Columbia Environmental Research Center

The USGS Columbia Environmental Research Center is located in Columbia, Missouri, with research and monitoring programs extending across our nation and other countries.

Introduction

http://www.cerc.usgs.gov/

The Columbia Environmental Research Center (CERC) provides scientific information and data for the U.S. Geological Survey (USGS) needed to address national and international environmental contaminant issues and assesses effects of habitat alterations on aquatic and terrestrial ecosystems.

The Center has a unique capability for conducting both focused and large-scale multidisciplinary research that includes, but is not limited to, large-river flood-plains, coastal habitats, wetlands, and lakes. Emphasis is on projects that integrate scientific disciplines to address complex environmental issues on large geographical scales. Scientists at CERC form partnerships with national, state and local agencies, non-government organizations and universities to enhance scientific information needed for management of the Nation's resources.

In addition to the main facility in Columbia, MO, CERC administers seven field research stations located across the Nation, and the River Studies Station located at the main facility in Columbia.

Historically, the Center was established in 1959 at the Denver Wildlife Research Center of the Fish and Wildlife Service, and was called the Fish Pesticide Research Laboratory (FPRL). In 1966, the University of Missouri deeded 33 acres to the Fish and Wildlife Service and the FPRL moved to its present location. The Center was incorporated into the USGS in 1996.

Center Organization

http://www.cerc.usgs.gov/about/about.htm

Staff at CERC have an extensive range of scientific and technical expertise. Research areas and services cover broad aspects of environmental toxicology and chemistry, ecology, ecogeography, large river ecology, and information and technology transfer. The Center's science program is organized into six branches:

Toxicology
Environmental Chemistry
Biochemistry and Physiology
Ecology
Field Station Research
Information Technology

Toxicology Branch

www.cerc.usgs.gov/about/tox_brnch.htm

Environmental toxicology scientists develop, apply, and validate methods for assessing the effects of contaminants and other environmental stressors on aquatic organisms. Research focuses on bioaccumulation and toxicity of contaminants from water, sediment, and food; the physical, chemical, and biological factors affecting these processes; and relationships between lab responses and characteristics of contaminated aquatic ecosystems.

Environmental Chemistry Branch

www.cerc.usgs.gov/brnch_webs/echem/

Environmental chemistry research encompasses all areas relating to environmental pollution, including analytical methods development, fate of environmental contaminants, development of techniques for defining bioavailability, bioconcentration potential, and determination of the toxicological significance of exposure to contaminant residues in aquatic, terrestrial, and atmospheric ecosystems.

Biochemistry and Physiology Branch

www.cerc.usgs.gov/about/bchem_brnch.htm

The Biochemistry/Physiology Branch conducts basic and applied research at the cellular, organ, and organismal levels in fish and wildlife. Emphasis is on the sublethal effects of chemicals that lead to behavioral, developmental, and population changes that may ultimately influence ecosystem health.

Research focus includes reproductive, developmental, and neurotoxic effects of stressors. The Branch develops and uses analytical techniques such as microscale assay, cell bioassay, and immunoassay, to quantitate exposure and estimate toxicity in both lab and field studies.

Field Station Research Branch

www.cerc.usgs.gov/about/frs_brnch.htm

The Field Station Research Branch specializes in ecological and toxicological research that is relevant to natural resource issues in the DOI from the Texas/Gulf Coast, Intermountain West, and Great Lakes/Great Plains regions. Research Stations are located in Corpus Christi, TX; College Station, TX; Padre Island, TX; Jackson, WY; Yankton, SD; and International Falls, MN.

Scientific expertise at the stations includes marine ecotoxicology; sediment

Fisheries biologists conduct in situ *toxicity tests to assess the biological significance of degraded water quality.*

toxicology; waterfowl and grassland bird ecology, wildlife ecology; ecotoxicology of mammals, reptiles, and amphibians; sea turtle ecology and population recovery; assessment of metals effects in native western fishes; Natural Resource Damage Assessments; agricultural irrigation drainwater assessment; and aquatic community evaluations of endangered, native, and invasive fish species.

Information Technology Branch

www.cerc.usgs.gov/about/it_brnch.htm

The Information Technology (IT) Branch performs information analysis and management; promotes science communication; develops decision support systems; and provides the technology infrastructure allowing Center staff to manage, utilize, and deliver scientific information. Functional areas within the IT Branch include computer services, data management, desktop publishing, geographic information systems, graphics design, information management, library services, outreach, statistical analysis, telecommunications, and web development.

Ecology Branch

www.cerc.usgs.gov/brnch_webs/ecology/

Ecological research focuses on understanding the effects of habitat alteration on aquatic systems caused by contamination, physical destruction, eutrophication, exotic species, and climate change. The ecological investigations are integrated with other biological, chemical, and physical science programs at CERC to provide a comprehensive understanding of habitat alteration on aquatic populations and communities.

Staff provide information and technical support for the development and use of digital databases for natural resource planning and management, and for conducting research at an ecosystem scale, which includes the Missouri River through the River Studies Station.

River Studies Station

www.cerc.usgs.gov/rss/

The primary mission of the USGS River Studies Station (RSS), located on site, is to increase the understanding of how management and restoration activities function on large river systems through an integrated science approach. River studies emphasizes how changes in the physical and chemical condition of rivers affect habitat and ecological conditions, through teams of experts in research, monitoring, and information technology.

CERC developed the RSS to improve scientific understanding of the ecological consequences of management actions on large-river ecosystems, achieved by evaluating habitat changes over temporal scales ranging from centuries to individual floods, and over spatial scales ranging from river segments to macrohabitats.

Scientists use historical approaches to evaluate baseline conditions and long-term dynamics of the channel and floodplain. Monitoring and sampling approaches are used to assess short-term dynamics and habitat affinities at the scale of river reaches. Through hydraulic habitat modeling, spatial and temporal distributions of depth and velocity in the channel and flood plain are inventoried. By varying flow duration and channel-geometry characteristics in such models, the RSS can evaluate alternative hydrographs and channel designs. The quantitative understanding of habitat availability provides a framework for biological sampling and telemetry studies to assess links between habitat and biotic responses.

The pre-development Missouri River represented one of North America's most diverse ecosystems with abundant braided channels, riparian lands, chutes, sloughs, islands, sandbars, and backwater areas.

Partners Co-Located at CERC

Big Muddy National Wildlife Refuge

The Big Muddy National Fish and Wildlife Refuge headquarters is co-located at CERC, to administer the Missouri River refuge.

Missouri Resource Assessment Partnership

MoRAP, co-located at CERC, partners with 11 government agencies and the University of Missouri. MoRAP develops and analyzes information using remote sensing technologies for natural resource inventory, monitoring, management and conservation goals.

Obtain more information on CERC research and science capabilities by contacting any of the following CERC staff:

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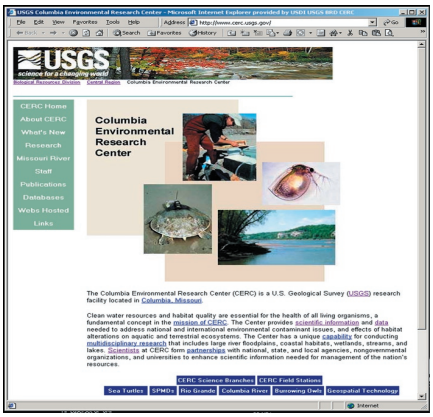

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