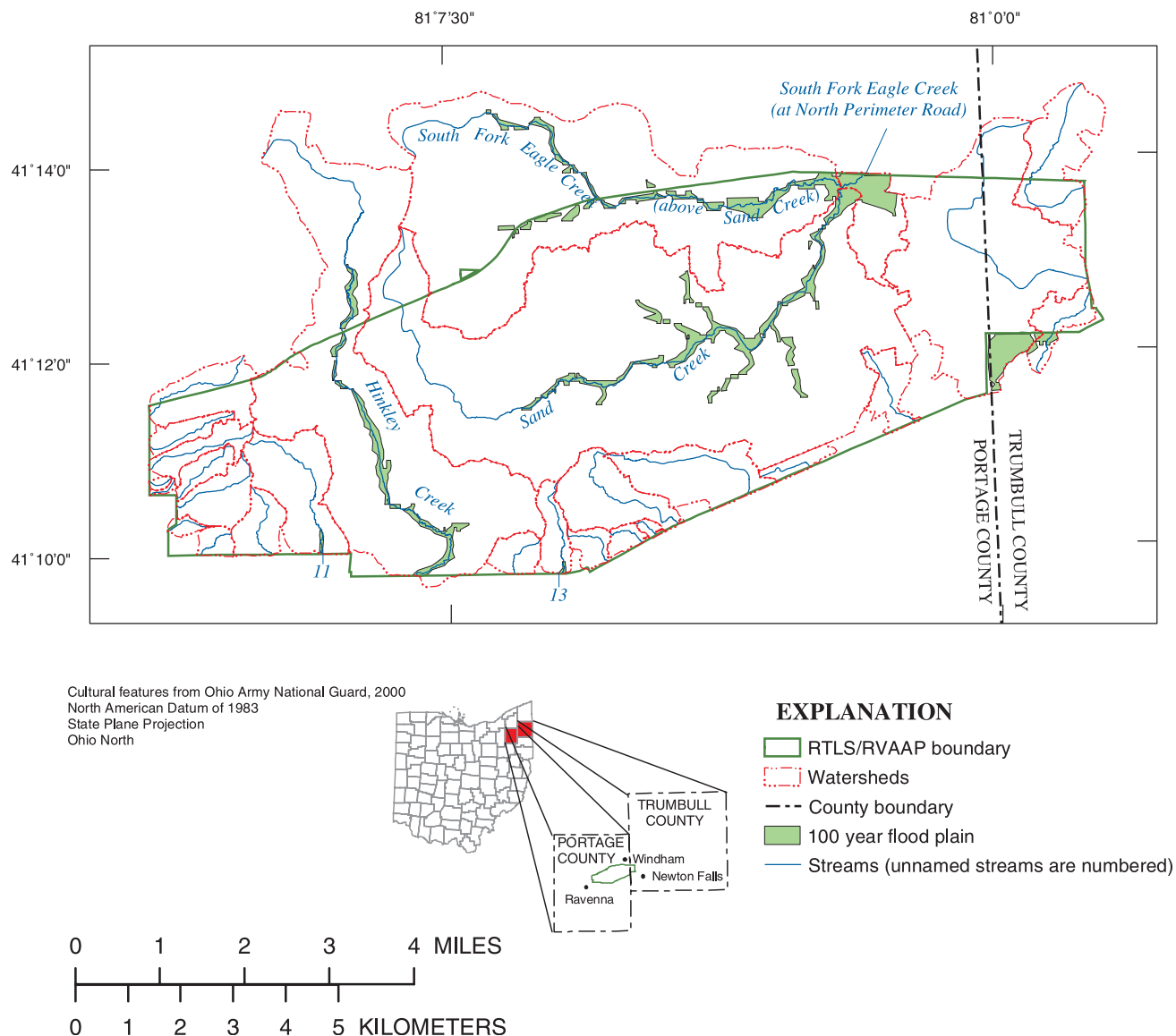


Figure 8. One-hundred-year flood plains of the area contained in and adjacent to the major and selected smaller watersheds of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant (RTL/RVAAP), Ohio. (Flood-plain delineations from Ohio Department of Natural Resources, 1984.)

natural alliances described by The Nature Conservancy were described in detail as communities (Drake and others, 1997; Grossman and others, 1998; The Association for Biodiversity Information, 2001). Wetlands were not delineated but were reported in the SAIC descriptions. The classes of wetland plants at the RTL/RVAAP are listed in table 3.

Animals

Biological surveys, including some on animals, were done at the RTL/RVAAP by State agencies and universities in 1993 and 1998. The data from these surveys are documented in various reports to the RTL/RVAAP (Dan Rice, Ohio Division of Natural Areas and Preserves, oral commun., 2001).

Aquatic macroinvertebrates were surveyed in 1998 by the USGS in the main streams and many lakes, ponds, and

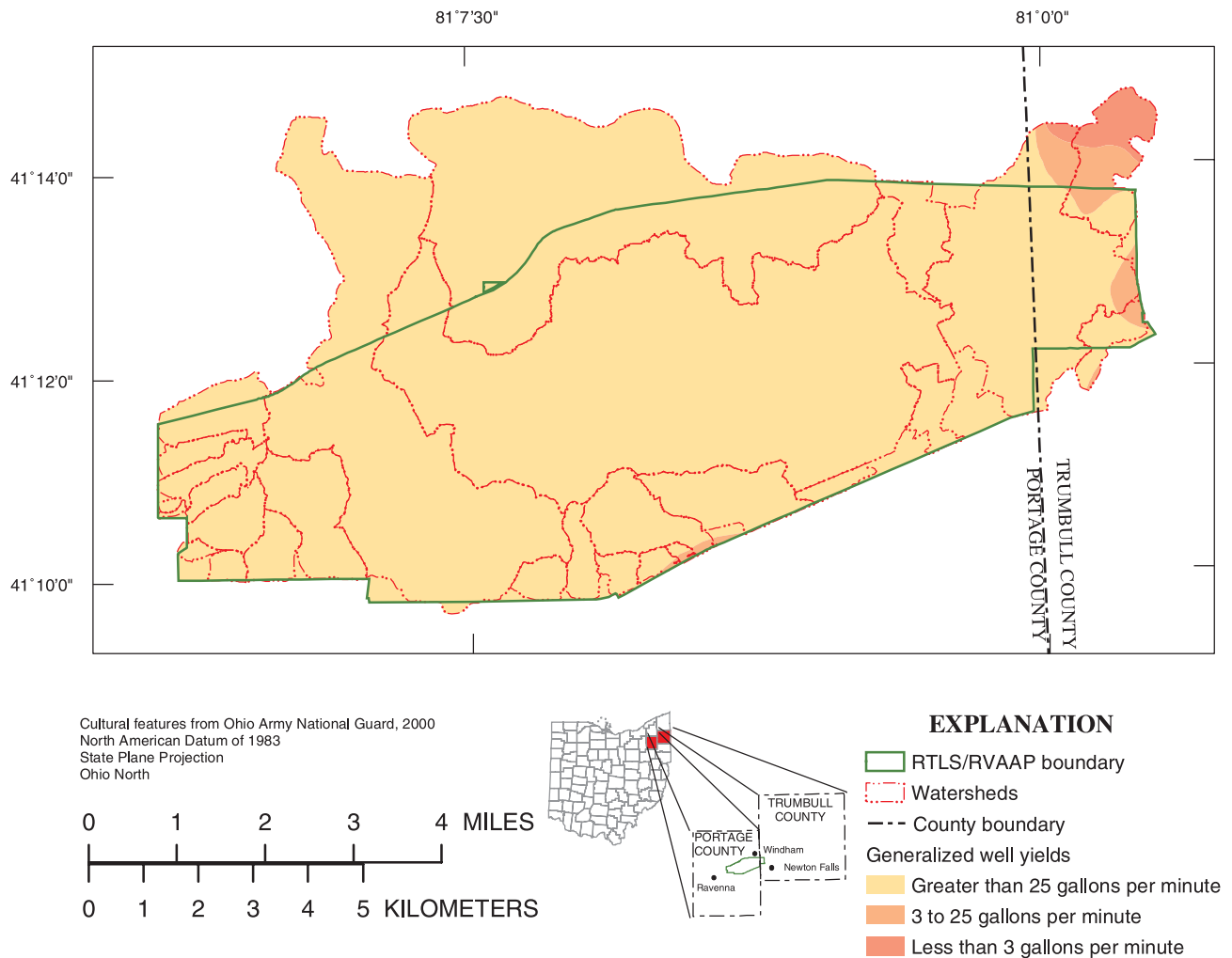


Figure 9. Generalized ground-water resources of the area contained in and adjacent to the major and selected smaller watersheds of the Ravensenna Training and Logistics Site / Ravensenna Army Ammunition Plant (RTLS/RVAAP), Ohio. (Well yields generalized from Ohio Department of Natural Resources, 1980.)

wetlands. Hinkley Creek, Sand Creek, and South Fork Eagle Creek were sampled quantitatively by use of artificial substrate-type samplers. Another 21 sites were sampled qualitatively by use of a D-framed net on a handle. Results of the aquatic-macroinvertebrate survey are published in Tertuliani, 1999.

Special status species

For the purposes of this report, “special-status species” means a species that is listed as endangered or threatened by the U.S. Government or the State of Ohio; also included are “special-interest species” listed by the State of Ohio. An endangered plant or animal is a native species or subspecies facing possible extirpation from the Nation or the State. The danger may result from one or more causes, such as habitat

loss, pollution, predation, interspecific competition, or disease. A threatened species or subspecies is not in immediate jeopardy, but continued or increased stress may cause it to become endangered. A special interest species or subspecies might become threatened under continued or increased stress; this definition also includes a species or subspecies for which there is concern but for which information is not sufficient to provide an adequate status evaluation (Ohio Department of Natural Resources, 1998).

Rare plants and animals found at the RTLS/RVAAP with their respective habitat are listed in table 4. No species on the Federal endangered species list are known to live at the RTLS/RVAAP; however, the RTLS/RVAAP lies within the known ranges of three such species: Indiana bat (*Myotis sodalis*), Mitchell’s satyr (*Neonympha mitchellii*), and club-shell mussel (*Pleurobema clava*). Northern monkshood

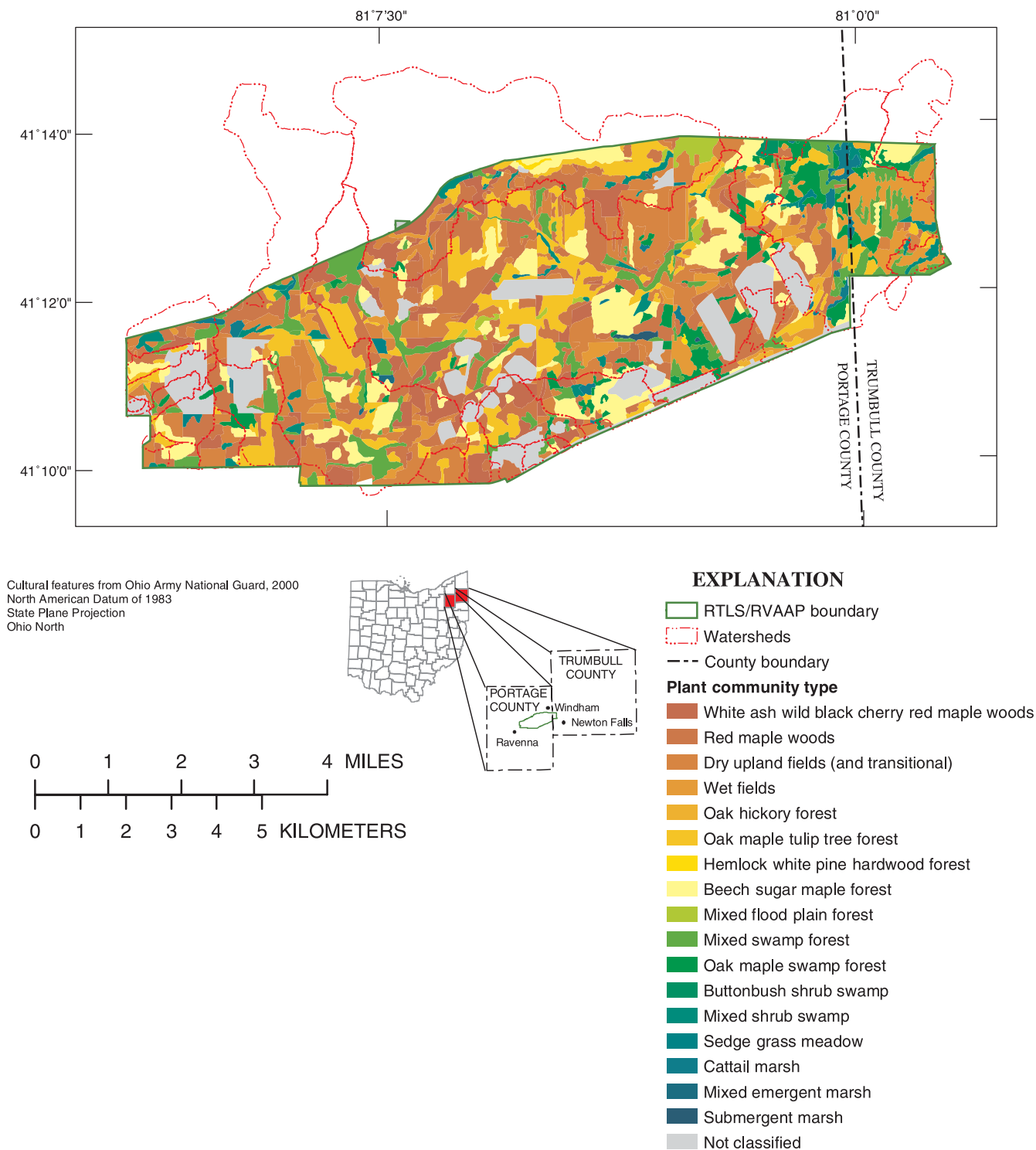


Figure 10. Plant communities of the area contained in and adjacent to the major and selected smaller watersheds of the Ravens Training and Logistics Site / Ravens Army Ammunition Plant (RTLRS/RVAAP), Ohio. (Plant communities from Andreas (1993).)

(*Aconitum noveboracense*), a Federal threatened species, is found in Portage County, as is another threatened species, the bald eagle (*Haliaeetus leucocephalus*). A recent addition to the list is the eastern massasauga (*Sistrurus catenatus*), now a Federal candidate species.

Twenty species of animals and plants are listed as State endangered, and another two species are listed as State threatened. All have been confirmed to live on the RTLS/RVAAP. Streams, lakes, ponds, and wetlands provide the necessary habitat for most of these 22 species, with the exception of the winter wren (*Troglodytes troglodytes*), sharp-shinned hawk (*Accipiter striatus*), Henlow's sparrow (*Ammodramus henslowii*), cerulean warbler (*Dendroica cerulea*), and solitary vireo (*Vireo solitarius*). These species inhabit varied areas from grasslands to successional fields to forest. Sightings of 15 additional species that are potentially threatened in the State have been confirmed on the RTLS/RVAAP.

SUMMARY AND CONCLUSIONS

Training activities affect watersheds by creating nonpoint sources of contamination. Pollutant loading levels within a watershed are limited by Federal, State, and local laws. In order to monitor the effects of training and maintain compliance with applicable laws it was necessary to establish the baseline conditions of the RTLS/RVAAP watersheds. The USGS, in cooperation with the OHARNG performed an inventory of the current watershed conditions of the RTLS/RVAAP. Previous surveys of natural resources were located through a literature search and are referenced herein. As the second part of the inventory, hydrologic analyses were performed on selected streams. A digital geographic database was developed as the third part of the inventory.

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Table 1: Discharge estimates for the major and selected smaller streams draining the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio.

[Based on Koltun and Roberts (1989) and Koltun and Whitehead (2002). All discharge statistics are in units of cubic feet per second; values in **bold** represent estimates in which one or more of the basin characteristics were outside of the range of values from which the regression equations were developed; Q_{100} , 100-year peak discharge; \overline{Q}_A , mean annual discharge; \overline{Q}_{Jan} to \overline{Q}_{Dec} , mean monthly discharge for indicated month]

Stream name	Q_{100}	\overline{Q}_A	\overline{Q}_{Jan}	\overline{Q}_{Feb}	\overline{Q}_{Mar}	\overline{Q}_{Apr}	\overline{Q}_{May}	\overline{Q}_{Jun}	\overline{Q}_{Jul}	\overline{Q}_{Aug}	\overline{Q}_{Sep}	\overline{Q}_{Oct}	\overline{Q}_{Nov}	\overline{Q}_{Dec}
Unnamed stream 1	115	0.69	1.14	1.25	1.38	1.29	0.73	0.48	0.25	0.21	0.15	0.14	0.30	0.70
Unnamed stream 2	65.6	0.23	0.35	0.44	0.48	0.46	0.25	0.16	0.09	0.07	0.05	0.05	0.10	0.24
Unnamed stream 3	86.4	0.34	0.44	0.64	0.70	0.67	0.37	0.24	0.16	0.10	0.07	0.07	0.15	0.36
Unnamed stream 4	18.3	0.03	0.05	0.06	0.06	0.06	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.03
Unnamed stream 5	12.3	0.02	0.04	0.04	0.05	0.05	0.02	0.02	0.01	0.01	<0.01	<0.01	0.01	0.02
Unnamed stream 6	40.4	0.21	0.33	0.39	0.42	0.40	0.23	0.15	0.08	0.06	0.04	0.04	0.09	0.21
Unnamed stream 7	94.4	0.46	0.64	0.86	0.95	0.89	0.51	0.33	0.20	0.14	0.10	0.09	0.20	0.48
Unnamed stream 8	28.1	0.07	0.09	0.14	0.15	0.14	0.08	0.05	0.03	0.02	0.01	0.01	0.03	0.07
Unnamed stream 9	49.3	0.13	0.17	0.25	0.27	0.26	0.15	0.09	0.06	0.04	0.03	0.03	0.05	0.14
Unnamed stream 10	85.1	0.35	0.49	0.66	0.72	0.68	0.39	0.25	0.15	0.10	0.07	0.07	0.15	0.37
Unnamed stream 11	192	1.07	1.63	1.93	2.18	2.01	1.18	0.76	0.43	0.31	0.22	0.22	0.47	1.11
Hinckley Creek	478	7.42	11.3	12.5	14.5	13.0	7.74	5.08	2.91	2.09	1.52	1.54	3.43	7.55
Unnamed stream 12	71.3	0.23	0.29	0.41	0.44	0.43	0.24	0.16	0.11	0.06	0.04	0.04	0.10	0.22
Unnamed stream 13	77.3	0.29	0.39	0.55	0.61	0.58	0.34	0.21	0.13	0.08	0.05	0.06	0.13	0.31
Unnamed stream 14	60.3	0.17	0.21	0.32	0.35	0.33	0.19	0.12	0.08	0.04	0.03	0.03	0.07	0.18
Unnamed stream 15	46.7	0.11	0.13	0.20	0.22	0.21	0.12	0.08	0.05	0.03	0.02	0.02	0.04	0.11
Unnamed stream 16	21.0	0.04	0.06	0.09	0.09	0.09	0.05	0.03	0.02	0.01	0.01	0.01	0.02	0.05
Unnamed stream 17	146	0.81	1.15	1.48	1.67	1.54	0.92	0.57	0.34	0.21	0.15	0.16	0.36	0.85

Table 1: Discharge estimates for the major and selected smaller streams draining the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio. —(Continued)

[Based on Koltun and Roberts (1989) and Koltun and Whitehead (2002). All discharge statistics are in units of cubic feet per second; values in **bold** represent estimates in which one or more of the basin characteristics were outside of the range of values from which the regression equations were developed; Q_{100} , 100-year peak discharge; $\overline{Q_A}$, mean annual discharge; $\overline{Q_{Jan}}$ to $\overline{Q_{Dec}}$, mean monthly discharge for indicated month]

Stream name	Q_{100}	$\overline{Q_A}$	$\overline{Q_{Jan}}$	$\overline{Q_{Feb}}$	$\overline{Q_{Mar}}$	$\overline{Q_{Apr}}$	$\overline{Q_{May}}$	$\overline{Q_{Jun}}$	$\overline{Q_{Jul}}$	$\overline{Q_{Aug}}$	$\overline{Q_{Sep}}$	$\overline{Q_{Oct}}$	$\overline{Q_{Nov}}$	$\overline{Q_{Dec}}$
Unnamed stream 18	154	0.93	1.36	1.69	1.91	1.76	1.06	0.67	0.39	0.25	0.18	0.19	0.41	0.97
Unnamed stream 19	30.2	0.14	0.19	0.27	0.29	0.28	0.16	0.11	0.07	0.04	0.03	0.03	0.06	0.15
Ordnance Creek	70.8	0.34	0.48	0.63	0.69	0.65	0.38	0.25	0.15	0.10	0.07	0.07	0.15	0.35
Unnamed stream 20	45.2	0.35	0.55	0.81	0.87	0.75	0.46	0.25	0.14	0.09	0.07	0.18	0.30	0.57
Unnamed stream21	266	4.30	7.20	9.20	10.4	8.51	5.60	3.04	1.60	1.18	0.84	2.41	3.98	6.98
Unnamed stream 22	91.1	1.04	1.63	2.27	2.48	2.10	1.30	0.74	0.41	0.30	0.20	0.57	0.92	1.64
S.F. Eagle Creek at North Perimeter Road	1360	23.2	35.9	47.2	54.8	43.5	27.6	16.1	9.24	6.60	4.93	13.5	22.3	37.5
Sand Creek	834	13.6	21.0	28.4	32.8	26.2	16.6	9.63	5.53	3.83	2.87	7.95	13.0	22.3
S.F. Eagle Creek above Sand Creek	691	8.75	13.4	18.0	20.4	16.6	10.1	5.84	3.33	2.52	1.80	4.76	8.04	13.8

Table 2: Basin characteristics for the major and selected smaller streams draining the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio.

[Obtained from U.S. Geological Survey topographical maps and Koltun and Whitehead (2002). Drainage area, in square miles; main channel slope, in feet per mile; storage, in percent; latitude and longitude in decimal degrees (North American Datum of 1927); rainfall, in inches; forested and wetland areas, in percent; streamflow variability, in base 10 logarithm of cubic feet per second]

Stream name	Drainage area	Main-channel slope	Storage	Latitude of basin centroid	Longitude of basin centroid	Mean annual rainfall at basin centroid	Percentage of basin covered by forest	Percentage of basin covered by wetlands	Streamflow variability index
Unnamed stream 1	0.67	57.7	0.5	41.19	81.18	37.0	68.1	16.1	0.515
Unnamed stream 2	0.23	83.5	0.0	41.19	81.18	36.9	84.0	6.2	0.512
Unnamed stream 3	0.34	77.9	0.0	41.19	81.18	36.8	83.9	0.4	0.511
Unnamed stream 4	0.03	183	0.0	41.18	81.19	36.7	64.9	18.1	0.511
Unnamed stream 5	0.02	115	0.0	41.18	81.19	36.7	68.2	18.2	0.510
Unnamed stream 6	0.21	50.0	1.0	41.18	81.18	36.7	79.5	11.0	0.511
Unnamed stream 7	0.47	65.3	0.3	41.18	81.18	36.6	81.0	1.7	0.510
Unnamed stream 8	0.07	94.7	0.0	41.17	81.19	36.5	89.3	0.0	0.509
Unnamed stream 9	0.13	131	0.0	41.17	81.18	36.4	83.5	0.3	0.511
Unnamed stream 10	0.36	64.8	0.0	41.17	81.17	36.4	74.7	1.9	0.521
Unnamed stream 11	1.08	61.2	0.0	41.18	81.16	36.4	79.1	6.1	0.529
Hinckley Creek	7.20	19.0	0.7	41.19	81.14	36.7	62.6	6.5	0.550
Unnamed stream 12	0.24	99.7	0.0	41.17	81.11	35.9	16.0	0.0	0.568
Unnamed stream 13	0.31	68.8	0.0	41.17	81.10	35.9	82.8	0.8	0.575
Unnamed stream 14	0.18	126	0.0	41.17	81.09	35.9	74.1	0.2	0.577
Unnamed stream 15	0.11	167	0.0	41.17	81.09	35.9	40.4	0.0	0.574
Unnamed stream 16	0.05	133	0.2	41.17	81.08	35.9	76.8	0.0	0.573
Unnamed stream 17	0.85	89.5	0.7	41.18	81.09	35.9	80.9	2.7	0.571
Unnamed stream 18	0.97	51.6	0.3	41.18	81.07	35.9	79.5	3.8	0.551
Unnamed stream 19	0.15	16.2	0.0	41.18	81.05	35.9	40.9	0.7	0.527

Table 2: Basin characteristics for the major and selected smaller streams draining the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio.—(Continued)

[Obtained from U.S. Geological Survey topographical maps and Koltun and Whitehead (2002). Drainage area, in square miles; main channel slope, in feet per mile; storage, in percent; latitude and longitude in decimal degrees (North American Datum of 1927); rainfall, in inches; forested and wetland areas, in percent; streamflow variability, in base 10 logarithm of cubic feet per second]

Stream name	Drainage area	Main-channel slope	Storage	Latitude of basin centroid	Longitude of basin centroid	Mean annual rainfall at basin centroid	Percentage of basin covered by forest	Percentage of basin covered by wetlands	Streamflow variability index
Ordnance Creek	0.36	61.9	0.6	41.19	81.03	35.9	58.1	2.4	0.514
Unnamed stream 20	0.37	30.8	2.3	41.20	80.99	35.9	66.9	8.3	0.560
Unnamed stream 21	4.36	12.5	1.1	41.22	81.00	36.1	61.5	17.6	0.556
Unnamed stream 22	1.05	27.0	2.9	41.23	80.99	36.3	40.4	9.0	0.527
S.F. Eagle Creek at North Perimeter Road	22.4	35.0	0.6	41.21	81.08	36.6	67.5	7.7	0.543
Sand Creek	13.5	25.1	0.7	41.20	81.08	36.3	74.9	7.3	0.544
S.F. Eagle Creek above Sand Creek	8.26	37.5	0.4	41.23	81.09	37.1	54.7	7.5	0.545

Table 3: Wetland plant communities at the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio

[From Science Applications International Corporation, 1999. ft, feet; m, meter; spp., more than one species]

Community description	Dominant plants alliances and habitat where found (Dual entries for communities comprising two alliances)	
Permanently flooded temperate or subpolar hydromorphic rooted vegetation	Spatterdock (<i>Nuphar lutea</i>) - White water lily (<i>Nymphaea odorata</i>) permanently flooded herbaceous alliance—shallow areas of lakes and ponds where depths are 0.5 m or less.	Pondweeds (<i>Potamogeton</i> spp.) - Hornworts (<i>Ceratophyllum</i> spp.) - Waterweeds (<i>Elodea</i> spp.) permanently flooded herbaceous alliance—areas of open water where depths are 6 ft or less.
Seasonally flooded temperate or subpolar grassland	Reed canary grass (<i>Phalaris arundinacea</i>) seasonally flooded herbaceous alliance—cleared areas of floodplains on mineral soils (Anderson, 1982).	Cattails (<i>Typha</i> spp.)- Bulrushes (<i>Scirpus</i> spp.)- Rushes (<i>Juncus</i> spp.) seasonally flooded herbaceous alliance—wet shores and shallow areas of open water.
Semipermanent flooded temperate or subpolar grassland	Cattails (<i>Typha angustifolia</i> , <i>T. latifolia</i>) - Bulrushes (<i>Scirpus</i> spp.) semipermanently flooded herbaceous alliance—a cattail marsh common to pond edges, ditches, and shallow depressions.	
Intermittently flooded temperate perennial forb vegetation	Intermittently flooded early successional herbaceous field—A transitional community often colonized by sedges (<i>Carex</i> spp.), rushes (<i>Juncus</i> spp.), and bulrushes (<i>Scirpus</i> spp.) in low areas and areas that are sometimes disturbed by mowing and vehicle movement (inundated tire or track ruts).	
Intermittently flooded mid-successional cold-deciduous shrubland	Similar to the dry midsuccessional cold-deciduous shrubland community with the exception of hydrophytic species present in depressional areas. Shrub and tree species include willows (<i>Salix nigra</i> and <i>S. discolor</i>), silky dogwood (<i>Cornus amomum</i>), eastern cottonwood (<i>Populus deltoides</i>) and quaking aspen (<i>P. tremuloides</i>).	Young stages of pioneering trees less than 21 ft in height, including red maple (<i>Acer rubrum</i>), eastern cottonwood (<i>Populus deltoides</i>), quaking aspen (<i>P. tremuloides</i>), and green ash (<i>Fraxinus pennsylvanica</i>), dominate this transition from wet field to shrub thicket
Semipermanent flooded cold-deciduous shrubland	Buttonbush (<i>Cephalanthus occidentalis</i>) semipermanent flooded shrubland alliance—dominant woody species include buttonbush (<i>Cephalanthus occidentalis</i>), winterberry (<i>Ilex verticillata</i>), swamp rose (<i>Rosa palustris</i>), common elder (<i>Sambucus canadensis</i>), northern arrowwood (<i>Viburnum recognitum</i>), willows (<i>Salix</i> spp.), and dogwoods (<i>Cornus</i> spp.) often found growing in shallow-water areas such as ponds, depressions, and flood plains.	
Saturated cold-deciduous shrubland	Dogwoods (<i>Cornus</i> spp.) - Willows (<i>Salix</i> spp.) saturated shrubland alliance—dominant woody species include dogwoods (<i>Cornus</i> spp.), in particular silky dogwood (<i>Cornus amomum</i>), pussy willow (<i>Salix discolor</i>), black willow (<i>S. nigra</i>), swamp rose (<i>Rosa palustris</i>), meadow-sweet (<i>Spiraea alba</i>), common elder (<i>Sambucus canadensis</i>), northern arrowwood (<i>Viburnum recognitum</i>); habitat varies from the edges of open water to beaver dams, swales, ditches, and depressions in fields and forests.	
Temporarily flooded cold-deciduous forest	Green ash (<i>Fraxinus pennsylvanica</i>) - American elm (<i>Ulmus americana</i>) - Hackberry (<i>Celtis occidentalis</i>) temporarily flooded forest alliance—associated with the floodplains of rivers and streams.	Black willow (<i>Salix nigra</i>) in a temporarily flooded forest alliance is associated with the flood plains of streams.
Seasonally flooded cold-deciduous forest	Red maple (<i>Acer rubrum</i>) - Green ash (<i>Fraxinus pennsylvanica</i>) seasonally flooded forest alliance—indicator species include red maple (<i>Acer rubrum</i>), green ash (<i>Fraxinus pennsylvanica</i>), American elm (<i>Ulmus americana</i>), pin oak (<i>Quercus palustris</i>), swamp white oak (<i>Quercus bicolor</i>), and quaking aspen (<i>P. tremuloides</i>) growing in areas subject to flooding.	Pin oak (<i>Quercus palustris</i>) - Swamp white oak (<i>Quercus bicolor</i>) seasonally flooded forest alliance—pin oak (<i>Quercus palustris</i>), swamp white oak (<i>Quercus bicolor</i>), and red maple (<i>Acer rubrum</i>) are the dominant species tolerant of seasonal saturation and inundation. Vernal pools are often present in the spring and early summer.

Table 4: Known habitat of rare plants and animals identified at the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio (Timothy M. Morgan, Ohio Army National Guard, written commun., 2001; Eric H. Metzler, Eric H. Metzler Research Associates, written commun., 2002)

[ft, feet]

Common name (Scientific name)	State status	Habitat
Plants		
Ovate spikerush (<i>Eleocharis ovata</i>)	Endangered	Open, moist and muddy areas.
Lurking leskea (<i>Plagiothecium latebricola</i>)	Endangered	Northern hardwood lowland swamps.
Simple willow-herb (<i>Epilobium strictum</i>)	Threatened	Semi-open wetland.
Pale sedge (<i>Carex pallescens</i>)	Threatened	Moist, open and somewhat disturbed sites; woodland clearings; wet woods borders; meadows; shrub borders of swamps and bogs; ditches
Gray birch (<i>Betula populifolia</i>)	Potentially Threatened	Infertile, rocky or sandy, dry to wet soils.
Round-leaved sundew (<i>Drosera rotundifolia</i>)	Potentially Threatened	Sphagnum hummocks in bogs and fens; wet sand.
Closed gentian (<i>Gentiana clausa</i>)	Potentially Threatened	Moist areas in partial shade.
Butternut (<i>Juglans cinerea</i>)	Potentially Threatened	Rich, moist soils in swamps or mixed hardwoods.
Northern rose azalea (<i>Rhododendron nudiflorum</i> var. <i>roseum</i>)	Potentially Threatened	Varied areas on acidic soils, in the open or shade.
Large cranberry (<i>Vaccinium macrocarpon</i>)	Potentially Threatened	Sphagnum hummocks in bogs and swamps, wet sand having acidic properties.
Hobblebush (<i>Vaccinium alnifolium</i>)	Potentially Threatened	Woods near swamps, stream banks, dense, shaded hemlock woods and ravines, moist, well drained soils.
Long beech-fern (<i>Phegopteris connectilis</i>)	Potentially Threatened	Acidic soils or rocks in full shade, seeps on a cliff.
Woodland horsetail (<i>Equisetum sylvaticum</i>)	Potentially Threatened	A variety of wet habitat in semi-shade areas.
Weak sedge (<i>Carex debilis</i> var. <i>debilis</i>)	Potentially Threatened	Upland forest communities with oak and beech
Straw sedge (<i>Carex straminea</i>)	Potentially Threatened	Moist habitat in shade or semi-shade.
Water avens (<i>Geum rivale</i>)	Potentially Threatened	Swamps and wet meadows, wooded margins.
Tall St. John's wort (<i>Hypericum majus</i>)	Potentially Threatened	Sand or muck shores of lakes and streams.
Swamp oats (<i>Sphenophilis pensylvanica</i>)	Potentially Threatened	Wet areas in full sun.

Table 4: Known habitat of rare plants and animals identified at the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio (Timothy M. Morgan, Ohio Army National Guard, written commun., 2001; Eric H. Metzler, Eric H. Metzler Research Associates, written commun., 2002)—Continued

[ft, feet]

Common name (Scientific name)	State status	Habitat
Shining ladies'-tresses (<i>Spiranthes ludica</i>)	Potentially Threatened	Calcareous soils in wet areas, often in wet pasture.
Blunt mountain-mint (<i>Pycnanthemum muticum</i>)	Monitored without status	Open grasslands.
Bryophyte: Mosses and liverworts (<i>Philonotis fontana</i> var. <i>caespitosa</i>)	Monitored without status	Bogs.
Bryophyte: Mosses and liverworts (<i>Pohlia elongata</i> var. <i>elongata</i>)	Monitored without status	Wet habitats.
Birds		
Northern harrier (<i>Circus cyaneus</i>)	Endangered	Hunts in the fall and winter over marshes, cropland, and rough pasture.
Common barn-owl (<i>Tyto alba</i>)	Endangered	Hunts open woodland, old fields, peat bogs, and moors.
Yellow-bellied sapsucker (<i>Sphyrapicus varius</i>)	Endangered	Woodlands, aspen groves, also uses orchards and other trees.
American bittern (<i>Botaurus lentiginosus</i>)	Endangered	Marshes, lakes with cattail colonies or reeds.
Least bittern (<i>Ixobrychus exilis</i>)	Endangered	Early successional marshes, ponds with cattails or reeds.
Little blue heron (<i>Egretta caerulea</i>)	Endangered	Marshes and swamps, rice fields, ponds, and lake shores.
Osprey (<i>Pandion haliaetus</i>)	Endangered	Rivers, lakes, and coastal areas.
Trumpeter swan (<i>Cygnus buccinator</i>)	Endangered	Large lakes, rivers, and marshes; also frequents grain fields in search of food.
Canada warbler (<i>Wilsonia canadensis</i>)	Endangered	Well-developed shrub layers (providing high densities of foliage 2 to 12 ft above the ground) and minimal ground cover below. Moist sites, especially those with sphagnum moss, are preferred.
Hermit thrush (<i>Catharus guttatus</i>)	Endangered	Young to mature forests with internal forest edges found near openings, including ponds, meadows, or small man-made clearings; winter habitats include a dense cover of woody plants near insect populations and berry-producing vegetation; open water is needed in the winter habitat.
Northern waterthrush (<i>Seiurus noveboracensis</i>)	Endangered	Wooded swamps with shaded areas, bog thickets, lake margins, river borders of willow and alder.
Winter wren (<i>Troglodytes troglodytes</i>)	Endangered	Woodland areas with thick underbrush, conifer stands in the winter.
Golden-winged warbler (<i>Vermivora chrysoptera</i>)	Endangered	Deciduous woodland in swampy areas; woodland edges with thick undergrowth; overgrown pastures; abandoned farmland; powerline rights-of-way; recently logged sites; bogs; and, forest openings.

Table 4: Known habitat of rare plants and animals identified at the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio (Timothy M. Morgan, Ohio Army National Guard, written commun., 2001; Eric H. Metzler, Eric H. Metzler Research Associates, written commun., 2002)—Continued

[ft, feet]

Common name (Scientific name)	State status	Habitat
Dark-eyed junco (<i>Junco hyemalis</i>)	Endangered	Juncos breed in open woodlands and forest edges. Nest is usually placed against a tree or shrub or a tuft of plants.
Magnolia warbler (<i>Dendroica magnolia</i>)	Endangered	Breeds in bogs, clearings, and woodland edges in conifers. Nest is found on a branch or near the trunk of a tree, 1-15 ft high.
Sora (<i>Porzana carolina</i>)	Special Interest	Swamp borders.
Virginia rail (<i>Rallus limicola</i>)	Special Interest	Marshes and wetlands: habitat includes shallow water with an emergent cover of cattails and bulrushes to support high numbers of aquatic macroinvertebrates.
Sharp-shinned hawk (<i>Accipiter striatus</i>)	Special Interest	Coniferous forests adjacent to other forest stands, mixed or patchy forests rather than large continuous stands of conifers; nesting usually in dense stands of trees with a well developed canopy.
Red-shouldered hawk (<i>Buteo lineatus</i>)	Special Interest	Nests in deciduous forests and swamps, prefers wet woodland areas and often perches on the top of dead trees in order to have an unimpeded view of the forest floor.
Henlow's sparrow (<i>Ammodramus henslowii</i>)	Special Interest	Uses grassland habitats with tall, dense grass and herbaceous vegetation; hay fields, pastures, wet meadows. Nests are typically constructed on or near to the ground.
Cerulean warbler (<i>Dendroica cerulea</i>)	Special Interest	Mature deciduous forests growing on floodplains or other mesic areas with large, mature trees and closed or semi-open canopies; nests are located on branches at considerable distances from both the ground and the trunk.
Common moorhen (<i>Gallinula chloropus</i>)	Special Interest	Early successional marshes, ponds with cattails or reeds.
Solitary vireo (<i>Vireo solitarius</i>)	Monitored without status	Frequents both coniferous and deciduous woodlands, mainly in mixed forests near water. Also found along powerline rights-of-way, field margins, rural roads, and similar clearings, as well as in middle-aged, regenerating forests on dry sites.
Mammals		
Pygmy shrew (<i>Sorex hoyi</i>)	Special Interest	Habitats supporting wet and dry areas in close proximity, swamps and marshes in spring and dry areas in summer; conifer stands with ground vegetation. Also found in disturbed habitats such as regenerating forests, cultivated land, and flooded areas.
Star-nosed mole (<i>Condylura cristata</i>)	Special Interest	Inhabits moist, saturated soils near the margins of swamps, lakes and streams.
Northern river otter (<i>Lutra canadensis</i>)	Endangered	Slow-moving water with deep pools, abundant riparian vegetation, and abundant fish populations, stream habitats often provide more suitable conditions than pond, lake, and reservoir habitats.
Woodland jumping mouse (<i>Napaeozapus insignis</i>)	Special Interest	Woodlands bordering lakes, and streams.
Amphibians and reptiles		
Four-toed salamander (<i>Hemidactylium scutatum</i>)	Special Interest	Bogs and wet ravines in undisturbed or mature deciduous forests. Sometimes in regenerating woods in soggy soil and below dams of lakes.

Table 4: Known habitat of rare plants and animals identified at the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, Ohio (Timothy M. Morgan, Ohio Army National Guard, written commun., 2001; Eric H. Metzler, Eric H. Metzler Research Associates, written commun., 2002)—Continued

[ft, feet]

Common name (Scientific name)	State status	Habitat
Eastern box turtle (<i>Terrapene carolina</i>)	Special Interest	Needs intact forests, sometimes uses forest edges.
Smooth green snake (<i>Ophedrys vernalis</i>)	Monitored without status	Moist prairies, savannas, bogs, marshes, wet meadows, old fields, and vacant lots.
Fish		
Mountain brook lamprey (<i>Ichthyomyzon greeleyi</i>)	Endangered	Spawning adults need high-quality streams containing riffles with bottoms of clean sand and gravel, juveniles require lower gradient sections of same stream containing sand bars and organic matter: streams without predacious fish large enough to eat lampreys are most productive.
Insects		
Graceful underwing moth (<i>Catocala gracilis</i>)	Endangered	Occurs all over the eastern United States, from southern Quebec west to Michigan, south to Florida and west through central Texas. Most common on the East Coast. Records in Ohio are mostly in the northern one-third of State. This species requires natural settings; not found in developed or agricultural areas.
Moth (<i>Capperia evansi</i>)	Monitored without status	Found across Ohio from the northeastern to the southwestern part of the State. Requires natural settings; not found in developed or agricultural areas. Infrequently seen, but not endangered.
Moth (<i>Zanclognatha martha</i>)	Monitored without status	Occurs across eastern North America from Massachusetts south to Florida, west to Louisiana, and north to Ohio. Seems to prefer dry woodlands, often a pine-oak mixed forest growing in acid soils. Infrequently seen and not found in developed or agricultural areas. <i>Zanclognatha martha</i> and closely related species are seldom collected by conventional means.
Moth (<i>Oliga bridghami</i>)	Monitored without status	A species common to northern habitats. Northern Ohio is near the southern limit of its natural range. Ohio specimens were collected in natural areas away from agriculture and development. Not endangered.
Moth (<i>Chaetagnalea sericea</i>)	Monitored without status	Infrequently seen in Ohio, the reasons for its scarcity not known. <i>Chaetagnalea sericea</i> is distributed from Quebec west to Manitoba, from Maine south to North Carolina and west to Wisconsin.
Moth (<i>Sutyna privata</i>)	Monitored without status	A northern species that reaches its southern limit in northeastern Ohio. Ohio specimens are collected in natural areas away from agriculture and development.
Moth (<i>Homorthodes frufurata</i>)	Monitored without status	A species common to northern and western habitats. Northern Ohio is near the southern limit of its range. Infrequently seen in Ohio, most often in northeastern Ohio. Requires natural areas not developed or farmed.

APPENDIX

Descriptions of digital data layers for natural resources at the Ravenna Training and Logistics Site

APPENDIX - Descriptions of digital data layers for natural resources at the Ravenna Training and Logistics Site

Generalized Bedrock - data layer: BEDROCK

Description of DOUBLE precision coverage BEDROCK

FEATURE CLASSES	ARCS	222		
	POLYGONS	89 (Topology)		
	NODES	151		
SECONDARY FEATURES	Tics	55		
	Arc Segments	7230		
	Polygon Labels	88		
TOLERANCES	Fuzzy =	8.411 V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	478722.047	Xmax =	509352.835
	Ymin =	4549466.747	Ymax =	4571460.851
COORDINATE SYSTEM DESCRIPTION				
Projection	UTM	Zone	17	
Datum	WGS84	Units	METERS	
Spheroid	WGS84			

Abstract: This is a coverage of the general bedrock geology of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio. This data were compiled from coverages of the Bedrock Geology files of Portage and Trumbull Counties from the Ohio Department of Natural Resources (ODNR) (Theme ID's 2207 and 1964).

Keywords: Bedrock, Geology, Ravenna, Portage, Trumbull.

Purpose: This map is to show the general bedrock geology of the RTLS/RVAAP. According to the ODNR metadata files, this coverage "can be used to aid land use planning, environmental analyses, etc."

Supplemental information: Additional information (original metadata) is available from ODNR's website.

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

<u>LEVEL</u>	<u>BEDROCK LAYER</u>
1	Pennsylvanian Homewood
2	Pennsylvanian Mercer
3	Pennsylvanian Connoquenessing
4	Pennsylvanian Sharon
5	Mississippian Cuyahoga
6	Mississippian Berea & Earlier

Procedures used: Coverages from ODNR website downloaded. Coverages projected from State Plane Ohio North NAD27 to UTM 17, WGS 84. A new attribute called LEVEL added to each coverage. Attribute was populated with a generalized bedrock type common in both counties. Original attribute CODE dropped from the coverages. Coverages were joined using the append command. Similar polygons were combined using the dissolve command. Combined coverage was clipped to the boundary of the drainage areas that surround the RTLS/RVAAP using the clip command.

Reference cited: ODNR.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: 125 feet.

Cloud cover: Not applicable.

Bufferstrips - data layer: BUFFSTRIPS

Description of DOUBLE precision coverage BUFFSTRIPS

FEATURE CLASSES	ARCS	94		
	POLYGONS	63 (Topology)		
	NODES	94		
SECONDARY FEATURES	Tics	12		
	Arc Segments	21169		
	Polygon Labels	87		
TOLERANCES	Fuzzy =	4.191 V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	483731.452	Xmax =	501816.102
	Ymin =	4556795.637	Ymax =	4564401.473

COORDINATE SYSTEM DESCRIPTION

Projection	UTM	Zone	17
Datum	WGS84	Units	METERS
Spheroid	WGS84		

Abstract:

This is a coverage of the suggested buffer strips for the ponds and streams of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio. Based on the STREAMS and PONDS coverages.

Keywords: Buffer, Greenstrip, Ravenna, Portage, Trumbull.

Purpose:

This data set was used for general planning and to aid in showing the locations of the suggested buffer strips within the RTLS/RVAAP.

Supplemental information:

This coverage was based on the following points: 1) streams within the RTLS/RVAAP, on average, are 50 feet wide, and 2) the buffer strips should extend 125 feet from the top of each bank or edge of pond. This resulted in many of the buffer strips being 300 feet (50 foot average width + 125 feet from top of left bank + 125 feet from top of right bank).

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information: The polygons have no specific attributes beyond the ARCINFO standard attributes.

Procedures used:

The PONDS and STREAMS coverages were appended into a temporary coverage. A buffers coverage was generated using the buffers command and a width of 150 feet. The temporary coverage was deleted, while the buffer coverage was renamed to BUFFSTRIPS. The "clean" command was used on the BUFFSTRIPS coverage to put points where any arcs intersected. All interior arcs within overlapping buffer strip areas were deleted. The remaining arcs were built as polygons to complete the coverage.

Reference cited: None.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Drainage Areas - data layer: DRAINAREAS

Description of DOUBLE precision coverage DRAINAREAS

FEATURE CLASSES	ARCS	82		
	POLYGONS	28 (Topology)		
	NODES	56		
SECONDARY FEATURES	Tics	4		
	Arc Segments	5904		
	Polygon Labels	27		
TOLERANCES	Fuzzy =	3.351 V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	483812.909	Xmax =	502109.194
	Ymin =	4556628.642	Ymax =	4566024.960

COORDINATE SYSTEM DESCRIPTION

Projection	UTM	Zone	17
Datum	WGS84	Units	METERS
Spheroid	WGS84		

Abstract:

This is a coverage of the drainage areas that contribute to or drain the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio.

Keywords: Basin, Drainage, Watershed, Ravenna, Portage, Trumbull.

Purpose:

This data set was used to estimate regression variables which were used to estimate various discharges for the main channel within the selected drainage areas. It is also for general planning and to aid in showing the locations of the major and selected drainage areas within the RTLS/RVAAP.

Supplemental information:

The drainage areas outside the RTLS/RVAAP were digitized from USGS 7.5-minute topographic quadrangle maps. Drainage areas within the RTLS/RVAAP were digitized from 1/2-meter topographical maps supplied by OHARNG.

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

<u>DANUM</u>	<u>DESCRIPTION OF DRAINAGE BASIN</u>
1	Unnamed Stream 1
2	Unnamed Stream 2
3	Unnamed Stream 3
4	Unnamed Stream 4
5	Unnamed Stream 5
6	Unnamed Stream 6
7	Unnamed Stream 7
8	Unnamed Stream 8
9	Unnamed Stream 9
10	Unnamed Stream 10
11	Unnamed Stream 11
12	Hinckley Creek
13	Unnamed Stream 12
14	Unnamed Stream 13
15	Unnamed Stream 14
16	Unnamed Stream 15
17	Unnamed Stream 16
18	Unnamed Stream 17
19	Unnamed Stream 18
20	Unnamed Stream 19
21	Ordinance Creek
22	Unnamed Stream 20
23	Unnamed Stream 21
24	Unnamed Stream 22

Drainage Areas - data layer: DRAINAREAS - Continued

<u>DANUM</u>	<u>DESCRIPTION OF DRAINAGE BASIN</u>
25	South Fork Eagle Creek at North Perimeter Road
26	Sand Creek
27	South Fork Eagle Creek above Sand Creek

Procedures used:

The drainage area boundaries outside the RTLS/RVAAP were digitized from USGS 7.5-minute topographic quadrangle maps projected to UTM 17, WGS 84 system. The drainage areas within the RTLS/RVAAP were digitized from a 1/2-meter topographical map supplied by OHARNG.

Reference cited: OHARNG.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Generalized Groundwater Resources- data layer: FLOODPLAIN

Description of DOUBLE precision coverage FLOODPLAIN

FEATURE CLASSES	ARCS	49		
	POLYGONS	50 (Topology)		
	NODES	47		
SECONDARY FEATURES	Tics	25		
	Arc Segments	889		
	Polygon Labels	0		
TOLERANCES	Fuzzy =	5.563 V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	487034.283	Xmax =	501142.203
	Ymin =	4556823.904	Ymax =	4565684.495

COORDINATE SYSTEM DESCRIPTION

Projection	UTM	Zone	17
Datum	WGS84	Units	METERS
Spheroid	WGS84		

Abstract: This is a coverage of the FEMA delineated 100-year floodplains in the area in and around the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio. This data was compiled from coverages of the Flood Hazard Areas files of Portage and Trumbull Counties from the Ohio Department of Natural Resources (Theme ID's 2205 and 1962).

Keywords: Groundwater, Ravenna, Portage, Trumbull.

Purpose: This map is to show the FEMA delineated 100-year floodplains in the area in and around the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio.

Supplemental information: Additional information (original metadata) is available from ODNR's website.

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

The polygons have no specific attributes beyond the ARCINFO standard attributes.

Procedures used: The coverages were downloaded from the ODNR website and projected from State Plane Ohio North NAD27 to UTM 17, WGS 84 coordinate system. The two coverages were joined using the append command. Similar polygons were combined using the dissolve command. The combined coverage was clipped to the boundary of the drainage areas that surround the RTLS/RVAAP using the clip command.

Reference cited: ODNR.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Generalized Groundwater Resources- data layer: GROUNDWATER

Description of DOUBLE precision coverage GROUNDWATER

FEATURE CLASSES	ARCS	31		
	POLYGONS	10 (Topology)		
	NODES	24		
SECONDARY FEATURES	Tics	48		
	Arc Segments	5040		
	Polygon Labels	11		
TOLERANCES	Fuzzy =	8.411 V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	478722.047	Xmax =	509352.835
	Ymin =	4549466.747	Ymax =	4571460.851

COORDINATE SYSTEM DESCRIPTION

Projection	UTM	Zone	17
Datum	WGS84	Units	METERS
Spheroid	WGS84		

Abstract: This is a coverage of generalized groundwater resources of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio. These data were compiled from coverages of the Groundwater Resources of Portage and Trumbull Counties from the Ohio Department of Natural Resources (Theme ID's 2199 and 1965).

Keywords: Groundwater, Ravenna, Portage, Trumbull.

Purpose: This map is to show the generalized sustained yields of the RTLS/RVAAP. According to the ODNR metadata files, this coverage "can be used to aid land use planning, environmental analyses, etc."

Supplemental information: Additional information (original metadata) is available from ODNR's website.

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

<u>YIELD</u>	<u>DISCHARGE RATE (GALLONS PER MINUTE)</u>
3	25-100
4	25-3
5	<3

Procedures used: Coverages from ODNR website downloaded. Coverages projected from State Plane Ohio North NAD27 to UTM 17, WGS 84. New attribute called YIELD added to coverages. This attribute was populated with a generalized groundwater yield common in both counties. Original attributes OCAPCODE and GWR-CDE dropped from the coverages. Coverages were joined using the append command. Similar polygons were combined using the dissolve command. The combined coverage was clipped to the drainage areas that surround the RTLS/RVAAP.

Reference cited: ODNR.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Land Cover - data layer: LANDCOVER

Description of DOUBLE precision coverage LANDCOVER

FEATURE CLASSES	ARCS	51488		
	POLYGONS	24187 (Topology)		
	NODES	32704		
SECONDARY FEATURES	Tics	8		
	Arc Segments	204539		
	Polygon Labels	24186		
TOLERANCES	Fuzzy =	7.473 V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	478722.047	Xmax =	509352.835
	Ymin =	4549466.747	Ymax =	4571460.851

COORDINATE SYSTEM DESCRIPTION

Projection	UTM	Zone	17
Datum	WGS84	Units	METERS
Spheroid	WGS84		

Abstract: This is a coverage of the land cover types of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio. These data were compiled from coverages of the 1994 Land Cover of Portage and Trumbull Counties from the Ohio Department of Natural Resources (Theme ID's 1911 and 1975).

Keywords: Landcover, Ravenna, Portage, Trumbull.

Purpose: This map is to show the land cover types of the RTLS/RVAAP.

Supplemental information: The original data was produced by ODNR for NASA's Land Cover and Land Use Change Program as part of the U.S. Global Change Research Program from Landsat Thematic Mapper Data. Additional information (original metadata) is available from ODNR's website.

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

<u>YIELD</u>	<u>DISCHARGE RATE (GALLONS PER MINUTE)</u>
3	25-100
4	25-3
5	<3

Procedures used: Coverages from ODNR website downloaded. Coverages were projected from State Plane Ohio North NAD27 to UTM 17, WGS 84. The two coverages were joined using the append command. Similar polygons were combined using the dissolve command. The combined coverage was clipped to the boundary of the drainage areas that surround the RTLS/RVAAP using the clip command.

Reference cited: ODNR.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Land Slope - data layer: LANDSLOPE
Description of DOUBLE precision coverage LANDSLOPE

FEATURE CLASSES	ARCS	120192		
	POLYGONS	58822 (Topology)		
	NODES	61472		
SECONDARY FEATURES	Tics	4		
	Arc Segments	151487		
	Polygon Labels	58821		
TOLERANCES	Fuzzy =	3.087 V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	478722.719	Xmax =	509312.075
	Ymin =	4549609.893	Ymax =	4571488.214

COORDINATE SYSTEM DESCRIPTION			
Projection	UTM	Zone	17
Datum	WGS84	Units	METERS
Spheroid	WGS84		

Abstract:
This is a cover of the land slope (in percent) of the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio. These data were developed from digital line graphs of USGS 7.5-minute topographic quadrangle maps. The ASPECT attribute was stripped so that the slopes could be aggregated into discrete bins.

Keywords: Slope, Landslope, Ravenna, Portage, Trumbull.

Purpose:
This map is to show the slope of the area in and around the RLTS/RVAAP. This map may be used to help identify areas that have a higher risk of erosion (in conjunction with other data sets such as soil types).

Supplemental information:
This map was generated from the following USGS 7.5-minute topographic quadrangle maps (in digital line graph format): Mantua, Garrettsville, Southington, Kent, Ravenna, Windham, Newton Falls, Atwater, Deerfield, and Lake Milton. These DLG's were obtained from the Ohio Geographically Referenced Information Program (OGRIP).

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:	
DEGREE_SLOPE	DESCRIPTION
0	Landslope = 0%
1	0% < Landslope <= 1%
2	1% < Landslope <= 2%
3	2% < Landslope <= 3%
4	3% < Landslope <= 4%
5	4% < Landslope <= 5%
6	5% < Landslope <= 6%
7	6% < Landslope <= 7%
8	7% < Landslope <= 8%
9	8% < Landslope <= 9%
10	9% < Landslope <= 10%

Procedures used:
Coverages from OGRIP website downloaded. Coverages were projected from UTM Zone17, NAD27 into UTM 17, WGS 84. A tin was generated based upon the topographic lines and the elevation data. The tin was converted to a polygon coverage with ASPECT and DEGREE_SLOPE as the attributes. ASPECT was attribute dropped and the slopes were aggregated into discrete bins to simplify visual interpretation of the data. Polygons with identical attributes were combined using the dissolve command. The coverage was then clipped to the drainage areas surrounding the RLTS/RVAAP.

Reference cited: None.

Notes: None.

Land Slope - data layer: LANDSLOPE - Continued

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Ponds - data layer: PONDS

Description of DOUBLE precision coverage PONDS

FEATURE CLASSES	ARCS	130		
	POLYGONS	95 (Topology)		
	NODES	130		
SECONDARY FEATURES	Tics	8		
	Arc Segments	1738		
TOLERANCES	Fuzzy =	3.148 V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	484285.014	Xmax =	501621.393
	Ymin =	4557686.316	Ymax =	4564287.798

COORDINATE SYSTEM DESCRIPTION

Projection	UTM	Zone	17
Datum	WGS84	Units	METERS
Spheroid	WGS84		

Abstract:

This is a coverage of the ponds and wetlands within the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio. These data were created by digitizing open water bodies visible from USGS digital ortho quarter quadrangle aerial photography.

Keywords: Ponds, Wetlands, Water, Ravenna, Portage, Trumbull.

Purpose:

This data set is not meant as a legal delineation of ponds or wetlands. It is for general planning and to aid in showing the locations of the major water features within the RTLS/RVAAP.

Supplemental information:

The ponds and wetlands were digitized based upon USGS DOQQ aerial photographs taken in 1994. Only the water bodies visible in the photographs were digitized - no attempt was made to find water bodies hidden beneath the vegetation. Digitized water bodies not field checked. Many of the small ponds and wetlands are due to beaver activity. The dams are continually being built and destroyed, with the locations changing as well.

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

The polygons have no specific attributes beyond the ARCINFO standard attributes.

Procedures used:

The ponds were digitized from DOQQ aerial photos in UTM 17, WGS 84 coordinate system.

Reference cited: None.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Sampling Sites - data layer: SAMPSITES

Description of DOUBLE precision coverage SAMPSITES

FEATURE CLASSES	POINTS	9		
SECONDARY FEATURES	Tics	4		
TOLERANCES	Fuzzy =	2.356V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	488268.262	Xmax =	501730.175
	Ymin =	4556842.937	Ymax =	4580400.581
COORDINATE SYSTEM DESCRIPTION				
Projection	UTM	Zone	17	
Datum	WGS84	Units	METERS	
Spheroid	WGS84			

Abstract:

This is a coverage of the suggested sampling sites for the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio. Based on the STREAMS and PONDS coverages. Each site will include biological, chemical, and sediment sampling.

Keywords: Sites, Sampling, Ravenna, Portage, Trumbull.

Purpose:

This data set was used for general planning and to aid in showing the locations of the suggested sampling sites within the RTLS/RVAAP.

Supplemental information:

None.

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

The polygons have no specific attributes beyond the ARCINFO standard attributes.

Procedures used:

The SAMPSITES coverage was generated by visually digitizing the suggested approximate sampling-site locations. This was performed while looking at the RTLS/RVAAP boundary, road, and railroad coverages supplied by OHARNG and the STREAMS coverage generated by the USGS.

Reference cited: None.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Generalized Soil Types- data layer: SOILTYPE

Description of DOUBLE precision coverage SOILTYPE

FEATURE CLASSES	ARCS	2837		
	POLYGONS	1036 (Topology)		
	NODES	1950		
SECONDARY FEATURES	Tics	20		
	Arc Segments	124491		
	Nodes	1035		
TOLERANCES	Fuzzy =	52.694 V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	169664.966	Xmax =	540665.771
	Ymin =	4251683.537	Ymax =	4647528.114

COORDINATE SYSTEM DESCRIPTION

Projection	UTM	Zone	17
Datum	WGS84	Units	METERS
Spheroid	WGS84		

Abstract:

This is a coverage of the generalized soil types of the area surrounding the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio. This coverage was obtained directly from the U.S. Department of Agriculture's State Soil Geographic Data Base (STATSGO).

Keywords: Soils, Ravenna, Portage, Trumbull.

Purpose: This data set was meant for general planning and locational purposes.

Supplemental information: Additional information is available in the STATSGO Data Use Information and Data Use Guides (1991).

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

MUID	GENERALIZED SOIL TYPE
OH115	WESTMORELAND-GUERNSEY-DEKALB (OH115)
OH116	GILPIN-WEIKERT-ERNEST (OH116)
OH117	COSHOCTON-HAZLETON-WESTMORELAND (OH117)
OH118	LOWELL-WESTMORELAND-WELLSTON (OH118)
OH120	MORRISTOWN-LOWELL-WESTMORELAND (OH120)
OH122	WESTMORELAND-GILPIN-RIGLEY (OH122)
OH124	UPSHUR-GILPIN-WESTMORELAND (OH124)
OH126	MAHONING-ELLSWORTH-URBAN LAND (OH126)
OH127	CARDINGTON-BENNINGTON-SLOAN (OH127)
OH128	WOOSTER-LOUDONVILLE-CANFIELD (OH128)
OH129	KIBBIE-COLWOOD-BIXLER (OH129)
OH131	MORRISTOWN-RAVENNA-CANFIELD (OH131)
OH132	URBAN LAND-MONONGAHELA-RAINSBORO (OH132)
OH133	URBAN LAND-HUNTINGTON-ELKINSVILLE (OH133)
OH134	GLYNWOOD-BLOUNT-GENESEE (OH134)
OH135	MORLEY-MILTON-RITCHEY (OH135)
OH136	MITIWANGA-URBAN LAND-MAHONING (OH136)
OH137	GILPIN-WESTMORELAND-ZANESVILLE (OH137)
OH138	ZANESVILLE-WESTMORELAND-GLENFORD (OH138)
OH139	GUERNSEY-VANDALIA-ELBA (OH139)
OH140	ELKINSVILLE-WEINBACH-NOLIN (OH140)
OH141	CIDERMILL-LAKIN-CONOTTON (OH141)
OH142	MENTOR-WATERTOWN-HUNTINGTON (OH142)
OH143	UPSHUR-WESTGATE-GILPIN (OH143)
OH144	GUERNSEY-UPSHUR-GILPIN (OH144)
OH145	LOWELL-BARKCAMP-ENOCH (OH145)
OH146	MORRISTOWN-GILPIN-LOWELL (OH146)
OH147	ELBA-GUERNSEY-BERKS (OH147)

Generalized Soil Types - data layer: SOILTYPE - Continued

<u>MUID</u>	<u>GENERALIZED SOIL TYPE</u>
OH148	BERKS-ZANESVILLE-VANDALIA (OH148)
OH149	VANDALIA-GUERNSEY-ELBA (OH149)
OH150	LOWELL-GILPIN-UPSHUR (OH150)
OH151	GILPIN-UPSHUR-LOWELL (OH151)
OH152	NOLIN-GENESEE-OCKLEY (OH152)
OH153	MENTOR-CHILI-CHAGRIN (OH153)
OH154	AARON-LOWELL-NICHOLSON (OH154)
OH155	GALLIA-ALLEGHENY-GILPIN (OH155)
OH156	MORRISTOWN-STEINSBURG-SHELOCTA (OH156)
OH157	FAIRPOINT-PINEGROVE-BETHESDA (OH157)
OH158	PINEGROVE-GILPIN-GUERNSEY (OH158)
OH159	LOWELL-WESTMORELAND-MORRISTOWN (OH159)
OH160	TIRO-FITCHVILLE-GLENFORD (OH160)
OH161	URBAN LAND-ELNORA-OSHTMO (OH161)
OH162	RENSSELAER-DARROCH-WHITAKER (OH162)
OH163	COOLVILLE-RARDEN-OMULGA (OH163)
OH164	NOLIN-LICKING-WILLIAMSBURG (OH164)
OH165	GILPIN-RARDEN-OMULGA (OH165)
OH166	STEINSBURG-WESTMORELAND-DEKALB (OH166)
OH167	WESTLAND-ELDEAN-BROOKSTON (OH167)
OH168	CANA-ROSSMOYNE-SHELOCTA (OH168)
OH169	CANA-MIAMIAN-CROSBY (OH169)
OH170	LURAY-KILLBUCK-GLENFORD (OH170)
OH171	CHAGRIN-OTWELL-WHEELING (OH171)
OH172	COSHOCTON-RIGLEY-HOMEWOOD (OH172)
OH173	TIOGA-CHAGRIN-MELVIN (OH173)
OH174	FITCHVILLE-SEBRING-MENTOR (OH174)
OH175	HASKINS-ARKPORT-OSHTMO (OH175)
OH176	SEBEWA-GILFORD-HOMER (OH176)

Procedures used:

A copy of the STATSGO data base was obtained. Map was generated by differentiating by generalized soil type only. Coverage projected to UTM 17, WGS 84.

Reference cited: USDA.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Streams - data layer: STREAMS

Description of DOUBLE precision coverage STREAMS

FEATURE CLASSES	ARCS	76		
	NODES	100		
SECONDARY FEATURES	Tics	4		
	Arc Segments	7080		
TOLERANCES	Fuzzy =	2.356V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	4833777.150	Xmax =	501770.405
	Ymin =	4556841.335	Ymax =	4564355.775

COORDINATE SYSTEM DESCRIPTION

Projection	UTM	Zone	17
Datum	WGS84	Units	METERS
Spheroid	WGS84		

Abstract:

This is a coverage of the major and selected smaller streams that drain the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio.

Keywords: Streams, Drainage, Water, Ravenna, Portage, Trumbull.

Purpose:

This data set was created to show the major and selected smaller streams of the RTLS/RVAAP, in Portage and Trumbull Counties, Ohio, for locational and planning purposes.

Supplemental information:

This data set show the streams from the point at which they leave the RTLS/RVAAP to either 1) the point at which they enter the RTLS/RVAAP, or 2) approximately 75% of the maximum possible length of the main channel within the drainage basin if it falls entirely within the boundary of the RTLS. The reason for limiting the main-channel length was to avoid delineating main channel to the point where it could no longer be defined in the field. The 75% cut-off resulted from the fact that streams on USGS 7.5 minute topographical quadrangle maps for the surrounding area, on the average, showed approximately 75% of the main channel length.

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

The arcs have no specific attributes beyond the ARCINFO standard attributes.

Procedures used:

The streams outside the RTLS/RVAAP were digitized from USGS 7.5-minute topographic quadrangle maps projected to UTM 17, WGS 84 system. The streams within the RTLS/RVAAP were digitized from a 1/2-meter topographic map supplied by OHARNG.

Reference cited: None.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Thalwegs- data layer: THALWEGS

Description of DOUBLE precision coverage THALWEGS

FEATURE CLASSES	ARCS	76		
	NODES	100		
SECONDARY FEATURES	Tics	4		
	Arc Segments	7080		
TOLERANCES	Fuzzy =	3.317V		
	Dangle =	0.000 N		
COVERAGE BOUNDARY	Xmin =	468595.780	Xmax =	501770.405
	Ymin =	4556841.335	Ymax =	4580461.000
COORDINATE SYSTEM DESCRIPTION				
Projection	UTM	Zone	17	
Datum	WGS84	Units	METERS	
Spheroid	WGS84			

Abstract:

This is a coverage of the major and selected smaller streams that drain into or from the Ravenna Training and Logistics Site / Ravenna Army Ammunition Plant, in Portage and Trumbull Counties, Ohio.

Keywords: Streams, Drainage, Water, Thalweg, Ravenna, Portage, Trumbull.

Purpose:

This data set was used to estimate regression variables which were used to estimate various discharges for the main channel (thalweg) within the selected drainage areas. It is also for general planning and to aid in showing the locations of the major and selected thalwegs within and contributing to the RTLS/RVAAP.

Supplemental information:

This data set show the streams from the point at which they leave the RTLS/RVAAP to the maximum possible length of the main channel within its drainage basin. Streams were extended to the uppermost portion of their respective drainage areas by following the available contours.

Limitations of data: 1:24,000. Not intended for engineering or construction.

Entity and attribute information:

The arcs have no specific attributes beyond the ARCINFO standard attributes.

Procedures used:

The streams outside the RTLS/RVAAP were digitized from USGS 7.5-minute topographic quadrangle maps projected to UTM 17, WGS 84 system. The streams within the RTLS/RVAAP were digitized from a 1/2-meter topographic map supplied by OHARNG. Streams were extended to the uppermost portion of their respective drainage areas by following the available contours.

Reference cited: None.

Notes: None.

Currentness: None.

Maintenance and update frequency: None planned.

Access constraints: None.

Data set credit (for funding): Ohio Army National Guard.

Completeness: Complete.

Vertical positional accuracy: None.

Horizontal positional accuracy: None.

Cloud cover: Not applicable.

Watershed Inventory, Ravenna Training and Logistics Site, Ohio
Open-File Report 02-495

