

Steel Creek

History....

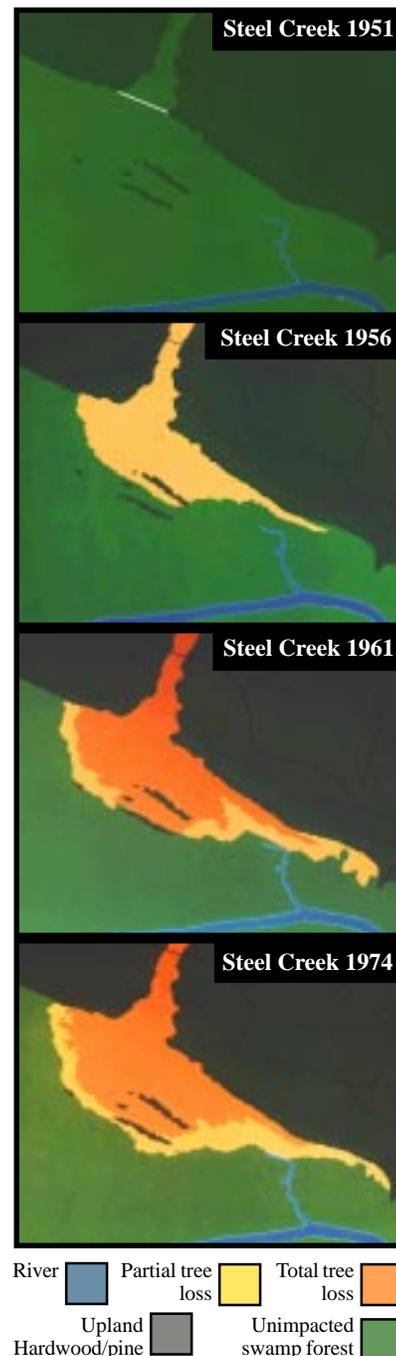
Prior to 1954, the natural flow rate of Steel Creek was approximately one cubic meter per second (m^3/sec). Steel Creek first received thermal effluents in early 1954, when P Reactor went on-line. From early 1954 until mid-1954, thermal discharges from P Reactor resulted in flow rates of $5.7 m^3/sec$, or $200 ft^3/sec$, in Steel Creek. Flow rates increased to $11.4 m^3/sec$ in mid-1954 when effluents from L Reactor also were routed into Steel Creek. Thermal discharges into Steel Creek from P and L Reactors peaked at $24 m^3/sec$ ($865 ft^3/sec$) in 1961 and then decreased in 1963 as a result of the construction of Par Pond, which subsequently received effluents from P and R Reactors. L Reactor continued discharging thermal effluents into Steel Creek at a rate of $11.3 m^3/sec$ until early 1968, when the reactor was placed on standby. Since that time, no further thermal effluents have been discharged directly into Steel Creek, although heated effluents did enter the creek

after passing through L Lake. During the period of thermal discharge, water temperatures where Steel Creek enters the Savannah River floodplain often exceeded $45^\circ C$. These high temperatures destroyed the original swamp forest and the area of tree loss was extended to the southeast as a result of flooding. Since 1968, a vegetation community dominated by early successional plant species has developed in the Steel Creek corridor and delta, but the original swamp forest has not become reestablished. As a result of reactor operations, approximately 261 curies of cesium-137 were released into Steel Creek from 1961 to 1973. Radiocesium still is confined primarily to the channel and floodplain of Steel Creek and the Savannah River because it has not migrated into the terrestrial ecosystem.

SREL Research in Steel Creek....

SREL research in Steel Creek has focused on the effects of past thermal effluents on the natural vegetation and aquatic invertebrates of the stream system, as well as on the effects of contaminants on natural communities and the distribution and movement of contaminants through this stream system. Additional studies have concentrated on use of Steel Creek by the federally endangered Wood Stork. More recent studies are examining the potential for wildlife to serve as vectors for transport of contaminants off of the SRS. Other studies are examining the movement of fish into and out of Steel Creek and the levels of radiocesium in fish that typically are harvested from the Savannah River by the public.

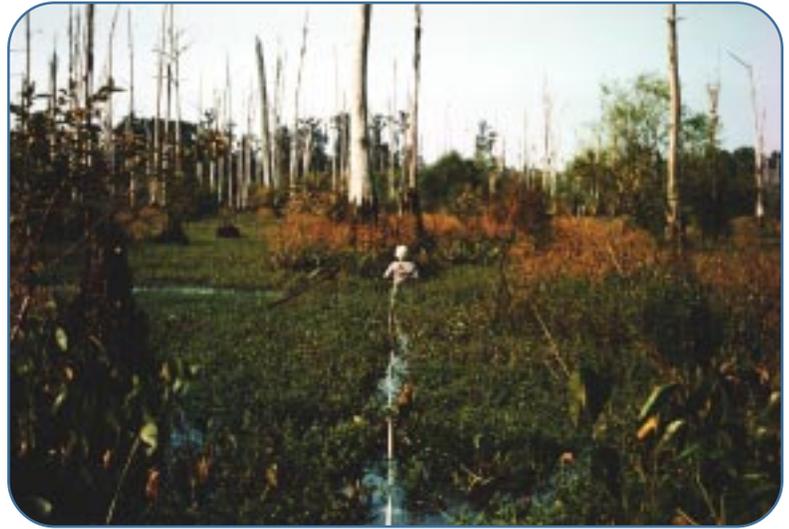
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The Steel Creek delta about six years after reactor shutdown.

Vegetation and wildlife studies

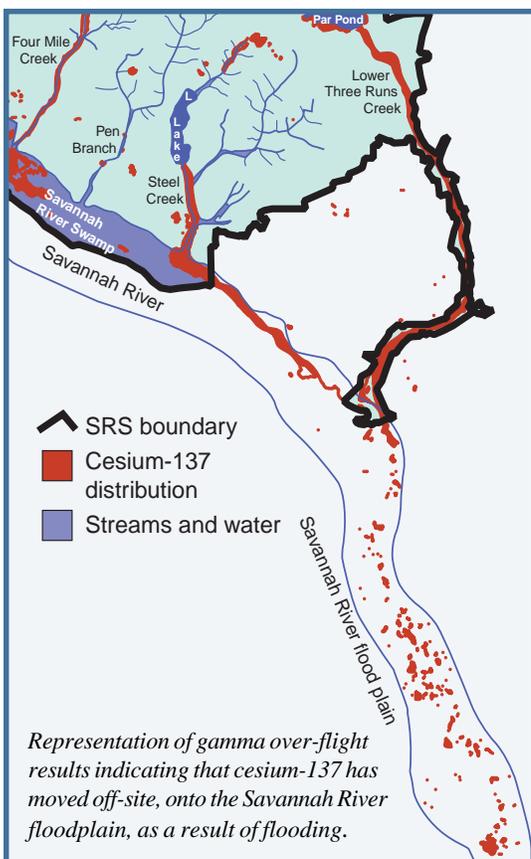
- The vegetation of Steel Creek and the delta now is dominated by early successional plant species, such as willows and shrubs, rather than the cypress and tupelos found in this region prior to thermal impacts.
- Fish communities of thermally impacted streams such as Steel Creek show elevated fish densities dominated by large numbers of a few species, particularly sunfish, some minnows, suckers, and mosquitofish, that are tolerant of conditions associated with more open canopies of willows and shrubs.
- Former reactor operations, and their effects on swamp water levels, greatly affected when, where, and how federally endangered Wood Storks foraged in the Steel Creek delta and the Savannah River swamp.
- Continued monitoring after cessation of reactor operations has shown that Wood Stork use of the Steel Creek delta and Savannah River swamp now is linked to river management and rainfall patterns; Wood Storks now forage primarily in more natural areas of the SRS, such as Carolina bays.
- Fish communities in Steel Creek have been influenced by the presence of L Lake, resulting in an increased abundance of some reservoir species, such as largemouth bass.



SREL researcher in the Steel Creek delta, late 1970's.

Contaminant studies

- Studies conducted in the 1980's found levels of radiocesium contamination in Steel Creek soils to be among the highest reported for any natural system studied at that time; relatively high radiocesium concentrations also were reported from plants and arthropods from Steel Creek.



- Radiocesium was found to desorb easily from the clays that are characteristic of Steel Creek, making this contaminant more available to biological systems in Steel Creek when compared to aquatic systems in other regions of the U.S. which also were contaminated with radiocesium. Further studies documented a high variability in radiocesium uptake by plants in Steel Creek, with uptake often varying independently of the concentration of radiocesium in soils.
- Radiocesium levels were found to be higher in the eggs of female Wood Ducks that foraged in contaminated areas of the SRS. Similarly, natural populations of vertebrates including various species of snakes, green tree frogs, herons, and game species such as Wood Ducks, which are consumed by the public, also have been documented to have higher levels of radiocesium contamination in Steel Creek than in noncontaminated regions of the Site.
- Studies over several decades have shown striking differences in the long-term rates of radiocesium decline in Steel Creek biota; contaminant burdens of animals, in general, have tended to decline much more rapidly than those of plants.
- Fish in Steel Creek have higher concentration ratios of radiocesium than fish from most other aquatic systems on the SRS, probably because of this creek's soft water and low potassium concentration.
- High populations of largemouth bass in Steel Creek represent a potential vector of contamination to the public off-site.