Outline of Tampa Bay regression manuscript

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May 6, 2014

- Introduction
  - Eutrophication description and its effects
  - CWA, management, standards, need for quantitative techniques for numeric criteria
  - Tampa Bay description, monitoring, eutrophication history, research opportunity
  - Problems with direct interpretation of monitoring data, WTRDS approach
  - Research goal and objectives
    - Goal: characterize trends in chlorophyll in Tampa Bay to resolve factors that influence primary production by considering unique and interacting effects of time and freshwater inputs
    - Obj. 1: Description of weighted regression adaptation
    - Obj. 2: Application of model to TB dataset
    - Obj. 3: Evaluation of model residuals with other variables
    - Obj. 4: Development of informed hypotheses from results
- Methods
  - Study area and data
    - Tampa Bay physical characteristics, watershed, segments
    - Climate, ENSO, precipitation, salinity and tidal effects
    - More detailed history of eutrophication
    - Long-term monitoring data - overview, annual/seasonal variation, potential covariates
    - Long-term monitoring data - used in current study, pre-processing
  - Weighted regression
    - Brief description of WRTDS, how it could be useful for Tampa Bay data
    - Model functional form, mean and quantile models
    - Model weighting and window widths
    - Application of model to bay segments, interpolation grids, performance and comparisons

        * Back-transformation correction bias
        * Salinity-normalization of prediicted values
    - Evaluation of model residuals
    - Co-variates used for evaluation and statistics
    - Methods for quantifying co-variates
- Results
    - Observed trends in chlorophyll
        * Trends by segment - annual and decadal, peaks and likely anomaly events
        * Trends by segment - seasonal, relationships with salinity
    - Predicted trends in chlorophyll
        * Model performance by type (mean, quantiles), comparison to non-weighted regression
        * Model performance by season, annual periods
        * Description of trends by year aggregation and normalized results, trends by decadal aggregation
        * Evaluation of chlorophyll salinity relationships using parameters estimates over time
    - Evaluation of model residuals
- Discussion
    - Primary conclusions
        * Weighted regression approach is useful for estuaries
        * Descriptions of water quality trends should consider heterogeneous variance
        * Use of quantile models to describe response not conditional on mean is critical
    - Description of change provided by weighted regression
        * Relationships of chlorophyll and salinity is dynamic over time, similar to Hirsch results for streams
        * Model provided evidence of shifts in pollutant sources over time, similar to Hirsch
        * Utility of normalized results and importance of identifying non-stationarity
        * Importance of quantile models, relation to criteria development
    - Limitation and future applicaitons
        * Evaluation of model with other spatial/temporal scales
        * Need for uncertainty estimates and evaluation of window widths
        * Lack of relationships between covariates and model residuals
- Conclusions
    - Re-iteration of conclusions

- Informed hypotheses from results
    - Temporal dynamics and changes in relationships of chlorophyll with salinity point to pollutant sources and physical forcing factors (flushing)