



# Geospatial Database to Map Mercury Concentration in East Fork Poplar Creek (EFPC) Watershed

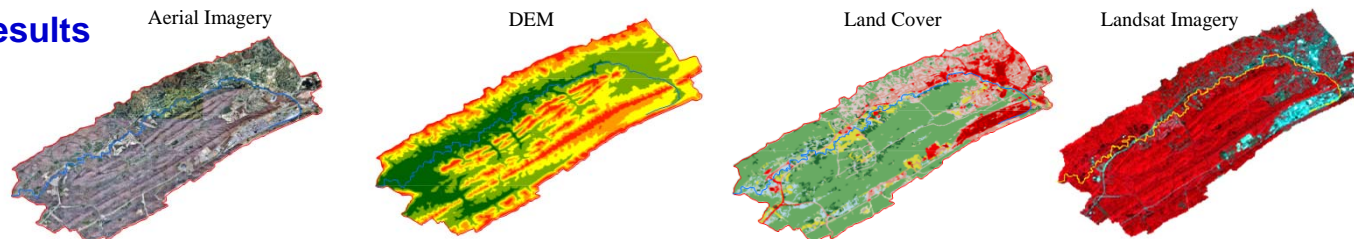


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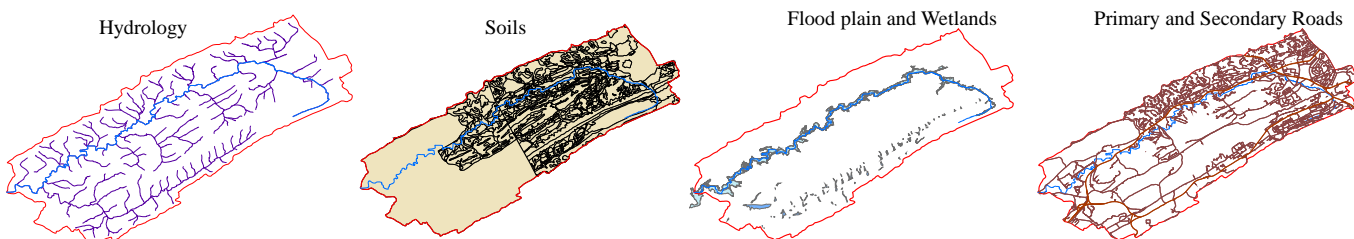
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**Abstract:** Monitoring of mercury (Hg) accumulation in fish has been conducted in East Fork Poplar Creek (EFPC) in Oak Ridge, Tennessee since 1985 under the Biological Monitoring and Abatement Program (BMAP). The bioaccumulation of Hg in EFPC fish has proven to be enigmatic over the past several years, with remedial actions at the industrial facility in the creek's headwaters successfully decreasing total Hg concentrations in water, but not resulting in commensurate decreases in fish Hg concentrations. The primary goal of this project is to develop an understanding of the spatial dynamics of Hg loading and distribution in the EFPC watershed. A comprehensive geospatial database which incorporated all the spatial and analytical data of the EFPC watershed was developed. Our spatial analysis indicated that the Hg concentrations in the fish in the lower EFPC slowly increased with time compared to the upper EFPC. Watershed scale environmental factors are being evaluated as to their influence on fish mercury trends.

## Results

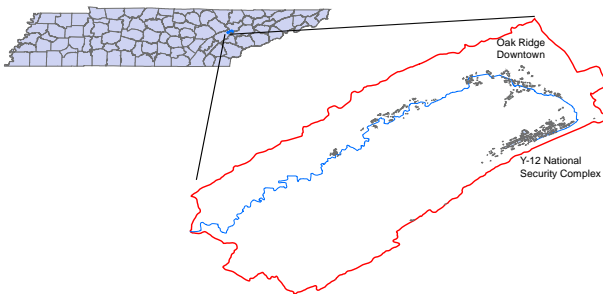


The raster layers that include the aerial imagery, Digital Elevation Models (DEM), Landsat imagery, land cover data were all downloaded and incorporated from various sources such as OREIS (Oak Ridge Environmental Information Systems), USGS and USDA.

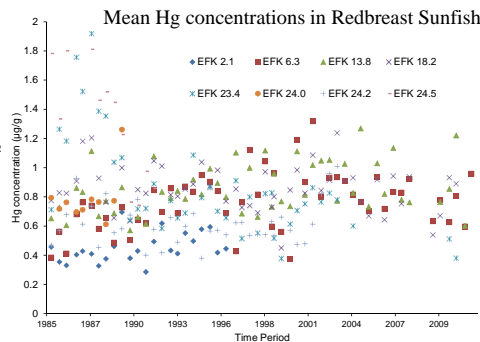
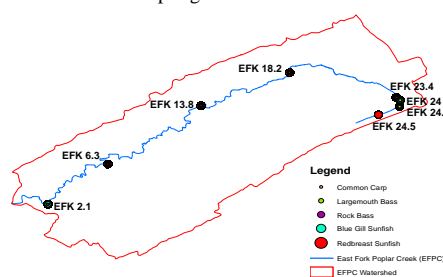


The vector data layers that include hydrology, soils, geology, roads, flood plain and wetlands were all downloaded and incorporated from various sources such as OREIS, Tennessee federal GIS data server, National Hydrology datasets of USGS, USDA and FEMA.

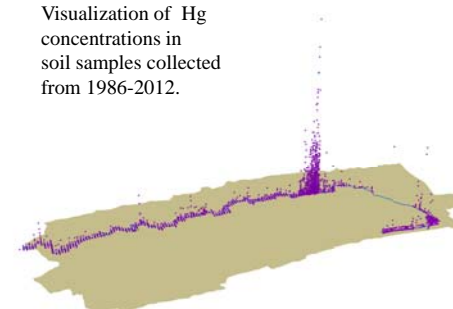
## Study Area



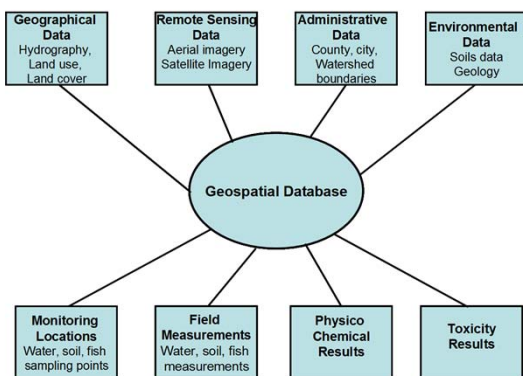
### Fish sampling locations



Visualization of Hg concentrations in soil samples collected from 1986-2012.



## Methodology



The analytical data that includes the Hg concentrations in biota, soils, sediments and water samples were all extracted from OREIS and then imported and projected into the geospatial database.

## Conclusions

- A comprehensive geospatial database was developed that incorporated all the spatial and analytical data from all the separate research studies that were carried out for the past several years at EFPC.
- The GIS cluster analysis and mapping indicated that the bioaccumulation of Hg in Redbreast sunfish showed an increasing trend in Lower EFPC (LEFPC) compared to Upper EFPC (UEFPC).
- The spatial interpolation analysis of Hg concentrations in soils showed higher Hg levels at certain locations along the LEFPC.
- The satellite image analysis showed that the impervious surface area decreases and the vegetative cover increases downstream along the creek from UEFPC to LEFPC.
- The geospatial and analytical data will be coupled with quantitative prediction models to allow for a more in-depth evaluation of the landscape and physical watershed factors that affect the transport and fate of Hg in EFPC.

This work was supported in part by the U.S. Department of Energy, Office of Science, Office of Workforce Development for Teachers and Scientists (WDTS) under the Visiting Faculty Program (VFP).