DETECTING LAND-BASED SIGNALS IN THE NEAR-SHORE ZONE OF LAKE ERIE DURING SUMMER 2009

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We conducted two styles of nearshore surveys in Lake Erie during August to mid-September 2009. The first used a spatially-balanced probability survey (SBS) design to establish discrete stations within a GIS-defined target population—the nearshore zone extending approximately 5 km from the shoreline. This survey was an exploratory precursor to the upcoming (2010) US National Coastal Condition Assessment, during which these sites will be re-sampled. The second sampling style used vessel-towed *in situ* sensors (for water quality and plankton), oscillated from near surface to near bottom while circumnavigating much of the lake (US and Canada) in the nearshore zone at ~15 m (10 m in the western Basin). The two survey styles complement each other — creating a comprehensive, semi-synoptic picture of late summer nearshore conditions and allowing examination of nearshore patterns to relate to watershed-based stressors. This short presentation will focus on some results of the SBS survey. We estimated mean total phosphorus (TP) in the US nearshore zone to be 34.6 μg/L (95% CI = ± 26%). Greater than 67% of the US nearshore area had TP concentrations in excess of 10 μg/L, >50% of the area exceeded 15 μg/L, and ~45% of the area exceeded 20 μg/L; these concentrations are water quality management threshold goals for Lake Erie's offshore (east and west basins) and nearshore regions, respectively. We examined spatial variability of nutrients as a function of watershed characteristics by mapping the 45 US sites in relation to adjacent landscape stressors (PCA-based metrics based on many individual parameters from the GLEI collaboration [Danz et al. 2007]). Multivariate regression modeling including landscape disturbance metrics as independent variables yielded strong empirical predictive models. For example, TP concentrations were predicted [N = 45, R^2 = 0.74, model ANOVA with df =3,41 showing significance at $p<0.00001$] as a function of three independent variables: (a) water column depth, (b) an agricultural landscape metric (non-point source), and (c) a point source landscape metric. The surveys and models provide strong insights about nearshore condition and response to landscape stressors across scales that range from localized to lake-wide and these comprehensive nearshore assessments suggest linkage to potential basin-wide management actions. *This abstract does not necessarily reflect U.S. EPA policy.*

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