

Technology Testbeds at Savannah River National Laboratory

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SRNL Fast Facts

- > The Savannah River National Laboratory (SRNL) has a unique set of assets that can be accessed to test innovative technologies that address Department of Energy, Office of Environmental Management (DOE-EM) high priority needs.
- > Priority DOE-EM concerns include technetium-99 (Tc-99), mercury, cesium-137 and strontium-90,
- > Stream-scale Ecosystem (Tims Branch) provides a control site for studying the fate and availability of mercury in streams, sediment and biota.

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Stream-Scale Ecosystem Testbed

Local streams and wetlands are the primary point of exposure for contaminants at many industrial sites, receiving contaminants directly from outfalls and indirectly via groundwater. Stream ecosystems are complex and include many types of plants and animals and multiple trophic levels.

This Stream-scale Ecosystem Testbed (Tims Branch) is a small stream ecosystem located in A and M Areas of the Department of Energy's Savannah River Site (SRS).

Tims Branch received direct discharges of process wastewater from metallurgical operations (1950s - 1982) and of treated groundwater and non-contact cooling water (1983-present). These direct discharges contained uranium, nickel, aluminum and other metal and radionuclides. The lower portion of Tims Branch also receives discharging groundwater containing trace organic solvent contaminants.

A number of innovative treatment systems have been deployed to limit the contaminant flux to Tims Branch, including a wetland treatment system (northern tributary in 2000) and a mercury removal system that uses tin(II) reagent and air stripping (outfall tributary in 2007). Together, these treatments eliminated all local anthropogenic mercury inputs to this ecosystem. The tin-based treatment resulted in a known step function addition of inert tin oxide particles – the released tin is a potential tracer for sedimentation and particle transport processes in the stream.

Attributes

- Baseline data for flora and fauna, including trees, fish, reptiles, amphibians and mammals
- Detailed GIS coverage, including land use, vegetation, elevation, soil type, rainfall and many others
- Availability of hydrology, geochemistry, geotechnical and geophysical data
- Access to an ecosystem to conduct studies
- Some archived biota and sediment samples



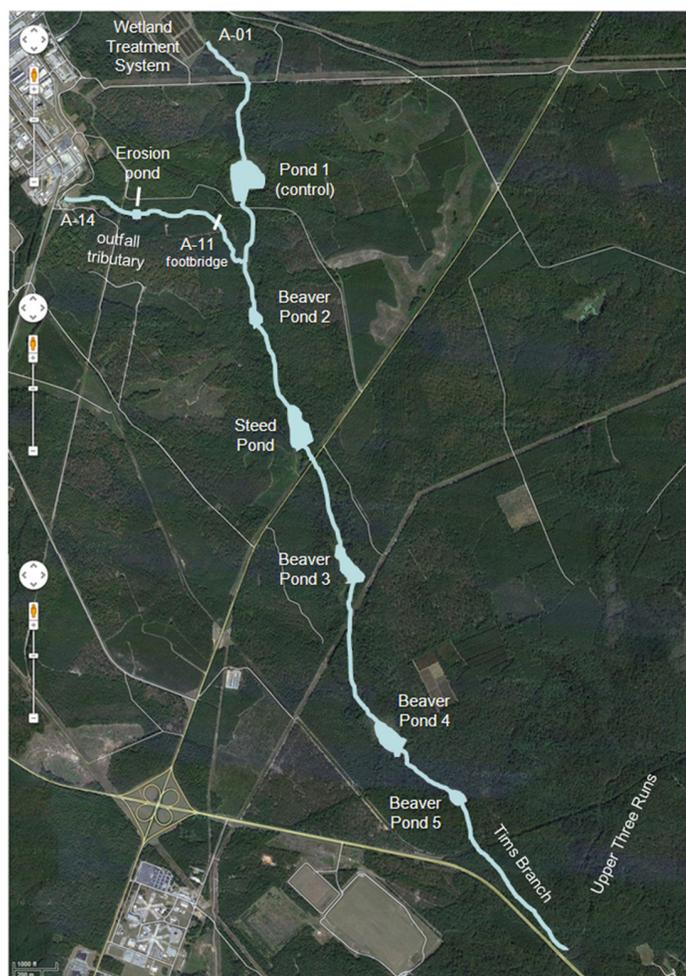
Researchers collecting aquatic and biological samples



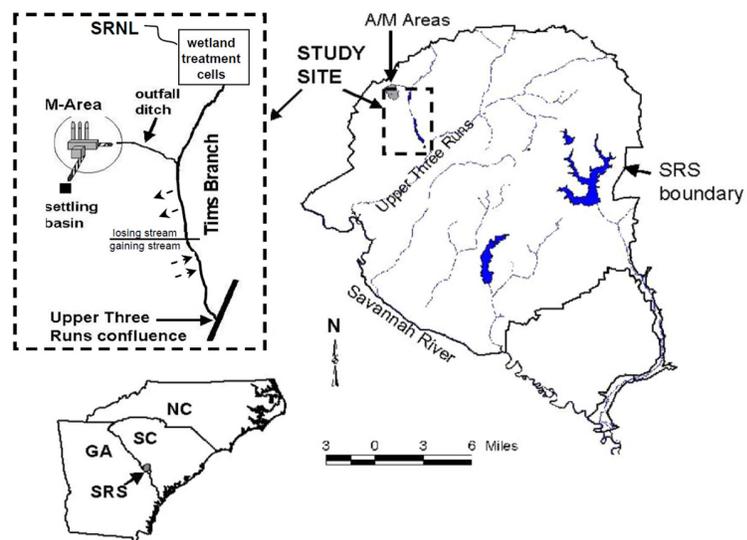
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Impact

- Ecosystem scale response and recovery after removing all local mercury sources to a stream
- Behavior (deposition, accumulation and export) of small particles (nanoparticles) released into a stream ecosystem
- Long-term monitoring strategies for streams and watersheds
- Regulatory framework that facilitates acceptance of innovative technologies



The Stream-scale Testbed involves the Tims Branch ecosystem at the Savannah River Site (SRS).



Savannah River National Laboratory
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