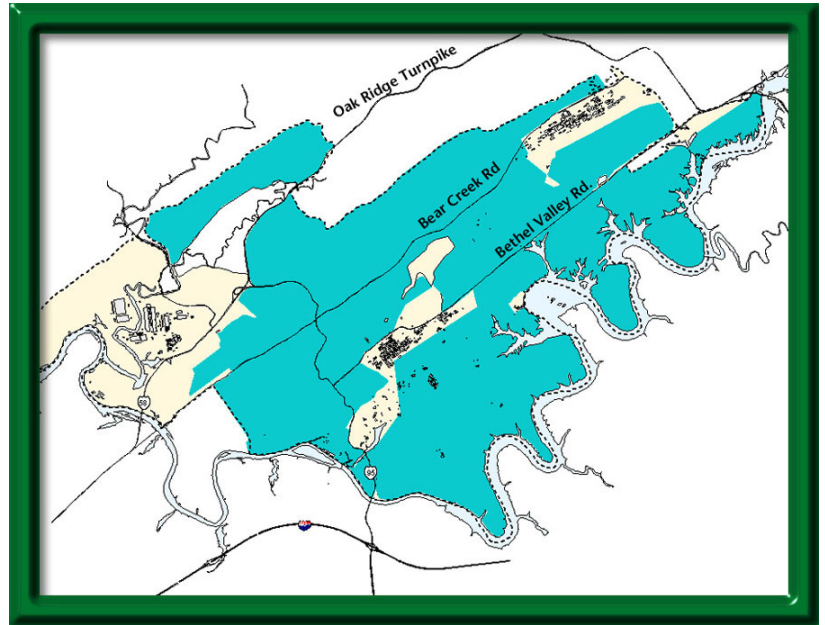


Research on the Oak Ridge Reservation

In 1980 the U.S. Department of Energy (DOE) established a National Environmental Research Park within the Oak Ridge Reservation (ORR). The 20,000-acre Research Park today serves as a giant outdoor experimental laboratory, hosting national and international programs that study the effects of energy-related activities on ecological systems and comparing these effects with natural variation. The Research Park is one of the few sites in the nation with more than 40 years of intensive, large-scale research in ecology, environmental technology, and measurement science. During the past 5 years alone, the Research Park has hosted approximately 900 users from more than 120 institutions.



The highlighted area indicates the large blocks of land available for research on the Oak Ridge Reservation.

Ecosystem Manipulation. The Research Park has made possible large-scale, long-term ecological manipulation experiments. At Walker Branch Watershed scientists have researched forest and stream ecosystems for more than 40 years. In 1993 several acres were outfitted with an elaborate system of troughs to shift rainfall from one area to another. Since then, researchers have been following biogeochemical and forest growth responses to the altered rainfall. This research constitutes the world's largest, multi-year experiment examining the response of a mature forest to rainfall changes. Several other ORR streams are the sites of manipulative experiments to investigate the limitation of primary productivity and the ecological effects of ultraviolet-B radiation. Also on the Research Park, a plantation of 50-foot sweetgum trees is exposed to various levels of carbon dioxide (CO₂) in a natural setting at the Free Air CO₂ Enrichment (FACE)

Facility. This facility allows scientists to study how increased CO₂ may affect long-term forest growth and development.



The Throughfall Displacement Experiment at Walker Branch Watershed assesses the effects of different amounts of rainfall on forests.



The Free Air CO₂ Enrichment (FACE) experiment tests critical hypotheses about the responses of sweetgum trees to the potential atmospheric CO₂ concentrations of future decades.

Atmospheric Research. The Research Park is a site in several national air pollutant research networks of the National Oceanic and Atmospheric Administration's Atmospheric Turbulence Diffusion Division (NOAA/ATDD). One ongoing research project at the

Walker Branch Watershed holds the world record for longest period of measurements of air pollutant dry deposition. The measurements began in 1984. NOAA/ATDD also has long-term observations of various wavelengths of solar radiation, part of a national solar-radiation observing network.

Ecosystem Restoration. Wildlife reintroductions and habitat improvements, restoration of native grasses and shrubs, and invasive plant management have been initiated on the Research Park. Interagency cooperative efforts have demonstrated conversion of fescue fields into native grass habitat, using fire as a tool; revegetation with native grasses and herbaceous plants of pine stands killed by southern pine bark beetle; control of exotic invasive plants and their removal from sensitive habitats; planting of native shrubs and grasses under powerlines and in riparian areas; restoration of wild turkey and osprey; and rare plant habitat management.



A prescribed burn at Freel's Bend is used as a tool to encourage the regrowth of native vegetation.

Innovative Power Conductors. Experiments on new power transmission line technology on the ORR may provide one answer to the growing demand for energy. Oak Ridge National Laboratory (ORNL) and 3M have teamed up to develop and test composite-core conductors that can increase the current-carrying capacity of a transmission line by 1.5 to 3 times over that of conductors now in use. If tests show that the new conductors perform well, they could become widely used. Their widespread adoption could lead to more efficient energy transmission and the supply of more power over existing overhead transmission lines.

Monitoring and Remediation. Studies of contaminated sites on the ORR improve the understanding of their fate and help develop the most effective approaches for cleaning them up. Findings from these long-term research and monitoring programs have significantly improved remediation of contaminated areas. Several ORR research



Biological Monitoring and Abatement Program (BMAP) staff have conducted studies since the mid-1980s to monitor changes in the ecological health of stream and river environments.

programs involve both conventional and innovative, state-of-the-art monitoring techniques. Three field facilities in one ORR waste area monitor storm-driven groundwater flow and can trace experimental injections of chemicals. In addition, several large field facilities are used for manipulative, ecosystem-level experiments to investigate biological breakdown of soil contaminants. Scientists conduct research at DOE's Natural Acceleration Bioremediation Investigation Research program Field Research Center (FRC). The FRC allows investigations of an existing plume of groundwater contaminated with metals and radionuclides and compares experiments on it with results from an uncontaminated reference area.

More detailed information on ORR research can be found on the Web at <http://www.ornl.gov/> and <http://www.esd.ornl.gov/> or by contacting Pat Parr, ORNL Area Manager, 865-576-8123; parrpd@ornl.gov.