Watershed Influences and In-Lake Processes – a Regional Scale Approach to Monitoring a Drinking Water Reservoir, Lake Houston, TX

Prepared in Cooperation with the City of Houston

Introduction

- Description of study area
- Watershed monitoring
- In-Lake monitoring
- Preliminary evaluation

Study Area

- Lake Houston located northeast of downtown Houston, TX
- Man-made reservoir with “small” contributing watershed
- Significant source water for Houston (pop. 4.5 mill)

Monitoring Locations

- Two sites selected above Lake Houston:
  - 08068500 Spring Creek near Spring, TX
    - Drainage area: 405 mi²
    - Streamflow data: 1939-present
    - Water-quality data: 1999-present
  - 08070200 E. Fk. San Jacinto River near New Caney, TX
    - Drainage area: 388 mi²
    - Streamflow data: 1984-present
    - Water-quality data: 1984-99; 2005-present
Monitoring Locations

- Three locations chosen in southwestern quadrant of lake
- Nearby drinking water raw intake
- Current set-up provides information at, upstream, and downstream of intake

In-Lake Monitoring

- Lake Houston site B (near intake) monitoring mechanism
- Lake Houston Site B (near intake)
Watershed Monitoring Approach

- Continuous water-quality monitoring
  - Turbidity, Dissolved Oxygen, Temp., Spec. Cond., and pH
- Discrete sampling
  - Nutrients, sediment, and others

In-Lake Monitoring Approach

- Continuous water-quality monitoring
- Discrete sampling
  - Nutrients, Geosmin, MIB, Phytoplankton (species), and others

Time of Travel Estimation
Preliminary Results

In-lake processes

- Continuous vertical profile data
- Stratification
- Rapid mixing

Phytoplankton Analysis

- Seasonal patterns in cyanobacterial biovolume were also similar among sites, although peak biovolume was observed in mid-August at Site B and late-September at sites A and C (a)
- The biovolume of potential taste-and-odor producers was significantly greater (ANOVA by site and date, p=0.03; depths treated as replicates) at Site A than Site B during late September (b)

Conclusions

- Mobile multi-depth lake water quality monitoring gages are a viable method for collecting and transmitting data
- When combined with watershed water-quality information the effects of watershed influences on the water-quality in the lake can be evaluated at multiple scales

- Discrete sampling for ancillary constituents can be used to develop methods by which to estimate loads and possibility of occurrence
- Water-quality techniques developed through this project can be scaled and modified to fit most project needs
Watershed Assessment Team

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