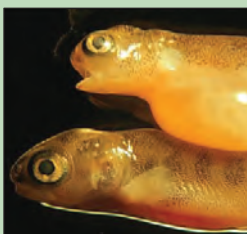


# Columbia Environmental Research Center

The U.S. Geological Survey (USGS) Columbia Environmental Research Center (CERC) performs research to solve challenging environmental problems related to contaminants and habitat alterations in aquatic and terrestrial ecosystems. The research is interdisciplinary and pursued through partnerships within the USGS and with national, international, state, and local agencies; nongovernmental organizations; and universities. Research is prioritized to provide science to the U.S. Department of the Interior and other natural resource management agencies to inform rehabilitation of degraded habitats and imperiled fish and wildlife populations.

The CERC was established in 1966 in Columbia, Missouri, as the U.S. Fish and Wildlife Service's Fish Pesticide Research Laboratory; the CERC was incorporated into the USGS in 1996. The CERC's staff of 130 includes 90 scientists of which one-half have advanced degrees in ecology, toxicology, biology, biochemistry, chemistry, hydrology, geology, and information technology.



CERC studies the effects of habitat alteration and contaminants on fish and wildlife, including freshwater mussels, amphibians, crayfish, and several species of fish, including the endangered pallid sturgeon shown above.



## CERC Science Facilities

The 33-acre center has 41,000 square feet of recently (2012) renovated laboratory space; extensive fish culture facilities; 32 research ponds; 2 deep wells providing 1,000,000 gallons per day capacity; water-conditioning and blending systems; flow-through aquaria, a mobile water chemistry laboratory, and 3 outdoor artificial streams. The CERC has modern analytical chemistry, biochemistry, physiology, ecology, and aquatic toxicology laboratories, plus field research stations in Yankton, South Dakota, and Jackson, Wyoming. The CERC has a fleet of more than 20 motorized watercraft for various sampling, telemetry, and mapping missions on large rivers. Information technology at the CERC allows scientists to manage, utilize, model, and deliver scientific information to the public.



## Basic and Applied Scientific Expertise at the CERC

**Biochemical and physiological research** addresses environmental stressor transmission through molecular, cellular, tissue, and organism levels to fish and wildlife populations. Stressors investigated include chemical contaminants, nutrient deficiencies, temperature, and invasive species. Emphasis is on how contaminants cause changes in behavior, development, and ultimately populations. The CERC scientists develop and apply molecular, genomic, biochemical and histological analyses to evaluate mechanisms of toxicity and to conduct forensic field investigations.

**Environmental chemistry research** develops and applies innovative methods to sample and analyze complex mixtures of organic and inorganic contaminants in fish and wildlife, soils, sediments, water, and air. Advanced analytical instrumentation and passive samplers are tools used to study environmental stressors, including legacy and emerging contaminants related to industrial, agricultural, military, and urban activities, such as PCBs, dioxins, pesticides, flame retardants, and toxins from harmful algal blooms.

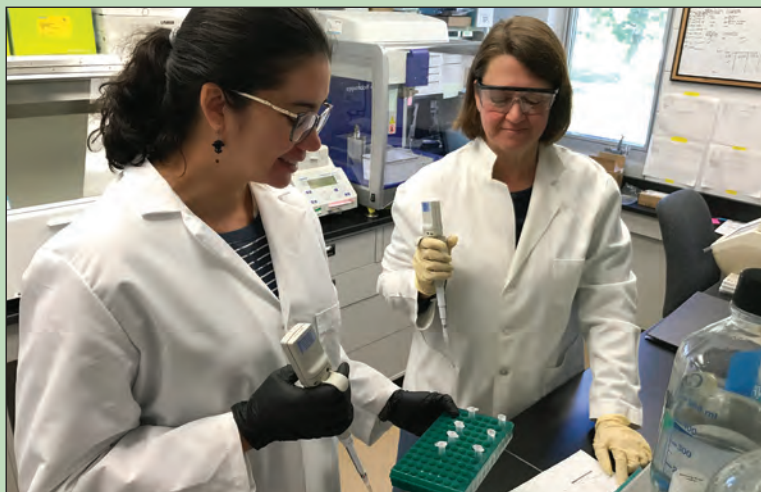
**Ecological research** evaluates organisms living in their environment. Studies address all life stages of fish and wildlife species, populations, and communities and their responses to a variety of environmental conditions and stressors including terrestrial or aquatic chemical contaminants, habitat degradation, invasive species, climate change, fire, and habitat fragmentation. Study data are used in ecological risk assessments to evaluate potential risk from chemical exposures.

**Toxicology and risk assessment research** includes development, application, and validation of methods for assessing the exposure and adverse biological effects of contaminants in aquatic ecosystems. This research emphasizes understanding rates of uptake and toxicity and how laboratory results can be applied to understanding and mitigating contaminated aquatic ecosystems. The research improves the accuracy and certainty of risk assessment and risk management of contaminants in water and sediments under Federal programs such as Superfund and the Clean Water Act.

**Integrative river research** informs ecosystem-level management of large rivers, streams, and flood-plain wetlands by providing interdisciplinary scientific understanding of riverine ecology, habitat dynamics, and effects of physical and chemical disturbances on aquatic ecosystems. The CERC research activities encompass a variety of approaches, including development of new theory, application of simulation models, field and mesocosm experimentation, and the monitoring and validation of ecological indicators. These efforts provide tools and resources needed to inform decisions about river management, with special emphasis on large, interjurisdictional rivers with multiple, often competing, management objectives.



CERC scientists using an electrofishing tow barge to evaluate floodplain habitat usage of invasive bigheaded carp.



Environmental DNA from natural waters is analyzed to inform resource managers of the presence of rare species of invasive fish and wildlife.



CERC capabilities include laboratory aquaria, large tanks, and ponds (mesocosms) for studying the health, development, toxicology, behavior, and habitat of fish and other aquatic organisms.

### Contact:

Rip S. Shively, CERC Director  
4200 New Haven Road  
Columbia, MO 65201  
573-876-1900; [rsshively@usgs.gov](mailto:rsshively@usgs.gov)

ISSN 2327-6916 (print)  
ISSN 2327-6932 (online)  
<https://doi.org/10.3133/fs20193040>