# American Water Resources Association
# 2012 SPRING SPECIALTY CONFERENCE
# GIS and Water Resources VII
## March 26-28, 2012
**New Orleans, LA**

### Wednesday, March 28
### 3:30 PM – 5:00 PM
### SESSION 39: Integrated Assessment Frameworks

**Because the Surface is not Continuous, but Flow Lines are: A Community Approach for Hydrologic Enforcement of Topography Data - Brian Quinn**, Community Development Agency, County of Marin, California, San Rafael, CA (co-author: Ricardo Lopez-Torrijos)

Water Resources applications best inform management decisions when guided by hydrographic networks of appropriate horizontal accuracy, resolution, and update frequency. Modeling components may also require vertical registration of the network with topography. High resolution topography is increasingly available across the nation and is typically collected in disjoint areas; coverage is not continuous enough for it to become the sole source of a hydrography update. Detailed topography can mitigate effort for densifying surface flow lines, which grows geometrically with more detailed mapping scales; the need to understand underground drainage becomes vital when tracing streams through urban areas.

With open data models and a community-sourced update workflow, we propose to combine flow accumulation modeling, community review of modeled flow lines, and integration of select community infrastructure data (Public Works, Flood Control) to model National Hydrography Dataset flow lines at large scale continuously through urban areas. Using aerial photography and a terrain surface fused from best-available sources, the semi-automated analysis can provide improved surface flow and help reviewers identify where underground drainage is likely present, but not yet included in the model. Time otherwise spent tracing ephemeral drainage from photos is re-purposed to community review of flow lines. Select public infrastructure features and other underground drainage paths are added to the model as hydrologic enforcement--refinements to the terrain surface that guide the corrected flow lines. Vertical alignment between topography and hydrography needed for modeling is built into the process.

The proposed strategy supports a wider community of update contributors and reviewers, makes the most efficient use of field expertise, incentivizes the contributors with incorporation into a functioning network and model of their updates, and increases the quality and timeliness of the resultant network. Vertically aligned datasets open the opportunity for algorithmic extraction of the desired network density, and for integration of hydrologic observations into the extraction algorithm. With this method, it becomes feasible to include flow accumulation as a linear referenced measure along the flow lines, so that transitions in flow regime from perennial thru ephemeral become catchment events, and the density of flow line network can be reduced by feature queries.

**TMDL Balance: Extending the Schematic Processor to Coastal Systems - Stephanie Johnson**, Houston Engineering, Inc., Maple Grove, MN

Bacterial contamination is the leading reason for impairment in Texas waters. Many of these bacterial impairments are along the Texas Gulf Coast because coastal waters often are regulated for oyster harvesting, which requires strict water quality standards. Under the Clean Water Act, each of these impaired waterbodies requires a Total Maximum Daily Load (TMDL) study to be performed. The TMDL Balance model is a steady state, mass balance, GIS-based model for simulating pollutant loads and concentrations in coastal systems. The model works with a flow network, using the schematic processor to pass pollutant loads downstream, accumulating and decaying them as they move. TMDL Balance was developed in the context of modeling bacterial TMDLs along the Texas Gulf Coast, but the approach may be applicable to a wider variety of pollutants and geographic areas. In this presentation, we will discuss the development of the TMDL Balance model and highlight its application to the Copano Bay watershed in southeast Texas. The basic functionality of the model, including its use of the schematic processor and the processing ops developed will be discussed. Select results of the TMDL study will also be presented.

**An Arc Hydro Based Analytical Framework for Water Quality Assessment at the National Level. - Mauro Di Luzio,** Texas AgriLife Research - Blackland Research Center, Temple, TX (co-authors: Dean Djokic, Jeff Arnold)

This presentation depicts an Arc Hydro-based framework (GeoCEAP) and the supporting geo-databases developed to allow efficient water quality assessments. It presents the data model, data, and tools developed as part of the GeoCEAP framework. The system is developed to support and upon the reporting requirements of the United States Department of Agriculture Conservation Effects Assessment Project (CEAP), which includes the integration of farm surveys, agricultural management hydrological models, and GIS products to quantify the environmental benefits of conservation practices at the national scale.

**ArcHydro on the Seafloor: Hydrologic Tools for Morphologic Analysis of the Atlantic Margin – Brian Andrews,** USGS, Woods Hole ,MA (co-author: Daniel S. Brothers)

A newly compiled bathymetric terrain model (BTM) covering 330,000 km2 of the seafloor along the Atlantic Margin between Georges Bank and the Blake Plateau was analyzed using the standard terrestrial techniques within ArcHydro Tools. Multibeam sonar depth data from 28 surveys was compiled to produce a 100-m BTM; providing the first detailed view of the entire continental shelf, slope, and rise off the East coast of the United States. Watershed analysis was used to subdivide the BTM into 13 watersheds that were named for the major shelf-breaching canyons within each watershed. Drainage lines and geometric networks were constructed for all canyons using ArcHydro Tools; providing a framework to investigate along-margin variation in submarine canyon morphology and channel density. Canyon network scaling relations were extracted from log-log plots of channel thalwag gradient versus catchment area. We observed a common geomorphic threshold amongst more than 150 submarine canyons that separates straight and convex profiles along the upper slope from concave profiles of the middle slope to upper rise. This transition is inferred to represent a process boundary separating channel-heads dominated by landslide and debris flow sediment transport (upper slope) from valley incision dominated by turbidity flows. The boundary occurs between slope gradients of 6-9 degrees, and catchment area of 4-20 km2. Applying analysis tools developed for terrestrial environments to the subaqueous realm provides new insights into the major geomorphic processes that shape the submerged portions of continental margins.