

The Complexity of Reservoir Benthic Habitats: Deciphering the Effects of the Kingston Fly Ash Release on the Benthic Macroinvertebrate Community

TVA Symposium | August 3, 2011

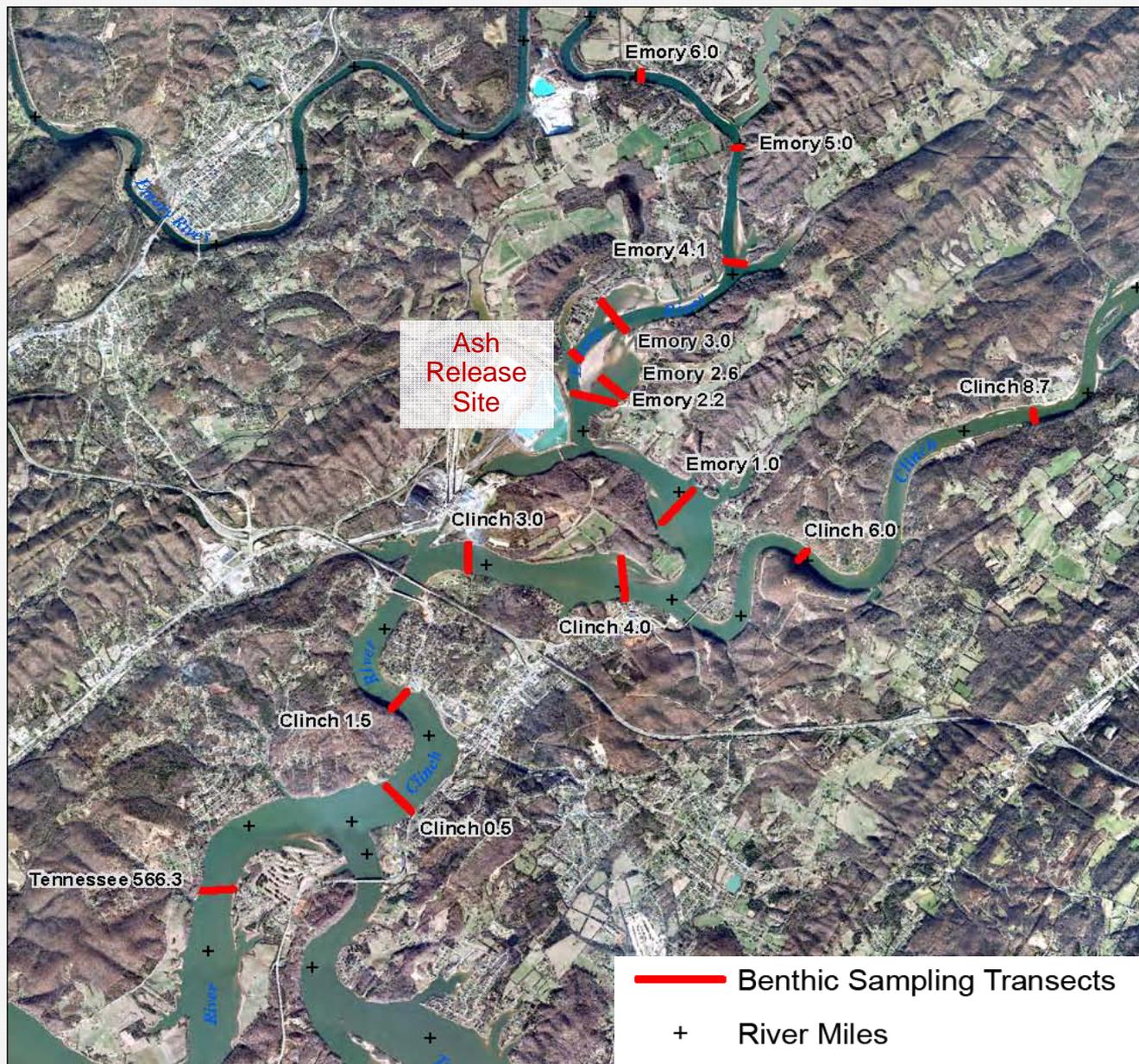
Tyler Baker
Tennessee Valley Authority

John Smith
Oak Ridge National Laboratory



Sampling Method

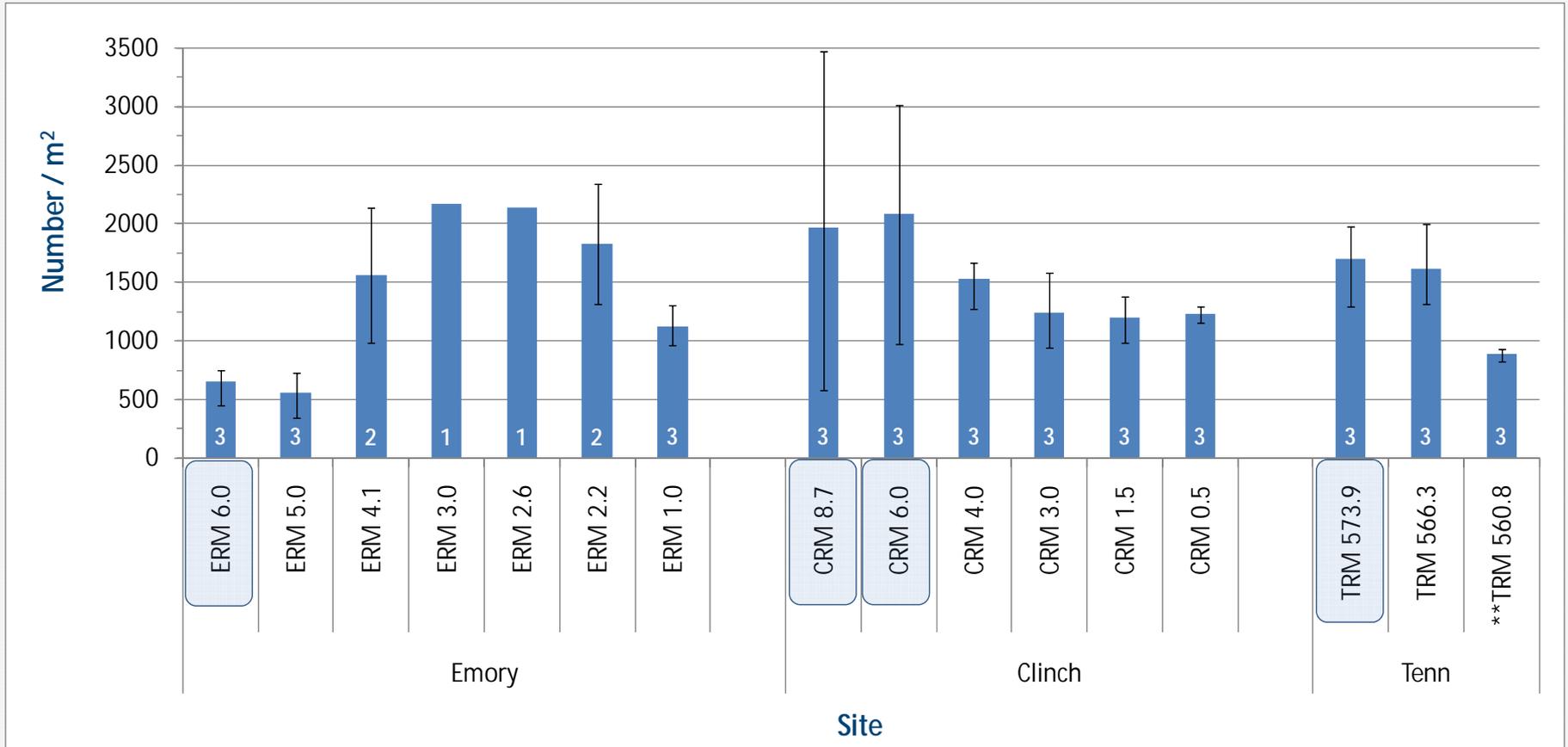
- 11 sites, January 2009
- 13 sites, December 2009
- 15 sites, December 2010



Sampling Method



Mean Population Density

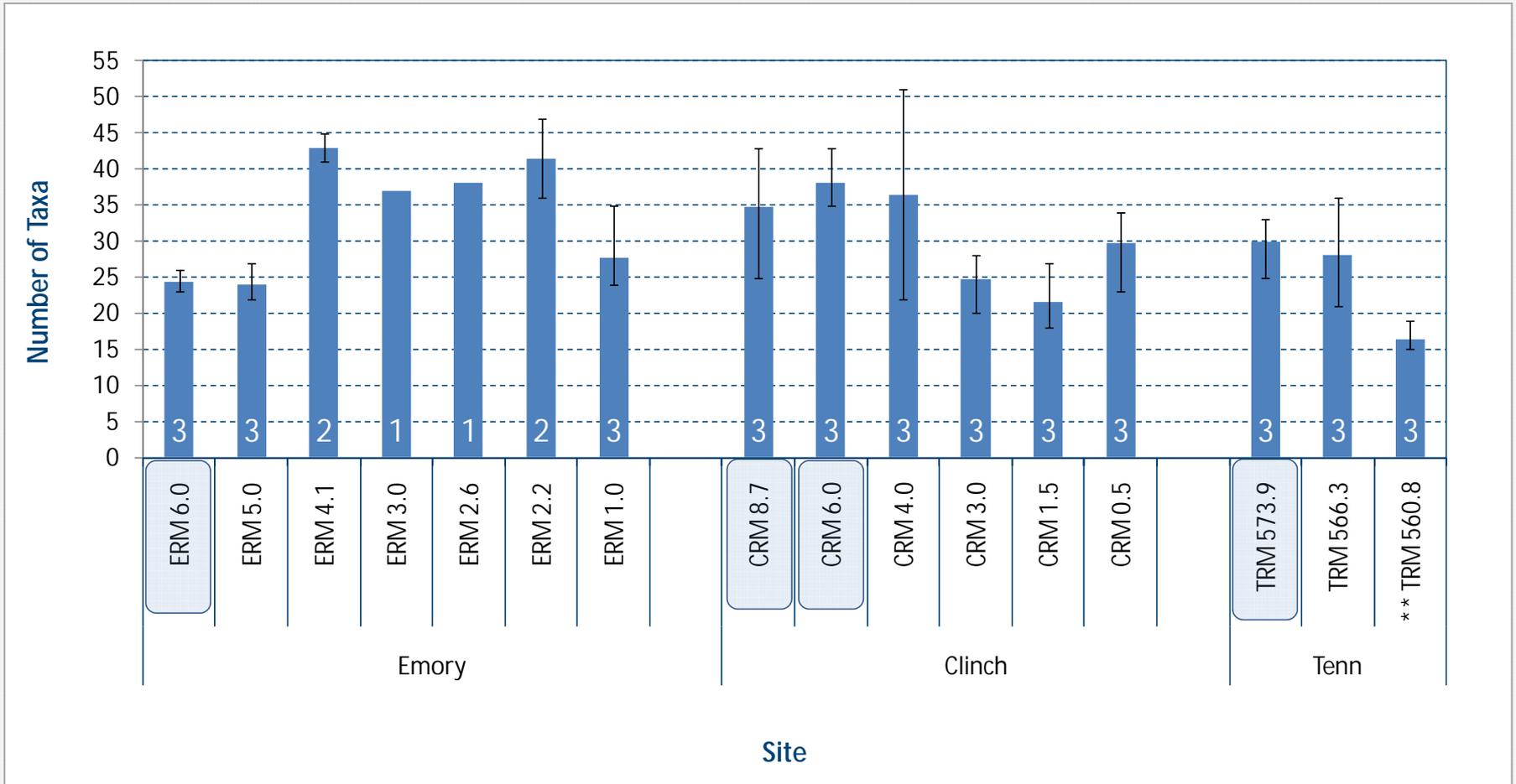


Mean (\pm Min and Max)

"Reference" Sites

** Sampled in November of 2008, 2009, and 2010

Mean Taxa Richness



Mean (\pm Min and Max)

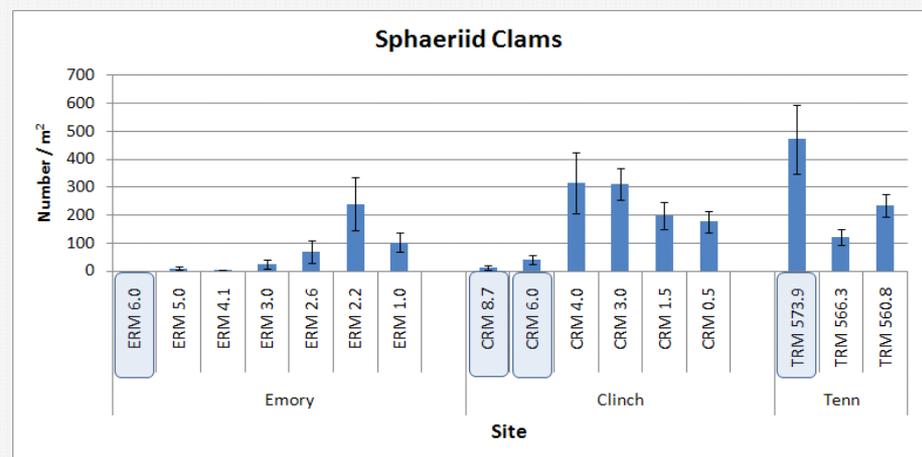
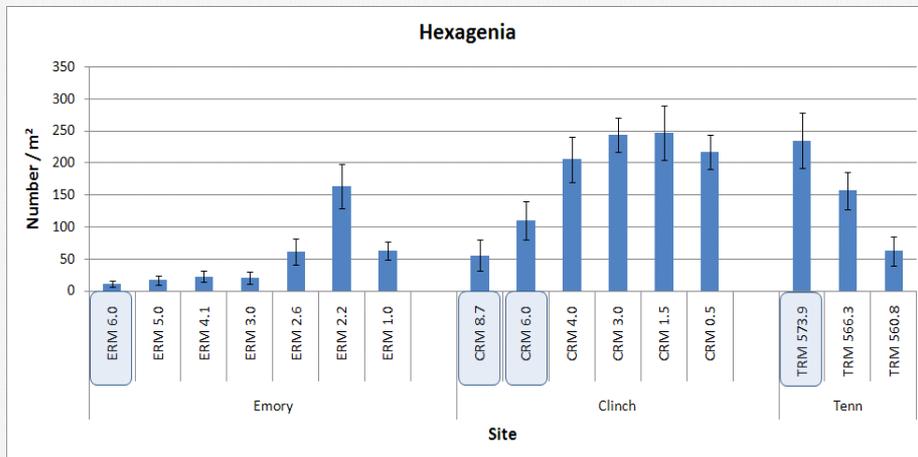
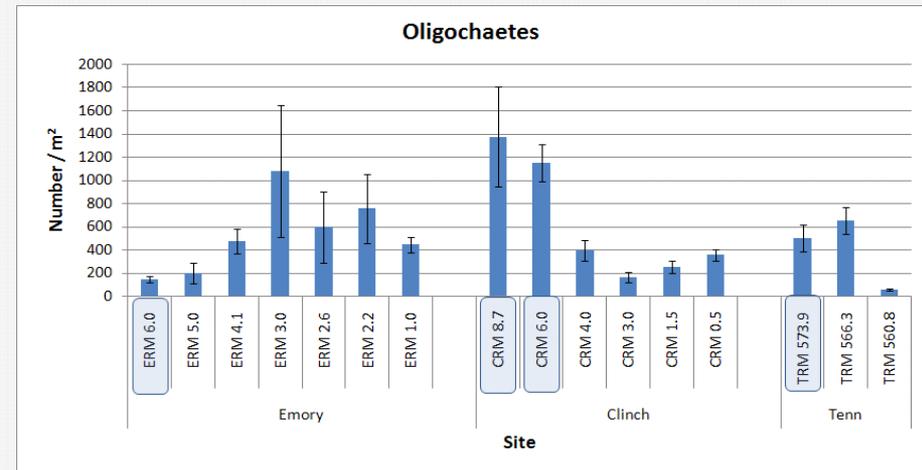
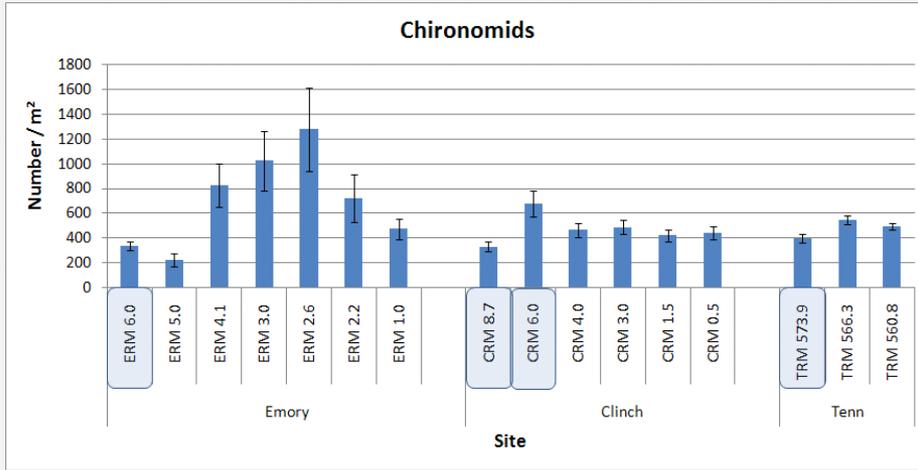
"Reference" Sites

** Sampled in November of 2008, 2009, and 2010

Summary of Benthic Macroinvertebrate Composition

Taxa Group		# Organisms	# Taxa	Composition	
				Density	Taxa
EPTs	Mayfly	25	6	0.1%	3.7%
	<i>Hexagenia sp.</i>	3,500	1	9%	0.6%
	Stonefly	5	2	0.0%	1.2%
	Caddisfly	100	8	0.2%	4.9%
Sphaerid Clams		4,200	2	10%	1.2%
Oligochaetes		13,100	20	32%	12.3%
Chironomids		15,300	73	38%	45.1%
Other		4,200	50	10%	30.9%
Total		40405	162	100.0%	100.0%

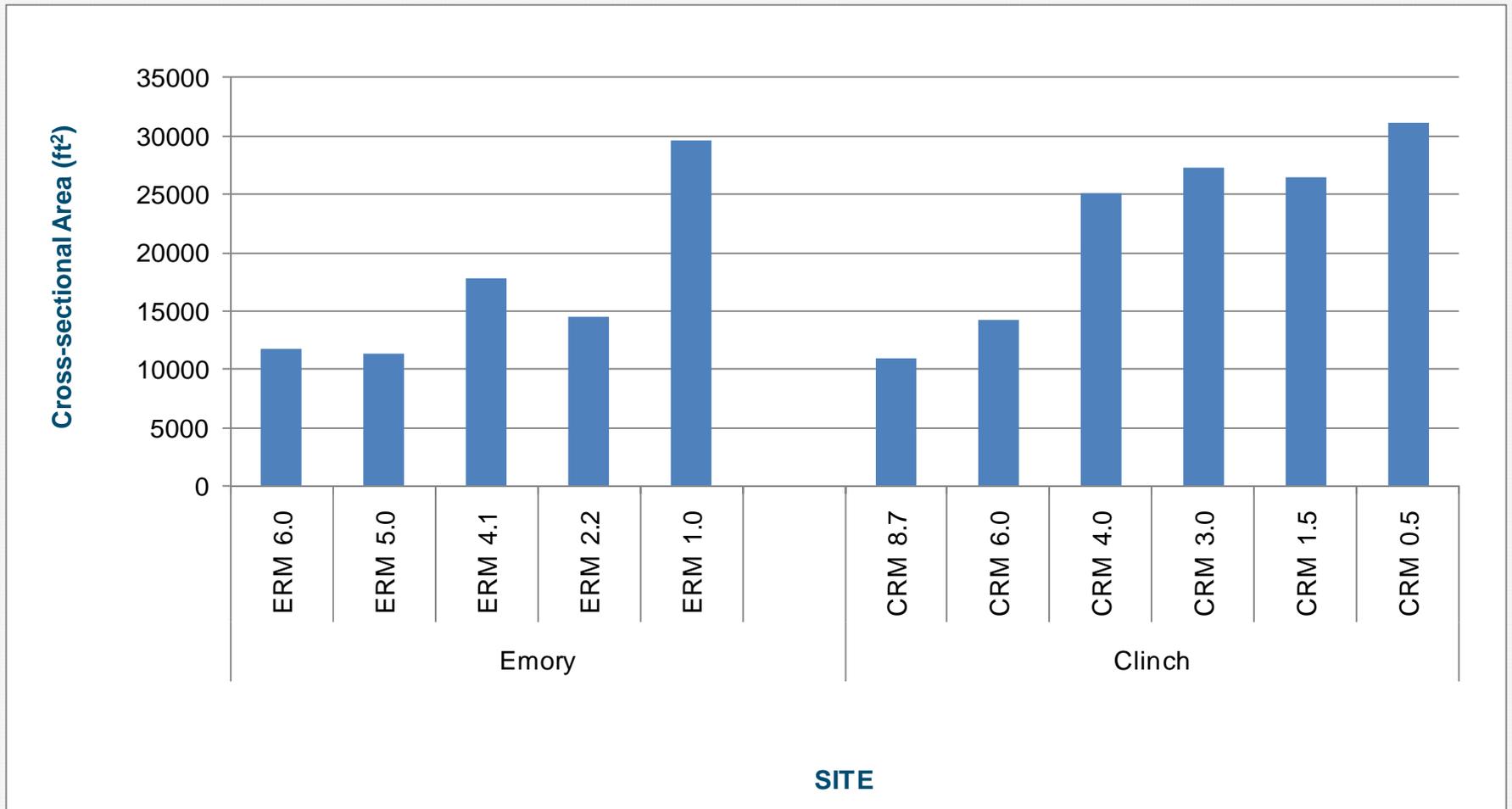
Mean Density of Dominant Taxa Groups



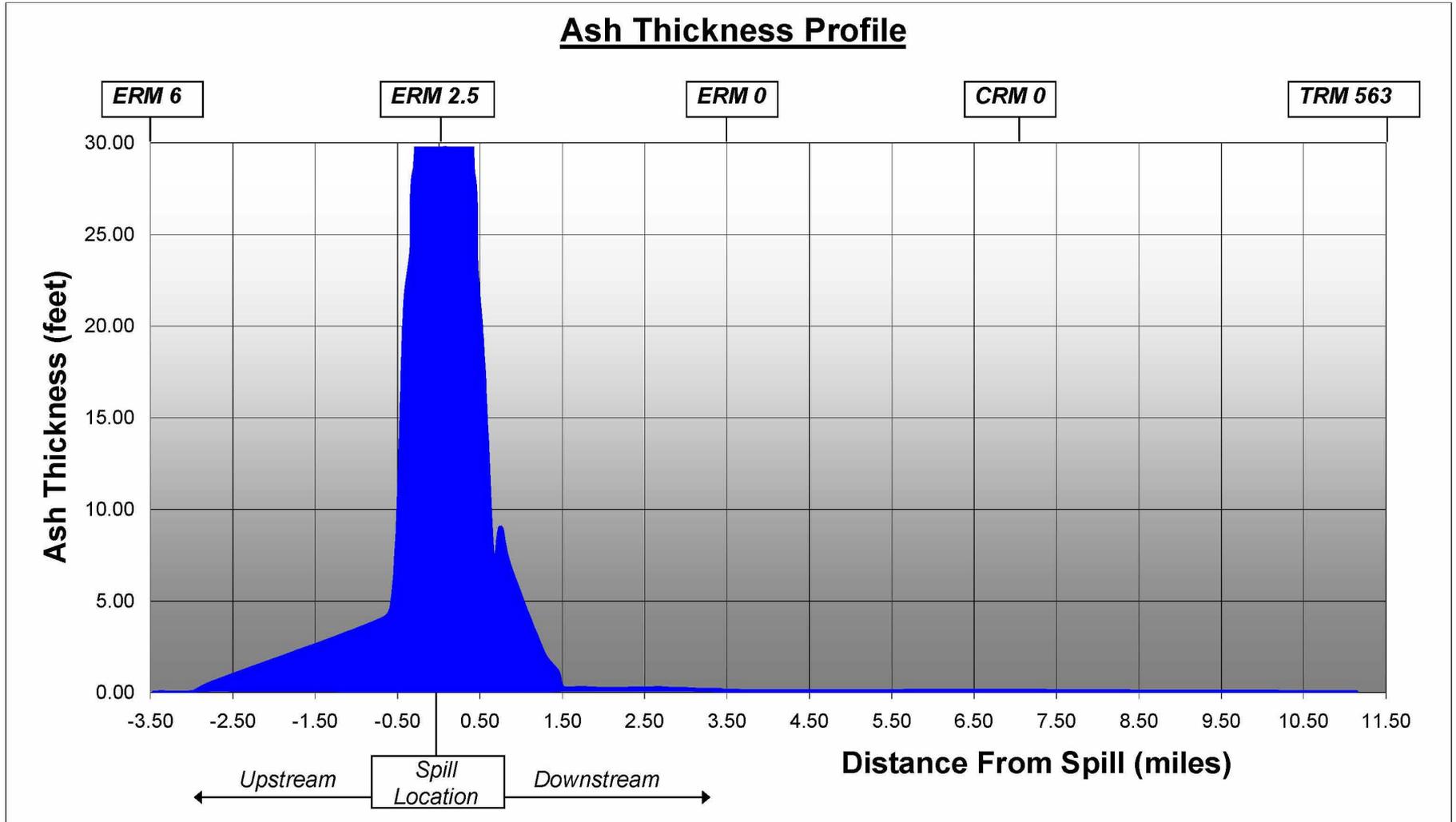
Mean Density (\pm SE)

"Reference" Sites

Cross-sectional Area Emory and Clinch Rivers



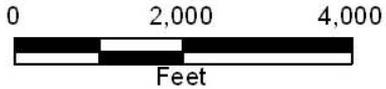
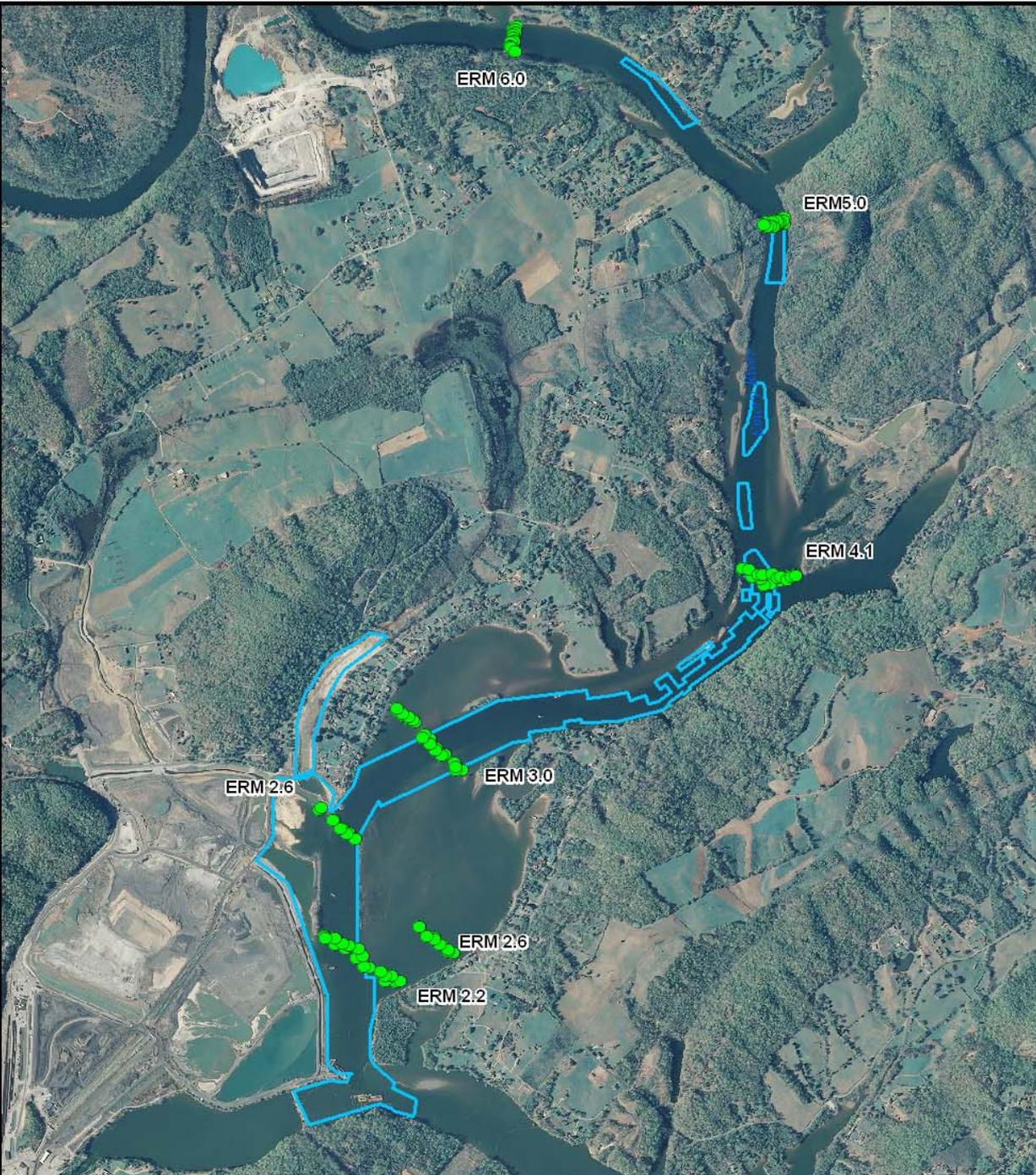
Ash Thickness in Rivers



Kingston Ash Recovery

Benthic Community Waypoints

- Benthic Community Waypoints
- Phase 1 Dredge Area

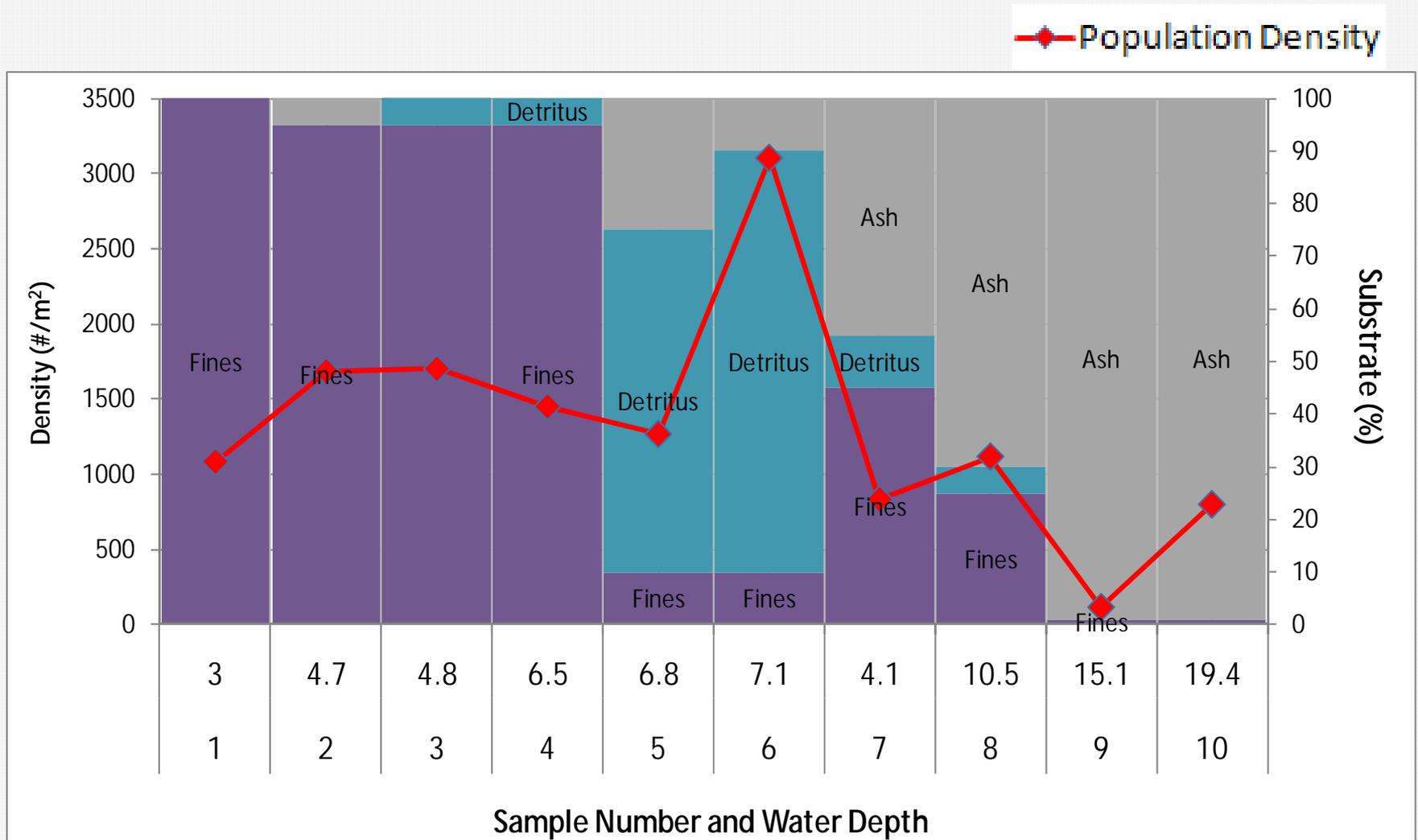


Photography Date:
04/11/2010

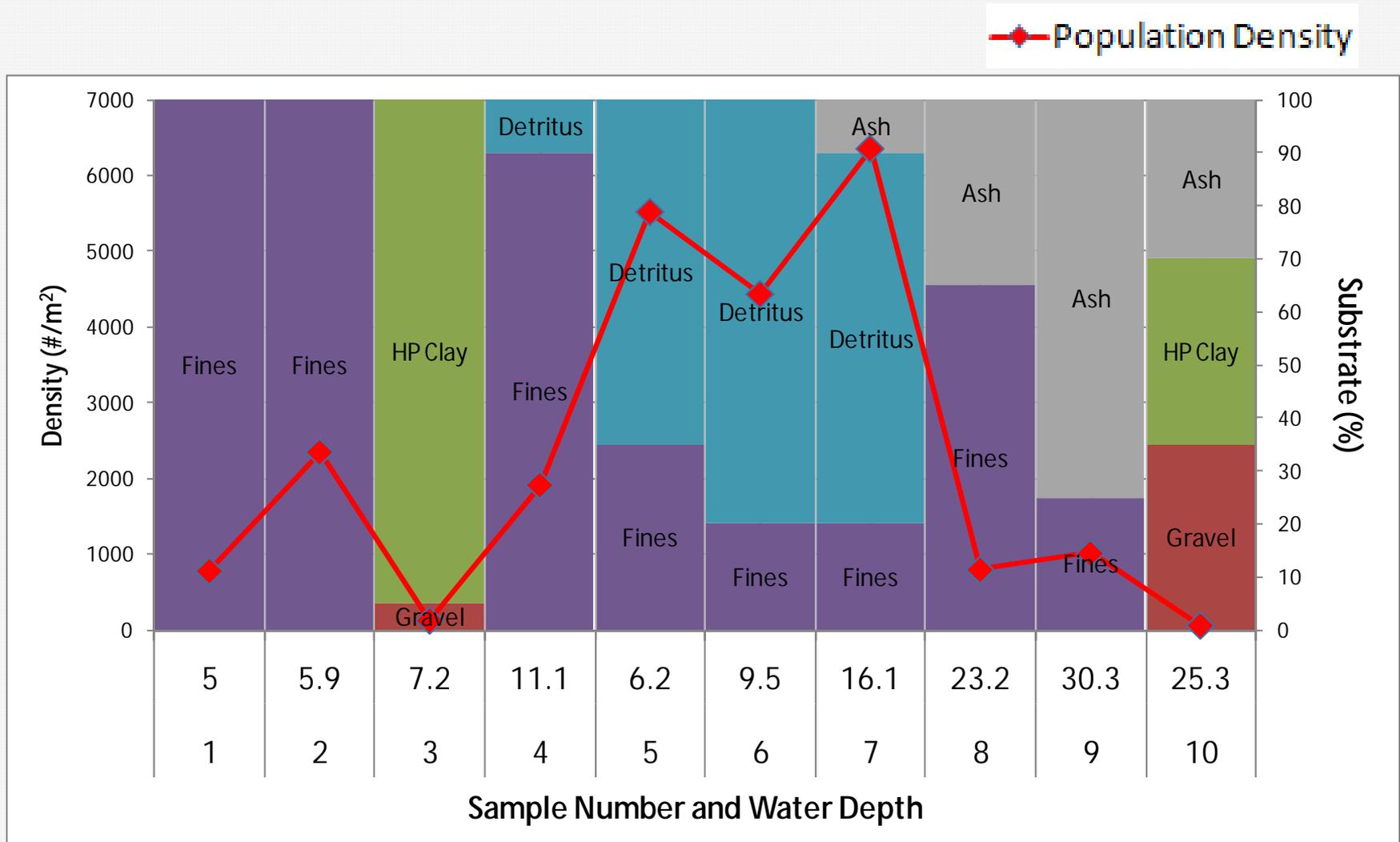
Map Compiled
07/27/2011

Tennessee Valley Authority
Geographic Information & Engineering

Population Density, Substrate, and Water Depth Emory River Mile 2.2, December 2009



Population Density, Substrate, and Water Depth Emory River Mile 2.2, December 2010



Summary

- Benthic community differences among sites clearly exist.
- Differences appear to be primarily related to variations in channel morphology and the complexity of converging river systems with different hydrological, physical and chemical characteristics.
- No historical benthic macroinvertebrate data were available for the affected environment.
- No comparable reference sites upstream of the affected environment
- These factors, coupled with inherent variation in benthic communities, make it difficult to draw definitive conclusions about ash-related effects except for the original Emory River channel in the immediate area of the spill where ash was removed.

A large number of dragonflies are flying in a field against a cloudy sky. The dragonflies are silhouetted against the light sky, and their wings are spread out. The sky is a mix of light blue and white, with some darker clouds. The dragonflies are scattered throughout the frame, creating a sense of movement and activity.

QUESTIONS?