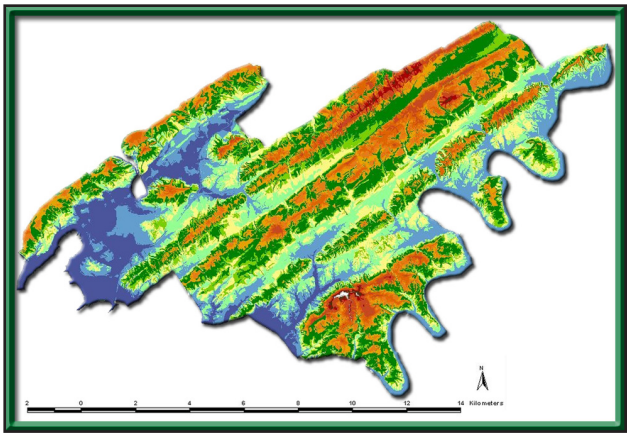
Environmental Data

from the Oak Ridge Reservation



With distortions removed, photographs taken from a low-flying airplane can accurately represent real-life conditions. This map is based on air photos of the ORR taken in 1993 and 1998. Ridge tops are shown in reds and oranges; low areas are in blues.

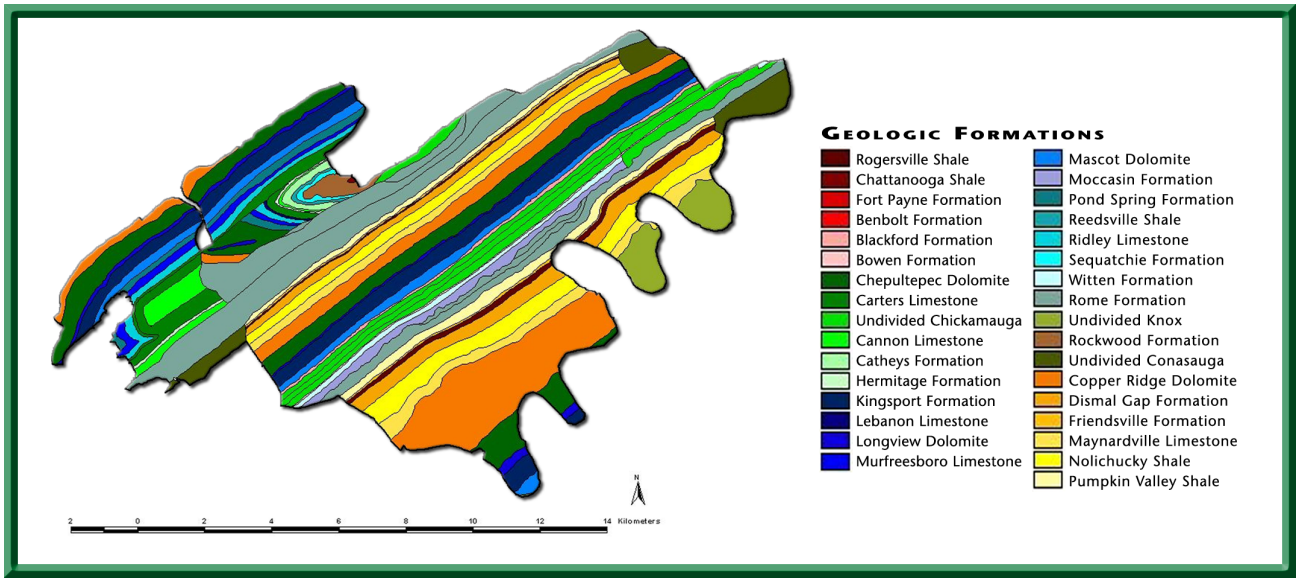
Over the past 65 years much valuable environmental data has been compiled about the U.S. Department of Energy's (DOE's) Oak Ridge Reservation (ORR). This accumulated information ranges from ecological measurements resulting from various research projects to data derived from satellite and ground-based observations. This rich library of data about the ORR covers such topics as

- wind, temperature, precipitation, and water vapor;
- atmospheric deposition and air quality;
- terrestrial habitats, vegetation, and wildlife;
- aquatic habitats and surface water (daily stream flow, stream chemistry);
- infrastructure;
- land use, land cover, soils, and topography; and
- geologic formations.

This amassed data can be used to solve complex planning and management problems.

Outdoor Research Laboratory

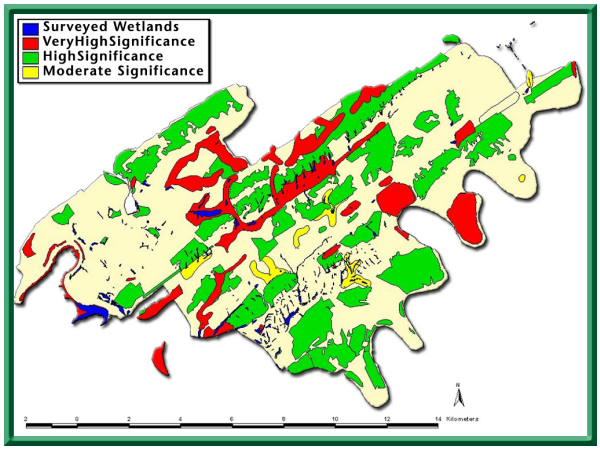
With more than 33,000 acres, the ORR is one of the few intact, forested landscapes remaining in the eastern Tennessee region. Acquired in 1942 as part of the Manhattan Project, the ORR has become an outstanding research site that is annually used by Oak Ridge National Laboratory (ORNL) and nearly 50 other research and educational institutions. More than 20,000 acres of the ORR are designated as a DOE National Environmental Research Park. Scientists use this area as an outdoor laboratory to investigate environmental issues and conduct ecosystem research.



The ORR's exposed bedrock is composed entirely of sedimentary rocks that range in age from the Early Cambrian era to the Early Mississippian era. This map was created by walking in straight lines across the ORR and recording the geological features encountered.

Geographic Information System

Much of the data collected from the ORR and its major research facilities has been incorporated into a geographic information system (GIS) that covers the ORR and surrounding counties—Anderson, Blount, Loudon, Knox, Morgan, and Roane. The GIS combines and analyzes layers of data taken from many sources and maps the results. Two or more map layers can be superimposed to produce a composite layer. By pointing at a location, object, or area on a computer screen, information about it can be retrieved from the GIS. Thus, such analysis can identify locations that have particular attributes or reveal those of a specified location.



The ORR is a refuge for rare and endangered species and offers a unique opportunity to study landscape ecology and land-management practices. Using existing data and field observations, The Nature Conservancy identified the regions of biological significance on the ORR depicted here.

ORNL's Environmental Sciences Division (ESD) maintains a GIS laboratory to compute, process, and analyze geospatial data. It can convert map lines and points to digital information; use global positioning system information to compute the latitude, longitude, and elevation of a location; make spatial measurements; and analyze digital photographs. This laboratory is a tool that can be used for environmental research and analysis as well as land management at landscape and regional levels.

Data Sources

While some of the following projects are no longer active, the information they provided contributes to the rich collection of data about the ORR:

Researchers use special instruments to collect data on the level of light along a stream in a forested area.

- Annual **surveys** provide data on ORR wildlife populations to monitor general ecosystem health.
- Many data sets about the ORR and its major research facilities are accessible through the **Environmental Data for the Oak Ridge Area** Mercury web-based data system.
- The **Walker Branch Watershed** has two intensively instrumented drainage areas. A number of experiments (e.g., the Throughfall-Displacement Experiment) and monitoring programs (e.g., the Long-Term Measurements Program) at Walker Branch provide environmental information. This data has been validated by comparing information collected from satellites to that collected in the field and from aircraft.
- The **Free Air Carbon Dioxide Enrichment** experimental site has been used to measure the responses of an intact forest ecosystem to projected future atmospheric concentrations of carbon dioxide.
- The **Biological Monitoring and Abatement Program** has created a unique long-term (more-than-25-year) database on ecological impact and recovery of streams that receive discharges from DOE facilities on the ORR.
- The Field Research Center of the **Environmental Remediation Sciences Program** contains an area used for conducting experiments on a plume of contaminated groundwater, a background area that allows comparison studies in an uncontaminated area, and ancillary structures.
- The **National Oceanic and Atmospheric Administration** maintains two meteorological towers on the ORR—one at Walker Branch and the other on Chestnut Ridge. The organization also collects climate data at other weather stations on the ORR.

For more information on the GIS lab and environmental data related to the ORR, contact Tammy Beaty, the ESD GIS facilities manager, at beatytw@ornl.gov.

For more information about the National Environmental Research Park, contact Pat Parr, the ORNL natural resources manager, at 865-576-8123 or parrpd@ornl.gov or check the park's website at http://www.esd.ornl.gov/facilities/nerp/index.html.

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